RJ O'CONNELL & ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS
80 Montvale Ave., Suite 201 Stoneham, MA 02180
phone 781-279-0180 fax 781-279-0173

March 24, 2021

Mr. Nicholas Moreno &
Members of the Boston Conservation Commission
Boston City Hall
1 City Hall Square, Room 709
Boston, Massachusetts 02201

RE: Response to DEP Comments
839 Saratoga Street
Boston, MA 02128 – 1115
MA DEP File No. 006 – 1774 / Boston Conservation File No. 2021 - 012

Dear Mr. Moreno & Members of the Boston Conservation Commission:

On behalf of Volnay Capital (Applicant), RJ O'Connell & Associates, Inc. (RJOC) is respectfully submitting this letter, revised plan set, and revised Operation & Maintenance Plan in response to comments provided by the Massachusetts Department of Environmental Protection (MA DEP) and the Boston Conservation Commission for the project referenced above.

More specifically, MA DEP issued comments on March 17, 2021 in regards to their review of the initially submitted Application. This letter summarizes MA DEP's comments in addition to including a response to each comment and concern.

Comment: ***No information was provided on how the project meets TSS removal requirements.***

Response: *The combined weighted TSS Removal Rate for the proposed drainage system will be approximately 82%.*

The combined TSS Removal Rate was calculated as follows:

- *For runoff from areas beyond the building (approx. 1,700 sf):*
  - *25% TSS from deep sump, hooded catch basin*
  - *80% TSS from drywell.*
  - *Combined TSS removal rate of 85%.*
- *For runoff from roofed areas (approx. 3,300 sf):*
  - *80% TSS from drywell.*

The weighted TSS Removal Rate is calculated as follows:
[(0.85 x 1,700 sf) + (0.80 x 3,300 sf)] / 5,000 sf = 0.82

Note that slightly more than 60% of this Site will be covered by a residential building (runoff from roofs are considered "clean" per the Stormwater Management Standards.) The remaining uncovered impervious surfaces on the Site will be comprised of five (5) off-street parking spaces and walkways for the

residents of the building. These parking spaces are not anticipated to be sanded during the winter months.

Comment: ***At least 2 test pits are required in the infiltration area, per the Stormwater Handbook, but no test pit data was submitted.***

Response: *Two (2) borings were performed on the Site by Geotechnical Partnerships, Inc.. Results of these borings are attached to this letter and confirm the soil characteristics used for the design of the proposed infiltration system.*

Comment: ***Long Term O&M Plan appears to be generic instead of site specific, and does not seem suitable for a residential development.***

Response: *The Long Term O&M Plan has been modified (simplified) to be more site specific for the scope of project proposed (7 unit multifamily residential building).*

Comment: ***The Snow Management Section refers to storage in the BZ, but there is no BZ on site.***

Response: *The Snow Management Section of the O&M Plan has replaced any reference of a BZ to LSCSF.*

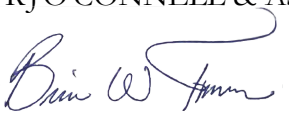
Comment: ***The O&M Plan should state no snow stockpiling over the catch basin or infiltration system.***

Response: *The O&M Plan has been revised to state that stockpiling of snow shall not be done over the catch basin or infiltration system.*

Please don't hesitate to contact me at brian.timm@rjoconnell.com or at 617.797.0046 if you have any questions or would like additional information. Otherwise, I anticipate that this letter and accompanying documents will sufficiently address the comments raised by MA DEP and the Boston Conservation Commission and look forward to presenting this revised information at the next Public Hearing on March 31, 2021.

Sincerely,

RJ O'CONNELL & ASSOCIATES



Brian W. Timm, PE
Associate Principal

cc: Richard Beliveau

Geotechnical Partnership, Inc.

Since 1987

Geotechnical Engineering Services for New England

Lisa R. Casselli,PE Principal - A WBE Firm

Subsurface Exploration ***Laboratory Soil Testing*** ***Geothermal Testing***
Foundation Specialty Systems ***Ground Improvement*** ***Earthwork Testing***

16 November 2020
File No. 2039

Volnay Capital
431 E. 3rd Street
Boston, MA 02127

Attention: Ricky Beliveau - CEO

Subject: ***Geotechnical Data Summary Report***
839 Saratoga Street
East Boston, Massachusetts

Dear Ricky:

This geotechnical data summary report outlines our site background data review including site history, surficial and bedrock geology as well as subsurface explorations, field soil and groundwater testing, engineering data summary, analyses and calculations for a potential new building to be erected on Saratoga Street in East Boston, Massachusetts (*Figure 1A*).

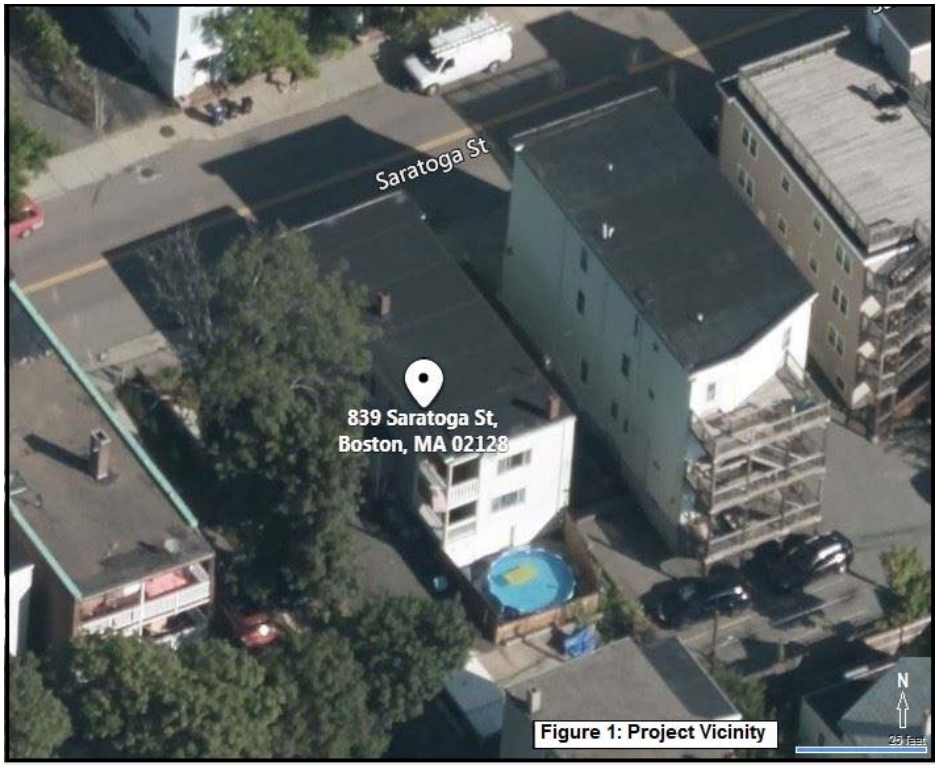


Figure 1: Project Vicinity

45 New Ocean Street – Suite A
Swampscott, MA 01907
Tel. 781/646-6982

805 Main Street
Sanford, ME 04073
Tel. 207/459-7800

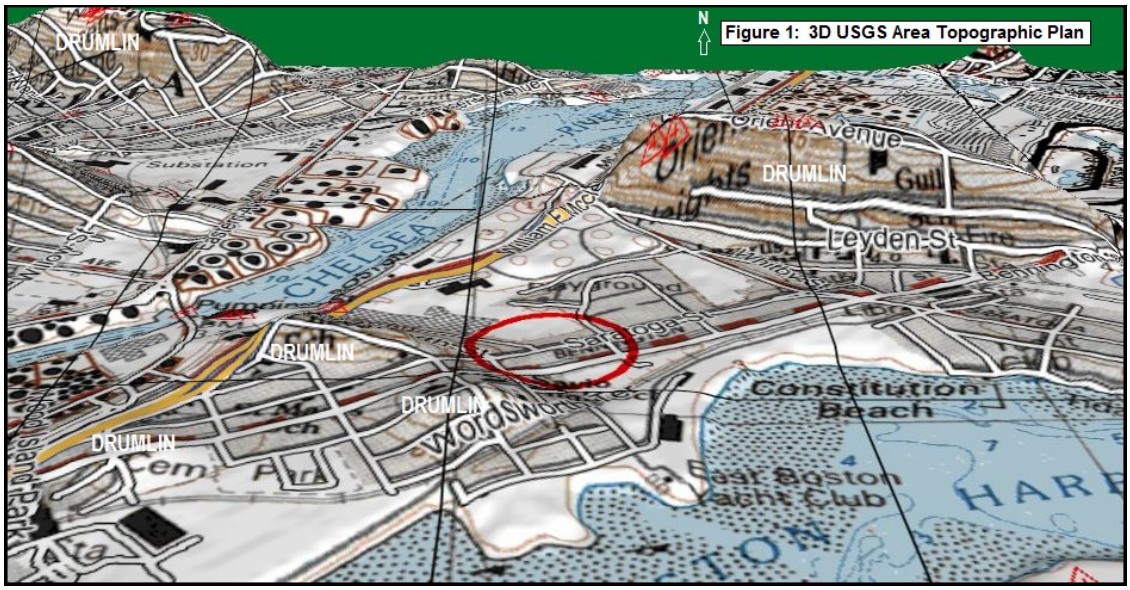


Figure 1: 3D USGS Area Topographic Plan

I. Proposed Construction:

Existing Conditions:

- Plan reference: no drawings were available at the time of this review

- Direction, Datum, Elevation and Coordinates:
  - Direction:
    - Plan north: *Figure 1A, Figure 1*
    - Called north for this review: in the general direction of Saratoga Street (*Figure 1A*).
  - Elevation and datum:
    - Vertical elevation: elevations utilized in this report are approximate and are as shown on *Figure 2*. They are for the purposes of this review, only.
    - Elevation datum: a temporary bench mark (TBM) has been used as shown on *Figure 2* for elevations utilized in this review.
  - Site coordinates:
    - Latitude: 42.3847° N
    - Longitude: -71.0140° W

- Existing Site Conditions:
  - No attempt has been made to undertake a detailed history of this 5,000 SF site. Historic review is included in research for Phase I environmental site assessments.
    - An 1874 and 1884 historic property maps showed 839 Saratoga as part of an undeveloped 10,000 SF site.
    - 1892 showed two buildings on-site.
    - 1901 mapping showed two stable buildings at the rear and an addition to the front building.
    - 1912 mapping was as 1901 but with a better display of the site (*Figure 1B*)
    - 1922 mapping (*Figure 1B-1*) was as 1912 with the front and rear buildings connected, an addition to one rear building and the absence of the other rear building.
    - 2002 mapping was as shown in 1922.
  - Overall the site has about 6 ft. of vertical elevation change (*Figure 2*). Site area topography is slightly sloping to moderately sloping (*Figure 1*).
  - Existing 839 Saratoga Street basement level has been estimated as shown on *Figure 5*.
  - Active site underground utilities list is held by the test boring contractor.

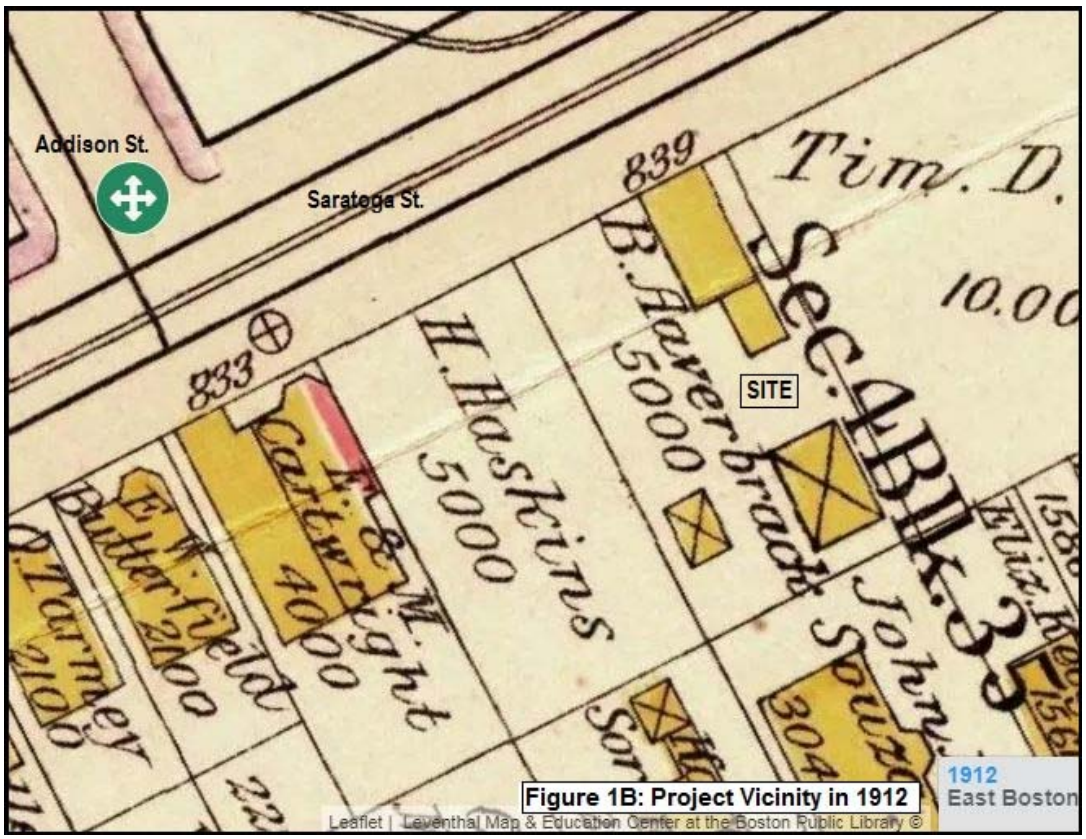


Figure 1B: Project Vicinity in 1912

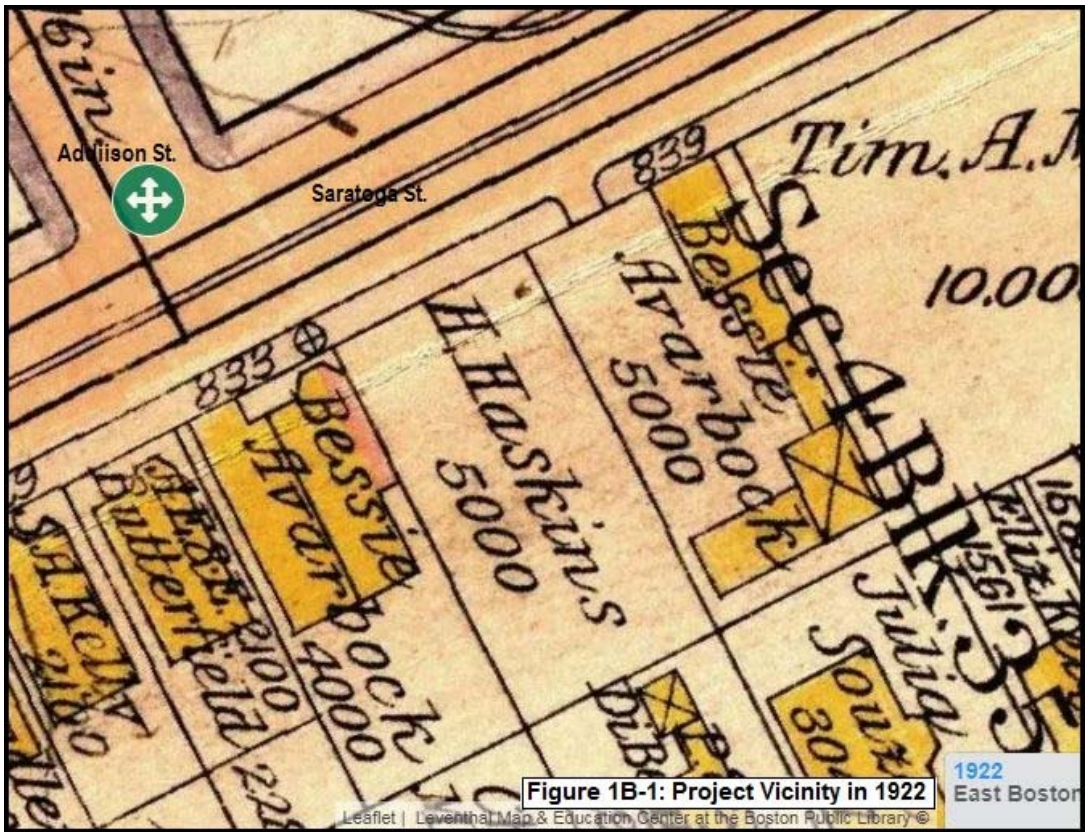


Figure 1B-1: Project Vicinity in 1922

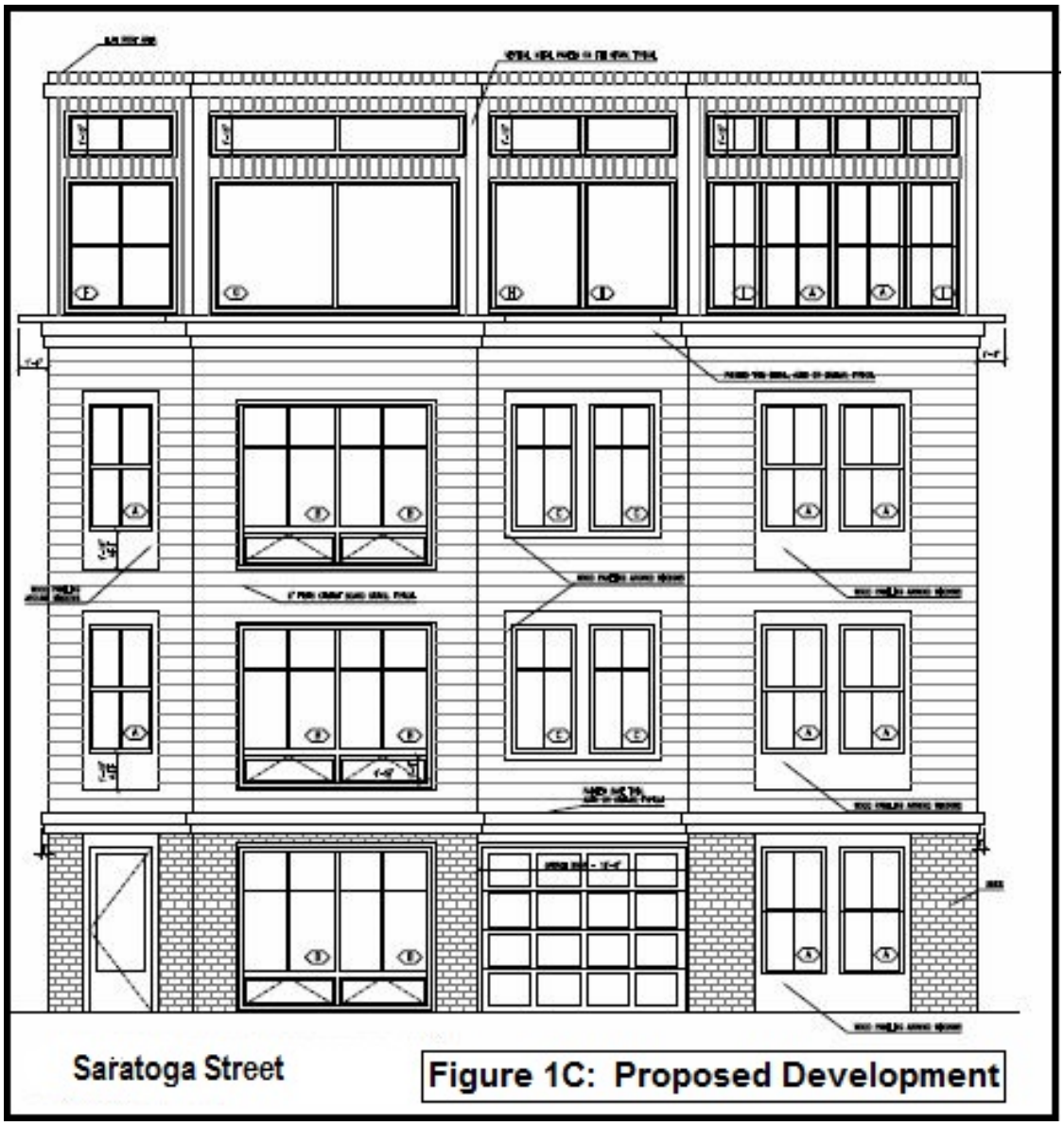


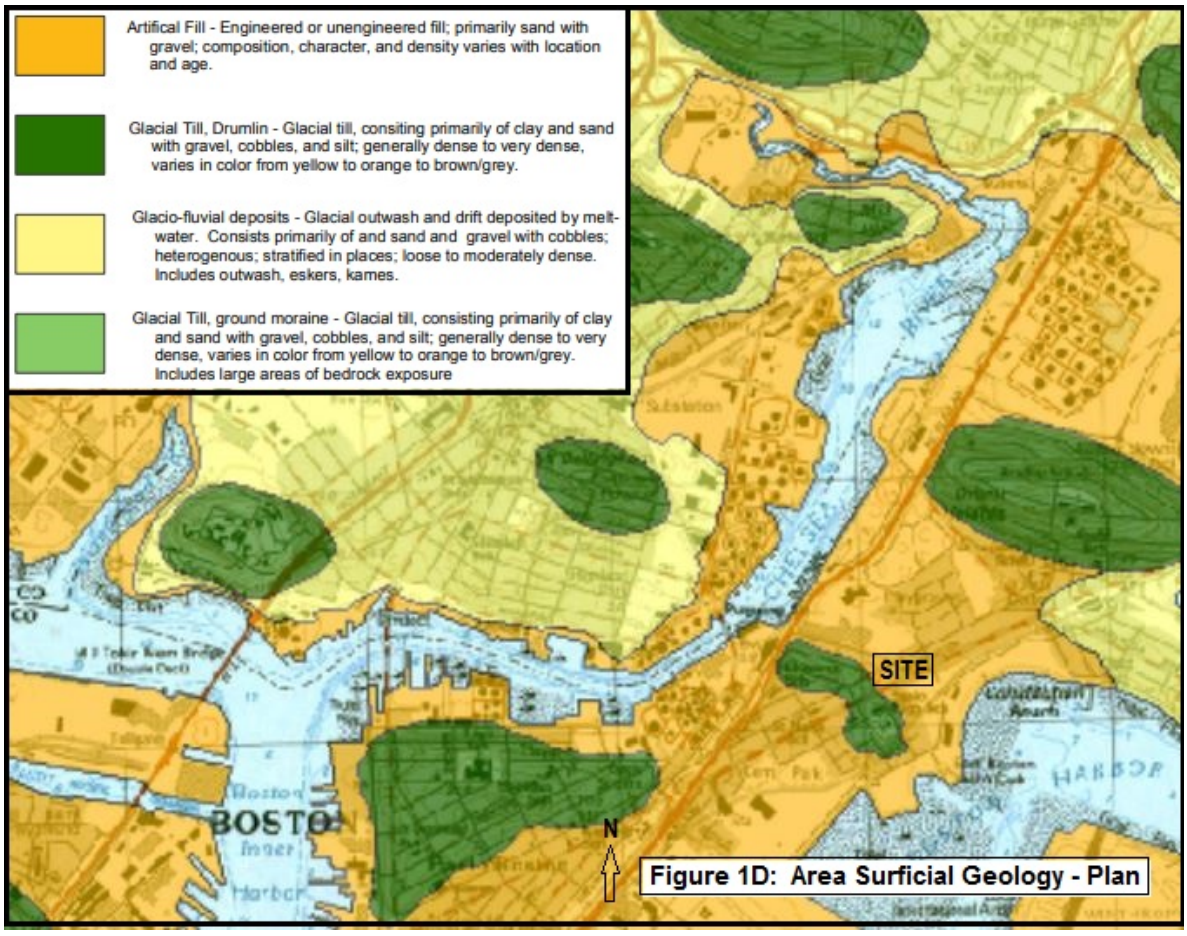
Figure 1C: Proposed Development

Anticipated New Construction:

- Plan Reference: no plans were available at the time of this review
  - *Proposed Site Plan (A-02) – 839-839A Saratoga Street East Boston, Massachusetts*; prepared by Context of Boston, MA; dated 10 September 2020.
  - *Proposed Level 1 Plan (A-10) – 839-839A Saratoga Street East Boston, Massachusetts*; prepared by Context of Boston, MA; dated 10 September 2020.
  - *Proposed Elevations (A-30) – 839-839A Saratoga Street East Boston, Massachusetts*; prepared by Context of Boston, MA; dated 10 September 2020.

- New Building Structural Information:
  - New construction: to occupy most of the property
    - There will be four (4) above-grade levels with the expectation of working with a sloped site (about 6 vertical feet of elevation change).
    - First floor level will provide interior vehicle parking.
    - An elevator is planned.

- Footings:
  - Applied loads:
    - Columns: 200 K (maximum, assumed)
    - Exterior walls: 7 KLF (maximum, assumed)
  - Bottom of footing (BOF):
    - Exterior: wall footings to bear at frost depth.
    - Interior: footings assumed to bear at normal depth, at 2 feet below top of lowest level floor slab.
- Lowest level floors:
  - Assumed lowest level floor elevations *Figure 1C; Figure 5*
    - Basement floor: none; no basement level
    - 1st floor: El. 0 ft.+/- (TBM)
  - Lowest level floor loads:
    - Mechanical or storage areas: 150 PSF applied total load (assumed)
- Parking and access lane areas: 450 PSF applied total load (assumed)
- Elevator pit: pit base assumed at 5 feet below 1st floor slab (El. – 5 ft. (TBM))



II. Subsurface Conditions:

Topographic Data:

- Elevation Range: The immediate site area is slightly to moderately sloping (see *Figure 1, Figure 1D-1*).

- Area Surficial Geology:
  - Area surficial geology is the result of a complex interaction of repeated glacial advance and retreat and intrusive marine action.
    - The result in East Boston was creation of a cluster of glacial drumlins (*Figure 1*) most of which were once seen as islands off the coast.
    - Around 1840 a massive made-land project was undertaken to connect the islands by placing fill. This process continued for 150 years in East Boston.
  - The subject site is located intermediately of two glacial drumlins situated southeast of the Chelsea River (see *Figure 1, Figure 1D; Figure 1D-1*). *Figure 1D* and *Figure 1D-1* show the general project area is low land interspersed between glacial drumlins and water bodies left behind by glacial scour and melt bordered by glacial outwash and alluvial plains.
    - An outwash plain is formed by deposition of various combinations of silt, sand and gravel during cyclic glacial melt; alluvial contribution occurred with river flooding such as along the Chelsea River (*Figure 1D-1*).
    - Glacial moraines, found south and west of this area, are an accumulation of glacial drift (silt, sand and gravel) within a glaciated region by deposition and thrust of glacial ice (bulldozed material)
    - Glacial drumlins such as Eagle Hill are oval hills of clay, silt, sand and gravel compacted under pressure at the base of hundreds of vertical feet of glacial ice. A drumlin's axis indicates the direction of ice movement (compacted material).
  - According to area surficial geologic mapping utilizing the site latitude and longitude coordinates [*Massachusetts GIS, Surficial Geology;* Commonwealth of Massachusetts Office of Geographic Information; September 2012; updated 2018] and other mapping the site was located on the following surficial soil deposit:
    - Man placed fill (*Figure 1D*).

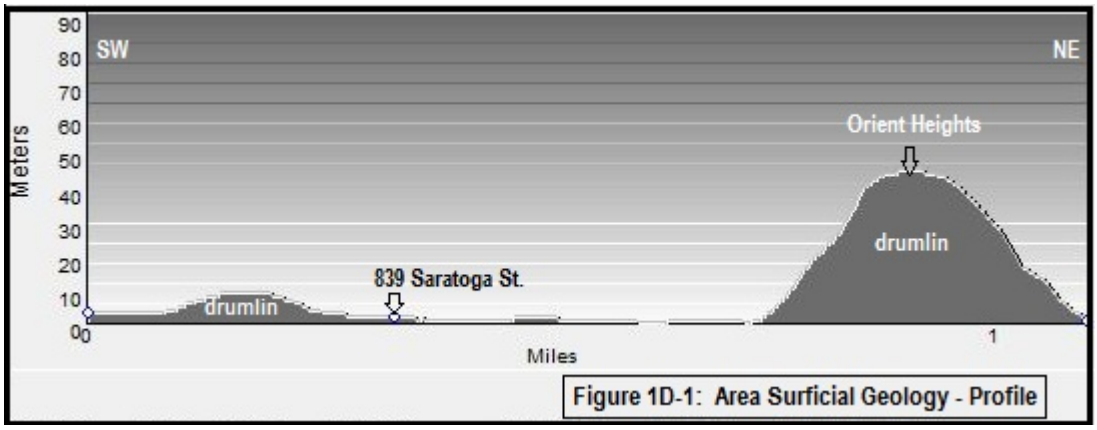
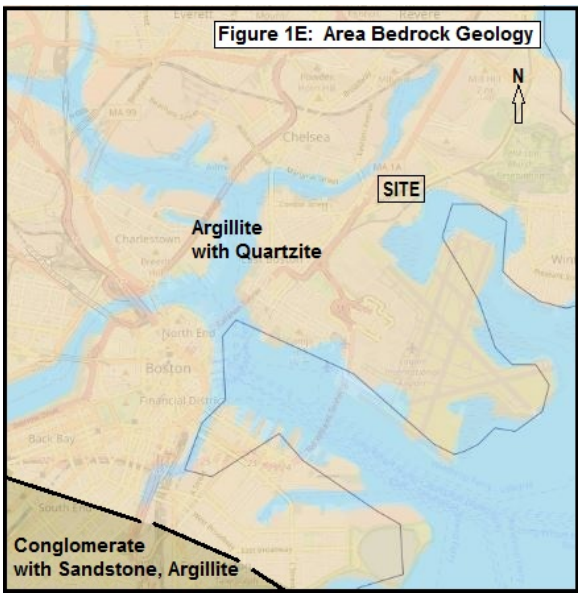


Figure 1D-1: Area Surficial Geology - Profile

- Area Water Bodies:
  - Chelsea River: 1560 ft. northwest
  - Boston Harbor: 1080 ft. east
  - No other significant project area water bodies (ponds, lakes, rivers, streams) or wetlands are mapped within 5000 ft. of this site (*Figure 1*).
  - Unmapped wetlands can be found within area glacial lowlands (*Figure 1D-1*). They are common in East Boston lowlands.

- Anticipated Site Substrata: Based upon the collected geologic and topographic data, anticipated native site subsoils were considered to potentially include:
  - Man-placed fill
  - Organic soils
  - Marine sediment
  - Glacial till

- Area Bedrock Geology: [US Department of the Interior; US Geological Survey, *Massachusetts State Geologic Map*; 1998; updated 2018; see *Figure 1E*]
  - Common area rock: argillite
    - Hardness: a medium hard rock; nearly metamorphic
    - Structure: fine grained
    - Mineralogy: indurated clay or silt; silt sized quartz or feldspar grains
  - Secondary rock: quartzite
    - Hardness: a hard rock
    - Structure: homogeneous, granoblastic, fine grained
    - Mineralogy: quartz (derived from sandstone)
  - Nearest alternate primary rock: conglomerate
    - Hardness: a soft to hard sedimentary to meta-sedimentary rock dependent upon degree of cementation (listed as such in two entries in the Massachusetts state building code supplement with respect to rock hardness [Table 1806.2a; 2017])
    - Structure: large rounded water worked pebbles in a fine matrix; the consolidated equivalent of a gravel within sand (cemented gravel; Roxbury puddingstone found is a variant of conglomerate rock)
    - Mineralogy: natural cementing material varies
  - Nearest alternate secondary area rock: sandstone
    - Hardness: a soft sedimentary rock
    - Structure: homogeneous, fine grained (cemented sand); coarse sandstone can grade into conglomerate
    - Mineralogy: quartz; natural cementing material varies
  - Depth to bedrock data was not available from MA GIS (2018 database).



Previous Test Borings and Monitoring Wells:

- On-Site Borings: no on-site boring records were found

- Nearby Completed Test Borings:
  - Boring locations B60 (80 ft. west) and B356 (60 ft. east) are shown on *Figure 2*.
  - Borings were drilled prior to 1950.
  - Driller's logs from Boston Society of Civil Engineers records follow:

Boring B60 Ground Surface El. 8.5 ft. (BCB) Depth to Water: (not given)

Elev. Range:	Soil Type:	Boring Log Given Soil Strength
+8.5' to +3'	PEAT	NA
+3' to -7.5'	SILT & SHELLS	NA
-7.5' to -13.5'	Stiff blue, CLAY	NA

Boring B356	Ground Surface El. 9.5 ft. (BCB)	Depth to Water: (not given)
Elev. Range:	Soil Type:	Boring Log Given Soil Strength
+9.5' to -1.5'	Brown, PEAT	NA
-1.5' to -10.5'	Blue, CLAY	NA

- Groundwater Monitoring Wells:
  - On-site: no remnant groundwater wells were noted on-site
  - Off-site: a well was found nearby east in the Saratoga Street sidewalk (*Figure 6B*)

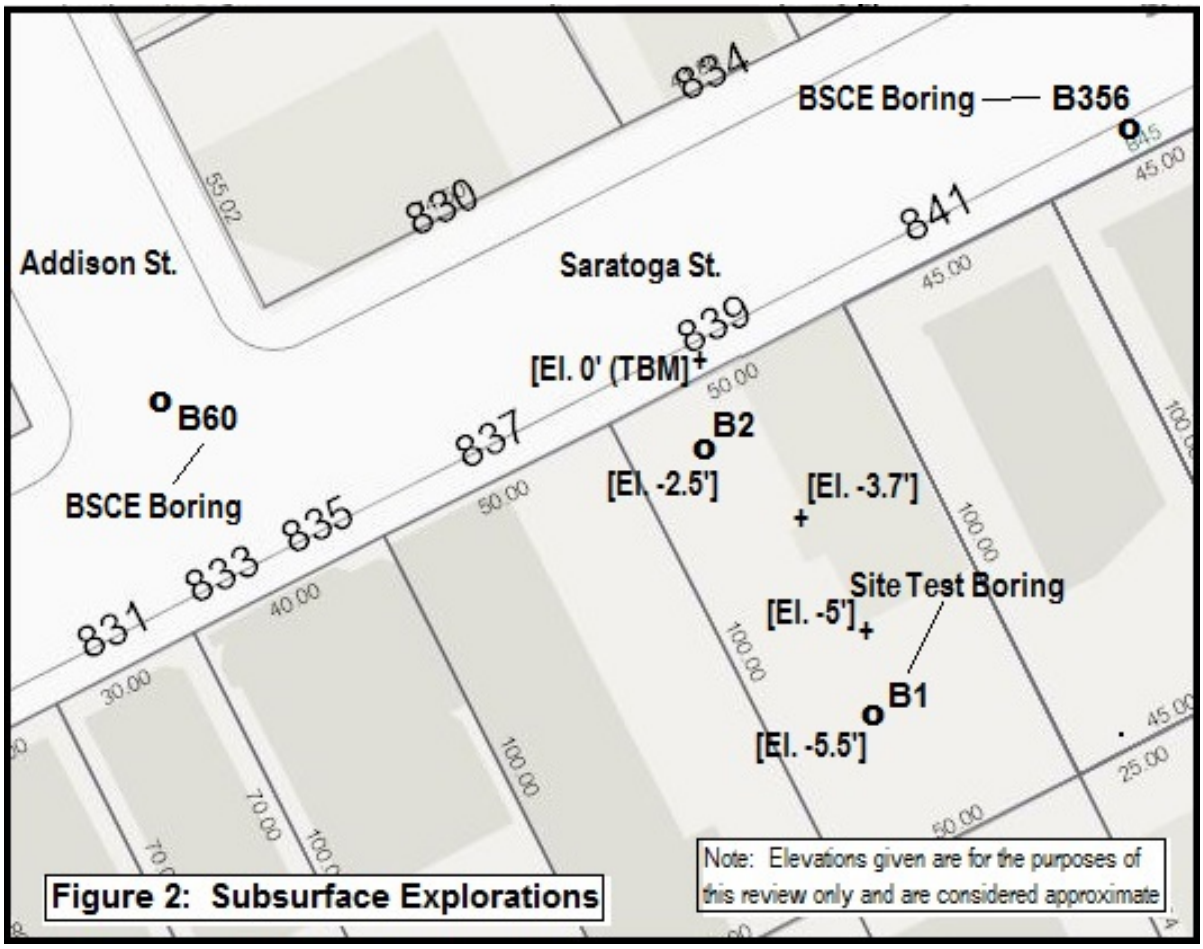


Figure 2: Subsurface Explorations

Test Borings Undertaken for this Study

- Dig Safe:
  - General Dig Safe site underground utility clearance: was provided by the test boring contractor.
    - The Dig Safe ticket number is held by the test boring contractor.
    - Utilities contacted: utilities' list is held by the test boring contractor; Boston Water & Sewer was contacted separately.
  - Likely test boring drilling locations were laid out as part of the Dig Safe site clearance.

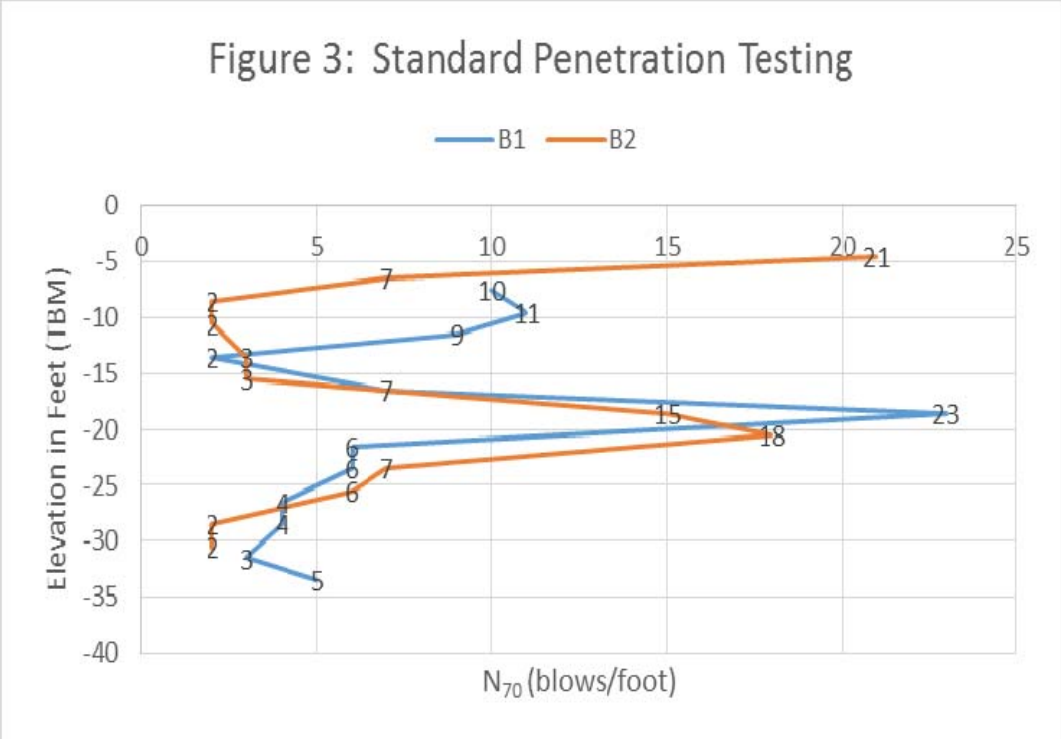
- Test borings:
  - Drilling was performed by Soil Exploration of Leominster, MA:
    - Two (2) structural test borings (designated B1 and B2) were drilled on-site on 16 November 2020.
    - Refer to *Figure 2: Subsurface Explorations* for approximate as-drilled test boring locations.
  - A track mounted ATV drill-rig equipped with an auto-hammer drilled and sampled soils in the borings below grade (*Photo 1*).
  - Percussion borings (*Photo 1*) were advanced to a 29 foot depth, each.
  - 2- foot soil sampling intervals were semi-continuous throughout the borings.

- Digital Boring Logs:
  - Recovered test boring soil and rock samples were digitally logged by the geotechnical engineer in accordance with *ASTM D-5434-97: Standard Guide for Logging of Subsurface Explorations of Soil and Rock*.
  - Boring logs prepared by the engineer are presented in soil boring log sheets in *Appendix A*. Logs detail soil type, boundary elevation or depth, density, consistency, thickness, coloration, moisture and composition.

III. Geotechnical Testing:

Field Testing Performed:

- Standard Penetration Tests (SPT) (N_{70} in blows/foot)
- Field Unconfined Compressive Strength Tests ($q_{u\text{-}field}$ in tons per square foot)
- Field Gradation Tests



Standard Penetration Testing (SPT):

- SPT Presentation and Definition:
  - A standard penetration test is defined as the number of blows of a 140 lb. hammer falling 30 inches to drive a standard soil split spoon sampler 12 vertical inches. The number of blows is designated as "N"
  - Standard penetration tests (SPT) N are summarized for the borings with depth on the boring logs in *Appendix A* and in *Figure 5.*
  - Field SPT N (blows/foot) is taken from blow count graphs provided on the boring logs.
  - Standard penetration test N is plotted for the borings with depth in *Figure 3.*

- SPT Type:
  - The borings drilled for this study (see *Appendix A*) used an auto-hammer sampler drive system which delivers replicable, consistent energy for each blow struck.
  - This is considered an improvement over older style drill rigs which utilized a rope and cathead system and can have operator error or bias particularly when drilling in dense soils (e.g. "short stroke" as driller tired, yielding artificially high N values).

- SPT N Data Analysis of this Site:
  - Note that in the plots of N with depth in *Figure 3*:
    - Plot shapes are similar for B1 and B2, normalized for elevation rather than depth.
    - Boring N values are low within the existing fill and the organics
    - Boring values jump up within the upper portion of the marine sediment
    - Boring N values generally decrease with depth within the marine sediment deposit.
    - No sampler or casing refusals were found to the depths drilled.
  - See also the N pattern variation with respect to soil type in *Figure 5* as well as in the blow count graph on the boring logs in *Appendix A.*

- SPT N Engineering Uses: SPT data can be useful in determination of values of soil bearing capacity, Young's Modulus for footing settlement evaluation, as well as input to footing base soil friction angle, seismic site class and slab subgrade modulus determination.

- Corrected SPT N:
  - Correction of raw field N_{70} values is performed based upon:
    - Factors of soil overburden pressure, drill rig sampler hammer type, drill rod length, sampler liner, etc. are employed to calibrate the field N values reported.
    - Auto hammer field N values can require initial correction by a factor of about 1.15 when using other hammer systems as a basis for calculations.
  - Final N energy adjustment to N_{55} is required for performance of granular soil foundation settlement calculations [refer to Joseph E. Bowles; *Foundation Analysis and Design*; *5th Edition*; 1997].

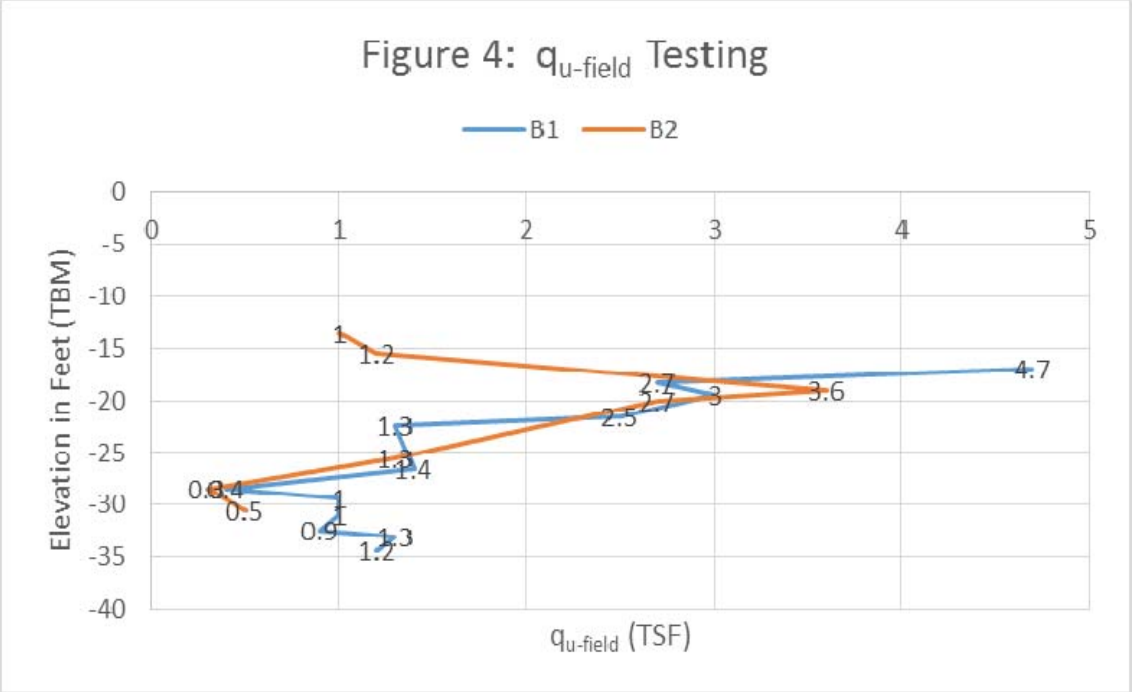
Field Compressive Strength Tests ($q_{u-field}$, in TSF):

- Test Use:
  - Field compressive strength tests are a good indicator of plastic (cohesive) soil field compressive strength variation ($q_{u-field}$, in TSF) in organic soil and cohesive marine sediment (silty clay).
  - The test also gives preliminary input for marine sediment soils' undrained shear strength

- Presentation:
  - All $q_{u-field}$ tests performed for the site borings in organic soil and silty clay are plotted on *Figure 4.*
  - Test averages for cohesive soil sampling intervals are plotted on the boring logs *(Appendix A).*

- All individual $q_{u-field}$ tests are given on the boring logs (*Appendix A)* and in *Figure 5*.

- Data Review:
  - Cohesive organic soil and silty clay were encountered in the borings drilled and $q_{u-field}$ tests were performed on recovered samples.
  - Review of *Figure 4* and *Figure 5* show the trend seen below ground is:
    - Very similar B1 and B2 plot shape with elevation change.
    - Weak organic soils nearer surface;
    - A jump to higher $q_{u-field}$ test values within the top portion of the marine sediment
    - A distinct, although relatively thin, competent bearing zone; and
    - Continual marine sediment soil softening with depth with some oscillation seen.
  - Refer to *Figure 5* for depictions of soil sub-layers as seen in the borings below ground.



Field Gradation Tests:

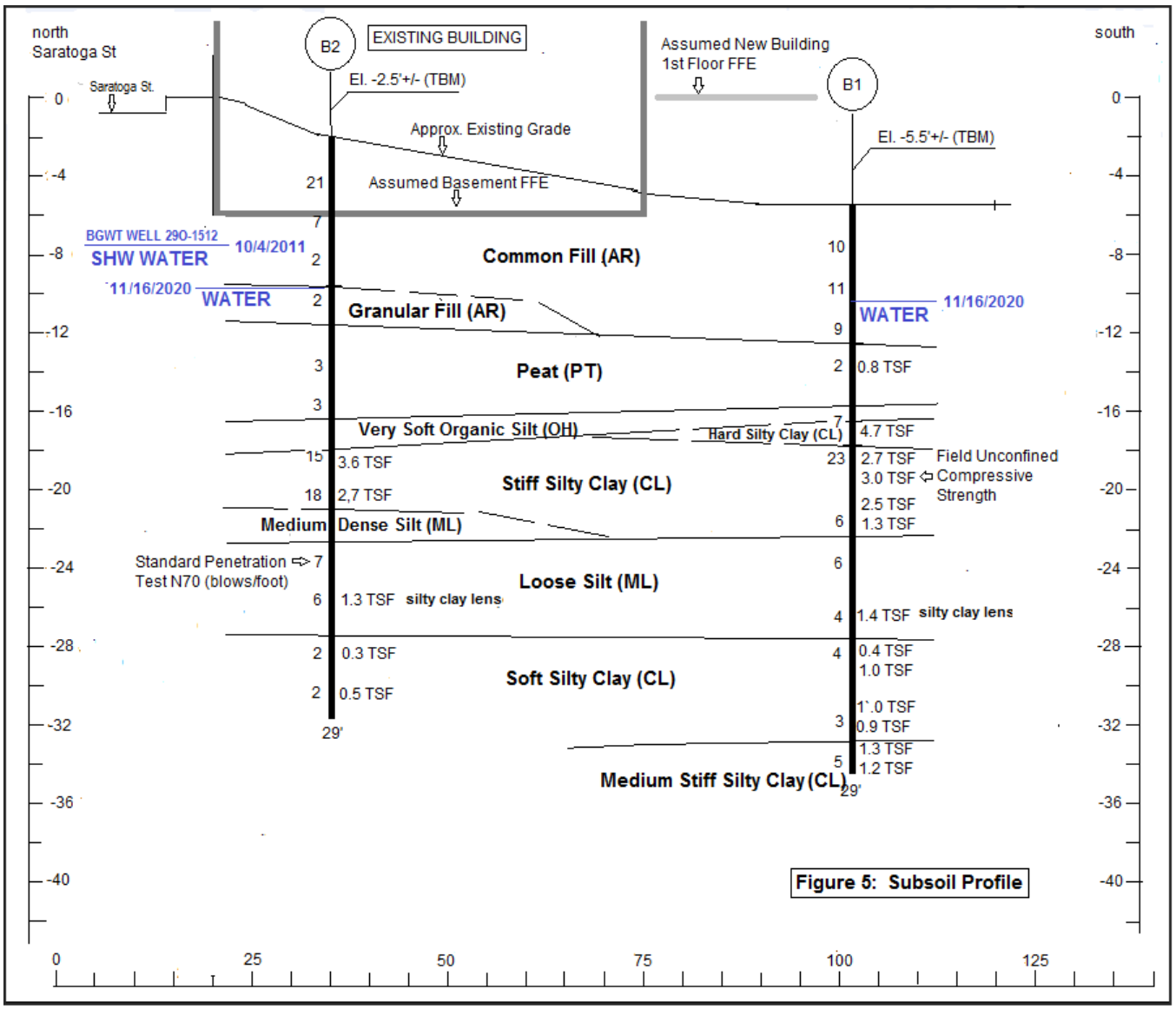
- Test Use: limited field gradation tests were performed to better determine the relative percents of coarse gravel, fine gravel, coarse sand, and medium sand and fines (silt and fine sand) in recovered site cohesionless granular fill subsoil samples.

- Limitations:
  - Field tests are limited to recovered dry or field air dried soil samples.
  - 4-sieve method does not allow for separation of silt from fine sand.

Laboratory Soil Tests:

- Test Boring Sampling: no laboratory soil particle gradation testing was undertaken for this review.

- Quality of Sampled Soils for Re-use: this subject is addressed in the report section entitled "Site Subsoil Descriptions" as well as in the final section of this report.



IV. Soil Strata:

Data Summaries:

- Profile Data Summary: general summary of soil substrata found in the subsurface exploration are provided in:
  - *Table I*
  - Report section: "Site Subsoil Descriptions"

- Subsurface Summary Drawing:
  - Refer to the subsoil profile sketched in *Figure 5* to gain an overview of site subsurface soil and groundwater conditions at the locations drilled (*Figure 2*).
  - Subsoil profile (*Figure 5*) orientation is perpendicular to Saratoga Street (*Figure 2)*.

- Profile Field Descriptions: Detailed field subsoil descriptions are given in the boring logs presented in *Appendix A*.

Table I: Exploration Summary

Location	***Surface El. (ft.) (TBM)***	***Depth Drilled (ft.)***	***All Fill (ft.)***	***All Organics (ft.)***	***Stiff to Hard Silty Clay (ft.)***	***Medium Dense Silt (ft.)***	***Loose Silt (ft.)***	***Soft Silty Clay (ft.)***
B1	-5.5	29	7	4	6	---	5	>7
B2	-2.5	29	9	7	2.5	1.5	5	>4

Soil Classification System Used for this Site Investigation:

- Soil Classification System: Project soils have been classified in accordance with the Unified Soil Classification System (USCS; MIT System). Refer the test boring logs in *Appendix A*.

- Soil Descriptions: Soils are described in terms of color, grain size, moisture content, density (coarse grained soils), consistency (fine grained soils), plasticity and cementation, as appropriate.

Grain	Size Boundaries (dia.)	Common Size Example
Boulder	>12 in.	>Basketball
Cobble	3-in. to 12-in.	Grapefruit size
Coarse Gravel	¾-in. to 3-in.	Lemon size
Fine Gravel	#4 Sieve (4.75mm) to ¾-in.	Pea to grape size
Coarse Sand	#10 Sieve (2 mm) to #4 Sieve	Peppercorn size
Medium Sand	# 40 Sieve (.425 mm) to #10 Sieve	Sugar to table salt size
Fine Sand	#200 Sieve (.075 mm) to #40 Sieve	Powdered sugar size
Silt/Clay	<#200 Sieve (.075 mm)	Flour particle or finer

- Soil Moisture Content:
  - Dry: no moisture noted
  - Moist: some moisture observed
  - Very moist: very moist, but not saturated (possible vadose zone)
  - Wet: saturated above the liquid limit (likely groundwater zone)

- Soil Density and Consistency:
  - Density of coarse grained soils (non-plastic silts, sands, gravels): defined in terms of standard penetration test blowcount N values (refer to the summary table at the bottom of any boring log)
  - Consistency (plastic silts, clay, and organics): defined secondarily in terms of blowcount N values and primarily with respect to field unconfined compressive strength in TSF (refer to the summary table at the bottom of any boring log).

- Soil Particle Percentage Field Designation: Relative soil particle size percentages (trace, few, little, some, mostly [capitalized soil unit]): refer to summary table at bottom of any boring log. These are more accurately tallied by laboratory soil particle gradation tests.

- Subsoil Classes on this Site: USCS soil type designations utilized in this report:
  - AR = man placed fill; artificial soil stratum; granular fill, common fill
  - PT = organic; peat
  - OH = organic; organic silt
  - ML = marine sediment; inorganic silt
  - CL = marine sediment; silty clay

Photo 1: Rubber track percussion drill rig

Photo 2: Common fil in B1 at 3 ft.

Site Subsoil Descriptions:

- Existing Fill (AR):
  - Types: Two (2) general types of fill are generally encountered underground:
    - Granular fill: cohesionless soil with low silt content; granular fill was only found in boring B2, yet may exist elsewhere on the property.
    - Common fill: contains elevated silt content within the soil (*Photo 2*).
  - Description:
    - Common fill: found in both borings
      - Coloration found in boring B1 was tan to tan-brown to brown
      - Consists of a mix of non-plastic silt with lesser quantities of sand and gravel in varying non-engineered proportions (B1; *Photo 2*).
      - B2 common fill was found as a sand with high silt content, and lesser gravel.
      - Also can occur as (silt loam) as seen in boring B1.
      - Water bearing at depth in boring B1 (*Figure 5; Appendix A*)
    - Granular fill:
      - Found in boring B2
      - Typically a sand mix with scant gravel and minor silt content
      - Was found below groundwater level in B2 (*Figure 5; Appendix A*)
  - Thickness:
    - Common fill: thickness at both borings drilled (*Table I*): t = 7 ft.
    - Granular fill: thickness at the boring B2: t = 2 ft.
  - Density:
    - Common fill: very loose to medium dense in-situ soil density (*Appendix A*);
    - Granular fill: very loose in-situ soil density (*Appendix A*).
  - Competence:
    - Common fill: no common fill type observed should be allowed to remain in-place below structural units (footings, grade slabs).
    - Granular fill: if found nearer surface than at B2, could possibly be re-used as earthwork phase engineered fill pending results of laboratory soil gradation tests.

- Organics:
  - Definition and source:
    - Peat is semi carbonized plant material. It is strongly odiferous (*Photo 3*).
    - Organic silt is a plastic (cohesive) sediment (*Photo 4*)
    - The site appears to be salt marsh land which was subsequently filled.

Photo 3: Peat in B1 at 7 ft.

Photo 4: Organic Silt in B1 at 10 ft.

- Description:
  - Peat: peat was found in both borings as both amorphous and fibrous peat
    - Fibrous peat is rich in humus and is acidic in found state.
    - Amorphous peat has no typical distinguishing peaty characteristics (roots, fibers);
    - Peat was noted to have a strong rotten egg type of odor.
  - Organic silt: found in both borings drilled
    - Organic silt is cohesive soil with included significant component of skeletons of former living organisms.
    - It can contain shells or shell fragments.
    - Organic silt can sometimes be confused with marine sediment (silty clay) at first glance. However it has a greasy texture and can be odiferous.
- Organics thickness: 4 ft. < organics < 7 ft.
- Coloration:
  - Peat is usually brown to dark brown
  - Organic silt: gray to dark-gray
- Position (*Figure 5*):
  - The organics were found directly below the existing fill
  - Peat overlies the organic silt on this site.
- Competency:
  - Organics are nearly infinitely compressible
  - Organics on this site were found to vary from very soft to medium stiff in found consistency.

- Organics left below structural units can create ongoing building subsidence with time, dependent upon building loads, load interval and load influence distribution with depth.

- <u>Glacial Fluvial Soils (glacial outwash)</u>: not found on this site at the locations drilled

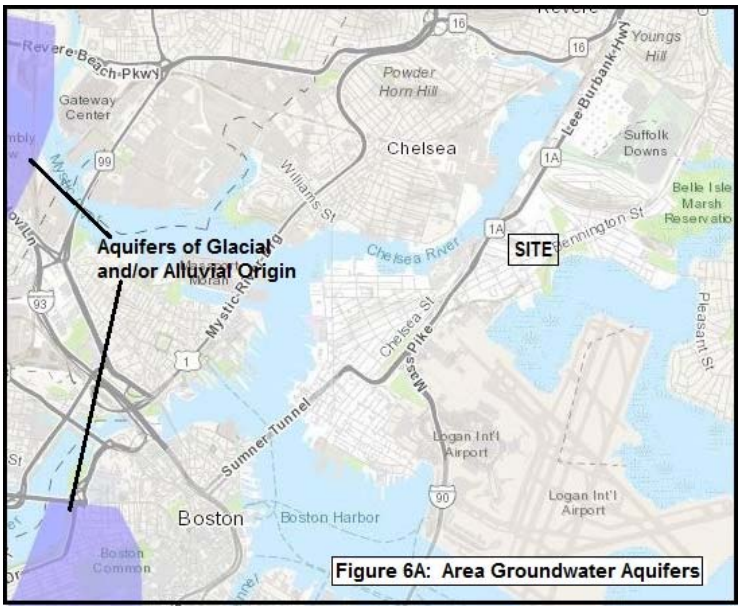
- <u>Marine Sediment</u>:
  - Definition:
    - Marine sediment is a fine grained material of varying consistency (strength).
      - The cohesive portion is known locally as Boston Blue Clay.
      - It is formed from glacial melt sedimentation deposits within relatively still water.
      - It presents both as a cohesive silty clay (CL; *Photo 5*) and a cohesionless inorganic silt (ML).

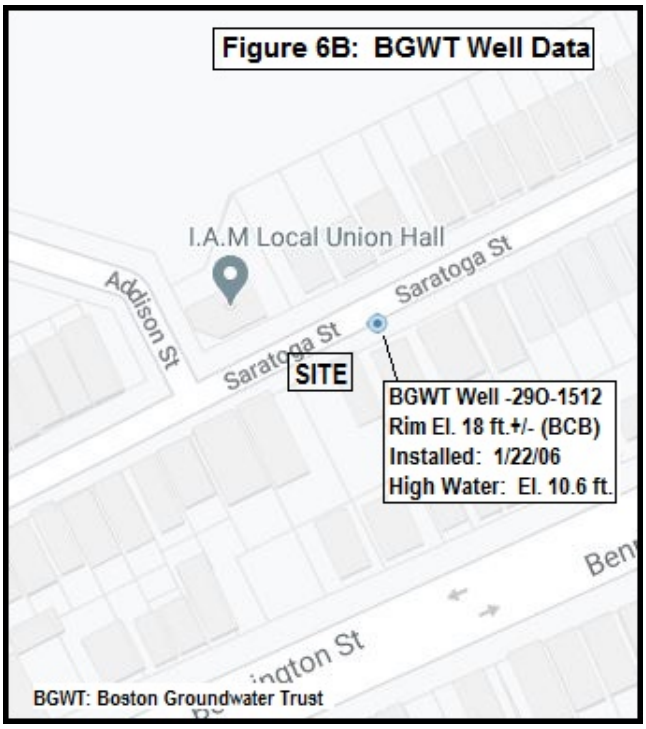
- Glacially reworked marine sediment: the marine sediment zone's often softened gray-blue top, was not found in the borings, yet may exist elsewhere on-site.
  - In this case, the marine sediment layer's top became degraded, weakened material by repeated glacial advance and retreat (bulldozing) at the top of the deposit and is termed "reworked".
  - Reworked silty clay (CL) is typically somewhat less competent than the glacially undisturbed silty clay material beneath it.
- Glacially undisturbed silty clay (CL) (*Photo 5*):
  - This is marine sediment generally untouched by glacial movement.
  - Limited hard consistency silty clay was seen only in B1, was found in the marine sediment zone (*Figure 5*, *Appendix A).*
  - Stiff and soft silty clay (CL) and loose to medium dense inorganic silt (ML) was found immediately below the organic and/or hard silty clay marine sediment in the borings (*Figure 5*, *Appendix A*).
  - Refer to *Table I* and *Appendix A* for marine sediment sub-layer thicknesses.

Photo 5: Hard desiccated cohesive silty clay marine sediment in B1 at 11 ft. depth

- <u>Glacial Till:</u>
  - Glacial till is a random mix of clay, silt, sand and gravel, with clay sometimes absent.
  - Two common types of glacial till are found in this area:
    - Variable density ablation till soil which tended to be carried within a mass of glacial ice.
    - Dense basal till (hardpan) found at the base of a glacier.
  - Glacial till was not found on site to the 29 ft. depth drilled.

- Bedrock:
  - No rock outcropping was noted in the general site area.
  - No weathered rock was found in the borings.
  - Intact bedrock was not found.
  - Depth to top of bedrock is not known and is estimated at about 100 ft. depth.
  - Rock type expected is argillite (see "Area Bedrock Geology" report section and *Figure 1E*).





V. Groundwater Behavior

- Free Water:
  - Wet (saturated) soil was encountered in both site test boring within the fill soil deposits (*Figure 5*, *Appendix A*).
  - No groundwater monitoring well was installed in completed borings.
  - The site does not lie within a mapped significant groundwater aquifer (*Figure 6A*).
  - No existing groundwater monitoring wells were found on-site.
  - A Boston Groundwater Trust (BGWT) groundwater monitoring well was found nearby on Saratoga Street. Well data is summarized in *Figure 5, Figure 6B* and *Table II*.

Table II: Groundwater Data

Loc.	Elevation (TBM)	Date	Observation	Groundwater Depth	Groundwater El. (TBM)
29O-1512	0 ft.+/-	10/04/11	14 year high well reading	7.4 ft.	-7.4 ft.+/-
B1	-5.5 ft.+/-	11/16/20	Wet common fill	5.0 ft.	-10.5 ft.+/-
B2	-2.5 ft.+/-	11/16/20	Wet granular fill	7.0 ft.	-9.5 ft.+/-

Note: El. 0 ft. (TBM) is assumed as Saratoga Street sidewalk level

- Groundwater Level Variation:
  - Clear soil mottling (color variation, typically splotches, due to past or current water presence) or rust staining was not seen in site soil boring.
    - Rust staining and mottling give an indication of a past water level possibly indicative of seasonal high groundwater level.
    - No wet or very moist soil was found in the boring to depth.

- Localized temporary and long term changes to groundwater level can be natural or man-made. These changes source from activities such as:
  - The 2016 extreme drought condition, the relatively dry summer of 2017, and the drought of 2020.
  - A notably wetter 2018 and parts of 2019, with near record high water levels in many parts of Boston.
  - Winter drier season water levels.
  - Heavy rainstorms or lengthy precipitation periods
  - Leaky underground structures (pipes, tunnels)
  - Underground flow retarders (buried structures, walls, rock outcrops)
  - Percent of land surface covered by pavement and buildings without ability to recharge.
  - Nearby construction dewatering.
  - Changes to the existing surface drainage pattern due to new site topography, trenches, infiltrators, bio-retention basins and subgrade structures.
  - Tidal variations.
- Groundwater impact based upon the data collected to date (*Table II, Appendix A*):
  - Groundwater is not expected to impact new foundation and 1st floor slab related excavations (*Figure 5*).
  - Fill and glacial soils can contain groundwater, however this was not observe on-site.. Based on the data collected we initially assume Seasonal High Groundwater is about El. -7.4 ft. (TBM) (*Figure 5*).
  - Underground utilities on some sites are designed to be installed deeper than foundations, however such data has not been provided us to-date for this project.

Hydraulic Conductivity (K in GPD/ft.^{2}):

- Scope: Laboratory soil gradation testing was not undertaken for this study and associated calculations and estimations of soil hydraulic conductivity (K) were not undertaken for any site subsoil unit.

- K Determination:
  - Many input factors go into determination of K. K is a function of particle grain sizes, soil density, soil particle uniformity, gravel content, soil cementation and soil layering.
  - Common fill (till fill) and glacial till (basal till) soils found in the borings are expected to be of low soil permeability, with the permeability value downgraded by actual found silt and clay content.

Site Civil and Environmental Site Investigation and Remediation Structural Unit Impact:

- Intrusive Environmental Testing and Remediation:
  - Site civil and environmental exploration (test pits and test trenches) can damage anticipated building structural unit bearing soils by lowering native bearing capacity.
  - Site remediation work including underground tank removal and soil replacement can remove significant volumes of contaminated soil materials from within proposed new construction footprints and inadvertently cause structural unit bearing soil degradation at the excavation base.
  - Any new site soil remediation work should be reviewed by the design team for quality of soil material placed to replace removed soils and/or tanks, as well as documentation that replacement soils were placed in compacted lifts.

- Protection of Structural Unit Bearing Subgrade: to protect structural bearing areas, project specifications should require:
  - Test pit and test trench areas avoid proposed project footing and slab bearing zones.
  - Test pit and test trench depths be limited to structural bearing depths minus one foot.

- Where contaminated soil removal is required, replacement soil should be structural fill placed in compacted lifts, verified by field soil density testing to a laboratory Proctor standard for the placed soil.

VI. Foundation Review and Recommendations:

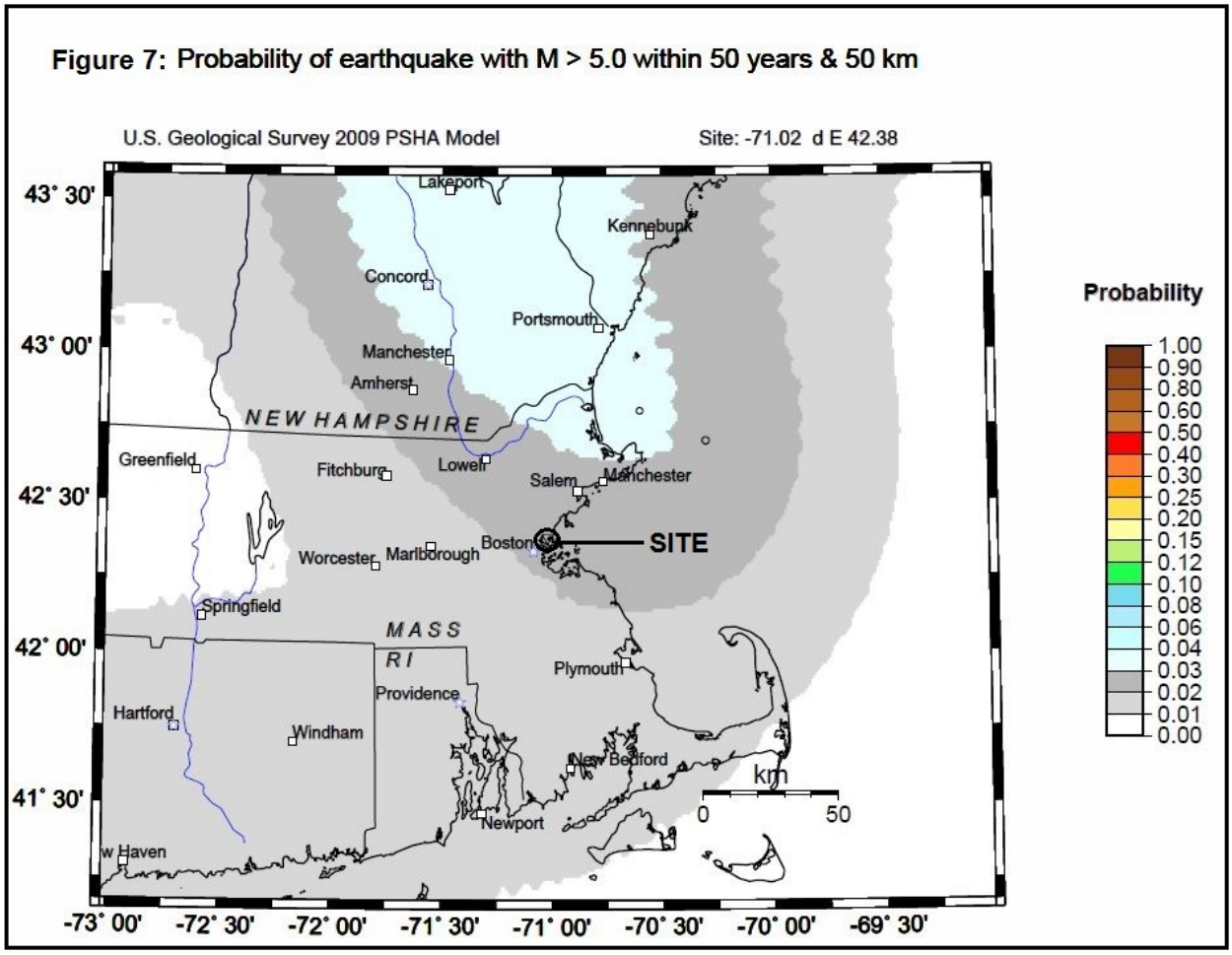
Foundation System:

- Conventional Shallow Foundation (wall and column footings) and Slab-on Grade Installation and Potential Foundation System Limiting Factors:
  - Site groundwater:
    - Groundwater was found in the existing fill (*Table II, Figure 5*) on-site.
    - Seasonal high groundwater was estimated at El. -7.4 ft. (TBM) (page 18)
    - Earthwork excavation will likely not encounter groundwater.
  - Existing site fills and weak organic soils:
    - Weak subsoils were found down to El. -17 ft.+/- (TBM) including (*Figure 5*):
      - Very loose silty common fill and very loose granular fill.
      - Very soft peat and organic silt.
  - The potential soil bearing zone:
    - *Figure 5* shows a 4 ft. to 6 ft. thick soil composite zone consisting of medium dense inorganic silt (ML; marine sediment) and stiff to hard silty clay (CL; marine sediment) as a potential foundation soil bearing zone.
    - Soil bearing zone limitation is its relative thinness.

- Ground improvement:
  - Installation of grids of grouted aggregate piers below footings, and ungrouted piers below the lowest level slab, would be drilled into the 4 ft. to 6 ft. thick bearing zone (*Figure 5*).
  - Practicability of use:
    - The site may have enough work space to utilize this approach.
    - The soil bearing zone may be too thin for this system to work on this property**. Final determination of ground improvement workability for this project is the domain of the aggregate pier system designers as theirs are proprietary systems.**
    - Benefits of ground improvement:
      - No unusual support of excavation would be needed with ground improvement.
      - The 1st floor (lowest level floor) could be a slab-on-grade.
      - Conventional shallow foundations can be installed upon improved ground.
      - Pier improved ground net allowable soil bearing capacity may be as much as 4 KSF.
    - Installation vibrations:
      - Non-displacement and/or pre-augered type aggregate piers would be required to avoid generating vibrations capable of impacting adjacent and nearby structures.
      - If displacement type piers are used, it is best to limit vibrations to a maximum of 0.3 in./sec shear velocity (peak particle velocity).
      - Limiting vibrations is done on-site by adjusting the vibratory hammer based upon 3rd party seismograph measurements at adjacent structures.
    - To determine if ground improvement is feasible for this site contact area installers:
      - Geopiers and geo-concrete columns: Helical Drilling, Inc.: 781/535-5832
      - Vibro-piers and rigid inclusions: Hayward Baker, Inc.: 617/306-5910

- Helical pile option for structural support within a 4 ft. to 6 ft. thick bearing zone:
  - The 4 ft. to 6 ft. thick potential soil bearing zone is not considered thick enough for helical pile bearing on 5 foot long bearing plate lead shafts.
  - Use of helical piles here would result in unacceptable foundation settlement.
  - Helical piles are not recommended for this site.

- Ductile Iron Piles:
  - Ductile iron piles (DIPs) can be installed on this site.
  - Pile installer's engineers tend to prefer to install the ductile iron piles to bedrock.
    - Allowable pile bearing capacities of 60 K or more have reportedly been obtained in Boston.
    - Initial depth to rock estimate from existing site grade (El. 0 ft. (TBM)) is 100 ft.
  - Lesser pile capacity and a shorter pile lengths could be obtained by installing piles to bear in glacial till. Depth to glacial till could be significantly less.
  - A deep test boring may be required here to confirm depth to glacial till and bedrock.
  - Local DIP installer: Helical Drilling



Seismic Recommendations:

- Seismic Site Hazard Review:
  - Probabilistic Site Hard Analysis [*PSHA Interactive Deagregation*; Geologic Hazards Science Center, US Geologic Survey; 2008 v.2]
    - Decimal site latitude and longitude utilized in this review: (42.3847° N, -71.0140° W)
    - Probability of magnitude 5 (M5.0) or greater earthquake occurrence within 50 miles of the subject site within a 50-year building design life is considered relatively low (< 2.2 %+/-) according to *Figure 7*.
  - Area earthquake history:
    - Typical measured earthquakes within the past 40 years have magnitude ≤ 3.1+/-
    - Past significant earthquakes with area impact recreated from the geologic record:

Year	Magnitude	Location	Intensity in Boston
1638	6.5	Central New Hampshire	MMI: V-VII
1663	7.0	Charlevoix, Quebec	MMI: V-VI
1727	5.6	Newbury, MA	MMI: V-VI
1755	5.9	Scituate, MA	MMI: IX

MMI: Modified Mercalli Scale (subjective; observed damage and effects)

- Seismic Site Class: The collected site subsoil data has been applied to the Massachusetts adopted *International Building Code (2015)*. According to the *Building Code*
  - Analytic depth:
    - The upper 100 feet of soil and bedrock are subject to analysis.
    - Soil data on-site has been collected to up to 29 ft. depth (*Table I, Appendix A*).
  - Bedrock:
    - Bedrock is argillite rock (see "Area Bedrock Geology" report section).
    - Bedrock is preliminarily estimated at about 100 ft. depth from ground surface
    - Depth to intact bedrock as measured from likely BOF is not < 10 ft. which precludes assignment of a rock controlled seismic Site Class A or B to this project.
    - The soil and rock data collected allows preliminary classification of this site as seismic Site Class E.

- Seismic Design Factors: Preliminary estimated Earthquake Design Factors for East Boston (Boston), Massachusetts (*Massachusetts Amendments to the International Building Code (2017; 9th Edition))* and *IBC (2015)*:
  - S_s = 0.217g (short interval)
  - S_1 = 0.069g (1-second interval)
  - F_a = 2.5 (site coefficient, classification as Site Class E)
  - F_v = 3.5 (site coefficient, classification as Site Class E)

Liquefaction:

- Liquefaction Factors:
  - Earthquake magnitude
  - Earthquake amplitude (duration)
  - Subsoil types and condition

- Earthquake Magnitude:
  - Collected data indicates that the probability of occurrence of an earthquake of magnitude 5 or higher is low probable during a 50 year building design life.
  - However, with a time period measured in centuries instead of decades, earthquakes of magnitude 5 or greater can be expected to occur as the earthquakes listed above indicate.

- Earthquake Duration: This topic is beyond the scope of this review.

- Subsoil Data Input: Review of the site subsoil profile was necessary for soil liquefaction determination below structural units:
  - Relevant test boring information: no significant thickness of post compaction, loose to very loose saturated silty to clean sands and non-plastic silts (SM, SP, SW, ML) would be found below structural units.
  - Drill rig, site groundwater level and measured soil strength data with depth:
    - Drill rig hammer type: auto
    - Groundwater level: seasonal high
    - Plotted field N_{70}-values from the borings with depth (*Figure 3*).

- Site Liquefaction Determination:
  - Review of field auto hammer N_{70} from the borings with depth with respect to *Figure 1806.4c* of the *Massachusetts Amendments (2017; 9th Edition)* for preliminary liquefaction exclusion review compared to seasonal high groundwater level.
  - Result: liquefaction settlement is not of concern for this site were a 5M or greater earthquake to occur here.

Structural Unit Frost Protection Depth:

- Definition:
  - Frost depth, freezing depth or frost line is the depth to which moisture in subsoil is expected to freeze.
  - Frost line varies in position (elevation) during seasonal freeze and thaw.

- *Massachusetts State Building Code* Mandated Frost Protection Depth Changes:
  - 7th Edition: "All foundations for buildings and structures shall extend to a minimum of 4 ft. below (exterior) finished grades…"
  - 8th Edition: Foundations and permanent building supports should be protected by "extending below the frost line of the locality…" This suggests a 4 ft. frost depth is too deep for coastal and southern areas and too shallow for northern or topographically elevated locales.

- Site Structural Unit Frost Protection Depth:
  - Frost line:
    - Average area frost line value: 0.9 m = 35.5 in. [J.E. *Bowles; Foundation Analysis and Design 5th Ed*.; 1997; Figure 7-1].
    - Extreme frost line based upon state average: 53 in. [NAVFAC DM-7.1; *Soil Mechanics Design Manual 7.1*; Figure 7; 1982].
    - Based upon the data collected to-date: recommended minimum site structural unit frost protection depth in soil bearing for this property as measured from final adjacent exterior grade: = 48 in. (4 ft.)
    - Direct bearing on intact bedrock does not require a minimum frost depth embedment.

- Cold Weather Work Soil Protection:
  - During construction earthwork the contractor must be prepared to provide protection and/or thawing of foundation bearing soils against freezing.
    - Footings: insulation blankets and/or ground heating hoses should be utilized if footing subgrade is exposed to freezing during cold weather periods.
    - Lowest Level Slabs:
      - Typically slab subgrade areas are thawed once basic framing is up by providing heaters after enclosing the lowest level in plastic sheeting.
      - Then any remaining required grade raise fill, treatment and placement of the slab base pad can be properly performed.

Below Grade Foundation Wall Design (Restrained Walls):

- Lateral Active Earth Pressure and Hydrostatic Pressure:
  - New below grade walls should be designed to resist *lateral active pressures* calculated on the basis of an equivalent fluid density equal
    - 60 PCF (not designed to resist hydrostatic pressure: foundation drains provided)
    - 90 PCF (designed to resist hydrostatic pressure: no foundation drains provided)

- The recommendations assume an at-rest earth pressure coefficient (K_o) as follows [Knappett & Craig, *Craig's Soil Mechanics*; Figure 11.11; Spon Press; 2012]:

  K_o = 0.56; where K_o is based upon an assumed low medium dense existing common fill with Φ' = 28°

- Surcharge Loads:
  - Surcharge loads are generated by loads due to construction equipment, materials, stockpiles and traffic loads
  - Surcharge loads can be determined on the basis of a uniform lateral pressure equal to K_o multiplied by the vertical surcharge load applied over the full height of the wall.

- Seismically Induced Loads:
  - Seismically-induced earth pressures (*earthquake force*, F_w) should be distributed as an inverted triangle over the height of the wall (*Massachusetts Amendments (2017))*.
  - $F_w = 0.1 (S_s)(F_a)(Y_t)(H)^2$
    - S_s = 0.217 (see "Seismic Recommendations" report section)
    - F_a = Site Coefficient = 2.5 (Site Class E)
    - Y_t = Total Soil Unit Weight = use 120 PCF, existing common fill
    - H = height of foundation wall
  - Where the calculated earth pressure behind walls is < 250 PSF, it should be increased to 250 PSF to account for stresses caused by compaction within 5 lateral feet from the wall face.

- Total Lateral Active Stress: The two static lateral pressures and the seismic pressure when added yield the total lateral stress for structural design of the walls.

Drainage and Waterproofing:

- General Comments/Good Practice:
  - Exterior grading at the building should be designed to carry surface water runoff away from the structure.
  - Planted areas or pavements should enhance the exterior grading performed to insure surface water runoff beyond building limits.
  - Roof downspout water or other water should not be allowed to pool near the building.

- Review Summary of Groundwater and Structural Unit Elevation Data (TBM):
  - Structural unit elevations (*Figure 1C, Figure 5*).
    - Elevation at Saratoga Street exterior wall footing (frost depth): El. -4 ft. (TBM)
    - Elevation at other footings:
      - Exterior footings: at frost depth
      - Interior footings: at El. -2 ft. (TBM)
    - First floor elevation: assumed El. 0 ft.+/- (TBM; *Figure 5*)
  - Groundwater elevation ("Groundwater Behavior" report section*):*
    - Estimated seasonal high groundwater level: El. -7.4 ft.+/- (TBM) (page 18)
    - Site test boring groundwater levels: less than seasonal high (*Table II*)
  - Site flooding: confirm with project site civil engineer.

- Building Foundation Wall Drainage and Waterproofing:
  - Based upon the data collected, foundation wall drains are not necessary.
  - Exterior wall waterproofing below grade: is considered prudent

- Lowest Level Floor Slab Drainage and Waterproofing:
  - Waterproofing such as an under slab underdrain system (under slab perimeter and interior drainage pipes set in a stone bed out letting to a sump pit) is not strictly necessary below the lowest level floor (*Figure 5*) based upon the data collected. However many area contractors install under slab drainage as a project safety factor against infiltrating surface water at the building limits or further upslope off-site.
  - Normal under slab damp proofing should be provided.

- Lowest Level Floor Slab Design:
  - Ground improvement alternative: grade slab design input should be provided by the ground improvement system designer as the slab will be underlain by a grid of aggregate piers
  - Ductile iron pile alternative: the lowest level slab will be a pile supported structural slab

- Under Grade Slab Pads and Grade Slab Control Joints:
  - Slab base pads should be provided. Base pads should be at least 6 inches in thickness.
  - Pad material can consist of compacted structural fill or alternately, compacted ¾ inch crushed stone if desired by the Structural Engineer.
  - Slab control joints should be utilized within patterns as determined by the Project Structural Engineer.

Excavation and Bracing:

- Excavation Depth ≤ 4 ft.+/-:
  - Common practice is to maintain a 1H:1V temporary side slope for shallow excavation (≤ 4 ft.+/-) during construction. Benched steps can also be executed.
  - Note that the sidewall stability will be undermined by:
    - Minor sloughing when sidewall bleeding occurs either from release of trapped water in soil or drainage following storm events; and
    - Surficial exposed sidewall soil drying and subsequent caving or sloughing.

- Excavation > 4 ft.:
  - A braced excavation is required where adequate lateral space does not exist for a 1.5H:1V sloped temporary excavation layback (OSHA Type C soil).
  - Protection of adjacent building bearing is required if the excavation is to proceed below abutters' footing bearing levels.
  - Simplest temporary short-term small area bracing would be utilization of trench boxes working in small sections with any needed water pumping performed.
  - To have larger excavation sections open, soldier pile and lagging is recommended for support of excavation.
    - Cantilever 10 X 57 piles embedded to at least 1.5 H and spaced at about 8 feet likely could be used.
    - Final support of excavation design is the domain of the installer's engineer

Elevator Pit:

- Pit Foundation and Slab:
  - The elevator pit base is assumed to bear at about 5 feet below lowest level slab finish floor elevation (El. – 5 ft. (TBM)).
  - Elevator system may be supported upon either:
    - Continuous wall footings with a slab-on-grade underlain by grouted aggregate piers; or
    - A pile supported structural mat slab or mat slab underlain by grouted aggregate piers.

- A minimum 12 inch thick base of structural fill or ¾ inch crushed stone over non-woven structural filter fabric (Mirafi 140N or equivalent) should be set below the slab-on-grade or structural mat; or as specified by the ground improvement or ductile iron pile design engineers.

- Elevator Pit Drainage and Waterproofing:
  - Water proofing is typically provided no matter what the groundwater conditions as the elevator pit is the lowest elevation construction point on-site.
  - Pit waterproofing should consist of installation of a positive side membrane system such as PrePrufe (or equivalent).
  - Since the elevator pit should require properly tied continuous waterstops in all construction joints and if a mat, sufficient load to resist water buoyant forces (the latter in this case is not anticipated (El. -7.4 ft. (TBM); seasonal high groundwater; page 18).

Construction Dewatering:

- Groundwater Impact:
  - Based upon the data collected to-date, groundwater will likely not impact excavations for foundations and lowest level floor slabs (*Figure 5).*
  - Refer also to the "Groundwater Behavior" report section (pages 17 and 18).

- Dewatering Required:
  - It is expected that much of any intruding water into the site excavation's most likely source is from rain and melt events.
  - Water can be controlled by ditching to filtered sumps.

- Pumped Discharge:
  - Discharge of any pumped water should be performed in accord with all City, Commonwealth and Federal regulations. Filtering of pumped water prior to discharge should be expected.
  - Permitting required by the USEPA, MWRA, or the City of Boston should be reviewed. Assessment by the Project Civil Engineer should be sought.
  - The contractor would be responsible for obtaining all permits and any associated laboratory testing required for construction dewatering.
  - Based upon City requirements the contractor may be required to use frac tanks to temporarily store pumped water at the work site. This possibility should be reviewed in conjunction with the Project Civil Engineer.

City of Boston Sidewalks:

- Sidewalks: Note that where city sidewalks are widened, removed or undermined, partial replacement or new sidewalks and support section must conform to the detailed guidelines provided by the City of Boston Public Works Department [*Rules and Specifications for Excavation Activity within the City of Boston;* dated 10 February 2009].

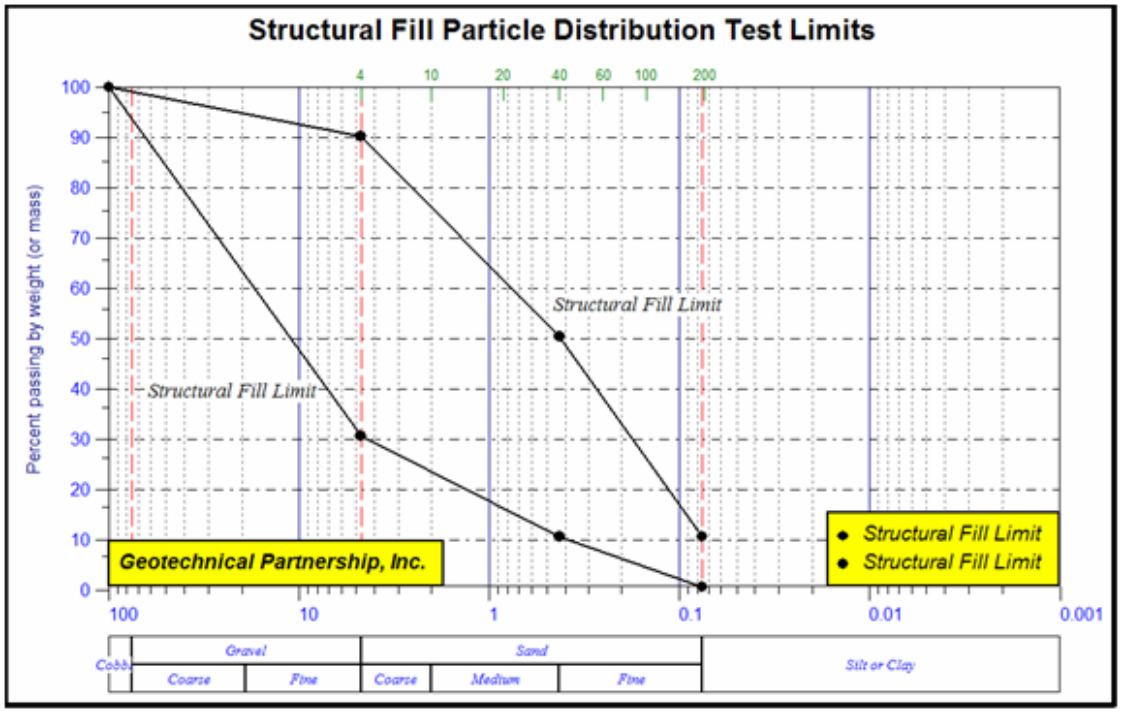
- BPWD Specifications:
  - *Section 4.04 Backfill Requirements*
  - *Section 5.08 Methods of Construction: Sidewalk*

Engineered Fills and their Uses:

- Crushed stone: ¾ in. clean, hard, durable crushed stone; uses:
  - As a construction working pad
  - As a surface protection below footings
  - As drainage media in wall and under slab drainage systems.

- Gravel: sandy gravel, bank run gravel; max. 3-in. gravel; limit No. 200 sieve content to about 6%; uses:
  - As base in a pavement section

- Structural fill: hard, durable sand and gravel;
  - Common gradation limits for structural fill are given in the plot shown below.
  - Gradation adjustments: gradations often specify
    - Minimum of 2% passing No. 200 to aid compaction
    - Maximum of 15% passing No. 200 with the assumption that work may not proceed during wet conditions using this material (Dense Grade can be substituted)
  - Structural Fill Uses (in lieu of crushed stone):
    - To form a protective base directly below footings and pile caps
    - As a slab base pad
    - As a replacement fill below structural units (over-excavated soft areas)
    - As sub base in a pavement section



- Dense Grade Structural Fill/2-in. Crushed Stone: Structural fill/crushed stone meeting the following minimum requirements

Sieve Size	Percent Finer by Weight
2 in.	100
1.5 in.	70 – 100
¾ in.	50 – 85
No. 4	30 – 55
No. 50	8 – 24
No. 200	3 – 10

  - Dense grade structural fill uses:
    - As a readily workable replacement for conventional or recycled concrete type structural fill when work must proceed during cold and/or wet conditions.
    - As a base pad for lowest level floor slabs, footings and pile caps.

- Granular Fill: absent to minor gravel; primarily medium to fine sand and silt meeting the following minimum requirements

Sieve Size	Percent Finer by Weight
4 in.	100
No. 10	30 – 95
No. 40	10 – 70
No. 200	0 – 15*

** May be as high as 20% if field compaction can be verified in **dry** conditions*

  - Granular Fill Uses:
    - As under slab fill below 12 in. depth as measured from the slab base.
    - As densified trench backfill

Re-use of Existing Site Subsoils as Engineered Fill:

- Existing Common Fill:
  - Refer to the "Existing Fill" report section on page 14.
  - The existing common fill can only be classified as ordinary fill or common fill.
  - Common fill can only be reused on-site below planted areas or structural slabs.
  - Some earthwork specifications commonly in use provide strict silt content limits for "common fill". The site common fill soils may not meet such a specification.

- Existing Granular Fill:
  - In the borings drilled, no near surface granular fill soil was found on this site.
  - If found, granular fill might be able to be re-used on-site as "engineered fill", the type of engineered fill dependent upon the results of laboratory soil particle gradation testing of contractor submitted recovered granular fill soil samples.
  - Granular fill soil would likely be non-engineered, thus laboratory Proctor and associated field compaction tests are not particularly useful. Re-use of this soil on-site would require compaction testing in terms of experienced third party field observation of compaction equipment supported by consideration of addition of water to dry soil or drying of saturated soils (harrowing) as needed.

Thank you for inviting us to perform this site study. Please contact us with any questions.

Sincerely yours,
Geotechnical Partnership, Inc.

Lisa R. Casselli, PE
Principal

Attachments: *Appendix A*: *Log of Test Borings B1 and B2*

APPENDIX A: Log of Structural Test Borings B1 and B2

839 Saratoga Street
East Boston, Massachusetts

Geotechnical Partnership, Inc.
Swampscott, MA
File No. 2039

Geotechnical Partnership, Inc.
Swampscott, Massachusetts
Sanford, Maine

PROJECT: New Construction
839 Saratoga Street
East Boston, Massachusetts

CLIENT: Volnay Capital

File No. 2039

Date Drilled	: 16 November 2020
Boring Location	: Refer to Report Figure 2
Drilling Contractor	: Soil Exploration Corp.
	: Leominster, MA
Driller	: D. Ledger
Rock Core	: ---
GPI Field Engineer	: LR Casselli, PE, MASCE CSI
Elevation and Datum	: El. 5.5' (TBM)
Drilling Mud Utilized	: Not necessary
Constant Water Head	: Not necessary

Test Boring No. B1

(1 of 2)

Drill Rig Type	: Track Rig
Hammer Type	: Auto
Cat-Head or Winch	: NA
Soil Casing Type	: 4 in. OD NW
Sampler Type	: SS - 1.375 in. I.D.; unlined
Sampler Hammer Fall	: 140 lbs. / 30 in.

Depth in Feet	Elev. in Feet	DESCRIPTIONS	USCS	Sample No.	Blow Count	Average qu-Field	REMARKS
0	-5.5	Concrete Red, briick					Groundwater=5' Well Set: no
1	-6.5	Dark-brown, SILT LOAM, few medium to fine sand (medium stiff; moist)	AR	1	7 6 4 7		SS-1: 1' - 3' R=14 N=10
2	-7.5						
3	-8.5	Dark-brown, SILT LOAM, few medium to fine sand gray, silty medium to fine SAND to sandy SILT (non-plastic) (medium dense; moist)		2	7 7 4 4		SS-2: 3' - 5' R=16 N=11
4	-9.5						
5	-10.5	Dark-brown, SILT LOAM, few medium to fine sand and coal dust (moist) --Common Fill-- 5.5 ft.		3	2 4 5 2		SS-3: 5' - 7' R=14 N=9
6	-11.5	Brown, medium to fine sandy SILT (non-plastic) to silty SAND, few to little coarse to fine gravel (loose; very moist) --Common Fill-- 7.0 ft.	AR				
7	-12.5			4	1 1 1 1	0.8	SS-4: 7' - 9' R=18 N=2 **P=0.8 TSF@8** .
8	-13.5	Dark-brown, amorphous and fibrous PEAT (medium siff; moist) --Organics--	PT				
9	-14.5						
10	-15.5	10.0 ft. Gray, ORGANIC SILT (very soft; very moist) --Organics--	OH	5	woh 1 6 9	4.7	SS-5: 10' - 12' R=19 N=7 **P=4.7 TSF@11.5**
11	-16.5	11.0 ft. Olive-yellow, silty CLAY (desiccated; hard dry to moist) --Hard Marine Sediment-- 12.0 ft.	CL				
12	-17.5			6	9 9 14 10	2.8	SS-6: 12' - 14' R=24 N=23 **P=2.7 TSF@12.8** **P=3.0 TSF@13.9**
13	-18.5	Olive, silty CLAY (stiff; moist)					
14	-19.5		CL				
15	-20.5			7	3 3 3 4	1.9	SS-7: 15' - 17' R=24 N=6 **P=2.5 TSF@16** **P=1.3 TSF@16.9**
16	-21.5	Olive, silty CLAY (stiff; moist) --Stiff Marine Sediment--					
17							

Blow Count Graph: 10 50

Average qu-Field (TSF): 0 1 2 3 4

COHESIONLESS SOILS: 0-6 Very Loose 0-8
(DENSITY) 6-10 Loose 8-15
L: Sands; R: Gravels 11-30 Med-Dense 16-40
>30 Dense 41-50
Very Dense >50

COHESIVE SOILS: 0-2 Very Soft (<0.25 TSF)
(CONSISTENCY) 2-4 Soft (0.25-0.5 TSF)
4-8 Med. Stiff (0.5-1.0 TSF)
9-20 Stiff (1.0-4.0 TSF)
>20 Hard (>4.0 TSF)

Test Boring No. B1

(1 of 2)

Geotechnical Partnership, Inc.
Swampscott, Massachusetts
Sanford, Maine

PROJECT: New Construction
839 Saratoga Street
East Boston, Massachusetts

CLIENT: Volnay Capital

File No. 2039

Date Drilled	: 16 November 2020
Boring Location	: Refer to Report Figure 2
Drilling Contractor	: Soil Exploration Corp.
	: Leominster, MA
Driller	: D. Ledger
Rock Core	: ---
GPI Field Engineer	: LR Casselli, PE, MASCE CSI
Elevation and Datum	: El. 5.5' (TBM)
Drilling Mud Utilized	: Not necessary
Constant Water Head	: Not necessary

Test Boring No. B1

(2 of 2)

Drill Rig Type	: Track Rig
Hammer Type	: Auto
Cat-Head or Winch	: NA
Soil Casing Type	: 4 in. OD NW
Sampler Type	: SS - 1.375 in. I.D.; unlined
Sampler Hammer Fall	: 140 lbs. / 30 in.

Depth in Feet	Elev. in Feet	DESCRIPTIONS	USCS	Sample No.	Blow Count	Average qu-Field	REMARKS
	-5.5						
17	-22.5	Olive, SILT (non-plastic), few fine sand (loose; moist)	ML	8	3 3 3 6		SS-8: 17' - 19' R=22 N=6
18	-23.5						
19	-24.5						
20	-25.5			9	1 2 2 3	1.4	SS-9: 20' - 22' R=24 N=4 **P=1.4 TSF@21**
21	-26.5	Olive, SILT (non-plastic), few fine sand (very loose; moist) with lenses olive, silty CLAY (stiff; moist) --Fine Granular Marine Sediment-- 22.0 ft.					
22	-27.5	Olive-gray to gray, silty CLAY (soft to medium stiff; moist)	CL	10	2 2 2 2	0.7	SS-10: 22' - 24' R=24 N=4 **P=0.4 TSF@23** **P=1.0 TSF@23.9**
23	-28.5						
24	-29.5						
25	-30.5			11	woh 1 2 2	0.95	SS-11: 25' - 27' R=24 N=3 **P=1.0 TSF@25.5** **P=0.9 TSF@26.9**
26	-31.5	Olive-gray to gray, silty CLAY (soft to medium stiff; moist)					
27	-32.5			12	2 2 3 3	1.25	SS-12: 27' - 29' R=24 N=5 **P=1.3 TSF@28** **P=1.2 TSF@28.9**
28	-33.5	Olive-gray to gray, silty CLAY (soft to stiff; moist) --Soft Marine Sediment--					
29	-34.5	Bottom of Exploration at 29 feet Depth					P=Penetrometer
30	-35.5						
31	-36.5						
32	-37.5						
33	-38.5	Particle Size: trace: <5%; few: 5-10%; little: 15-20%; some 30-45%; mostly: 50-100%					
34							

Blow Count Graph: 10 50

Average qu-Field (TSF): 0 1 2 3 4

COHESIONLESS SOILS: (DENSITY) L: Sands; R: Gravels
0-6 Very Loose 0-8
6-10 Loose 8-15
11-30 Med-Dense 16-40
>30 Dense 41-50
Very Dense >50

COHESIVE SOILS: (CONSISTENCY)
0-2 Very Soft (<0.25 TSF)
2-4 Soft (0.25-0.5 TSF)
4-8 Med. Stiff (0.5-1.0 TSF)
9-20 Stiff (1.0-4.0 TSF)
>20 Hard (>4.0 TSF)

Test Boring No. B1

(2 of 2)

Geotechnical Partnership, Inc.
Swampscott, Massachusetts
Sanford, Maine

PROJECT: New Construction
839 Saratoga Street
East Boston, Massachusetts

CLIENT: Volnay Capital

File No. 2039

Date Drilled	: 16 November 2020
Boring Location	: Refer to Report Figure 2
Drilling Contractor	: Soil Exploration Corp.
	: Leominster, MA
Driller	: D. Ledger
Rock Core	: ---
GPI Field Engineer	: LR Casselli, PE, MASCE CSI
Elevation and Datum	: El. -2.5 ft. (TBM)
Drilling Mud Utilized	: Not necessary
Constant Water Head	: Not necessary

Test Boring No. B2

(1 of 2)

Drill Rig Type	: Track Rig
Hammer Type	: Auto
Cat-Head or Winch	: NA
Soil Casing Type	: 4 in. OD NW
Sampler Type	: SS - 1.375 in. I.D.; unlined
Sampler Hammer Fall	: 140 lbs. / 30 in.

Depth in Feet	Elev. in Feet	DESCRIPTIONS	USCS	Sample No.	Blow Count	Average qu-Field	REMARKS
0	-2.5	Pavement Concrete; brick					Groundwater=7' Well Set: no
1	-3.5			1	11 14 7 5		SS-1: 1' - 3' R=12 N=21
2	-4.5	Tan, silty medium to fine SAND, few to little coarse to fine gravel (medium dense; moist)					
3	-5.5		AR	2	10 4 3 2		SS-2: 3' - 5' R=12 N=7
4	-6.5	Tan to tan-brown, silty medium to fine SAND (medium dense; moist)					
5	-7.5			3	3 1 1 4		SS-3: 5' - 7' R=8 N=2
6	-8.5	Tan, medium to fine sandy SILT (non-plastic), few coarse to fine gravel (very loose; moist); coal dust --Common Fill--					
7	-9.5	7.0 ft.		4	4 1 1 1		SS-4: 7' - 9' R=7 N=2
8	-10.5	Brown, medium to fine SAND, few fine gravel (very loose; wet) --Granular Fill--	AR				
9	-11.5	9.0 ft.					
10	-12.5			5	4 1 2 2	1.0	SS-5: 10' - 12' R=24 N=3 **P= 1 TSF@11**
11	-13.5	Brown, amorphous and fibous PEAT (soft to medium stiff)	PT				
12	-14.5			6	1 2 1 2	1.2	SS-6: 12' - 14' R=24 N=3 **P=1.2 TSF@13**
13	-15.5	Brown, amorphous and fibous PEAT (very soft to medium stiff) --Organics--					
14	-16.5	14.0 ft.					
15	-17.5	Gray, ORGANIC SILT (medium stiff; moist) --Organics--	OH	7	4 6 9 7	3.6	SS-7: 15' - 17' R=24 N=15 **P=3.6 TSF@16.5**
16	-18.5	16.0 ft. Olive, silty CLAY (stiff; moist) --Stiff Marine Sediment--	CL				
17							

Blow Count Graph: 10 50

Average qu-Field (TSF): 0 1 2 3 4

COHESIONLESS SOILS: (DENSITY) L: Sands; R: Gravels
0-6 Very Loose
6-10 Loose
11-30 Med-Dense
>30 Dense
0-8
8-15
16-40
41-50
Very Dense >50

COHESIVE SOILS: (CONSISTENCY)
0-2 Very Soft (<0.25 TSF)
2-4 Soft (0.25-0.5 TSF)
4-8 Med. Stiff (0.5-1.0 TSF)
9-20 Stiff (1.0-4.0 TSF)
>20 Hard (>4.0 TSF)

Test Boring No. B2

(1 of 2)

Geotechnical Partnership, Inc.
Swampscott, Massachusetts
Sanford, Maine

PROJECT: New Construction
839 Saratoga Street
East Boston, Massachusetts

CLIENT: Volnay Capital

File No. 2039

Date Drilled	: 16 November 2020
Boring Location	: Refer to Report Figure 2
Drilling Contractor	: Soil Exploration Corp.
	: Leominster, MA
Driller	: D. Ledger
Rock Core	: ---
GPI Field Engineer	: LR Casselli, PE, MASCE CSI
Elevation and Datum	: El. -2.5 ft. (TBM)
Drilling Mud Utilized	: Not necessary
Constant Water Head	: Not necessary

Test Boring No. B2

(2 of 2)

Drill Rig Type	: Track Rig
Hammer Type	: Auto
Cat-Head or Winch	: NA
Soil Casing Type	: 4 in. OD NW
Sampler Type	: SS - 1.375 in. I.D.; unlined
Sampler Hammer Fall	: 140 lbs. / 30 in.

Depth in Feet	Elev. in Feet	DESCRIPTIONS	USCS	Sample No.	Blow Count	Average qu-Field	REMARKS
	-2.5						
17	-19.5	Olive, silty CLAY (stiff; moist) --Stiff Marine Sediment--	CL	8	5, 7, 11, 9	2.7	SS-8: 17' - 19' R=18 N=18 **P=2.7 TSF@17.5**
18	-20.5	18.5 ft.					
19	-21.5	Olive, SILT (non-plastic) (medium dense; moist) --Med. DenseFine Granular Marine Sediment--	ML				
20	-22.5	20.0 ft.		9	3, 3, 4, 4		SS-9: 20' - 22' R=24 N=7
21	-23.5	Olive, SILT (non-plastic), few fine sand (loose; moist)					
22	-24.5		ML	10	3, 3, 3, 3	1.3	SS-10: 22' - 24' R=24 N=6 **P=1.3 TSF@23**
23	-25.5	Olive, SILT (non-plastic), few fine sand (loose; moist) with lenses olive, silty CLAY (medium stiff to stiff; moist)					
24	-26.5	--Loose Fine Granular Marine Sediment--					
25	-27.5	25.0 ft.		11	1, 1, 1, 1	0.3	SS-11: 25' - 27' R=24 N=2 **P=0.3 TSF@26**
26	-28.5	Olive-gray to gray, silty CLAY (very soft to soft; moist)	CL				
27	-29.5			12	1, 1, 1, 1	0.5	SS-12: 27' - 29' R=24 N=2 **P=0.5 TSF@28**
28	-30.5	Olive-gray to gray, silty CLAY (very soft to soft; moist) with lenses, olive, SILT (non-plastic) (very loose; moist) --Soft Marine Sediment--					
29	-31.5	Bottom of Exploration at 29 feet Depth					P=Penetrometer
30	-32.5						
31	-33.5						
32	-34.5						
33	-35.5						
34		Particle Size: trace: <5%; few: 5-10%; little: 15-20%; some 30-45%; mostly: 50-100%					

Blow Count Graph: 10 50

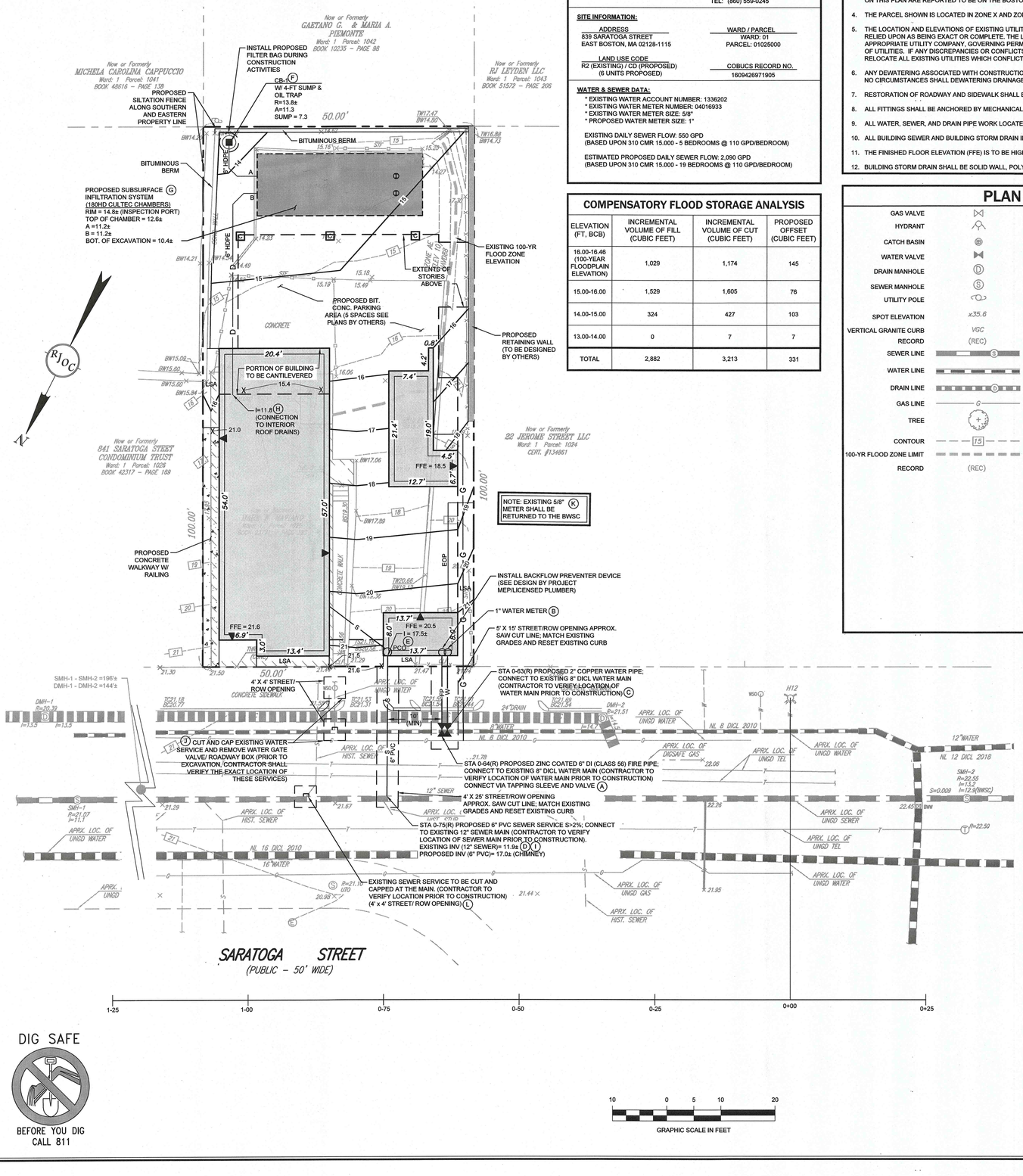
Average qu-Field (TSF): 0 1 2 3 4

COHESIONLESS SOILS: (DENSITY) L: Sands; R: Gravels
0-6 Very Loose; 6-10 Loose; 11-30 Med-Dense; >30 Dense; Very Dense >50
0-8; 8-15; 16-40; 41-50

COHESIVE SOILS: (CONSISTENCY)
0-2 Very Soft (<0.25 TSF)
2-4 Soft (0.25-0.5 TSF)
4-8 Med. Stiff (0.5-1.0 TSF)
9-20 Stiff (1.0-4.0 TSF)
>20 Hard (>4.0 TSF)

Test Boring No. B2

(2 of 2)



ADMINISTRATIVE INFORMATION

OWNER & APPLICANT INFORMATION:

OWNER	APPLICANT
MARK W. SAVIANO 839 SARATOGA STREET EAST BOSTON, MA 02128	839 SARATOGA STREET, LLC ATTN: RICHARD BELIVEAU PO BOX 638 WINCHESTER, MA 01890 TEL: (860) 559-0245

SITE INFORMATION:

ADDRESS	WARD / PARCEL
839 SARATOGA STREET EAST BOSTON, MA 02128-1115	WARD: 01 PARCEL: 01025000
LAND USE CODE	**COBUCS RECORD NO.**
R2 (EXISTING) / CD (PROPOSED) (6 UNITS PROPOSED)	1609426971905

WATER & SEWER DATA:

* EXISTING WATER ACCOUNT NUMBER: 1336202
* EXISTING WATER METER NUMBER: 04016933
* EXISTING WATER METER SIZE: 5/8"
* PROPOSED WATER METER SIZE: 1"

EXISTING DAILY SEWER FLOW: 550 GPD
(BASED UPON 310 CMR 15.000 - 5 BEDROOMS @ 110 GPD/BEDROOM)

ESTIMATED PROPOSED DAILY SEWER FLOW: 2,090 GPD
(BASED UPON 310 CMR 15.000 - 19 BEDROOMS @ 110 GPD/BEDROOM)

COMPENSATORY FLOOD STORAGE ANALYSIS

ELEVATION (FT, BCB)	INCREMENTAL VOLUME OF FILL (CUBIC FEET)	INCREMENTAL VOLUME OF CUT (CUBIC FEET)	PROPOSED OFFSET (CUBIC FEET)
16.00-16.46 (100-YEAR FLOODPLAIN ELEVATION)	1,029	1,174	145
15.00-16.00	1,529	1,605	76
14.00-15.00	324	427	103
13.00-14.00	0	7	7
TOTAL	2,882	3,213	331

GENERAL NOTES

1. THE PURPOSE OF THIS PLAN IS TO DEPICT PROPOSED SITE IMPROVEMENTS ON THE LOCUS PROPERTY INCLUDING, BUT NOT LIMITED TO THE CONSTRUCTION OF A MULTI-STORY BUILDING, AND INSTALLATION OF NEW DOMESTIC WATER LINE, FIRE PROTECTION LINE, NEW SEWER SERVICE, AND A NEW ONSITE SUBSURFACE DRAINAGE SYSTEM.
2. CONSTRUCTION BASELINE STATION 0+00 IS ESTABLISHED AT THE HYDRANT LOCATED IN FRONT OF 833 SARATOGA STREET.
3. THE EXISTING CONDITIONS DEPICTED ON THIS PLAN ARE BASED UPON A PLAN PREPARED BY FRAMINGHAM SURVEY CONSULTANTS INC. ENTITLED "TOPOGRAPHIC PLAN - 839 SARATOGA ST. BOSTON, MA" DATED SEPTEMBER 30, 2019. ELEVATIONS DEPICTED ON THIS PLAN ARE REPORTED TO BE ON THE BOSTON CITY BASE VERTICAL DATUM.
4. THE PARCEL SHOWN IS LOCATED IN ZONE X AND ZONE AE, AS SHOWN ON "FLOOD INSURANCE RATE MAP, SUFFOLK COUNTY, MASSACHUSETTS" PANEL 19 OF 176, MAP NUMBER 25025C0019J, EFFECTIVE DATE MARCH 16, 2016.
5. THE LOCATION AND ELEVATIONS OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, GOVERNING PERMITTING AUTHORITY AND "DIG SAFE" AT 1-888-344-7233 AT LEAST SEVENTY-TWO (72) HOURS (EXCLUDING WEEKENDS AND HOLIDAYS) PRIOR TO ANY EXCAVATION WORK TO REQUEST EXACT FIELD LOCATIONS OF UTILITIES. IF ANY DISCREPANCIES OR CONFLICTS ARE DISCOVERED, THE ENGINEER SHALL BE CONTACTED AND APPROPRIATE REMEDIAL ACTION TAKEN BEFORE PROCEEDING WITH THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
6. ANY DEWATERING ASSOCIATED WITH CONSTRUCTION ACTIVITIES MUST FIRST OBTAIN A DEWATERING DRAINAGE PERMIT FROM THE BWSC. SUCH DISCHARGES SHALL COMPLY WITH THE BWSC, U.S. EPA, MWRA AND OTHER APPROPRIATE AGENCIES. UNDER NO CIRCUMSTANCES SHALL DEWATERING DRAINAGE BE DISCHARGED INTO A SANITARY SEWER.
7. RESTORATION OF ROADWAY AND SIDEWALK SHALL BE IN ACCORDANCE WITH BWSC CONSTRUCTION STANDARDS AND SPECIFICATIONS.
8. ALL FITTINGS SHALL BE ANCHORED BY MECHANICAL MEANS OR BY CONCRETE THRUST BLOCKS, OR BOTH IF REQUIRED BY THE BWSC.
9. ALL WATER, SEWER, AND DRAIN PIPE WORK LOCATED WITHIN TEN (10') FEET OF BUILDING WALL SHALL BE INSTALLED BY A LICENSED PLUMBER. SEE BUILDING PLUMBING PLANS FOR DETAILS.
10. ALL BUILDING SEWER AND BUILDING STORM DRAIN INSTALLATION, REPAIR, OR MAINTENANCE WORK SHALL BE PERFORMED BY A DRAIN LAYER POSSESSING A VALID DRAIN LAYERS LICENSE ISSUED BY THE BWSC.
11. THE FINISHED FLOOR ELEVATION (FFE) IS TO BE HIGHER THAN ANY ADJACENT PUBLIC SIDEWALK.
12. BUILDING STORM DRAIN SHALL BE SOLID WALL, POLYVINYLCHLORIDE (PVC) PIPE, SDR 35 CONFORMING TO ASTM D3034 UNLESS NOTED OTHERWISE. NEW WATER SERVICES SHALL BE TYPE K COPPER.

PLAN LEGEND

GAS VALVE		PROPOSED CORPORATION STOP/ TAPPING SLEEVE AND VALVE	
HYDRANT		PROPOSED DOOR/ENTRY	
CATCH BASIN		PROPOSED FOUNDATION	
WATER VALVE		PROPOSED OVERHANG/ STORIES ABOVE	
DRAIN MANHOLE	D	PROPOSED SUBSURFACE INFILTRATION SYSTEM	
SEWER MANHOLE	S	PROPOSED RETAINING WALL	
UTILITY POLE		PROPOSED DRAIN LINE	D
SPOT ELEVATION	x35.6	PROPOSED FIRE SERVICE	FP
VERTICAL GRANITE CURB	VGC	PROPOSED WATER SERVICE	W
RECORD	(REC)	PROPOSED SEWER SERVICE	S
SEWER LINE	S	PROPOSED CONTOUR	75
WATER LINE		PROPOSED RIM	R=
DRAIN LINE	D	PROPOSED INVERT	I=
GAS LINE	G	PROPOSED CATCH BASIN	
TREE		PROPOSED DOWN SPOUT	DS
CONTOUR	75	PROPOSED SEWER CLEANOUT	PCO
100-YR FLOOD ZONE LIMIT		PROPOSED SPOT GRADE	157.4
RECORD	(REC)	PROPOSED DRAIN BASIN	D
		PROPOSED TOP AND BOTTOM WALL ELEV.	TW=xx BW=xx
		LANDSCAPED AREA	LSA
		PROPOSED COLUMN	C
		FINISHED FLOOR ELEVATION	FFE
		EDGE OF PAVEMENT	EOP

INSPECTION SIGN-OFF SCHEDULE

ITEM NO.	DESCRIPTION	QTY.	BWSC INSPECTOR / DATE	COMMENTS
A	ZINC COATED 6" DUCTILE IRON (CL56) FIRE PIPE W/ TAPPING SLEEVE AND VALVE	1		
B	INSTALL 1" WATER METER	1		
C	2" COPPER TYPE K DOMESTIC WATER SERVICE AND CORP. STOP	1		
D	6" PVC SDR35 SEWER SERVICE	1		
E	PROPOSED SEWER CLEANOUT	1		
F	DEEP SUMP CATCH BASIN W/ OIL TRAP (CB-1)	1		
G	PROPOSED SUBSURFACE INFILTRATION SYSTEM (180HD CULTEC CHAMBERS)	1		
H	CONNECT ALL PROPOSED ROOF DRAINS TO SUBSURFACE INFILTRATION SYSTEM	1		
I	DYE TEST NEW SEWER SERVICE	1		
J	CUT AND CAP EXISTING WATER SERVICE: REMOVE EXISTING WATER GATE AND ROADWAY BOX	1		
K	RETURN EXISTING 5/8" WATER METER TO BWSC	1		
L	CUT AND CAP EXISTING SEWER SERVICE	1		
M	AS-BUILT PREPARATION FEE			

SIZING OF DRAINAGE SYSTEM

QUANTITY OF PROPOSED ONSITE IMPERVIOUS SURFACES (SF)

SITE FEATURE	AREA (SF)
BUILDING(S):	3,282 SF
DRIVEWAY(S), WALKWAY(S) & PATIO(S):	1,415 SF
GRASSED AREA / LANDSCAPING:	303 SF
TOTAL IMPERVIOUS AREA ONSITE: (EXCLUDES PERMEABLE PAVER SURFACES)	4,697 SF

REQUIRED STORAGE VOLUME (1-INCH OVER TOTAL IMPERVIOUS AREA) (CF)

= (1-INCH) X (1 FOOT/12 INCHES) X (IMPERVIOUS AREA)
= (1-INCH) X (1 FOOT/12 INCHES) X (4,697 SF)
= 391 CF

VOLUME CALCULATION FOR SUBSURFACE INFILTRATION SYSTEM (CF)

VOLUME WITHIN CULTEC 180HD CHAMBERS
=(VOLUME WITHIN ONE 180HD CHAMBER) X (NO. CHAMBERS)
=(21.8 CF /CHAMBERS) X (6 CHAMBERS)
=180 CF

VOLUME OF VOIDS IN STONE SURROUNDING DRYWELL (ASSUME 30% VOID RATIO)
=TOTAL VOLUME OF EXCAVATION
=(11.5 FT WIDE) X (30.5 FT LONG) X (2.7 FT DEEP)
=950 CF

-VOLUME OF CHAMBERS
= 180 CF

-TOTAL VOLUME OF STONE
=VOLUME OF EXCAVATION - VOLUME OF CULTEC CHAMBERS
=950 CF - 180 CF
= 770 CF

-TOTAL VOLUME OF STONE VOIDS (30%)
=770 CF X 0.3
=231 CF

TOTAL VOLUME PROVIDED IN SUBSURFACE INFILTRATION SYSTEM:
=DRYWELL VOLUME + VOID IN STONE VOLUME
=180 CF + 231 CF
=411CF

411 CF (PROVIDED) > 391 CF (REQUIRED)

FOR BWSC USE ONLY

BWSC SP #21077

RJOC

NO.	DATE	REVISION
2	03/24/2021	MODIFIED INFILTRATION SYSTEM
1	03/16/2021	BWSC COMMENTS DATED 03/11/2021

PREPARED BY:
RJO'CONNELL & ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS
80 MONTVALE AVENUE, SUITE 201 STONEHAM, MA 02180
PHONE: 781.279.0180 RJOCONNELL.COM

PREPARED FOR:
839 SARATOGA STREET LLC.
PO BOX 638
WINCHESTER, MA 01890

PROJECT NAME:
839 SARATOGA STREET
BOSTON, MA

SEAL:
COMMONWEALTH OF MASSACHUSETTS
BRIAN W. TIMM
No. 48120
CIVIL
REGISTERED PROFESSIONAL ENGINEER
3/24/2021

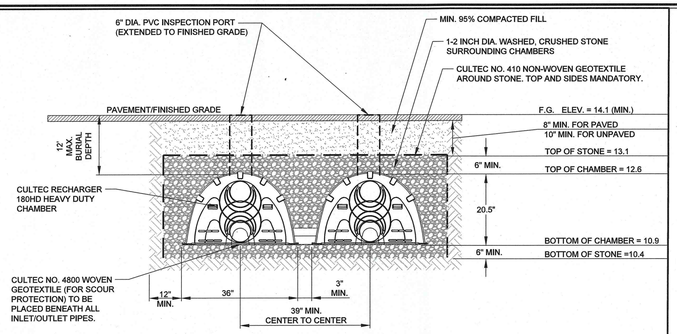
DESIGNED BY:	TRG/CMM
DRAWN BY:	CMM
REVIEWED BY:	BWT
SCALE:	1" = 10'
DATE:	02/16/2021

DRAWING NAME:
GRADING AND DRAINAGE PLAN

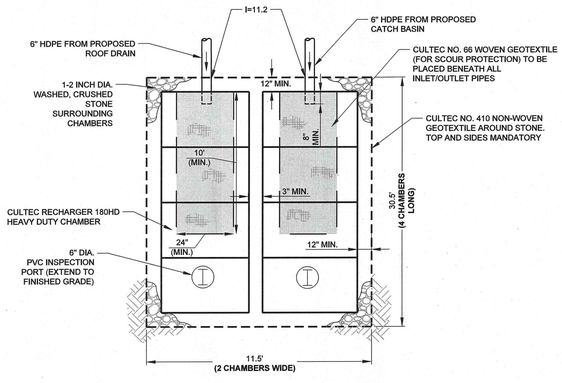
DRAWING NUMBER:
C-1

PROJECT NUMBER:
20155

Drawing name: G:\MA\Boston\Volnay Capital\839 Saratoga Street\Main\20155 C-1 Grading and Drainage Plan.dwg
Mar 24, 2021 - 14:46pm



SECTION VIEW

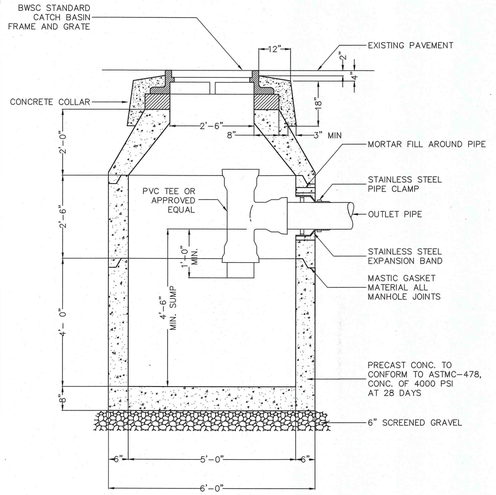


PLAN VIEW

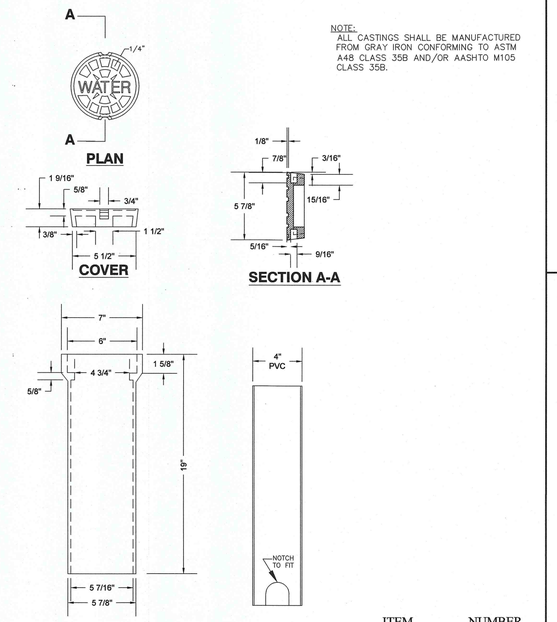
GENERAL NOTES

1. CONTACTOR 180HD BY CULTEC, INC. OF BROOKFIELD, CT. THE CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. ALL CHAMBERS MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.
2. CONTRACTOR SHALL INSTALL THE SYSTEM ACCORDING TO CULTEC, INC.'S CURRENT RECOMMENDED INSTALLATION GUIDELINES. CALL CULTEC, INC. AT (800) 428-5832 TO ARRANGE A PRE-CONSTRUCTION MEETING.
3. CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".

PROPOSED SUBSURFACE INFILTRATION SYSTEM - EIGHT 180HD CULTEC CHAMBERS
SCALE: N.T.S.



Boston Water and Sewer Commission	CATCH BASIN WITH OIL TRAP OUTLET	DATE:	DETAIL NO.
980 HARRISON AVE., BOSTON, MA 02119 (617) 989-7000 www.bwsc.org	Scale: Not To Scale	June 30, 2012	B-01g

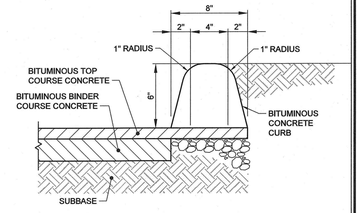


NOTE:
ALL CASTINGS SHALL BE MANUFACTURED FROM GRAY IRON CONFORMING TO ASTM A48 CLASS 35B AND/OR AASHTO M105 CLASS 35B.

ITEM	NUMBER
COVER	99460000
TOP SECTION	99460001

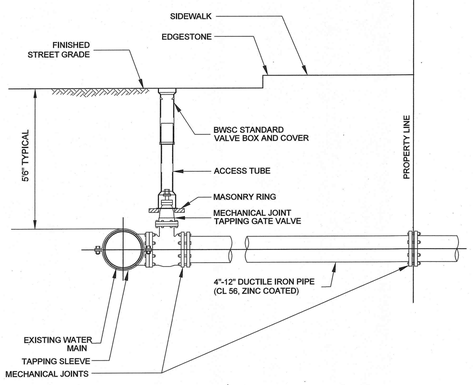
Boston Water and Sewer Commission	WATER SERVICE ROADWAY BOX	DATE:	DETAIL NO.
980 HARRISON AVE., BOSTON, MA 02119 (617) 989-7000 www.bwsc.org	Scale: Not To Scale	NOV 20, 2014	F2-09

NOTE:
1. BITUMINOUS CONCRETE FOR CURBING SHALL BE CLASS I CONFORMING TO THE APPLICABLE REQUIREMENTS FOR DENSE MIX IN SECTION M3.11.03, TABLE A, OF THE MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
2. THE BITUMINOUS CONCRETE MIXTURE SHALL BE PLACED AND COMPACTED WITH A MACHINE CAPABLE OF SPREADING THE MIXTURE TRUE TO LINE AND GRADE AND TO THE SHAPE STIPULATED.
3. IF AT ANY TIME BEFORE ACCEPTANCE OF THE WORK ANY SOFT OR IMPERFECT SPOTS DEVELOP IN THE EXPOSED SURFACE OF THE CURB, THAT PORTION OF THE CURB SHALL BE REMOVED AND REPLACED WITH NEW CURBING AT NO COST TO THE OWNER.

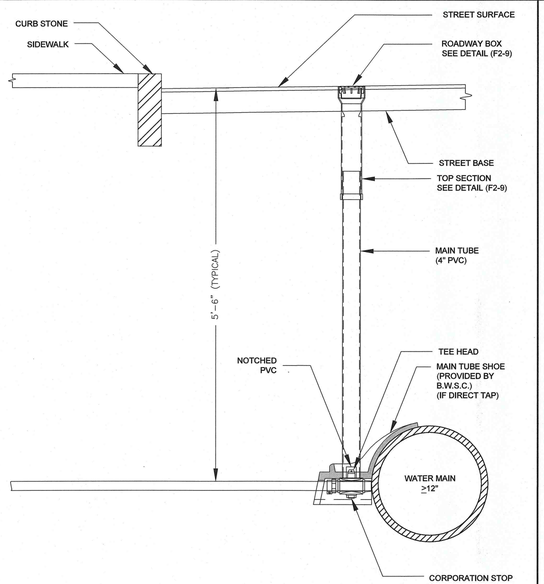


BITUMINOUS CONCRETE CURB DETAIL
SCALE: N.T.S.

NOTES:
1. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH
2. USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE
3. SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS

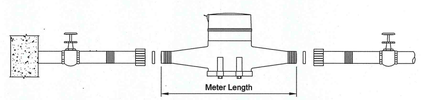


Boston Water and Sewer Commission	TYPICAL WATER PIPE CONNECTION WITH TAPPING SLEEVE AND GATE VALVE	DATE:	DETAIL NO.
980 HARRISON AVE., BOSTON, MA 02119 (617) 989-7000 www.bwsc.org	Scale: Not To Scale	June 30, 2012	A-09



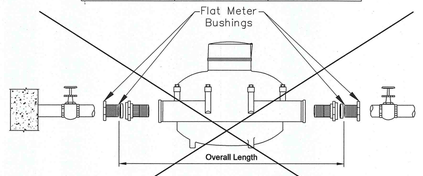
Boston Water and Sewer Commission	TYPICAL WATER CONNECTION FOR 1-1/2 AND 2-INCH SERVICE PIPES TO 12"-16" WATER MAINS	DATE:	DETAIL NO.
980 HARRISON AVE., BOSTON, MA 02119 (617) 989-7000 www.bwsc.org	Scale: Not To Scale	NOV 20, 2014	A-11a

Note The Direction of The Meter Couplings



SIZE	LENGTH	FLOW GPM
5/8"	7 1/2"	1/2-20
3/4"	9"	3/4-30
1"	10 3/4"	1-50

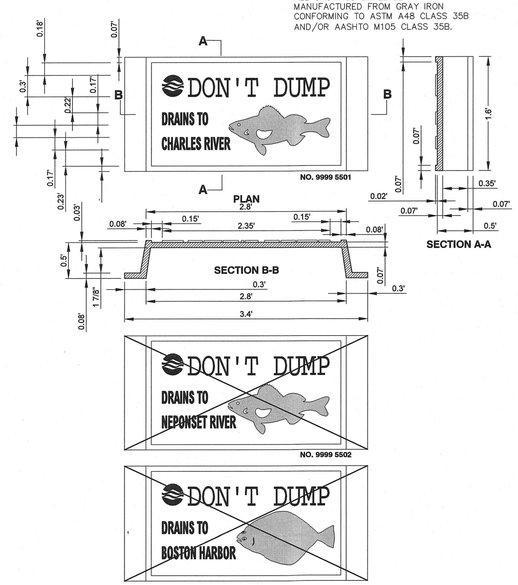
Flat Meter Bushings



SIZE	METER LENGTH	OVERALL	FLOW GPM
1 1/2"	12 5/8"	17"	2-100
2"	15 1/4"	20"	2 1/2-160

Boston Water and Sewer Commission	INSTALLATION OF WATER METERS (5/8" - 2")	DATE:	DETAIL NO.
980 HARRISON AVE., BOSTON, MA 02119 (617) 989-7000 www.bwsc.org	Scale: Not To Scale	May 8, 2019	M-03B

NOTE:
ALL CASTINGS SHALL BE MANUFACTURED FROM GRAY IRON CONFORMING TO ASTM A48 CLASS 35B AND/OR AASHTO M105 CLASS 35B.



Boston Water and Sewer Commission	8X14 CATCH BASIN SIGN	DATE:	DETAIL NO.
980 HARRISON AVE., BOSTON, MA 02119 (617) 989-7000 www.bwsc.org	Scale: Not To Scale	JAN. 17, 2014	F1-D23

BWSC SP #21077

RJOC

NO.	REVISION	DATE
2	MODIFIED INFILTRATION SYSTEM	03/24/2021
1	BWSC COMMENTS DATED 03/11/2021	03/16/2021

PREPARED BY:
RJO'CONNELL & ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS
80 MONTVALE AVENUE, SUITE 201 STONEHAM, MA 02180
PHONE: 781.279.0180 RJOCONNELL.COM

PREPARED FOR:
839 SARATOGA STREET LLC.
PO BOX 638
WINCHESTER, MA 01890

PROJECT NAME:
839 SARATOGA STREET
BOSTON, MA

SEAL:
COMMONWEALTH OF MASSACHUSETTS
BRIAN W. TIMM No. 48120 CIVIL REGISTERED PROFESSIONAL ENGINEER
1/27/2021

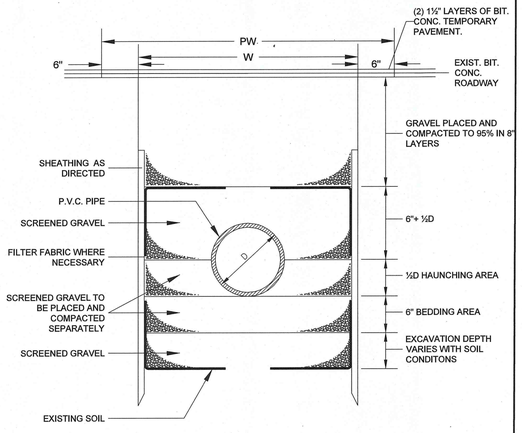
DESIGNED BY:	CMM
DRAWN BY:	CMM/MCR
REVIEWED BY:	BWT
SCALE:	N.T.S.
DATE:	02/16/2021

DRAWING NAME:
DETAILS I

DRAWING NUMBER:
C-2

PROJECT NUMBER:
20155

Drawing name: G:\MA\Boston\Vohay Capital\839 Saratoga Street\Main\20155 C-2 Details.dwg
Mar 24, 2021 - 14:46pm



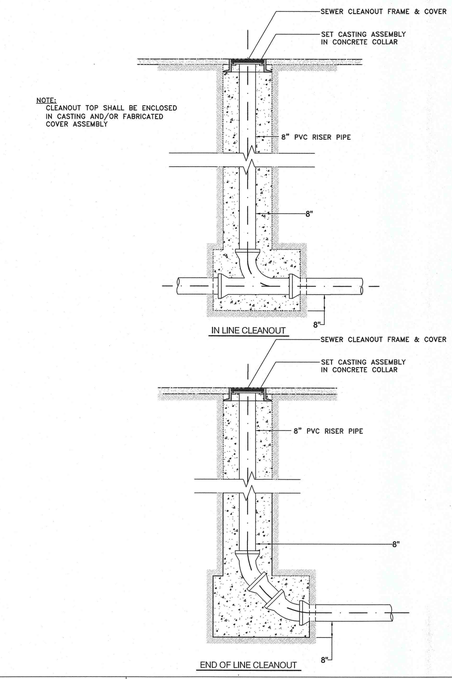
W = MAXIMUM TRENCH WIDTH
PW = MAXIMUM PAVING WIDTH = W+1'-0"
D = OUTSIDE DIAMETER
UNSHEATHED TRENCH: W = D+2' (3'-0"MIN.)
SHEATHED TRENCH: W = D+2'+ SHEATHING WIDTH:
4'-0"MIN. W/0 WALERS
5'-0"MIN. WWALERS
TRENCH BOX OR HYDRAULIC SHORING:
W = D+2'+ [WALL SHIELD WIDTH ± 8"] + 1' FOR TRENCH BOX

Boston Water and Sewer Commission
980 HARRISON AVE., BOSTON, MA 02119
(617) 989-7000 www.bwsc.org

TRENCH DETAIL FOR PVC PIPE
Scale: Not To Scale

DATE: June 30, 2012

DETAIL NO. B-09



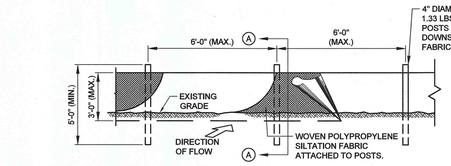
NOTE:
CLEANOUT TOP SHALL BE ENCLOSED IN CASTING AND/OR FABRICATED COVER ASSEMBLY

Boston Water and Sewer Commission
980 HARRISON AVE., BOSTON, MA 02119
(617) 989-7000 www.bwsc.org

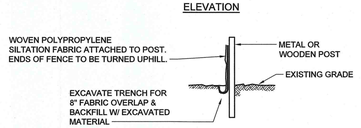
WYE CLEANOUT
Scale: Not To Scale

DATE: Sept. 30, 2012

DETAIL NO. B-17



ELEVATION

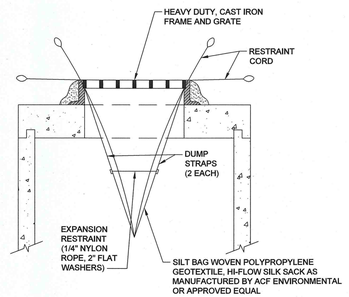


SECTION A-A

NOTES:

1. IN AREAS WHERE ANCHOR TRENCH CANNOT BE DUG, FABRIC WILL BE LAID ON SURFACE AND COVERED WITH 6" (MINIMUM DEPTH) OF SOIL.
2. SILTATION FENCING AS MANUFACTURED BY ACF ENVIRONMENTAL OR APPROVED EQUAL.
3. SILTATION FENCING SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURE'S SPECIFICATIONS.
4. INSPECTIONS SHALL BE PERFORMED PER THE INSPECTION REQUIREMENTS AS OUTLINED IN THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) IN THE ABSENCE OF A SWPPP. INSPECTIONS SHALL OCCUR AT LEAST ONCE EVERY SEVEN (7) CALENDAR DAYS AND WITHIN 24 HOURS OF A RAIN STORM EVENT OF 0.25 INCHES OR GREATER. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.

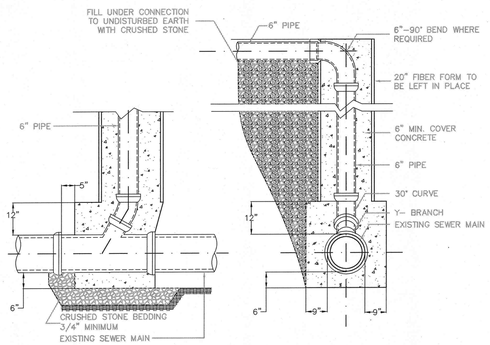
TYPICAL SILTATION FENCE DETAIL
SCALE: N.T.S.



NOTES:

1. INSTALL SILT BAG IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. WHEN EXPANSION RESTRAINT CORD IS NO LONGER VISIBLE, THE SILT BAG IS FULL AND SHOULD BE EMPTIED OR REPLACED.
3. REMOVE SILT BAG PER MANUFACTURER'S INSTRUCTIONS.

TYPICAL FILTER BAG DETAIL
SCALE: N.T.S.

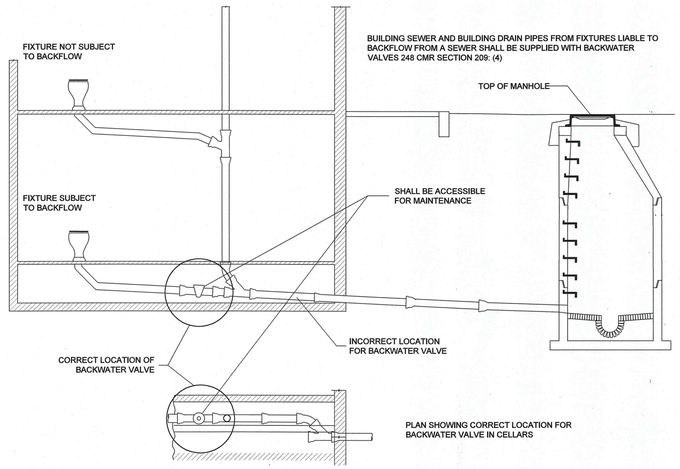


Boston Water and Sewer Commission
980 HARRISON AVE., BOSTON, MA 02119
(617) 989-7000 www.bwsc.org

TYPICAL SEWER CHIMNEY
Scale: Not To Scale

DATE: Sept. 30, 2012

DETAIL NO. B-15



NOTE:
ALL PLUMBING FIXTURES BELOW THE LEVEL OF THE TOP OF THE MANHOLE OF THE SEWER SERVICING THE FIXTURE(S) SHALL BE CONSIDERED AS BEING SUBJECT TO BACKFLOW AND SHALL BE SUPPLIED WITH BACKWATER VALVES.

Boston Water and Sewer Commission
980 HARRISON AVE., BOSTON, MA 02119
(617) 989-7000 www.bwsc.org

LOCATION OF BACKWATER VALVES IN CELLARS
Scale: Not To Scale

DATE: Sept. 30, 2012

DETAIL NO. B-14

RJOC

NO.	REVISION	DATE
2	MODIFIED INFILTRATION SYSTEM	03/24/2021
1	BWSC COMMENTS DATED 03/11/2021	03/16/2021

PREPARED BY:
RJO'CONNELL & ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS
80 MONTVALE AVENUE, SUITE 201 STONEHAM, MA 02180
PHONE: 781.279.0180 RJOCONNELL.COM

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839 SARATOGA STREET LLC.
PO BOX 638
WINCHESTER, MA 01890

PROJECT NAME:
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BOSTON, MA

SEAL:
COMMONWEALTH OF MASSACHUSETTS
BRIAN W. TIMM
No. 48120
CIVIL
REGISTERED PROFESSIONAL ENGINEER
3/24/2021

DESIGNED BY:	CMM
DRAWN BY:	CMM/MCR
REVIEWED BY:	BWT
SCALE:	N.T.S.
DATE:	02/16/2021

DRAWING NAME:
DETAILS I

DRAWING NUMBER:
C-3

PROJECT NUMBER:
20155

BWSC SP #21077

Drawing name: G:\MA\Boston\Volnay Capital\839 Saratoga Street\Main\20155 C-3 Details.dwg
Mar 24, 2021 - 14:47pm

Operation and Maintenance Plan (O&M)

839 Saratoga Street
Boston, MA 02128

Prepared by:

RJ O'CONNELL & ASSOCIATES, INC.
80 Montvale Ave, Suite 201
Stoneham, MA 02180

Date:

February 16, 2021

Revised:

March 24, 2021

Table of Contents

Appendix – Maintenance and Inspection Forms

1.0 Introduction

This Operation and Maintenance Plan has been prepared to ensure that the stormwater management system implemented for 839 Saratoga Street, Boston, Massachusetts functions as designed. It has also been prepared to develop and carry out suitable practices for source control and pollution prevention. It consists of three sections:

Section 1 – Introduction

Section 2 – Stormwater Management System Operation and Maintenance (O&M)
Describes the various components of the stormwater management system, identifies the inspection and maintenance tasks to be undertaken after construction is complete, and includes a schedule for implementing these tasks to ensure the proper long-term operation of the system.

Section 3 – Long Term Pollution Prevention Plan (LTPPP)
Identifies and implements suitable measures, practices, and procedures for source control and pollution prevention.

2.0 Stormwater Management System Operation and Maintenance (O&M)

The objectives of the stormwater management system are to effectively control and treat stormwater runoff from the site in accordance with the City of Boston requirements for On-Site Drainage (Stormwater Management). To accomplish this objective, the following Best Management Practices (BMPs) are included in the stormwater management system:

Treatment BMP

- Subsurface infiltration system to reduce the potential for flooding.
- Catch Basin to reduce the potential for flooding and to provide water quality improvements.

In consideration of the foregoing, it is the ongoing responsibility of the Landowner and his/her successors and assignees to adequately maintain the on-site stormwater management/BMP facilities. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions.

Based on this, the Landowner and his/her successors and assignees will be responsible for implementing the Operation and Maintenance Plan. Upon transfer of ownership of the property, the Landowner is required to notify the new owner of the presence of the stormwater management system and the requirements of this Operation and Maintenance Plan.

Property Information
Address: 839 Saratoga Street
Boston Massachusetts, 02128

Responsibilities of Landowner: Coordinate all aspects of the Operation and Maintenance Plan, coordinate and hire any other Pollution Prevention Team members in order to conduct inspections, keep all records, and coordinate with contractors for maintenance and repairs of the stormwater management system.

Day to Day Operator/Site Contractor
Company Name: TBD
Contractor Contact: TBD
Phone: TBD

Spill Prevention & Control Contractor
Primary Contact: TBD
Company Name: TBD
Phone: TBD

Emergency Contact: TBD
Company Name: TBD
Phone: TBD

Consultant Contact: TBD
Company Name: TBD
Phone: TBD

Department of Environmental Protection (DEP) Contact
Spill Emergency Coordinator
Contact Name: TBD
Phone: TBD

Municipal Contact
Contact Name: John Dempsey, Fire Chief
Phone: 617-343-3550

Other Pollution Prevention Team Members
Member: Qualified Engineering and/or Environmental Consulting Firm(s)

Responsibilities: Conduct scheduled inspections, maintain records, advise the Landowner of maintenance needs, ensure inspection maintenance and repairs are completed, and keep and maintain all records and inspection reports. A copy of all reports shall be kept on the site at a designated location at all times.

Company Name: TBD
Address: TBD
Phone: TBD

Team Member Training
The Landowner will coordinate an annual in-house training session with the qualified Engineering and/or Environmental Consulting Firm to discuss the Operation and Maintenance Plan, ongoing inspections, and maintenance and preventative maintenance procedures.

Annual training sessions will generally include the following:

- Discuss the Operation and Maintenance Plan
    - What it is – identify potential sources of stormwater pollution and methods of reducing or eliminating that pollution.
    - What it contains – emphasize good housekeeping measures and location of potential pollution sources.
    - Pollution Prevention Team – introduce the team and responsibilities, explain that the goal is to continually monitor the stormwater management system and encourage input and assistance from all.
- Review and explain the storm drainage system, how it works, and its components.
- Emphasize the importance of maintaining current and up-to-date inspection reports and maintenance records of BMPs. Documentation shall include any changes to the Operation and Maintenance Plan's procedures to accommodate changes and revisions to BMPs.

The components of the stormwater management system must be inspected, monitored, and maintained as explained below in order to ensure that the on-site stormwater management/BMP facilities are functioning as designed. Routine inspection and proper maintenance of these individual components is essential to providing the long-term enhancement of both the quality and quantity of runoff to the subsurface infiltration system.

Site Clean-Up:
Routine sweeping of paved areas is an effective method to provide important nonpoint source pollution control and will be performed regularly. Most stormwater pollutants travel with the suspended solids contained in the stormwater runoff, and regular sweeping will help reduce a portion of this load. Sweeping and site clean-up, especially during the period immediately following winter snowmelt (March/April), when sand and other debris has accumulated on the pavement, will capture a peak sediment load before spring rains wash that sand and debris into the stormwater management system, and/or off the site.

Inspection: Paved areas will be inspected for litter on a weekly basis, picked up, and properly disposed of immediately.

Maintenance: All paved areas will be picked up and swept clean of sand, litter, trash, etc. on a regular basis. Clean-up services will be conducted at least twice a year, once between October and December (after leaf fall), and once during the month of March or April (after snow melt). Additional cleanup services will be conducted as necessary.

Subsurface Infiltration System:
Subsurface infiltration systems are underground structures designed to temporarily store runoff and allow it to slowly infiltrate into the ground.

- (System 1) This system consists of plastic Cultec chambers surrounded by 1-1/2 to 2-inch angular, washed stone wrapped in filter fabric. To ensure proper functioning of these structures, they will be inspected and maintained as follows:

  Inspection: Inlets and riser pipe are to be inspected biannually and after major storm events (3.8 inches or more in a 24-hour period).

  Maintenance: Maintenance should be minimal since runoff is primarily from the roof of the building (roof runoff is considered clean). If there is a visible build-up of sediment (6 inches), it should be jet vacuumed by a licensed contractor and disposed of in accordance with applicable local, state, and federal guidelines and regulations.

Catch Basin:

Stormwater runoff from pavement areas is directed to a catch basin via site grading. The catch basin will be equipped with a deep (4 foot) sump and an oil/gas trap hood. The sump is designed to capture sediment and coarse particles and the hood prevents hydrocarbons and other floatable debris from entering the infiltration system. To ensure proper functioning of the catch basin, it will be inspected and maintained as follows:

Inspection: Quarterly and after major storm events (2.0 inches or more in a 24-hour period). Structural damage and other malfunctions are to be noted and reported. The catch basin shall also be inspected during every major rain event to ensure the grate is not clogged and is functioning properly.

Maintenance: To be cleaned 4-times a year by a licensed contractor. Sediment and hydrocarbons will be properly handled and legally disposed of offsite in accordance with local, state, and federal guidelines and regulations. Any structural damage to the catch basin and/or castings will be repaired upon discovery.

3.0 Long Term Pollution Prevention Plan (LTPPP)

3.1 Materials Covered

The following materials or substances are expected to be present on-site after construction:

Cleaning solvents	Detergents
Paints	Solid waste
Pet waste	

3.2 Materials Management Practices

The following materials management practices will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The Landowner will be responsible for ensuring that these procedures are followed.

1. Good Housekeeping
   a) An effort will be made to store only enough products required to do the job.
   b) All materials stored on-site will be stored in a neat, orderly manner and under a roof or in a containment area if possible. At a minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
   c) Products will be kept in their original containers with the original manufacturer's label in legible condition.
   d) Substances will not be mixed with one another unless recommended by the manufacturer.
   e) Whenever possible, all of a product will be used prior to disposal of the container.
   f) Manufacturer's recommendations for proper use and disposal will be followed.

g) The Landowner will be responsible for regular inspections to ensure proper use and disposal of materials.

2. Hazardous Substances
   Safety Data Sheets (SDSs) for each product with hazardous properties that is used at the site will be obtained and used for the proper management of potential wastes that may result from these products. An SDS will be posted in the immediate area where such a product is stored and/or used.
   a) SDSs will be procured and used for each product.
   b) If surplus product must be disposed of, the manufacturer's and local/state/federal required methods for proper disposal must be followed.

3. Cleaning Solvents, Detergents, and Paints
   All containers will be tightly sealed and stored when not in use. Excess cleaning solvents, detergents, and points will not be discharged to the stormwater system but will be properly disposed of according to manufacturer's instructions and local/state/federal regulations.

4. Solid Waste
   All waste materials will be collected and stored in an appropriately covered container and/or securely contained metal dumpster rented from a licensed local solid waste management company. The dumpster will comply with all local and state solid waste management regulations. The waste containers will be emptied a minimum of once per week, or more often if necessary. All waste containers will be located in an area where the likelihood of the containers contributing to stormwater discharges is negligible.

5. Pet Waste
   The site will be inspected weekly for pet waste. Pet waste will be collected, placed in a closed, tied trash bag, and disposed of in accordance with applicable code requirements.

3.3 Spill Prevention and Response Procedures

It shall be the responsibility of the Landowner to be properly trained in spill prevention and the proper handling and cleanup procedures for hazardous substances and oil. No spilled hazardous substances or oil will be allowed to come in contact with stormwater discharges. If such contact occurs, the stormwater discharge will be contained on-site until appropriate measures in compliance with local, state, and federal regulations are taken to dispose of such contaminated stormwater.

1. In order to prevent or minimize the potential for a hazardous substances or oil spill to come into contact with stormwater, the following steps will be implemented:
   a) All hazardous substances and oil will be stored in a secure location, with their lids on, preferably under cover, when not in use.
   b) The minimum practical quantity of all such materials will be kept on-site.
   c) 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.

d) Manufacturer's recommended methods for spill cleanup will be clearly posted and the Landowner will be trained regarding these procedures and the location of the information and cleanup supplies.
e) It is the Landowner's responsibility to ensure that any hazardous substances on-site are disposed of properly by a licensed hazardous material disposal company. The Landowner is responsible for not exceeding hazardous substance storage requirements mandated by the EPA or state or local authority.

2. In the event of a spill of hazardous substances or oil, the following procedures must be followed:
   a) All measures must 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 must be kept well ventilated and personnel must wear appropriate protective clothing to prevent injury from contact with the hazardous substances.
   b) 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 circumstance dictates that the spill should be treated by a professional emergency response contractor.
   c) For spills greater than five (5) gallons of material, immediately contact the City Fire Chief, John Dempsey, at 617-343-3550, the MA DEP Hazardous Waste Incident Response Group at 617-792-7653, 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. Then proceed with prevention, containment and/or clean-up if so desired.
   d) If there is a Reportable Quantity (RQ) release, then the National Response Center will be notified immediately at 800-424-8802. Within 14 days a report will 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 must be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

3. The Landowner will be the spill prevention and response coordinator.

4.0 Snow Management

Snow management will be overseen by the Property Manager who will implement this plan and be authorized to utilize additional resources should unusual events occur. The Snow Management Contractor (SMC) shall be responsible for maintaining all driveway/parking areas and pedestrian access areas for clear and safe travel. The SMC shall report directly to the Property Manager and maintain communication via cell phones 24 hours per day, 7 days per week. During extreme events, the first priority will be to clear and maintain walkways both on and off site to provide proper access for residents and to clear the area surrounding the nearest public fire hydrant. The next priority will be the driveway and parking areas. Snow shall not be piled around light bases, fire hydrants, or catch basin(s) on and near the Site. Snow shall be either transported off site or piled under the covered parking area (not over the infiltration system).

The anti-icing operations typically precede snow plowing and will be provided when conditions warrant. Within 12 months of concrete walks, pads, or other features being poured, no salt shall be placed on those surfaces. After the materials have cured for 12 months, a combination of calcium chloride deicers and sand (“washed”, fine to medium grade) shall be utilized. Parking areas shall receive spot treatment only when and where needed in a similar manner.

Due to the nature of the Site, snow plowing is not anticipated to occur on this Site. Any snow removal will occur via hand removal (shoveling). Snow shall be deposited in appropriate snow storage areas outside of the Land Subject to Coastal Storm Flowage. In addition, it is extremely important not to pile snow over the catch basin located in the rear of the Site nor over the infiltration system. The SMC shall keep the new catch basin open for drainage or water resulting from melting.

STANDARD 10 - ILLICIT DISCHARGE STATEMENT

Certain types of discharges are allowable under the U.S. Environmental Protection Agency Construction General Permit, and it is the intent of this Operations and Maintenance Plan (O&M Plan) and Long Term Pollution Prevention Plan (LTPPP) to allow such discharges. 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 O&M and LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Illicit discharges, if they exist currently, shall be contained and eliminated in the manner specified by local, state and federal regulations, and will be prohibited in the proposed development.

Owner/Responsible Party

02-16-2021

Date

APPENDIX

Maintenance and Inspection Forms

839 Saratoga Street
Operation and Maintenance Plan (O&M)
Activity Guide

The table below indicates the minimum inspection and maintenance activities the Landowner needs to conduct for the Operation and Maintenance Plan. It also indicates who is responsible for each activity. The Activity Guide is provided to assist the Landowner and ensure that the activities are being conducted as scheduled.

Timing	Activity	Responsible Party
Weekly	Inspect lot/land Pet waste management	Landowner Landowner
Biannually	Inspect and clean subsurface infiltration system, and Catch Basin	Landowner/Contractor
Annually	Comprehensive annual stormwater evaluation and inspection report	Landowner
March/April	Spring clean-up	Landowner/Contractor
Between October and December	Fall clean-up	Landowner/Contractor

839 Saratoga Street
Operation and Maintenance Plan (O&M)
Comprehensive Annual Evaluation and Inspection Report

Once a year, the Landowner must inspect and evaluate all aspects and provisions of the Operation and Maintenance Plan, complete the following report, and keep a copy on file at the site.

Inspector/Reviewers:_____

Date of Inspection/Review:_____

Note any changes to the Plan in the space below and in the appropriate section of the Plan.

1. Review the Pollution Prevention Team list and update as necessary.
   Does the Pollution Prevention Team list need updating: (circle one) Yes No

2. Review the Operation and Maintenance Plan (O&M) and update as necessary.
   Does the O&M need updating: (circle one) Yes No

3. Review the Inspection Checklists and the Spill and Leak History and update as necessary.
   Do the Inspection Checklists or the Spill and Leak History need updating: (circle one) Yes No

4. Review the site drawings and update as necessary.
   Do the site drawings need updating: (circle one) Yes No

Requested Changes (attach revisions)

839 Saratoga Street
Operation and Maintenance Plan (O&M)
Weekly Inspection Checklist

The following will be checked each week for sources of pollutants by the Landowner. If the condition in the "Action" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of this checklist each week.

Date: _____ **Checklist completed by**: _____

BMP/LOCATION	ACTION	DESCRIPTION OF PROBLEM	CORRECTIVE MEASURES TAKEN
Perimeter of property	Inspect for debris, trash, and pet waste		
Landscaped areas	Inspect for debris, trash, and pet waste		

839 Saratoga Street
Operation and Maintenance Plan (O&M)
Quarterly Inspection Checklist

The following will be checked each quarter for sources of pollutants by the Landowner. If the condition in the "Action" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of this checklist each quarter.

Date: _____ **Checklist completed by**: _____

BMP	ACTION	DESCRIPTION OF PROBLEM	CORRECTIVE MEASURES TAKEN
Catch Basin	Inspect for trash, excessive sediment in sump, grate (securely fastened and clear of debris)		

839 Saratoga Street
Operation and Maintenance Plan (O&M)
Biannual Inspection Checklist

The following will be checked biannually for sources of pollutants by the Landowner. If the condition in the "Action" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of this checklist biannually.

Date: _____ **Checklist completed by**: _____

BMP	ACTION	DESCRIPTION OF PROBLEM	CORRECTIVE MEASURES TAKEN
Subsurface infiltration system	Inspect and clean or otherwise address clogged pipes, trash, oil sheen, excessive sediment, structural damage		
Catch Basin	Inspect for trash, excessive sediment in sump, grate (securely fastened and clear of debris)		

839 Saratoga Street
Operation and Maintenance Plan (O&M)
Annual Inspection Checklist

The following will be checked annually for sources of pollutants by the Landowner. If the condition in the "Action" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of this checklist annually.

Date: _____ **Checklist completed by**: _____

BMP	ACTION	DESCRIPTION OF PROBLEM	CORRECTIVE MEASURES TAKEN
Comprehensive annual stormwater evaluation and inspection report	Complete evaluation and prepare inspection report		

839 Saratoga Street
Long Term Pollution Prevention Plan (LTPPP)
Spill and Leak History
(_____ to _____)

Date	**Spill**	**Leak**	**Location**	**Description**				**Response Procedures**	**Measures to Prevent Reoccurrence**	**Reporting PPT Member**
(MM/DD/YY)	*(check one)*		*(as indicated on Site Map)*	*Type of Material*	*Quantity*	*Source, if known*	*Reason*			