



Eaglebrook Engineering & Survey, LLC

Civil Engineers, Land Planners and Land Surveyors

April 4, 2017

John Sarkis
Sarkis Development Company
2 Elm Square
Andover, MA 01810

Re: 470 Boston Street
Topsfield, MA

Dear Mr. Sarkis,

On Monday April 3, 2017 Eaglebrook Engineering & Survey conducted a deep hole soil observation at 470 Boston Street in Topsfield Massachusetts. The test pit was excavated in undisturbed soil in the northwest corner of underground infiltration system #1, between the staked corner of the system and test pit 11 as identified on Allen & Major Associates Test Pits Plan, TPP-1, dated 3-16-2017. On site to perform the evaluation were Alexander Parker and myself. On site to observe the evaluation were Paula Thompson of Beals And Thomas, Inc. and David Bond from the Town of Topsfield.

The excavation started at approximately 10:15am once all parties were present. The soil evaluation was performed in accordance with MADEP Title 5 procedures, 310 CMR 15.102 and 15.103.

The attached Soils Suitability Assessment Report details the soil profile evaluated on site. The soil profile consisted of a Sandy Loam A horizon from 0"-16"; Sandy Loam B horizon from 16"-28"; gravelly fine to coarse Sand C1 horizon from 28"-54"; very fine to fine Sand C2 horizon from 54"-121"; and a gravelly Sandy Loam C3 horizon from 121"-143". Water weeping from the face of the excavation was observed at 128" below grade. Prominent soil mottling was observed at a depth of 136". Due to the instability of the excavation, a detailed examination of the face of the test pit between 128" and 136" to determine the upper limit of soil mottling was not feasible. The current USGS groundwater well map indicates that the Topsfield USGS well is much above normal, greater than 90th percentile, so the actual estimated seasonal high groundwater table is likely at a depth between 128" and 136", but we agreed that a conservative approach was to assign the observable weep at 128" as the seasonal high groundwater elevation.

The elevation of the estimated seasonal high groundwater at the test pit is approximately 57.8' based on the topography on the Allen & Major test pits plan. The depth to seasonal

Read at 4/4/17 PB mang



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high groundwater and elevation is consistent with the results from Eaglebrook's previous soil evaluations performed in July 2016.

If you need any additional information or have any questions do not hesitate to call.

Sincerely,

Kenneth C. Knowles, P.E., CSE#1247
Principal

Cc: Ryan Bianchetto, Allen & Major Associates

SOIL SUITABILITY ASSESSMENT REPORT

COMMONWEALTH OF MASSACHUSETTS

TOPSFIELD, MASSACHUSETTS

SOIL EVALUATION FOR DETERMINATION OF SEASONAL HIGH GROUNDWATER TABLE ELEVATION

SITE INFORMATION

Topsfield Assessor's Parcel ID: 7-3

Date: April 03, 2017

Street Address: 470 Boston Street Town: Topsfield State: Massachusetts Zip Code: 01983 County: Essex

Land Use: Undeveloped; open meadow Latitude: ~42° 39' 50.1" N Longitude: ~70° 55' 51.1" W

PUBLISHED SOIL DATA AND MAP UNIT DESCRIPTION

Physiographic Division: Appalachian Highlands Physio. Province: New England Physio. Section: Seaboard lowland section

NRCS/USDA web soil survey: Essex County, Massachusetts, Northern part Map Scale: 1:300'

Soil map unit: 420B - Canton fine sandy loam (coarse loamy over sandy, mixed, mesic, Typic Dystrochrepts), 03-08% slopes

Soil temperature regime: Mesic Soil moisture regime: Udic Drainage Class: Well drained Hydrologic Soil Group: A

Ksat: High (2.00 – 6.00 in/hr) Available water capacity: Low (~4.4") Soil hydric/ upland: Upland

Depth to restrictive feature: Variable depths to bedrock Frequency of flooding: None Frequency of ponding: None

Soil limitations: Moderate permeability, gravelly substratum, variable seasonal groundwater table, shallow to bedrock in areas.

CLOSEST USGS WELL MEASUREMENTS and WETLAND AREA

Current Water Resource Condition (USGS): Well Site # 423505070491702, MA-WPW 76 Wenham, MA.

Well depth: 22.00 feet Borehole depth: 22.00 feet Land surface altitude: 60.00 feet above NGVD29

Well completed in Sand and gravel aquifers and ice-contact deposits, including kames and eskers

Most recent data value: 0.54' on 04/02/17 (depth to water level below land surface). Range: High

National Wetland Inventory Map: NA Wetlands Conservancy Program: NA Bordering vegetative wetland: >100' feet

SURFICIAL & BEDROCK GEOLOGY:

Surficial geology: Geological Quadrangle Map, Surficial Geology – Georgetown Quadrangle, Mass, 1958 – 1959

Ogi: Deposits in the Ipswich River area; Light-brown to light-gray, medium, well sorted sand in the valleys of the Ipswich River and its tributaries in the southern part of the quadrangle. Sandy deposits underlain by lodgment till.

Geomorphic landform: Kame plain Landform position (2D): Foot slope Landform position (3D): Baseslope

Slope aspect: Easterly Slope gradient: ~00-03% Down slope shape: Concave Across slope shape: Concave

Slope complexity: Simple Bedrock outcropping in vicinity: Not observed Glacial erratics in vicinity: None observed

Bedrock Type: Topsfield granodiorite – Gray to gray-green, porphyritic granodiorite containing blue quartz; cataclastically foliated.

TP17-1 DEEP OBSERVATION HOLE

470 Boston Street, Topsfield, Massachusetts

Date: Monday, April 03, 2017 Time: 10:36 Weather: Sunny, dry, ~45°F, Northeast breeze
 Position on landscape: Backslope Slope aspect: Northerly Land Cover: Meadow grass
 Property line: 10⁺ feet Drainage way: 50⁺ feet Drinking water well: 100⁺ feet
 Wetlands: 100⁺ feet Ipswich River: 400⁺ feet Open water body: 400⁺ feet Abutting septic system: NA

SOIL PROFILE ► TP17-1

Depth below land surface (inches)	Soil Horizon/Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 16"	A _p	Sandy Loam	10YR 3/2 very dark grayish brown	none observed	Very friable; moderate-grade fine to medium subangular granular structure; weak cohesive matrix; fine grained mineral content; slightly damp; common fine to medium roots; free of clasts; clear wavy boundary.
16" → 28"	B _w	Sandy Loam	10YR 4/4 dark yellowish brown	none observed	Very friable; weak-grade fine to medium angular blocky structure; weak cohesive matrix; gritty; mixed medium to mostly fine grained mineral content; damp; ~05-10% subrounded gravel content; diffuse wavy boundary.
28" → 54"	2C ₁	Sand gravelly	10YR 3/3 dark brown	none observed	Loose; structurless; unstable; damp; mixed fine to coarse grained sand; crudely stratified and well graded; ~20 -25% rounded to subrounded gravel content of mixed lithology; few strong red variegated iron stains on clasts and along bedding planes; stratified beds slightly dipping to the East; no refusal at test hole depth.
54" → 121"	2C ₂	Sand	2.5Y 4/3 olive brown	none observed	Friable; massive/structurless; unstable; damp; mixed very-fine to fine grained sand; thinly bedded stratification; poorly graded; free of clasts; stratified beds slightly dipping to the East; no refusal at test hole depth.
121" → 143"	2C ₃	Sandy Loam gravelly	10YR 4/3 brown	136" (m,3,p) 10R 4/4 5GY 8/1	Friable; moderate-grade medium-to-coarse subangular platy structure; mixed fine to coarse grained mineral content; well-graded; moderately compact matrix; crudely stratified with minor imbrication of clasts; somewhat silty; wet; ~25-30% scattered subangular-to-subrounded gravel and ~15% scattered subangular-cobble content of mixed lithology; clasts somewhat tightly nested in matrix; compactness slightly increases with depth; no bedrock contact at test hole depth and apparent water observed at 128".

Depth to bedrock: >143" Seasonal High Groundwater Table: >136" Apparent water table: >128"

420B - Canton fine sandy loam (coarse loamy over sandy, mixed, mesic, Typic Dystrochrepts), 03-08% slopes

TP17-1 DEEP OBSERVATION HOLE

470 Boston Street, Topsfield, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE:

Apparent water seeping from pit face: 128" (below land surface) Depth to stabilized apparent water: _____ (below land surface)

Soil moisture state: Damp to wet with increasing depth

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 136" (below land surface)

Type: Masses on and within peds Abundance: Many Size: Medium Contrast: Prominent

Shape: Irregular/ spheroidal Moisture state: Moist to wet Location: 2C₃ matrix

Hardness: Soft Boundary: Diffuse Concentration color: 10R 4/4 (weak red) Reduction color: 5GY 8/1 (greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: 128" inches below grade

Observed depth to redoximorphic features: 136" inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 10.58 feet

Depth of naturally occurring pervious material in TP17-1 Upper boundary: 16"
Lower boundary: 143"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker *Certified Soil Evaluator #1848*

Printed name of evaluator & certification number

June 1998

Date of Soil Evaluator Certification

Mr. David Bond, Topsfield Stormwater Coordinator

Town of Topsfield witness

04/03/17

Date of soil testing