

Tighe & Bond

**Town of Wayland
Town Office Building
41 Cochituate Road
Wayland, Massachusetts**

Hydrogeologic Report

Prepared For:

Town of Wayland
Facilities Department
41 Cochituate Road
Wayland, MA

March 2012

Executive Summary**Section 1 Introduction****Section 2 Historical Review**

2.1	Site Description.....	2-1
2.2	Chemicals Used On Site.....	2-1
2.3	Subsurface Utilities.....	2-1
2.4	Previous Subsurface Work	2-3

Section 3 Regional Information

3.1	Watershed.....	3-1
3.2	Surface Water Supplies	3-2
3.3	Public Groundwater Supply Wells	3-2
3.4	Private Wells.....	3-2
3.5	Groundwater Discharge Locations	3-5
3.6	Geologic Data	3-5
3.7	Potential Well Yield	3-6

Section 4 Subsurface Investigations

4.1	Test Pits.....	4-1
4.2	Borings	4-4
4.3	Monitoring Wells.....	4-4
4.4	Seasonal High Groundwater Elevation	4-5
4.5	Baseline Water Quality Sampling & Analysis	4-8
4.6	Estimation of Aquifer Properties.....	4-9

Section 5 Evaluation of Effluent Disposal System

5.1	Leachfield Design	5-1
5.2	Estimated Groundwater Mounding.....	5-2
5.3	Estimated Nitrate Loading.....	5-7
5.4	Impact on Public Groundwater Supply Wells	5-8

Table of Tables

Table 3-1 Private Wells	3-3
Table 3-2 Groundwater Discharge Facility Locations	3-5
Table 4-1 Test Pit Data	4-1
Table 4-2 Monitoring Well Summary	4-5
Table 4-3 Estimated Seasonal High Groundwater in Wells	4-6

Table 4-4 Water Quality Sampling Results	4-8
Table 4-5 EPA Priority Metals Sample Results	4-9
Table 4-6 Grain Size Analysis (Shepherd Method)	4-10
Table 4-7 Grain Size Analysis (Hazen Method)	4-11
Table 4-8 In-situ Hydraulic Conductivity Testing Results	4-12

List of Figures

Figure 1-1 Site Locus.....	1-2
Figure 2-1 Proposed Site Layout.....	2-2
Figure 3-1 Public Water Supplies	3-4
Figure 3-2 Soils Map.....	3-7
Figure 3-3 Regional Surficial Geology	3-8
Figure 4-1 Test Pit and Boring Locations	4-2
Figure 4-2 Geologic Cross-Section	4-3
Figure 4-3 Groundwater Contour Plan	4-7
Figure 4-4 Shepherd Method.....	4-10
Figure 5-1 Effluent Discharge Layout	5-3
Figure 5-2 Discharge System Profile	5-4
Figure 5-3 Drip Dispersal Details	5-5

Appendices

Appendix A: Test Pit Logs

Appendix B: Waste Site Cleanup Activity Sheets

Appendix C: Geotechnical Boring Logs and Well Logs

Appendix D: Well Sampling Results

Appendix E: Soil Laboratory Results

Appendix F: Hydraulic Conductivity Slug Test Results and Hydraulic Conductivity
Calculation Sheets

Appendix G: Mounding Calculation Sheets

Appendix H: Nitrate Loading Calculations

Appendix I: Bibliography

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Evaluation.doc

Section 1 Introduction

The proposed Town of Wayland groundwater discharge is located under the playing fields adjacent to the Town offices off of Cochituate Road. This area has been identified as a potential effluent discharge site due to its proximity to the Town's new treatment facility, mapped soil conditions, and Town ownership of the land. This Hydrogeologic Evaluation addresses issues concerned with the design and operation of the proposed effluent disposal system at the site.

The wastewater will be discharged from the wastewater treatment facility (WWTF) that is located at 430/440 Boston Post Road in Wayland. This facility is currently under construction to completely replace the existing facility and the new facility is designed utilizing membrane bioreactor (MBR) technology. As discussed in our scoping meeting on November 15, 2011, due to the high level of treatment from the MBR, the reserve area for the disposal area can be reduced by fifty percent (50%).

This effluent disposal area is intended to accommodate flows in excess of the existing WWTF's NPDES permitted flow rate of 52,000 gpd. In order to accommodate the flows exceeding the NPDES flow rate, the disposal area will need to handle approximately 30,000 gallons per day. However, the entire site was evaluated to determine the maximum capacity that can be handled on this site.

Details regarding the soil absorption system will be presented in the Engineering Report and Permit Plans submitted under a separate cover.



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Based on USGS Topographic Map for
Natick, MA Quadrangle. Revised 1987
Circle indicates a 1 mile radius



FIGURE 1-1 SITE LOCUS MAP

Wayland Town Offices
Wayland, Massachusetts

Tighe&Bond

March, 2012

Section 2 Historical Review

The sections that follow provide information on current and past uses at the Project site. A description of the site, the chemicals used on the site, existing utilities and previous subsurface work are discussed.

2.1 Site Description

The project site is located right in Wayland Center where Boston Post Road (Route 20) and Cochituate Road (Route 126) intersect. The address is 41 Cochituate Road, which is the location of the Town Office Building and ball fields. The location of the project is shown in the Site Locus Plan found in Figure 1-1.

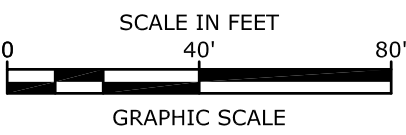
The parcel is approximately 33.4 acres, which consists of 13.0 acres of wetlands, 5.2 acres of ball fields, 10.2 acres of woodlands and the remaining 5.0 is developed for the Town Offices. The proposed groundwater discharge will be within the area of the ball fields, which are southeast of the Town Office Building. Specifically, the groundwater discharge will be located where the existing leachfield is for the Town Office Building Title 5 system, just northeast of the baseball field. Surrounding parcels include the Trinitarian Congregational Church and residential parcels across Cochituate Road. Figure 2-1 shows the proposed layout of the site.

2.2 Chemicals Used On Site

As the groundwater discharge is located on a separate site from the wastewater treatment facility, there will be no chemicals stored on site.

2.3 Subsurface Utilities

In order to transport the excess wastewater from the WWTF to the proposed groundwater discharge location, a force main will have to be installed. This will involve installing approximately $\frac{3}{4}$ mile force main that runs from the WWTF at 430/440 Boston Post Road, out the northeast corner of the parcel to Old Sudbury Road, down past the intersection of Boston Post Road, onto Cochituate Road where it will enter the site through the driveway of the Town Office Building. The force main will then run from the parking lot of the Town Office Building to the designated groundwater discharge location.



Wayland,
Massachusetts

Mark	Date	Description
PROJECT NO:		W1396
FILE:		TownHall_2012
DRAWN BY:		BJL
CHECKED:		KLK
APPROVED BY:		IBC

PROPOSED SITE LAYOUT

SCALE: 1"=40'

FIGURE 2-1

2.4 Previous Subsurface Work

Some test pit excavation work was performed at the site back when the Town was installing the Title 5 system for the Town Office Building. However, this work was done back in 1976. At that time, percolation rates were found to be less than 2 minutes per inch. Due to the age of these percolation tests as well as the lack of records and fact that they were not witnessed by MassDEP, these percolation test results were not used in the evaluation of the proposed groundwater discharge location.

On December 6, 2011, the Town of Wayland performed test pit excavations at the playing fields adjacent to the Town offices off of Cochituate Road in Wayland. This work was overseen by H. Criss Stephens, inspector for MassDEP, and Jeremy Cigal, a certified soil evaluator from Tighe & Bond. A total of eight (8) test pits were conducted in several locations across the entire field area. The results of the test pit excavations will be discussed in further detail in Section 4.

Past and current waste clean-up sites were identified to assess any activities or uses in the area that may have impacted water quality or site specific conditions. No waste site cleanup activities or areas subject to cleanup standards under MGL 21E have occurred on this parcel for development. There are several waste site cleanup activities and areas subject to cleanup standards under MGL 21E within a one mile radius of the proposed groundwater discharge site; however, all of these are upstream of the groundwater discharge and will not be impacted.

Section 3 Regional Information

The information included in this section was compiled from data available through the Massachusetts Department of Environmental Protection, MassGIS, the United States Geologic Survey and the Town of Littleton.

3.1 Watershed

The project site is located in the Concord River watershed. The Concord River Watershed is part of the greater Sudbury-Assabet-Concord (SuAsCo) drainage basin in northeastern Massachusetts. The SuAsCo Watershed, located in the metro-west area of the state, encompasses a large network of tributaries that ultimately flow into the Merrimack River. The watershed has a total drainage area of approximately 377 square miles. The Assabet River flows north for 30 miles from its headwaters in Westborough, through the densely developed urban centers of Northborough, Hudson, and Maynard, to its confluence with the Sudbury River at Egg Rock in Concord. The Sudbury River also has its beginnings in Westborough, flowing eastward from the Great Cedar Swamp toward Framingham. It then proceeds north to Concord a total of 29 miles from Westborough to its confluence with the Assabet River at Egg Rock. The Sudbury and Assabet Rivers join together at Egg Rock to form the Concord River which flows north for 15.5 miles through the towns of Concord, Carlisle, Bedford, and Billerica to join the Merrimack River in Lowell. Tributaries to the Concord River include Mill Brook and River Meadow Brook. The Concord River serves as a treated water supply for the Town of Billerica. It also receives discharges from four municipal wastewater treatment plants, as well as several industrial users.

The Concord River drains 398 square miles in the northeastern part of central Massachusetts. The two major tributaries that form the Concord River are the Assabet River, which drains 177 square miles, and the Sudbury River, which drains 162 square miles. The climate of the basin is temperate and humid; average monthly temperatures range from 25°F in January to 73°F in July. Average annual precipitation in the basin is 53 inches per year. Land-surface elevations in the basin range from 50 to about 480 ft above sea level. As a result of these characteristics, the streams in the basin generally are well supplied by precipitation but flow slowly.

Streamflows in the Concord River Basin are recorded continuously at USGS streamflow-gaging stations on the Assabet River at Maynard (01097000), Nashoba Brook at South Acton (01097300), Sudbury River at Saxonville (01098530), and Concord River at Lowell (01099500). Massachusetts's water quality standards are devised to provide protection to water quality for low flow conditions that satisfy a certain statistical condition designated 7Q10. This condition is the lowest flow averaged for a consecutive 7-day period with a recurrence interval of 10 years and is determined from the continuous record at the gauging station. Based on this data, the estimated 7Q10 at the USGS streamflow gage (01099500) located 300 feet downstream from Rogers Street in Lowell is estimated to be 32.2 cfs. The USGS remarks that the discharge includes water released from the Sudbury River basin and Lake Cochituate and that low flow is regulated by mills in Lowell. As all discharge flow will remain within the same watershed basin, the impact of the project's average daily flow of 17,000 gpd would equate to 0.082% of the total output from the watershed under low flow conditions.

As previously discussed, the source of potable water will be the Wayland Water Department whose water supply are the Baldwin Pond Wells located in Wayland. As the water supply is located in the same town as the groundwater discharge, there is no interbasin transfer.

3.2 Surface Water Supplies

There are no surface water supplies located within a one-mile radius of the proposed groundwater discharge location.

3.3 Public Groundwater Supply Wells

There are no public water supply wells located within one (1) mile of the proposed groundwater discharge. However, just outside of the one mile radius are the Baldwin Pond Wells, named 3315000-09G (Baldwin Pond #1), 3315000-07G (Baldwin Pond #2), and 3315000-06G (Baldwin Pond #3). These three wells are gravel packed wells located on Old Sudbury Road at the Baldwin Pond Site and are part of the Baldwin Pond Water Filtration Facility. In addition to these wells being outside the one mile radius of the groundwater discharge location, the MassDEP approved wellhead protection area (Zone II) surrounding these wells does not extend to the groundwater discharge location. Figure 3-1 shows the relative location of these wells to the site.

The Wayland DPW Water Division operates a total of eight (8) groundwater wells. The Baldwin wells make up three of these wells. Well #1 was originally an 18-inch diameter well approximately 48 feet deep drilled in 1962. A replacement 12-inch by 18-inch gravel packed well approximately 52 feet deep was installed in 2001. Well #2 was drilled in 1962 and is a 48-inch by 24-inch gravel packed well approximately 54 feet deep located just east of Well #1. Well #3 was drilled in 1953 and is located directly east of Well #2. Well #3 is a 24-inch diameter well approximately 53 feet in depth. The maximum rated capacity for the three wells combined is 1,575 gallons per minute (gpm) or 2.27 million gallons per day (mgd).

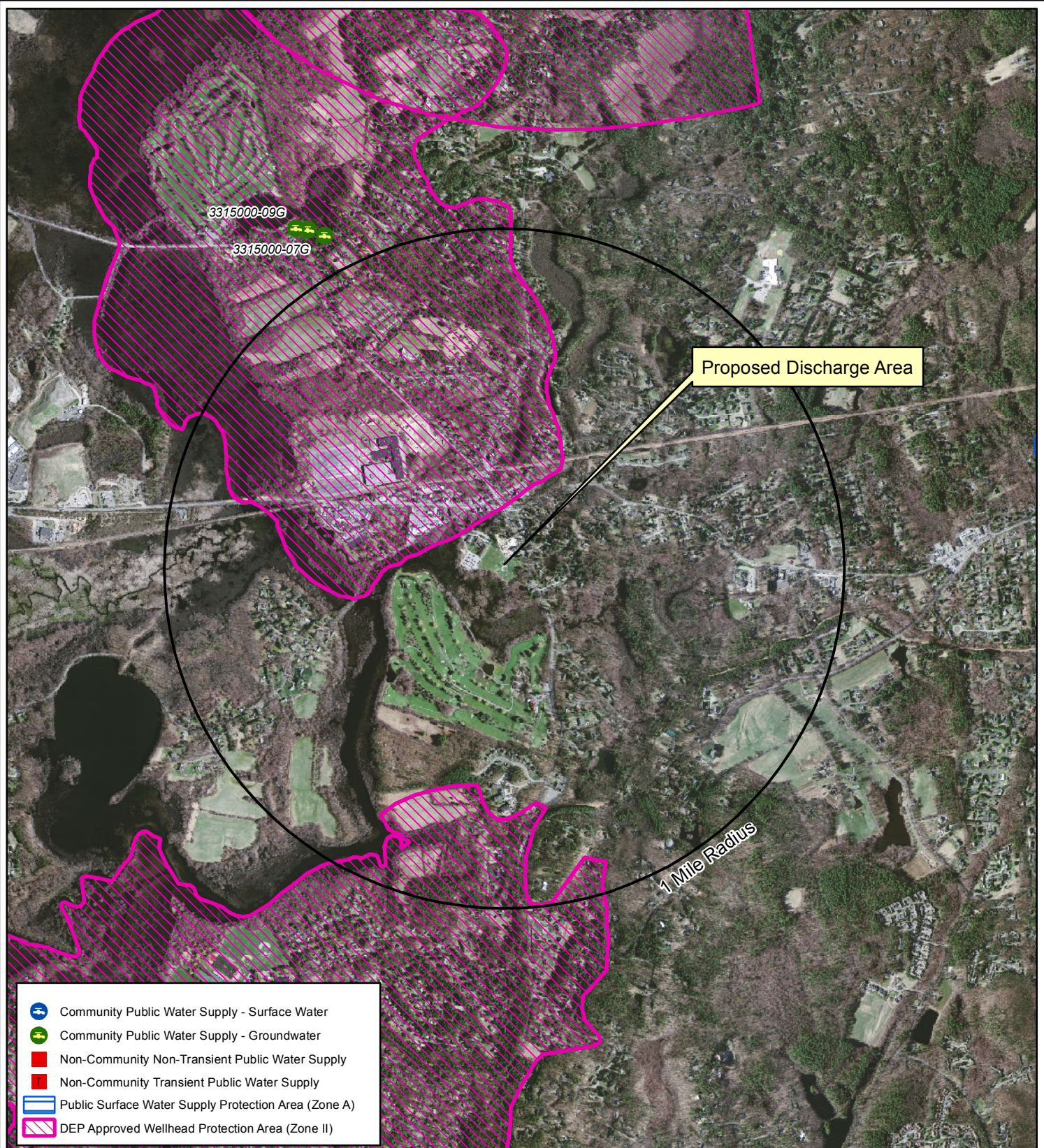
3.4 Private Wells

There are several private wells within a one-mile radius of the project. Table 3-1 identifies all of these private wells, as well as the depth and water levels of each of them.

Table 3-1 Private Wells

Town	Address	Well Type	Total Depth	Depth to Bedrock	Water Level
Wayland	412 Commonwealth Road	Monitoring	52	14	45
Wayland	Route 20	Monitoring	24	0	14
Wayland	18 Black Oak Road	Irrigation	951	2	30
Wayland	130 Main Street	Monitoring	15	0	8.5
Wayland	6 Barley Lane	Monitoring	16	0	8
Wayland	East Plain Street	Monitoring	8	0	.5
Wayland	Route 20	Monitoring	33	0	31
Wayland	12 Charles Street	Monitoring	35	0	28
Wayland	131 Boston Post Road	Monitoring	27	0	19
Wayland	Route 20	Monitoring	15	0	6
Wayland	533 Boston Post Road	Monitoring	25	0	7
Wayland	Oak Street	Monitoring	53.5	0	6
Wayland	310 Cochituate Road	Monitoring	14	0	7
Wayland	533 Boston Post Road	Monitoring	17	0	6.4
Wayland	19 Main Street	Monitoring	15	0	7
Wayland	9 Gennaro Circle	Domestic	138	117	25
Wayland	11 Gennaro Circle	GTCL	105	90	15
Wayland	10 Gennaro Circle	GTCL	131	118	36
Wayland	356 Boston Post Road	Monitoring	15		8
Wayland	400 Boston Post Road	Monitoring	30		15
Wayland	95 Claypit Hill Road	Irrigation	320	92	30
Wayland	32 Claypit Hill Road	Domestic	685	117	11
Wayland	8 Bennett Road	Irrigation	500	90	35
Wayland	325 Boston Post Road	Monitoring	13	0	6
Wayland	51 Plain Road	Irrigation	260	91	6
Wayland	61 Old Sudbury Road	Irrigation	160	93	40
Wayland	304 Boston Post Road	Monitoring	20	0	12
Wayland	397 Boston Post Road	Irrigation	900	60	20
Wayland	4 Plain Road	Monitoring	18		11

Source: MassDEP SearchWell website (<http://public.dep.state.ma.us/searchwell/>), 2012



1:25,000



Data source: Office of Geographic and Environmental Information (MassGIS) Data valid as of February 2012
Based on MassGIS Color Orthophotography (April 2009)
Circle indicate 1 mile radius



FIGURE 3-1 PUBLIC WATER SUPPLIES

Wayland Town Offices
Wayland, Massachusetts

Tighe&Bond

March, 2012

3.5 Groundwater Discharge Locations

There is currently one (1) groundwater discharge facility located within one mile of the Site. Table 3-2 identifies this facility along with the flows and contributing basin.

Table 3-2 Groundwater Discharge Facility Locations

Name	Address	Town	Basin	Permitted Flow
Green Way Development	Green Way	Wayland	Concord River Watershed	27,120 gpd

Source: MassDEP, Linda Barba, 03/14/2012

3.6 Geologic Data

Natural Resource Conservation Service (NRCS) data indicates that the discharge site is primarily composed of 626B Merrimac-Urban Land Complex, 0 to 8 percent slopes. Portions of the parcel are also composed of 255A Windsor Loamy Fine Sand, 0 to 3 percent slopes, 36A Saco Mucky Very Fine Sandy Loam, 0 to 3 percent slopes, and a small portion of 602 Urban Land.

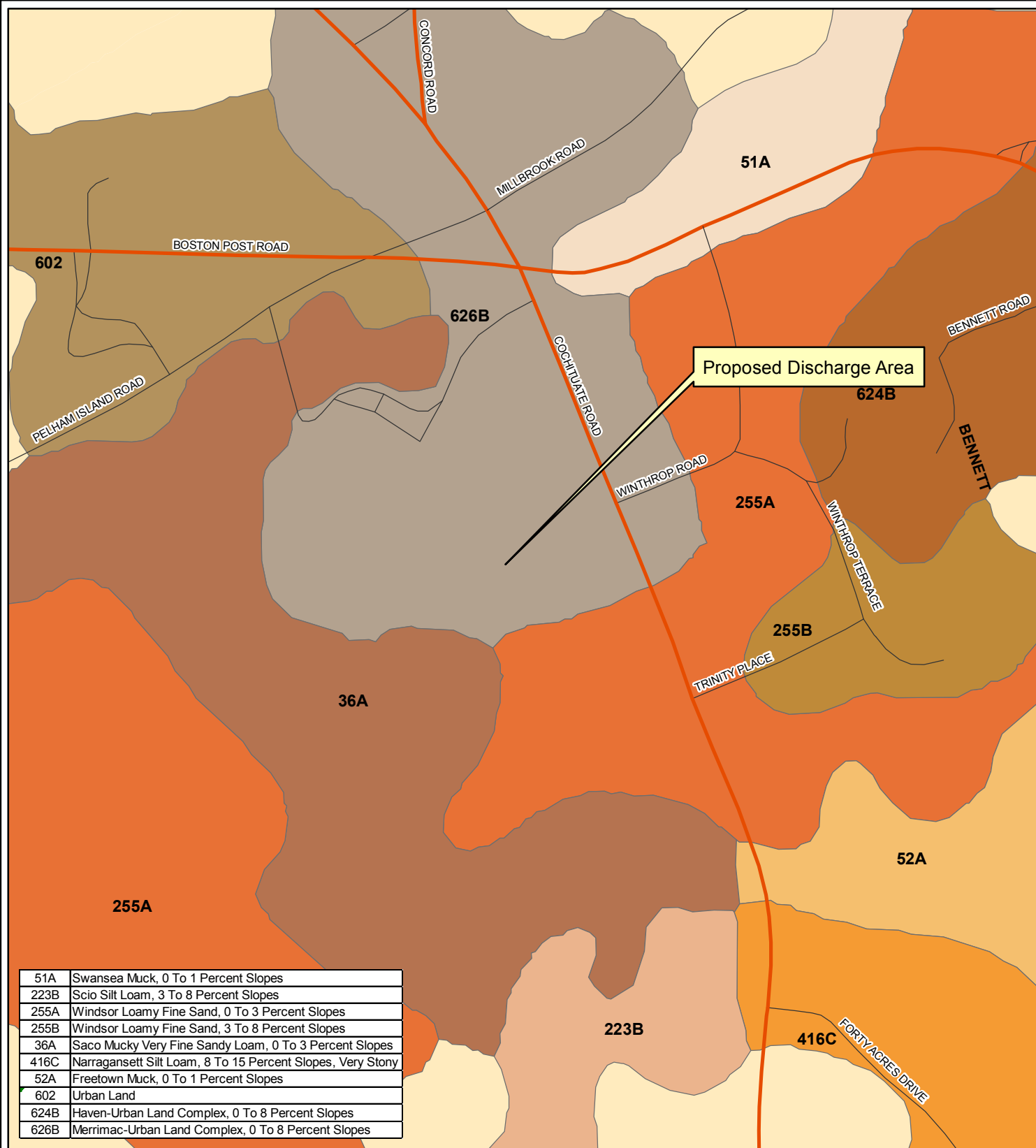
The Merrimac-Urban Land Complex, 0 to 8 percent slopes, typically consist of somewhat excessively drained Merrimac and similar soils, and areas of Urban land on broad plains. Typical composition is 40 percent Merrimac soils, 40 percent Urban land, and 20 percent other soils. These soils are typically described as having a surface layer which is very dark grayish brown find sandy loam about 9 inches thick. The subsoil is typically dark yellowish brown and about 17 inches thick. In the upper part, it is gravelly sandy loam, and the lower part it is gravelly loamy coarse sand. The substratum consists of an upper layer of light yellowish brown very gravelly coarse sand and a lower layer of light olive brown gravelly coarse sand. This material tends to be moderately rapid in the surface layer, moderately rapid or rapid in the subsoil, and rapid in the substratum.

The Windsor Loamy Sand is very deep, nearly level, excessively drained soil on glacial outwash plains and the tops of glacial stream terraces and deltas. These soils are typically described as having a surface layer which is dark brown loamy sand about 8 inches thick. The subsoil consists of yellowish brown loamy sand and light olive brown sand. The substratum is light yellowish brown gravelly sand. The Saco Mucky Very Fine Sandy Loam is very deep, nearly level, very poorly drained soil is on the lowest parts of floodplains adjacent to major streams and rivers. These soils are typically described as having a surface layer which is very dark brown mucky silt loam about 13 inches thick. The substratum is very dark gray to very dark grayish brown silt loam with faint dark gray redoximorphic depletions and prominent brown masses of iron accumulation. Deeper into the substratum it becomes a grayish brown silt loam with prominent strong brown masses of iron accumulation and eventually olive gray loamy sand. The relative location of all these soils is indicated on Figure 3-2.

The surficial geology at the proposed groundwater discharge location is Glaciolacustrine Fine. The surficial geology composition of the remainder of the parcel includes Coarse and Swamp Deposits. Figure 3-3 shows regional surficial geology.

3.7 Potential Well Yield

According to Hydrologic Investigations Atlas HA-662, Hydrology and Water Resources of Tributary Basins to the Merrimack River from Salmon Brook to the Concord River, Massachusetts, the project site is located in stratified glacial deposits, with transmissivity of less than 1,350 square feet/day, which equates to a potential well field of less than 100 gallons per minute.



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Data source: Office of Geographic and Environmental Information (MassGIS) Data valid as of February 2012
Based on MassGIS Color Orthophotography (April 2009)
Circle indicate 1 mile radius

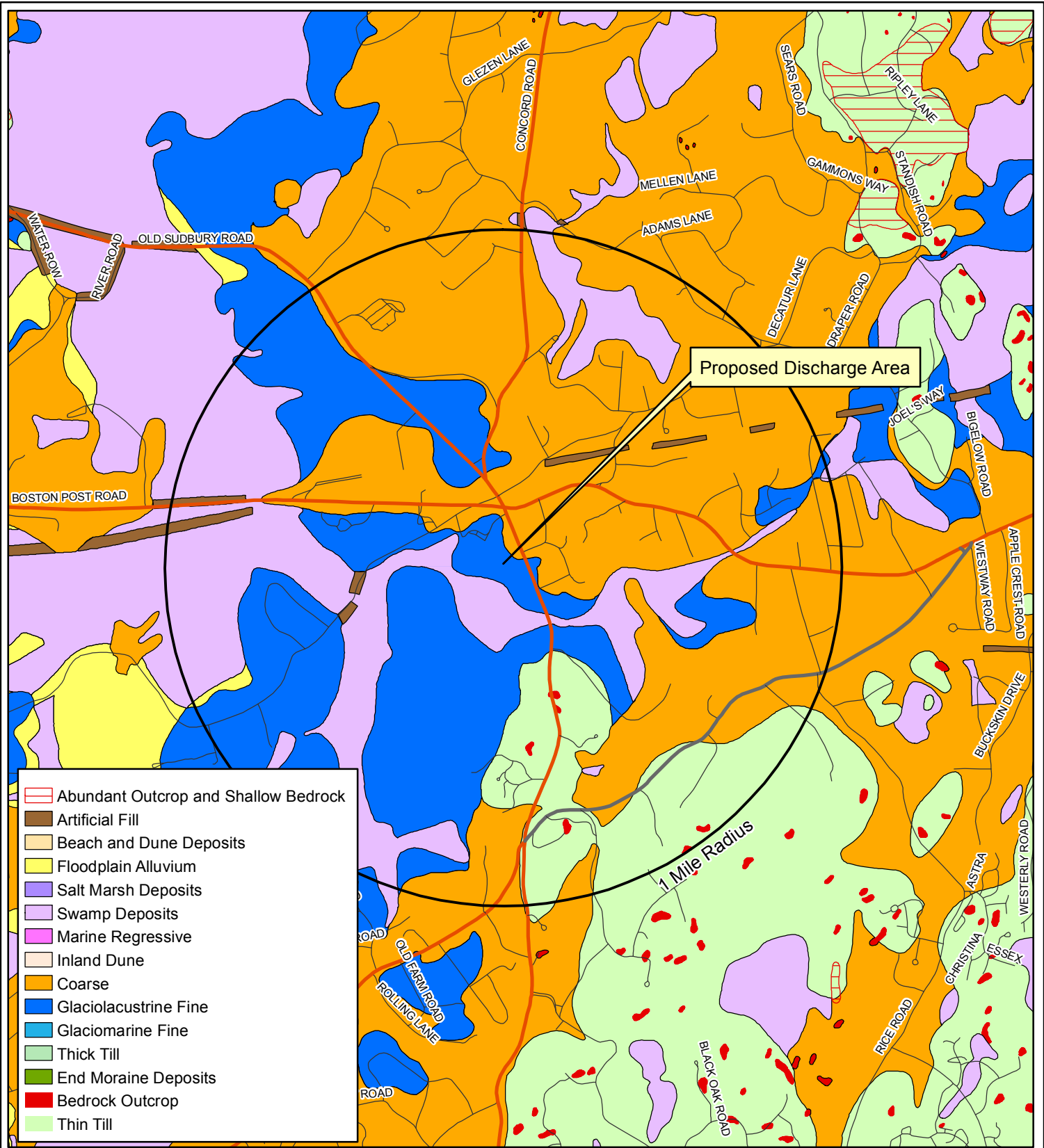


FIGURE 3-2 SOILS MAP

Wayland Town Offices
Wayland, Massachusetts

Tighe&Bond

March, 2012



1:25,000



Data source: Office of Geographic and Environmental Information (MassGIS) Data valid as of February 2012
Based on MassGIS Color Orthophotography (April 2009)
Circle indicate 1 mile radius



FIGURE 3-3 REGIONAL SURFICIAL GEOLOGY

Wayland Town Offices
Wayland, Massachusetts

Tighe & Bond

March, 2012

Section 4 Subsurface Investigations

A series of subsurface investigations were performed on the site during December 2011 and January 2012. These investigations included the installation of borings, monitoring wells and test pits throughout the site. Figure 4-1 shows the location of the borings and test pits discussed in this section. Figure 4-2 shows geologic cross sections through the effluent disposal area.

In the proposed disposal area, slug testing and baseline water quality sampling were also performed during this period. The sections that follow present the findings of these activities.

4.1 Test Pits

On December 6, 2011, the Town of Wayland performed test pit excavations at the playing fields adjacent to the Town offices off of Cochituate Road in Wayland. This work was overseen by H. Criss Stephens, inspector for MassDEP, and Jeremy Cigal, a certified soil evaluator from Tighe & Bond. A total of eight (8) test pits were conducted in several locations across the entire field area. Attached is a figure identifying the as-built test pit locations. These test pits have been labeled TP-1 through TP-8 in sequence to the order they were conducted. The test pit logs showing the detailed observations have been attached for review and record. As high groundwater levels and unsuitable soils were encountered at all test pit locations, no percolation tests were conducted. Soil samples were collected from various soil horizons in all of the test pits.

The results of the test pit excavations are summarized in Table 4-1. Test pit locations are shown in Figure 4-1. Test pit logs are included in Appendix A of this report.

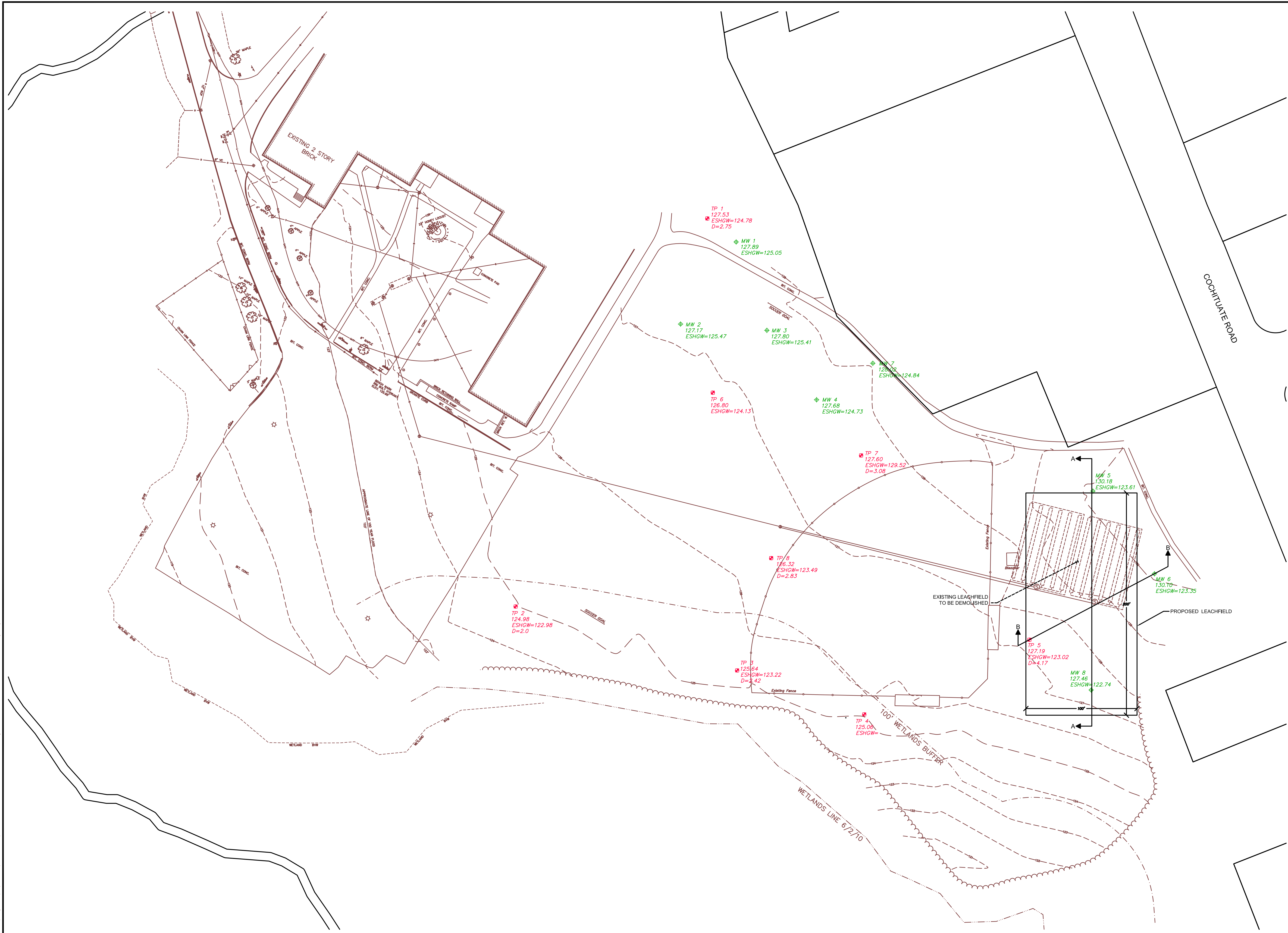
Table 4-1 Test Pit Data

Test Pit ID	Approximate Ground Surface Elevation (ft)	Estimated Seasonal High Groundwater Elevation (ft)	Depth to Estimated Seasonal High Groundwater (ft)
TP-1	127.53	124.78	2.75
TP-2	124.95	122.98	2.00
TP-3	125.64	123.22	2.42
TP-4	125.06	-	-
TP-5	127.19	123.02	4.17
TP-6	126.80	122.47	4.33
TP-7	127.60	124.52	3.08
TP-8	126.32	123.49	2.83

Note:

- (1) Test pits performed on 12/6/11 and observed by MassDEP staff.

O:\Projects\W1396\Town Hall\W-1396_TownHall-2012_FIG 4-1.dwg Mar 16, 2012-11:44am Plotted By: bj



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100 YEARS
STRONG
1911-2011

N

SCALE IN FEET
0 40 80
GRAPHIC SCALE

Town Office Building Groundwater Discharge

41 Cochituate Road
Wayland, Massachusetts

Mark	Date	Description
PROJECT NO:	W1396	
FILE:	TownHall_2012	
DRAWN BY:	BJL	
CHECKED:	KLK	
APPROVED BY:	IBC	

TEST PIT AND BORING LOCATIONS

SCALE: 1"=40'

FIGURE 4-1

O:\Projects\W\W1396\Town Hall\W-1396_TownHall-2012_FIG 4-2.dwg Mar 20, 2012-2:30pm

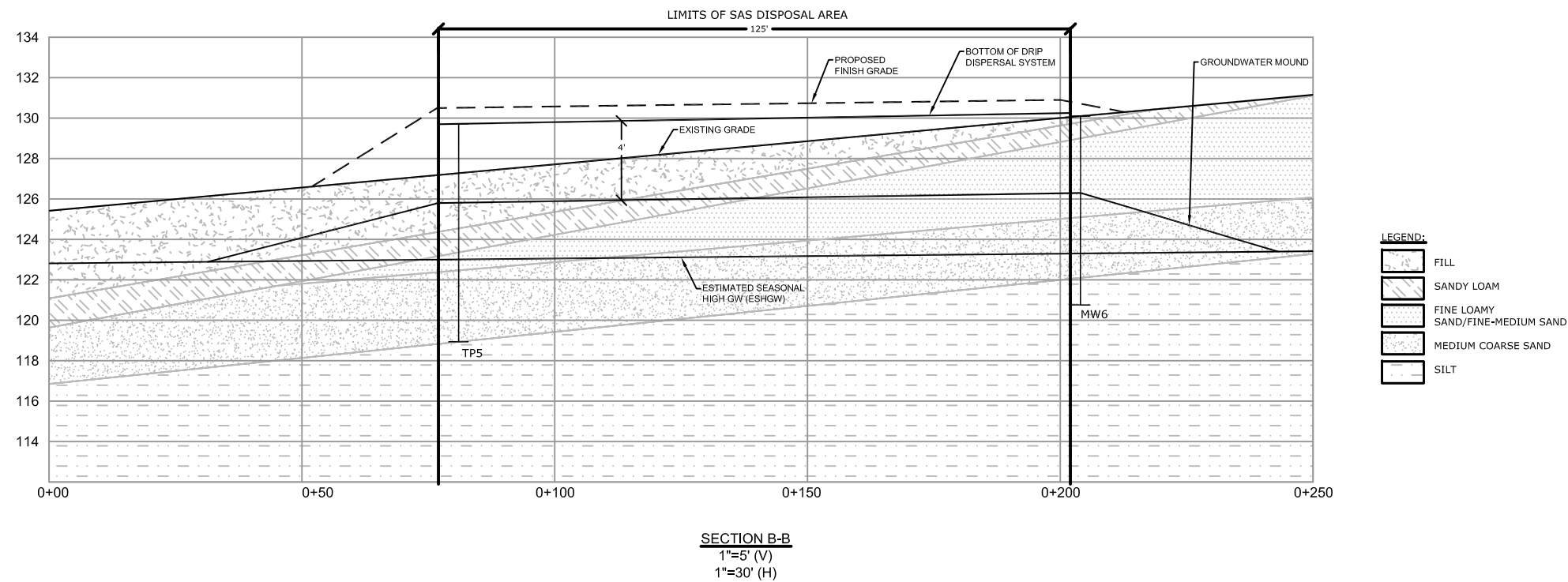
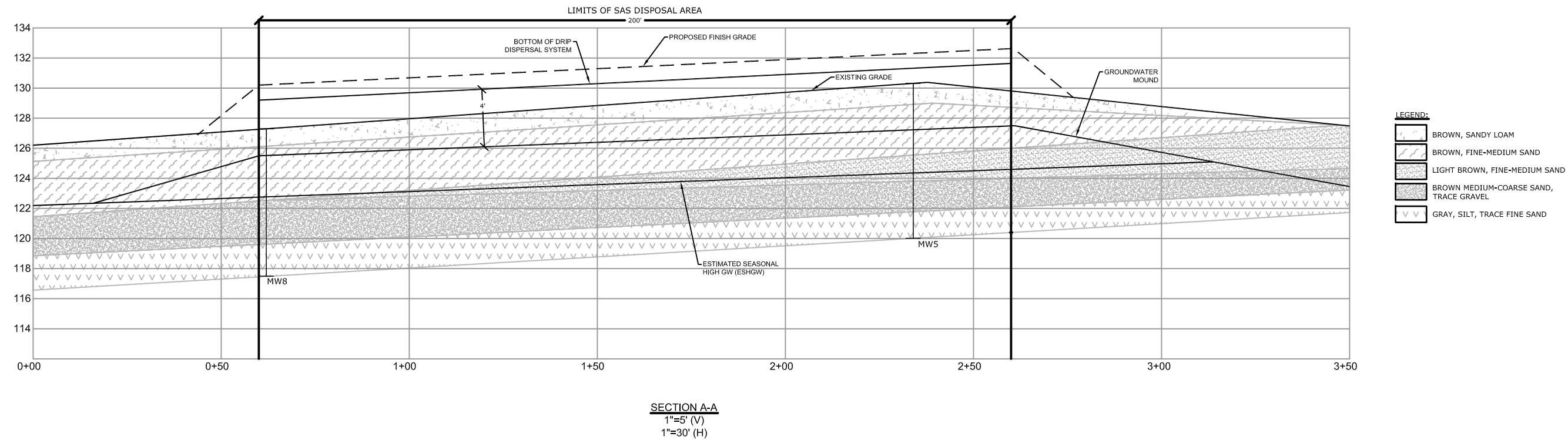


FIGURE 4-2

GEOLOGIC CROSS-SECTIONS

TOWN OFFICE BUILDING
GROUNDWATER DISCHARGE
41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS

Tighe&Bond Consulting Engineers
www.tighebond.com

SCALE: 1"=5'V, 1"=30'H

DATE: MARCH 2012

4.2 Borings

From January 9, 2012 through January 10, 2012, Technical Drilling Services installed eight (8) borings on the site, all of which were developed as monitoring wells. Soil borings were performed with an all-terrain vehicle mounted drill rig advancing 2" wells to the depth of 20'.

The soil samples were characterized, and in some cases used in laboratory grain size analysis. Representatives of Tighe & Bond also performed in-situ hydraulic conductivity testing in all of the monitoring wells. The results of the testing are presented in Section 4.6. Logs for the borings advanced by Technical Drilling Services and Tighe & Bond are included in Appendix C.

In general, boring logs within the proposed area indicate a region approximately 1 foot of brown sandy loam, followed by a layer of brown fine sand with some silt which varied between 2 feet to 4 feet thick. This stratum is underlain by a 1 to 2 foot thick layer of brown medium-coarse sand, and then a 1 to 2 foot thick brown fine sand and silt layer below that. The last stratum encountered in drilling these 10 foot wells was a 2 to 4 foot thick gray silt layer with traces of fine sand. Boring MW-5 and MW-6 were slight exceptions in that they had a 2 foot thick light brown fine-medium sand layer above the brown medium-course sand and no brown find layer between the medium-course sand and silt layers. Groundwater was observed at a 4-foot depth in all borings except in MW-8 where it was 5-foot depth. Geologic cross sections through the proposed effluent disposal area are shown in Figure 4-2.

4.3 Monitoring Wells

All eight borings advanced on site were completed as monitoring wells using 2-inch diameter, 0.010-inch machine slotted Schedule 40 PVC screen and 7" road box cemented in place. Clean filter sand was backfilled in the annular space around the well. A 1-foot thick bentonite seal was placed on top of the filler sand, and the remaining annular space was backfilled with native material. Wells were completed with a road box due to their location on the ball fields. Monitoring well logs are included in Appendix C.

Groundwater elevations were recorded at the time of the well construction on January 9-10, 2012. All monitoring well data can be found below in Table 4-2.

Table 4-2 Monitoring Well Summary

Monitoring Well ID	Reference Point Elevation (FT, Ground Surface)	Depth To Water (FT, from Ground Surface)	Depth To Bottom of Well (FT, from Ground Surface)	Groundwater Elevation (FT)
MW-1	127.89	3.75	10.0	124.14
MW-2	125.47	2.61	12.0	122.86
MW-3	125.41	3.30	12.0	122.11
MW-4	127.68	3.86	10.0	123.82
MW-5	130.18	7.48	10.0	122.70
MW-6	130.10	7.66	10.0	122.44
MW-7	128.02	4.09	10.0	123.93
MW-8	127.46	5.63	10.0	121.83

Note:

(1) Groundwater measurements taken on 01/24/2012

4.4 Seasonal High Groundwater Elevation

The estimated seasonal high groundwater table (ESHWT) was determined using both soil evaluation techniques and the USGS Frimpter Method. Estimates of seasonal high groundwater levels based on the Frimpter method rely on groundwater levels observed in wells on the site as well as at wells maintained by the United States Geological Survey. This section outlines the Frimpter Method and presents values for the ESHWT based on the application of the method.

The Frimpter Method uses the maximum water level measured in the nearest USGS monitoring well situated in a similar geologic setting to estimate probable depth to high groundwater at a project site (Frimpter, 1981). The Frimpter Method uses the following equation to estimate on-site maximum high groundwater:

$$S_h = S_c - \frac{S_r}{ow_r} (ow_c - ow_{max})$$

Where: S_h = Probable depth to high groundwater (feet).

S_c = Measured depth to groundwater on site (feet).

ow_c = Measured depth to groundwater in USGS observation well. USGS well designated MA-WKW 2 WAYLAND, MA (USGS Well ID: 421852071220501) was used, with ow_c = 15.37 feet on January 24, 2012.

ow_{max} = Maximum water level (i.e. minimum depth to groundwater) recorded in USGS observation well during historic record. Based on a record starting in 2010, ow_{max} = 14.75 feet for MA-WKW 2 WAYLAND, MA (USGS Well ID: 421852071220501).

ow_r = Maximum range of water levels in USGS observation well. For record since 2010, ow_r = 1.97 feet

S_r = Range of water levels at Project Site. Value is based on 95 percent confidence interval for water levels in sand and gravel, terrace. From Figure 12 of Frimpter (1981), S_r = 2.9 feet

This analysis was performed for all eight (8) wells in the vicinity of the proposed discharge area. The results of the Frimpter Method analysis are presented in Table 4-3.

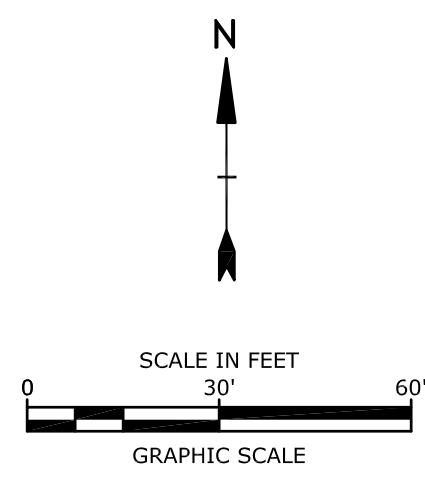
Table 4-3 Estimated Seasonal High Groundwater in Wells

Monitoring Well ID	Reference Point Elevation (FT, Ground Surface)	Depth to Groundwater ⁽¹⁾ (FT, from Ground Surface)	Groundwater Elevation (FT)	Estimated Depth to Seasonal High Groundwater (FT, from Ground Surface)	Estimated Seasonal High Groundwater Elevation (FT)
MW-1	127.89	3.75	124.14	2.84	125.05
MW-2	125.47	2.61	122.86	1.70	125.47
MW-3	125.41	3.30	122.11	2.39	125.41
MW-4	127.68	3.86	123.83	2.95	124.73
MW-5	130.18	7.48	122.70	6.57	123.61
MW-6	130.10	7.66	122.44	6.75	123.35
MW-7	128.02	4.09	123.93	3.18	124.84
MW-8	127.46	5.63	121.83	4.72	122.74

Note:

(1) Groundwater measurements taken on 01/24/2012

The estimated seasonal high groundwater elevations were used to develop the groundwater contours shown in Figure 4-3. The contours indicate that the general direction of groundwater flow is from northwest to southeast.



41 Cochituate Road
Wayland,
Massachusetts

Mark	Date	Description
PROJECT NO:		W1396
FILE:		TownHall_2012
DRAWN BY:		B.J.L
CHECKED:		K.L.K
APPROVED BY:		IBC
GROUNDWATER CONTOUR PLAN		
SCALE:		1"=40'
FIGURE 4-3		

4.5 Baseline Water Quality Sampling & Analysis

On March 12, 2011, Tighe & Bond personnel collected groundwater samples at wells MW-5, MW-6, and MW-8 which are all in the vicinity of the proposed groundwater discharge.

Prior to the collection of samples, each well was purged using a 2-inch submersible pump, removing a minimum of three well volumes of groundwater. At the conclusion of purging each well, the groundwater samples were collected in laboratory prepared bottles, placed on ice and submitted to Alpha Analytical Labs, a MassDEP certified laboratory. Groundwater sampling parameters were chosen based on typical MassDEP Groundwater Discharge Permit requirements and other guidance documents. The sampling and analysis was intended to establish background concentrations for these parameters.

Each groundwater sample was analyzed for the following parameters: pH, specific conductance, total alkalinity, total dissolved solids, total suspended solids, chloride, ammonia nitrogen, nitrite nitrogen, nitrate nitrogen, total Kjeldahl nitrogen, and total phosphorus. The results of this analysis are presented in Table 4-4 for each of the wells sampled.

Table 4-4 Water Quality Sampling Results

Parameter (Units)	MW-5	MW-6	MW-8
Temperature (°C)	9.74	9.97	8.11
pH (SU)	5.37	4.87	5.25
Specific Conductance (umhos/cm)	112	409	237
Alkalinity (mg CaCO ₃ /l)	10	9.7	13
Total Dissolved Solids (mg/l)	84	280	140
Total Suspended Solids (mg/l)	ND	ND	ND
Chloride (mg/l)	2.1	66	25
Ammonia Nitrogen (mg/l)	ND	ND	0.953
Nitrite Nitrogen (mg/l)	ND	ND	ND
Nitrate Nitrogen (mg/l)	7.9	18	10
Total Kjeldahl Nitrogen (mg/l)	ND	ND	ND
Total Phosphorous	0.028	0.014	ND

NA = Not Available

ND = Not Detected

In addition to the analysis presented in Table 4-4, wells MW-5, MW-6, and MW-8 were analyzed for EPA Priority Metals, and volatile organic compounds (EPA 624). All results were below the Reportable Concentration GW-1 (RCGW-1). See Appendix D for a full report with groundwater sample results.

Table 4-5 EPA Priority Metals Sample Results

Parameter (Units)	RC GW-1 Criteria	MW-5	MW-6	MW-8
Antimony (mg/L)	0.006	ND	ND	ND
Arsenic (mg/L)	0.01	ND	ND	ND
Beryllium (mg/L)	0.004	ND	ND	ND
Cadmium (mg/L)	0.004	ND	ND	ND
Chromium (mg/L)	0.1	ND	ND	ND
Copper (mg/L)	10	ND	ND	ND
Lead (mg/L)	0.01	ND	ND	ND
Mercury (mg/L)	0.002	ND	ND	ND
Nickel (mg/L)	0.1	ND	ND	ND
Selenium (mg/L)	0.05	ND	ND	ND
Silver (mg/L)	0.007	ND	ND	ND
Thallium (mg/L)	0.002	ND	ND	ND
Zinc (mg/L)	0.9	ND	ND	ND

ND = Not Detected

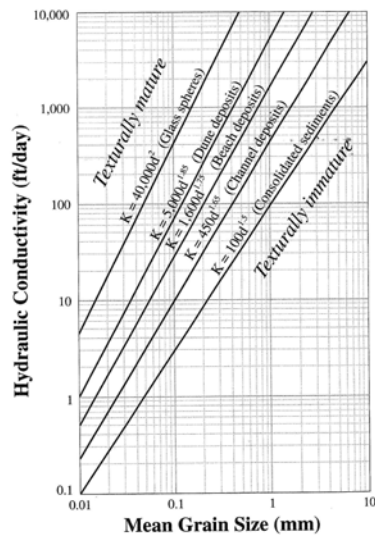
4.6 Estimation of Aquifer Properties

The estimation of aquifer properties is an essential component of any soil absorption system design. Aquifer properties determine how much of a groundwater mound is likely to develop and how fast groundwater is going to move away from the point of discharge. The sections that follow detail how both local and regional aquifer properties were estimated for use in the design and evaluation of the proposed soil absorption system.

According to Hydrologic Investigations Atlas HA-662, Hydrology and Water Resources of Tributary Basins to the Merrimack River from Salmon Brook to the Concord River, Massachusetts, the project site is located in stratified glacial deposits, with transmissivity of less than 1,350 square feet/day, which equates to a potential well field of less than 100 gallons per minute.

Attempts were made to evaluate aquifer properties in the vicinity of the disposal area using two different techniques. These techniques included soil gradation analysis and slug testing. The goal of this testing was to develop estimates of the hydraulic conductivity for use in groundwater mounding analysis.

As previously discussed, no percolation tests were conducted due to the high groundwater levels and unsuitable soils encountered at all test pit locations. In lieu of utilizing percolation test results, grain size analysis and in-situ hydraulic conductivity analysis were utilized to develop the hydraulic conductivity.

Figure 4-4 Shepherd Method

Initial estimates of hydraulic conductivity were made using data from grain size distributions of soils found on the site during test pit excavation work. For half of the samples, these estimates were based on a method developed by R.G. Shepherd (Fetter, 1994). Shepherd used a large number of data sets to produce an idealized graph that relates hydraulic conductivity to the mean grain size diameter (d_{50}) for different types of sediment. Figure 4-4 is a graph of the relationships that Shepherd found. The results from using the Shepherd method are presented in Table 4-7. Soil testing reports are found in Appendix E.

Table 4-6 Grain Size Analysis (Shepherd Method)

Test Pit ID	Soil Horizon	Sample Depth	Average Grain Size, D_{50} (mm)	Hydraulic Conductivity, K (ft/day)
TP-01	C-1	39"-84"	0.088	8.1
TP-05	C-1	48"-58"	0.107	11.3
TP-05	C-2	58"-100"	0.462	125.9
TP-06	C-1	13"-36"	0.292	59.0
TP-06	C-2	36"-52"	0.645	218.3
TP-07	C-2	25"-67"	0.700	249.8

For the other half of the soil samples, hydraulic conductivity was estimated by applying the Hazen Method to soil grain size information determined by a sieve analysis. The Hazen method is based on the assumption that groundwater flow through soil is analogous to the flow of water through a matrix of glass beads.

The method utilizes the following equation:

$$k = C(d_{10})^2$$

Where:

k = hydraulic conductivity (cm/s)

C = coefficient based on grain size and sorting (unitless)

d_{10} = the size of the particle which only 10% are smaller than (mm)

The Hazen Method is most appropriate for sands with a d_{10} between roughly 0.1 and 3 mm and the samples taken in the test pits were evaluated by this method because they matched this criterion. The results of the Hazen Method are presented in Table 4-8. Additional information and supporting calculations are included in Appendix E.

Table 4-7 Grain Size Analysis (Hazen Method)

Test Pit ID	Soil Horizon	Sample Depth	Grain Size, D_{10} (mm)	Hydraulic Conductivity, K (cm/sec)	Hydraulic Conductivity, K (ft/day)
TP-05	C-2	58"-100"	0.209	0.0393	111.5
TP-06	C-1	13"-36"	0.199	0.0356	101.0
TP-06	C-2	36"-52"	0.269	0.0651	184.6
TP-07	C-2	25"-67"	0.315	0.0893	253.2

The samples from TP-5 were taken from within the disposal area. The other samples were taken in the area surrounding the effluent disposal area. It should be noted that this method is an approximate means of estimating hydraulic conductivity.

In-situ permeability tests were conducted in several of the wells installed in the vicinity of the proposed effluent disposal area. Testing consisted of both rising and falling head slug tests. In a falling head test a pressure transducer is installed in the well and set to record the change in head over time after the water level in the well has been raised by the addition of either a metal slug or some amount of water. In a rising head test a pressure transducer is installed in the well and set to record the change in head over time after the water level in the well has been lowered by the instantaneous removal of a quantity of water. In both cases the data collected by the transducer can be analyzed using a variety of computational methods. Table 4-7 lists the location and type of testing performed for all the wells analyzed in this manner. Actual test results and corresponding calculations are included in Appendix F.

Due to the high groundwater conditions and less than ideal soil conditions, the focus of evaluation was to target the existing leachfield for the Title 5 system for the Town Office Building that is located in the southeast corner of the ball fields.

To determine a reasonable value for hydraulic conductivity in the vicinity of this discharge area, only the data collected from TP-5, MW-5, MW-6, and MW-8 was utilized to calculate the hydraulic conductivity value for that specific area. To reduce the impact of outlying data points on the estimated hydraulic conductivity, a geometric mean of the data was computed. Application of this method produced a geometric mean hydraulic conductivity of 76 feet/day.

Table 4-8 In-situ Hydraulic Conductivity Testing Results

Monitoring Well ID	Test Depth (Bottom of Slug) (FT, from Ground Surface)	Length of Submerged Slug (FT)	Test Type	Hydraulic Conductivity (FT/day)	Stratum Tested
MW-1	8.5	4.75	Rising Head Slug Test	246.1	Medium-Coarse Sand 3-5', Fine Sand/Silt Below
MW-2	10.5	5.0	Rising Head Slug Test	144.6	Course Sand 3-4', Fine Sand/Silt Below
MW-3	10.5	5.0	Rising Head Slug Test	57.3	Course Sand 3-4', Fine Sand/Silt Below
MW-4	8.5	5.0	Rising Head Slug Test	166.2	Course Sand 3-4', Fine Sand/Silt Below
MW-5	8.5	1.02	Rising Head Slug Test	302.5	Medium-Coarse Sand 6-8', Silt/Fine Sand Below
MW-6	8.5	0.84	Rising Head Slug Test	26.5	Medium-Coarse Sand 6-8', Silt/Fine Sand Below
MW-7	8.5	4.41	Rising Head Slug Test	56.6	Fine Sand/Silt 4-6', Silt/Fine Sand Below
MW-8	8.5	2.87	Rising Head Slug Test	153.5	Medium-Coarse Sand 6-8', Silt/Fine Sand Below

Several other aquifer parameters were determined in order to estimate the mounded groundwater height under the soil absorption system. These additional parameters included saturated thickness and specific yield. The saturated thickness was estimated to be 1.67 feet during seasonal high groundwater conditions. Due to the fact that no boring was drilled beyond 12 feet deep, bedrock was not determined during field exploration. However, the sand loam layer appeared to be acting as a barrier for the water and groundwater was perched on top of this silt loam layer. In determining the saturated thickness, the distance between the silt loam layer and estimated seasonal high groundwater was utilized. Specific yield was estimated based on values published by Fetter (1994). A specific yield of 0.12 ft³/ft³ was selected for the analysis.

Section 5 Evaluation of Effluent Disposal System

This section outlines the design of the proposed effluent discharge area, the estimated groundwater mound, the estimated nitrate loading resulting from the effluent discharge, and impacts on public groundwater supplies.

5.1 Leachfield Design

The project site is located right in Wayland Center where Boston Post Road (Route 20) and Cochituate Road (Route 126) intersect. The address is 41 Cochituate Road, which is the location of the Town Office Building and ball fields. The area proposed for subsurface discharge is located to the southeast of the baseball field. Figure 5-1 shows the layout and orientation of the proposed effluent discharge area.

Based on the preliminary development program, and the State's Title 5 sanitary code, the project will produce approximately 17,000 gallons per day (gpd) of wastewater. Due to the high groundwater and minimal space in this location, drip dispersal is likely the most feasible solution for this property. This method of dispersal is capable of uniformly distributing the wastewater effluent over large areas. The 4' separation from the mounded groundwater level will be maintained, while being able to reduce the amount of space needed for the system above the fill and also minimize the fill due to the ability to maintain the slope of the system.

The proposed system is a pressure distributed subsurface wastewater drip dispersal (discharge) system. Perc-rite drip dispersal systems are designed in accordance with 310 CMR 15.00 since their I/A approval falls under this regulation. The system is designed to distribute WWTF effluent and pressure discharge it at a depth of at least 6 inches below finished grade. Components include a pump chamber, control panel, a filter module/hydraulic unit and drip dispersal zone(s) with drip tubing incorporating discharge emitters. The dispersal zone(s) include small diameter flexible polyethylene tubing with pressure compensating emitters. They operate on a pressure differential across the emitter, with wastewater discharged in small doses. Dispersal field dosing is timed and controlled electronically to provide pre-programmed volumes of effluent for discharge to each dispersal zone(s). The system allows periodic backwashing of the filtration system and forward-flushing of the dispersal tubing with the flush/backwash effluent conveyed by return line back to the WWTF.

In terms of design loading rate, the proposed effluent discharge design is based on a rate of 0.85 gpd/ft². MassDEP's *Guidelines For The Design, Construction, Operation and Maintenance of Small Sewage Treatment Facilities With Land Disposal* (MassDEP, 2004) does not provide a recommended design loading rate for a drip dispersal system. However, it has been accepted that the loading rate for a drip dispersal system approximates the design loading rate for a leaching trench specified in MassDEP's *Guidelines For The Design, Construction, Operation and Maintenance of Small Sewage Treatment Facilities With Land Disposal*, Table 3 and the design loading rate from Title 5 (310 CMR 15.00). The design loading rate for a leaching trench, based a percolation rate of 10 to 20 minutes per inch is 1.0 gpd/ft². The design loading rate for a Title 5 system in similar soils would be approximately 0.53 gpd/ft² based on a percolation rate of 20 minute/inch and Class II soil, which is described as sandy loams and loams. The proposed design loading rate of 0.85 gpd/ft² falls between these two values, and is an

accepted loading rate for a drip dispersal system based on these guidance documents. Currently there are two operational Perc-Rite systems approved under the MassDEP groundwater discharge program that utilized this same design approach. These two systems are located in Graniteville Woods in Westford and Prospect Lake Campground in Egremont. Graniteville Woods has a design flow of 43,500 gpd and a drip dispersal area of 52,000 square feet, with an effective loading rate of 0.84 gpd/ft². Prospect Lake Campground has a design flow of 13,084 gpd and a drip dispersal area of 16,062 square feet, with an effective loading rate of 0.81 gpd/ft². There is an additional system in Avalon Bay, Cohasset that has been permitted, built, and will be online at the beginning of April 2012.

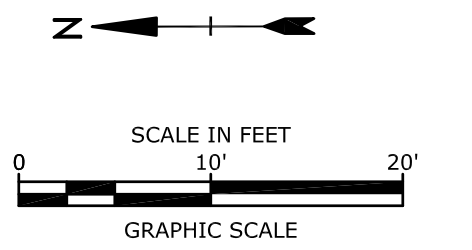
Based on the 0.85 gpd/ft² loading rate, the total effective leaching area required is 20,000 square feet. The drip dispersal piping layout is based on a 2 foot on center layout. This results in approximately one linear foot of drip piping every 2 square feet, resulting in approximately 10,000 linear feet of drip piping. The area between drip piping will serve as a reserve area. The reserve area will only be used in the event of primary discharge system failure. Figure 5-2 shows a profile of the disposal area in two locations of the discharge area.

The discharge area will be broken into two zones. This allows for distribution evenly throughout the system and minimizes the number of valves in the field because all equipment can be located in the WWTF. General details of the manifold connection and drip dispersal details are available in Figure 5-3. However, specific design layouts will be presented in the Engineering Report and Permit Plans submitted under separate cover.

5.2 Estimated Groundwater Mounding

When effluent is discharged to the ground at a rate greater than the rate of natural infiltration, groundwater levels may rise and a groundwater "mound" may develop. Under uniform discharge rates, this mound will continue to rise until equilibrium conditions occur. Such conditions are met when the lateral extent of the mound reaches a control, such as a stream, lake or sufficiently more permeable material, and an input/output balance is reached.

The mounding analysis was performed using the Hantush Method (Hantush, 1967). This method assumes that the aquifer is homogeneous, isotropic, and resting on an impermeable base. The method also assumes a relatively flat water table. Although all of these conditions may not be perfectly met in the field, the method is accepted as a reasonable approximation of projected conditions. Information gathered in the field indicates that all of these assumptions are reasonably applicable to the proposed discharge site.



41 Cochituate Road
Wayland,
Massachusetts

Mark	Date	Description
PROJECT NO:		W1396
FILE:		TownHall_2012
DRAWN BY:		BJL
CHECKED:		KLK
APPROVED BY:		IBC

SCALE: 1"=10'

FIGURE 5-1

O:\Projects\W\W1396\Town Hall\W-1396_TownHall-2012_FIG 5-2.dwg Mar 16, 2012-11:39am

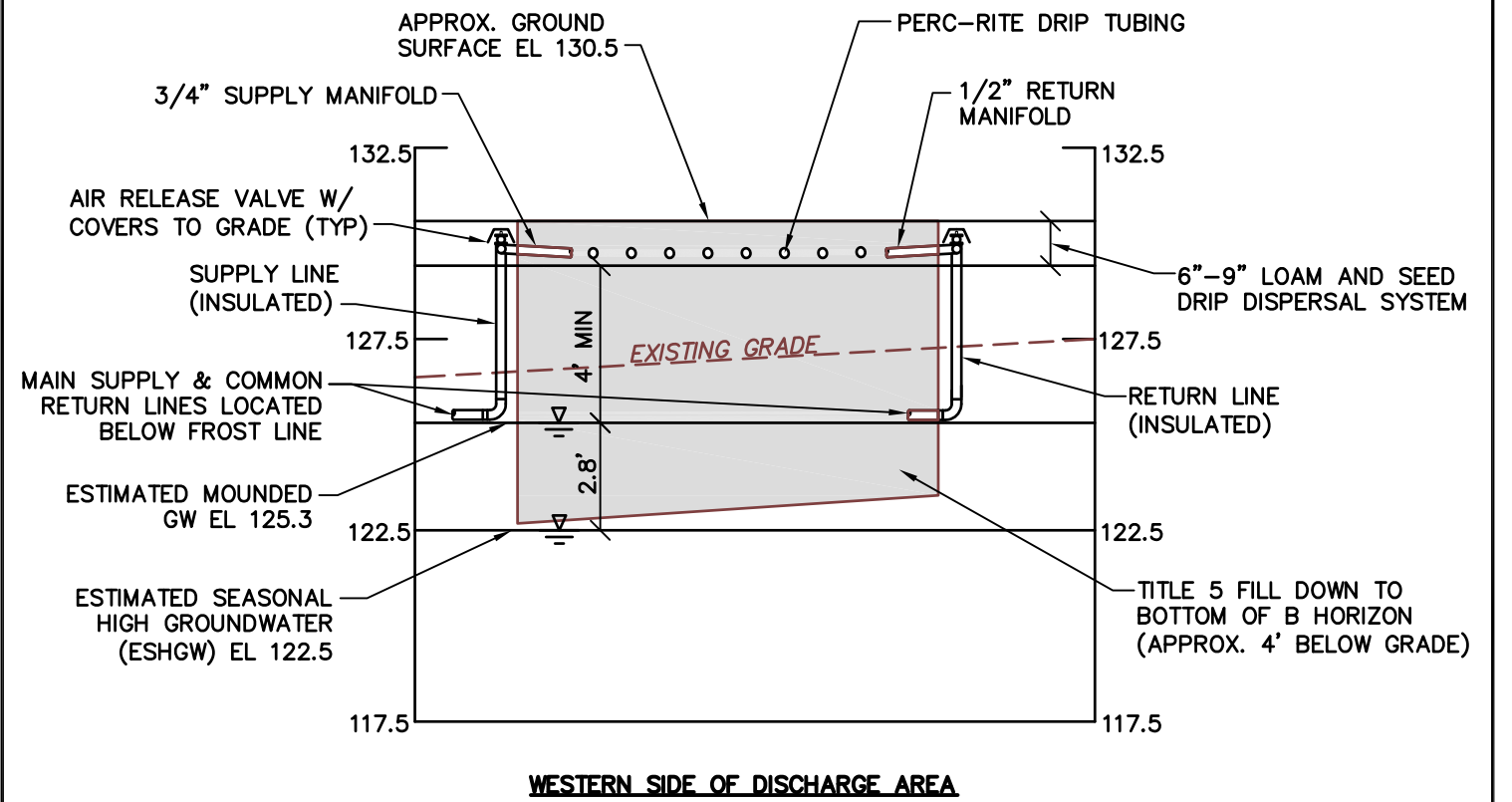
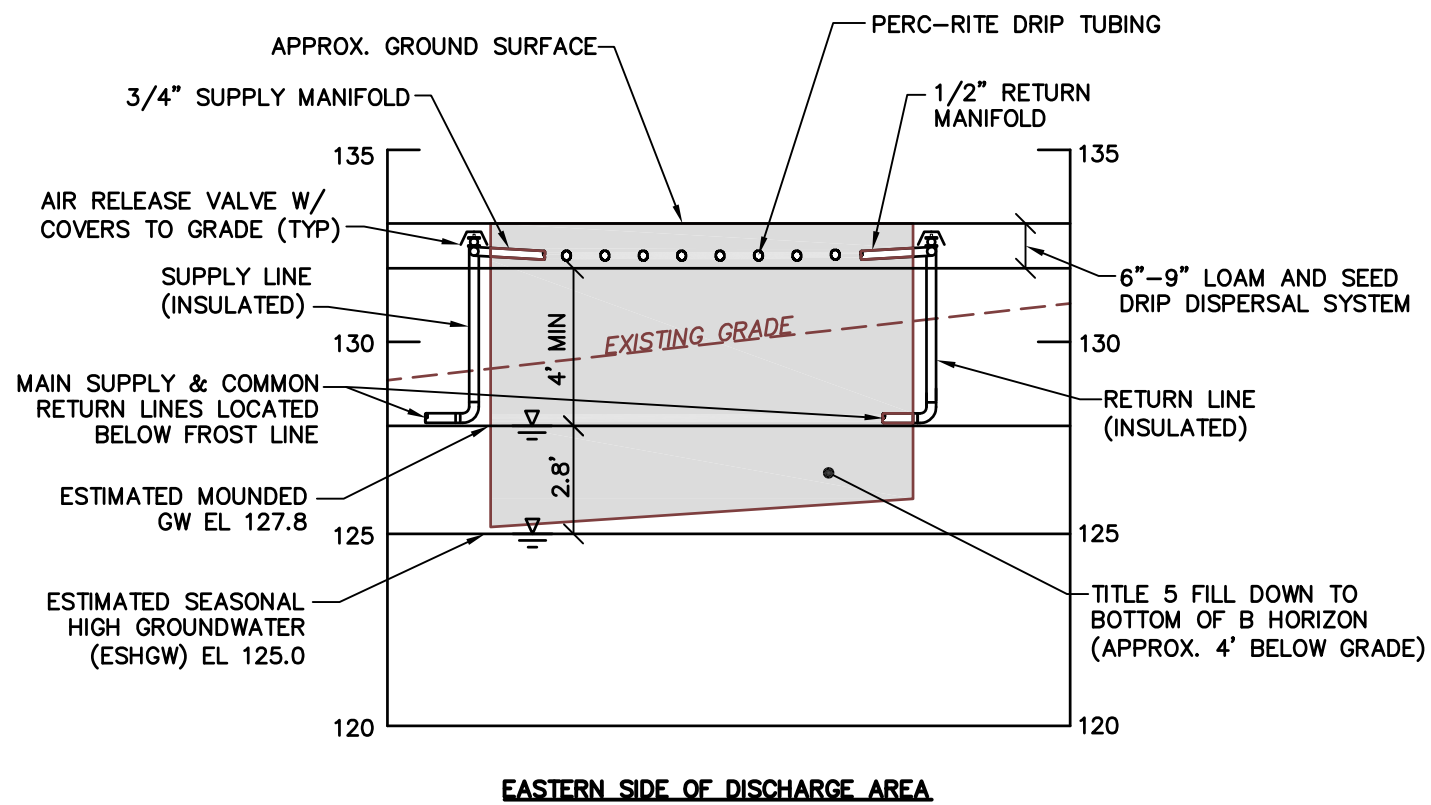


FIGURE 5-2

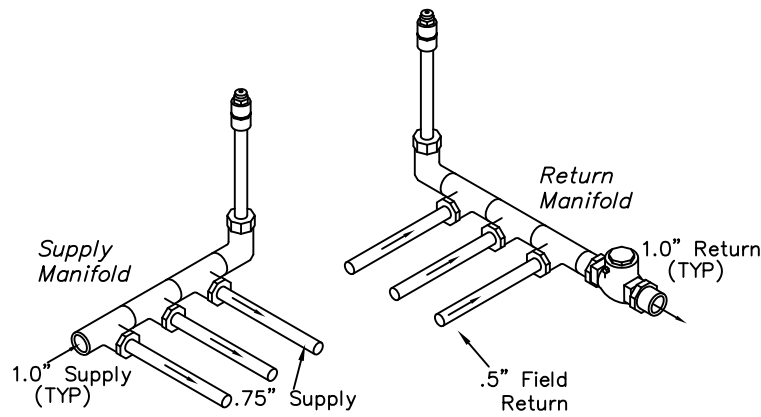
DISPOSAL BED PROFILES

TOWN OFFICE BUILDING
GROUNDWATER DISCHARGE
41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS

Tighe&Bond Consulting Engineers
www.tighebond.com

SCALE: 1"=30'H;1"=5'V

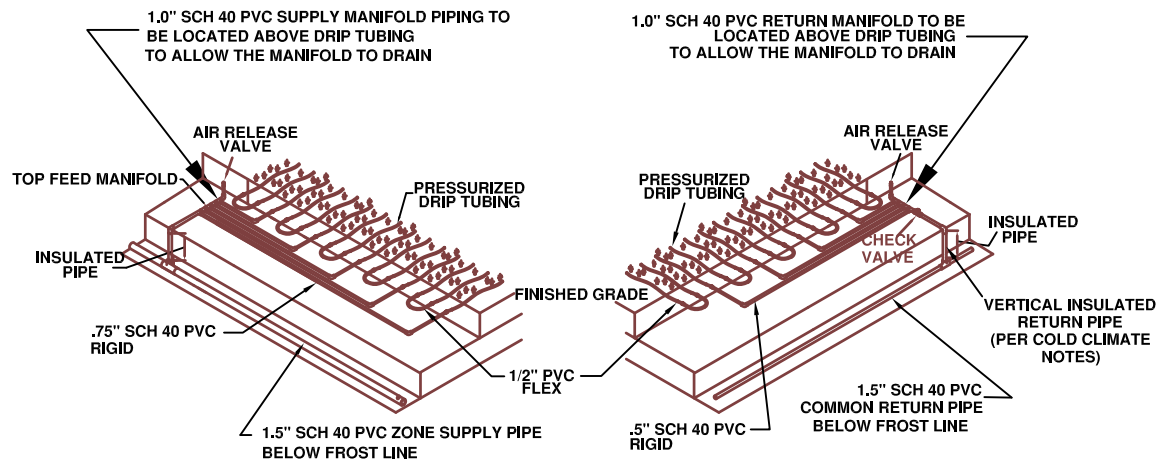
DATE: MARCH 2012



TYPICAL MANIFOLD CONNECTION

NOTE:
1. ALL RIGID AND FLEXIBLE PVC ARE TO BE LOCATED ABOVE THE DRIP LINE TO ALLOW FOR THE PIPES TO DRAIN

STANDARD DRIP SYSTEM DETAILS (TOP FEED MANIFOLD)



NOTE: THE DRIP TUBING SHALL BE THE LOWEST POINT TO ALLOW FOR DRAINAGE FROM BOTH THE VERTICAL INSULATED SUPPLY AND RETURN PIPES

FIGURE 5-3

DRIP DISPERSAL DETAILS

TOWN OFFICE BUILDING
GROUNDWATER DISCHARGE
41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS

Tighe&Bond Consulting Engineers
www.tighebond.com

NO SCALE

DATE: MARCH 2012

The Hantush's equation is:

$$h_{x,y,t} - H = \frac{v_a t}{4f} \{ F[W/2 + x, n, (L/2 + y)] + F[W/2 + x, n, (L/2 - y)] + F[W/2 - x, n, (L/2 + y)] + F[W/2 - x, n, (L/2 - y)] \}$$

Where: $h_{x,y,t}$ = height of water table above impermeable layer at x,y, and time

H = original height of water table above impermeable layer

v_a = arrival rate at water table of water from infiltration basin

t = time since start of recharge

f = fillable porosity ($1 > f > 0$)

L = length of recharge basis (in y direction)

W = width of recharge basin (in x direction)

$n = (4tT/f)^{-1/2}$

$$F(a, \beta) = \int_0^1 \text{erf}(\alpha\tau^{-1/2}) \cdot \text{erf}(\beta\tau^{-1/2}) d\tau \quad [\text{Tabulated by Hantush}]$$

L = length of recharge basis (in y direction)

Using this method, it was determined that a groundwater mound of 2.8 feet will be produced under peak day flow conditions over a period of 90 days. The bottom of the drip dispersal system will be a minimum 6.8 feet above the estimated seasonal high groundwater elevation. This consists of the 2.8 foot groundwater mound and the minimum four feet of separation between the groundwater mound and the bottom of the system. Drip dispersal will allow for this to be reduced because in lieu of the two-foot deep trench and one foot of cover, the system only needs approximately 6-9" from the bottom of the piping to grade. This reduces cover by about 2'-3" to 2'-6". Additionally, rather than having a flat mound, drip dispersal allows for matching the slope of the grade.

Given the proximity of the proposed disposal site to down gradient slopes, it was necessary to evaluate the possibility of groundwater breakout down gradient from the disposal site. Groundwater breakout or emergent groundwater occurs when the amount of artificial recharge exceeds the soil's natural ability to effectively disperse the effluent being applied to the aquifer. If this condition occurs, the water table elevation could exceed the ground surface elevation producing a potential public health risk. To evaluate the potential for this type of situation to occur on site a method to calculate the lateral spread of the groundwater mound was used (Bouwer, 1999).

The Bouwer Method is typically used to estimate the mound produced by the application of artificial recharge. However, unlike the Glover and Hantush methods, the Bouwer Method requires the designer to input the distance between the edge of the recharge area and the control area. The control area is defined as a point where the water table elevation is no longer affected by the application of artificial recharge. Bouwer's Method for rectangular areas is shown below:

$$H_c - H_n = \frac{iW}{2T} \left(\frac{W}{4} + L_n \right)$$

Where: H_c = Height of groundwater mound in center of recharge area

H_n = Height of groundwater table at control area

i = Average infiltration rate in recharge area

T = Transmissivity

W = Width of recharge area

L_n = Distance between edge of recharge area and control area

By setting H_c to the maximum predicated groundwater mound and solving the equation for the L_n term, an estimated of the horizontal limits of the groundwater mound can be made. Application of this method yields an L_n of 46 feet. Based on this estimate of the horizontal area impacted by groundwater mounding an emergent groundwater problem is not anticipated.

5.3 Estimated Nitrate Loading

A daily nitrate loading estimate was made using a mass balance approach to calculate the expected nitrate concentration immediately downgradient of the proposed leachfield. The equation shown below was used to perform the analysis.

$$C_m = \frac{(C_{gw} Q_{gw}) + (C_{ww} Q_{ww})}{Q_m}$$

Where: C_m = The nitrate concentration in the downgradient groundwater mixture, assuming complete mixing. (mg/l)

C_{gw} = The background concentration of nitrate in the groundwater based on baseline water quality sampling results.

C_{ww} = The nitrate concentration in WWTF effluent.

Q_{gw} = The groundwater flow rate under the leachfield

Q_{ww} = The peak daily wastewater flowrate

Q_m = The total flow rate. ($Q_{gw} + Q_{ww}$)

The resulting nitrate concentration immediately downgradient from the leachfield was calculated to be 16.5 mg/l. This is equivalent to a daily nitrate loading of 36.4 pounds per day under peak flow conditions. However, the background concentration of nitrate in the groundwater based on baseline water quality sample results was 18 mg/L. This is likely a result of the fact that the proposed groundwater discharge location and the location of the sampling was conducted in an existing leachfield for the Town Office Building's Title 5 system. While the calculated nitrate concentrations are not below the RCGW-1 standard of 10 mg/l and the anticipated permit limits, it is anticipated that the

nitrate level will actually decrease now that the discharge will be MBR treatment plant effluent rather than Title 5 discharge.

The calculations have been made assuming that nitrate is a conservative pollutant. This means that the only factor working to reduce its concentration is the initial dilution of the wastewater as it mixes with the groundwater beneath the discharge area. It does not account for additional factors such as adsorption, dispersion, advection and degradation, all of which will tend to decrease nitrate concentrations as the wastewater plume moves away from the discharge area.

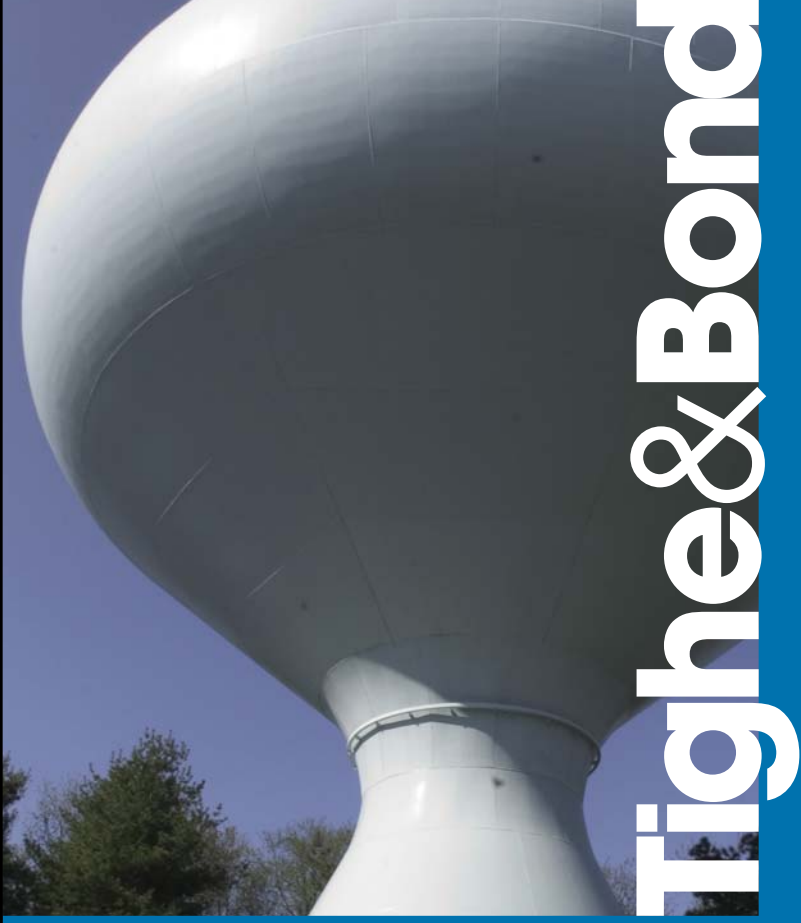
The calculations also assume a treatment plant effluent nitrate concentration of 7.0 mg/l. Although a permitted effluent limit of 10 mg/l is anticipated, the treatment process has been demonstrated to produce effluent with a maximum nitrate concentration of 7.0 mg/l. It is not uncommon for similar plants to produce effluent nitrate concentrations of 3 to 5 mg/l which would further reduce actual nitrate levels in local groundwater. Supporting calculations are included in Appendix F.

5.4 Impact on Public Groundwater Supply Wells

The proposed point of discharge is not located within a Zone A or Zone II wellhead protection district. As such, the State's Interim Guidelines on Reclaimed Water (DEP, 2000) do not apply to this site. As previously discussed, the direction of regional groundwater flow in the vicinity of the discharge is away from Baldwin Pond. See Figure 4-3 Groundwater Contour Plan for the proposed discharge area. Therefore, there will be no impact to Baldwin Pond.

In order to be able to monitor impacts of the proposed discharge system, one up gradient and two down gradient monitoring wells have been proposed. Well MW-2 developed for this study is proposed for use as the up gradient monitoring point, and MW-5 and MW-4 are proposed as the down gradient monitoring points. The location of these wells is indicated on Figures 4-1 and 4-3. If these wells are damaged during construction at the site, the Owner will coordinate the location of replacement wells with the Department.

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Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-01

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-23	Fill	--	--	--	--	--	--	--	--	--	
23-28	A	10YR/3/2	--	--	--	SL	5	0	MASS	FRIABLE	
28-39	Bw	7.5YR/5/3	33	2.5YR/5/ 1	5%	SL	0	0	MASS	FRIABLE	MOIST
39-84	C1	5YR/5/4	39	5YR/5/8	>5%	F-M LS	5	0	MASS	FRIABLE	
84-89	C2	10YR/5/2	84	7.5YR/6/ 1	>5%	SILT LOAM	0	0	MASS	FIRM	

Additional Notes:

Test pits 01 thru 08 conducted on 12/6/2011 (55 deg, cloudy, occasional light rain), around soccer/baseball field at 41 Cochituate Rd, Wayland, logged by Jeremy Cigal, Tighe&Bond (SE2870), witnessed by H. Criss Stephens, MassDEP, excavated by Town DPW using a John Deere Backhoe 310sc. Standing water = 39", ESHW = 33",
Fill = 7" topsoil over tan loamy sand (clean), stopped test pit @89" due to high groundwater, bright orange redox (50%) observed @54".



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-02

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-7	A	10YR/3/2	--	--	--	SL	0	0	SBK	FRIABLE	
7-14	Bw	7.5YR/5/3	--	--	--	LS	0	0	MASS	FRIABLE	
14-20	C1	5YR/5/4	--	--	--	LS	0	0	MASS	FRIABLE	FIRM IN PLACE
20-43	C2	5YR/6/1	24	2.5YR/5/1	>5%	F-M SAND	0	0	MASS	FRIABLE	
43-50	C3	5YR/6/1	43	5YR/5/8	>5%	COARSE SAND	0	0	SINGLE GRAIN	LOOSE	
50-96	C4	10YR/5/2	50	7.5YR/6/1	>5%	SILT LOAM	0	0	MASS	FIRM	

Additional Notes:

Standing water = 47", ESHW = 24", water appears to be perched on top of silt loam (C4)



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-03

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-29	FILL	--	--	--	--	--	--	--	--	--	
29-35	C1	10YR/3/2	29	5YR/5/8	>5%	LS	0	0	MASS	FRIABLE	
35-88	C2	7.5YR/5/3	35	5YR/5/8	>5%	MED SAND	0	0	MASS	FRIABLE	
88-94	C3	10YR/5/2	88	7.5YR/6/ 1	>5%	SILT LOAM	0	0	MASS	FIRM	

Additional Notes:

Standing water = 49", ESHW = 29", Fill = 10" topsoil over medium sand over dense firm loamy sand (impervious), stopped test pit @94" due collapsing pit, water

appears to be perched on top of silt loam (C3)



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-54	FILL	--	--	--	--	--	--	--	--	--	

Additional Notes:

Fill was a black – gray mix of sand, asphalt, loam. No weeping observed. Abandoned @54". Town DPW thinks it may be remnants of an old parking lot nearby that was abandoned.



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-05

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-33	Fill	--	--	--	--	--	--	--	--	--	
33-42	A	10YR/3/2	--	--	--	SL	0	0	MASS	FRIABLE	
42-48	Bw	7.5YR/5/3	--	--	--	SL	0	0	MASS	FRIABLE	
48-58	C1	7.5YR/5/4	50	7.5YR/6/ 1	>5%	FINE LS	0	0	MASS	FRIABLE	
58-100	C2	5YR/5/3	58	5YR/5/8	>5%	M-C SAND	0	0	SINGLE GRAIN	LOOSE	

Additional Notes:

Standing water = 62", ESHW = 50", Fill = 12" topsoil over tan sandy loam, ended pit at 100" due to collapsing sides.



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-06

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-7	A	10YR/3/2	--	--	--	SL	0	0	SBK	FRIABLE	
7-13	Bw	7.5YR/5/3	--	--	--	SL	0	0	MASS	FRIABLE	
13-36	C1	5YR/5/4	--	--	--	MED SAND	0	0	MASS	FRIABLE	
36-52	C2	5YR/5/3	--	--	--	COARSE SAND	0	0	SINGLE GRAIN	LOOSE	
52-71	C3	10YR/5/2	52	7.5YR/6/1	>5%	SILT LOAM	0	0	MASS	FIRM	

Additional Notes:

Standing water = 45", weeping = 36" ESHW = 32" based on soils being wet (redox not observed), water appears to be perched on top of silt loam (C3)



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-07

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-7	A	10YR/3/2	--	--	--	SL	0	0	SBK	FRIABLE	
7-16	Bw	7.5YR/5/3	--	--	--	SL	0	0	MASS	FRIABLE	
16-25	C1	5YR/5/3	--	--	--	LS	0	0	MASS	FRIABLE	
25-67	C2	5YR/5/4	37	5YR/5/8	<3%	M-C SAND	0	0	SINGLE GRAIN	LOOSE	
67-90	C3	10YR/5/2	67	7.5YR/6/ 1	>5%	SILT LOAM	0	0	MASS	FIRM	

Additional Notes:

Standing water = 55", ESHW = 37" based on soils being wet (few signs of redox observed), water appears to be perched on top of silt loam (C3)



Commonwealth of Massachusetts

City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

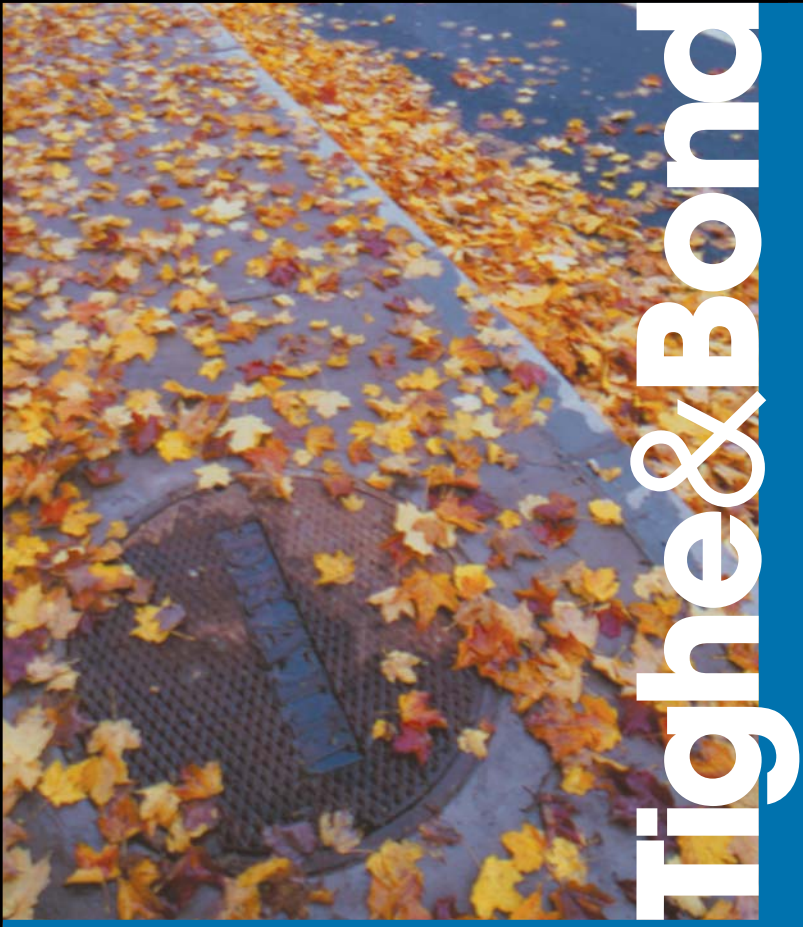
C. On-Site Review (continued)

Deep Observation Hole Number: TP-08

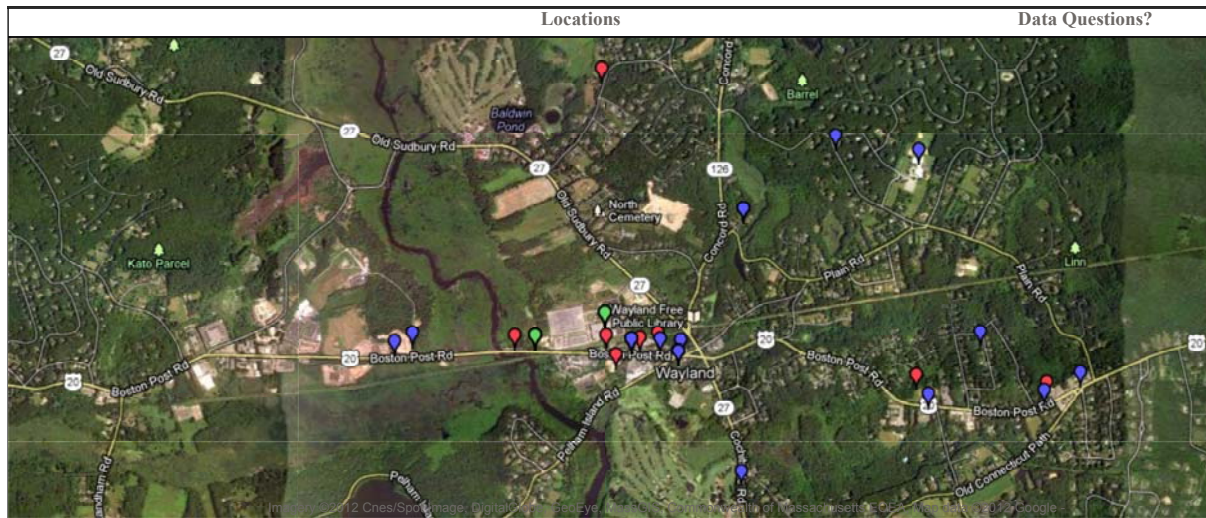
Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR/3/2	--	--	--	SL	0	0	SBK	FRIABLE	
6-15	Bw	7.5YR/5/3	--	--	--	SL	0	0	MASS	FRIABLE	
15-45	C1	5YR/5/4	34	7.5YR/6/1	>5%	LS	0	0	MASS	FRIABLE	
45-65	C2	5YR/5/3	45	5YR/5/8	>5%	M-C SAND	5%	0	SINGLE GRAIN	LOOSE	
65-90	C3	10YR/5/2	65	7.5YR/6/1	>5%	SILT LOAM	0	0	MASS	FIRM	

Additional Notes:

Standing water = 56", ESHW = 34", wet up to 42", water appears to be perched on top of silt loam (C3)



Reportable Release Lookup



The search returned 74 results | Search Keywords >> 'WAYLAND' | Sorted by: RTN | Data last updated: 02/22/2012

RTN	City/Town	Release Address	Site Name/ Location Aid	Reporting Category	Notification Date	Compliance Status	Date	Phase	RAO Class	Chemical Type	Supporting Documents
3-0000059	WAYLAND	522 BOSTON POST RD LONGFELLOW	WATERS MANUFACTURING	NONE	5/28/1986	RAO	6/29/1995		A2	Oil	
3-0000461	WAYLAND	321 COMMONWEALTH RD	CARLSON GROUP INC	NONE	1/15/1987	RAO	12/23/1996		B1		
3-0000543	WAYLAND	267 BOSTON POST RD	SERVICE STATION FMR	NONE	1/15/1987	RAO	8/2/1996		A2	Oil	
3-0000609	WAYLAND	6 MOORE RD	WATERTOWN DAIRY FARM FMR	NONE	7/15/1987	DEPNFA	4/24/1992			Hazardous Material	
3-0001051	WAYLAND	310 EAST COMMONWEALTH RD	BLOOMSTEIN GASOLINE STATION	NONE	1/15/1988	RAO	8/7/1995				
3-0001594	WAYLAND	ADAMS LN	CLAYPIT HILL SCHOOL	NONE	4/28/1994	RAO	12/23/2009	PHASE III	A2		Files
3-0001724	WAYLAND	BOSTON POST RD	SEPTAGE FACILITY	NONE	4/15/1987	DEPNDS	7/23/1993				
3-0001783	WAYLAND	430 BOSTON POST RD	RAYTHEON CO EQUIPMENT DIV	NONE	1/15/1987	RAO	8/3/1995		B1	Oil	
3-0002247	WAYLAND	139 COMMWEALTH AVE 24-44 MAIN	COCHITUATE MOTORS INC	NONE	10/15/1989	RAO	11/17/1997	PHASE II	A2		
3-0002299	WAYLAND	28 BOSTON POST RD	EXXON GASOLINE STATION	NONE	1/15/1990	RAO	11/4/1994				
3-0002667	WAYLAND	19 MAIN ST	SUNOCO GASOLINE STATION	NONE	10/23/1990	RAO	9/12/1994		A2		
3-0002915	WAYLAND	135 BOSTON POST RD	OLD COLONY GAS STATION FMR	NONE	1/15/1991	RAO	11/21/2001	PHASE IV	A2		
3-0003171	WAYLAND	315 COMMONWEALTH RD	MOBIL STATION 01 515	NONE	7/15/1990	RAO	2/18/2011	PHASE V	A3	Oil	Files
3-0003325	WAYLAND	268 BOSTON POST RD	SHEPARDS MOBIL STATION	NONE	10/15/1990	TIER 1C	11/21/2003	PHASE IV			Files
3-0003351	WAYLAND	533 BOSTON POST RD	PROPERTY	NONE	8/27/1990	RAO	8/2/1996				
3-0003866	WAYLAND	412 COMMONWEALTH RD	DOW CHEMICAL FMR	NONE	7/15/1993	RAO	4/3/2000	PHASE III	A2	Oil and Hazardous Material	
3-0004220	WAYLAND	96 MAIN ST	COMMERCIAL PROPERTY	NONE	10/1/1993	RAO	12/3/2007	PHASE II	A2		
3-0004394	WAYLAND	322 COMMONWEALTH RD	WAYLAND AUTOMOTIVE	NONE	7/15/1993	RAO	1/19/2010	PHASE IV	A3		Files
3-0004490	WAYLAND	130 MAIN ST	GULF SERVICE STATION	NONE	7/15/1993	RAO	11/7/2007	PHASE V	A2	Oil	Files
3-0010389	WAYLAND	42 GLEZEN LN	PRIVATE RESIDENCE	120 DY	12/21/1993	TIER 1C	2/24/2004	PHASE II		Oil	
3-0010806	WAYLAND	130 MAIN ST	NO LOCATION AID	TWO HR	4/5/1994	RTN CLOSED	1/20/1999	PHASE III		Oil	
3-0011146	WAYLAND	DUDLEY POND	BEHIND 4 LAKESHORE DR	TWO HR	6/15/1994	RAO	10/26/1994			Hazardous Material	
3-0012336	WAYLAND	130 MAIN ST	NO LOCATION AID	TWO HR	3/31/1995	RTN CLOSED	1/20/1999			Oil	
3-0012588	WAYLAND	277 BOSTON POST RD	US POSTAL SERVICE	72 HR	6/16/1995	RAO	10/16/1995		A2	Oil	
3-0012834	WAYLAND	LK COCHITUATE	NO LOCATION AID	TWO HR	8/21/1995	RAO	11/22/1995		B1	Oil	
3-0013302	WAYLAND	430 BOSTON POST RD	RAYTHEON COMPANY	72 HR	1/2/1996	REMOPS	12/3/2004	PHASE V		Oil	Files
3-0013571	WAYLAND	200 OLD CONNECTICUT PATH	NO LOCATION AID	120 DY	3/18/1996	RAO	8/30/1996		A3	Oil	
3-0013574	WAYLAND	430 BOSTON POST RD	RAYTHEON COMPANY	120 DY	3/15/1996	RTN CLOSED	11/28/2000			Hazardous Material	
3-0013902	WAYLAND	280 CONCORD RD	RT 126	TWO HR	6/13/1996	RAO	8/16/1996		A2	Oil	
3-0014042	WAYLAND	430 BOSTON POST RD	RAYTHEON COMPANY	120 DY	7/25/1996	RTN CLOSED	11/28/2000			Oil and Hazardous Material	
3-0014457	WAYLAND	322 EAST COMMONWEALTH AVE	NO LOCATION AID	72 HR	10/10/1996	RTN CLOSED	8/1/1997			Oil	
3-0014462	WAYLAND	OXBOW RD	NORTH OUTFALL MISS MAG AREA	120 DY	11/1/1996	RAO	10/8/1997		A2	Hazardous Material	

RTN	City/Town	Release Address	Site Name/ Location Aid	Reporting Category	Notification Date	Compliance Status	Date	Phase	RAO Class	Chemical Type	Supporting Documents
3-0014463	WAYLAND	OXBOW RD	ASSEMBLY TEST BLDG L5	120 DY	11/1/1996	RAO	10/8/1997			Hazardous Material	
3-0014633	WAYLAND	28 BOSTON POST RD	NO LOCATION AID	120 DY	12/16/1996	RAO	12/16/1996		A2	Oil	
3-0015061	WAYLAND	139 COMMONWEALTH RD AND MAIN ST	FMR COCHITUATE MOTORS INC	72 HR	5/1/1997	RAO	11/17/1997		A2	Oil	
3-0015706	WAYLAND	4 PLAIN RD	NO LOCATION AID	120 DY	11/6/1997	RAO	12/21/2001	PHASE III	A2	Oil	
3-0015881	WAYLAND	153 LOKER ST	OFF SCHOOL ST	120 DY	12/31/1997	RAO	2/5/1998		B1	Oil	
3-0015943	WAYLAND	4 PLAIN RD	RESIDENCE	72 HR	1/23/1998	RTN CLOSED	11/13/1998			Oil	
3-0016798	WAYLAND	195 MAIN ST	WAYLAND HIGHWAY DEPT	TWO HR	5/14/1998	RAO	5/28/1999		B1	Oil	
3-0017707	WAYLAND	RTE 20 W	BOSTON POST RD	TWO HR	12/9/1998	RAO	9/21/1999		A1	Hazardous Material	
3-0017974	WAYLAND	356 BOSTON POST RD	COOKS AUTOMOTIVE OF WAYLAND INC	120 DY	2/4/1999	STMRET	9/20/2007	PHASE V		Oil	Files
3-0018346	WAYLAND	103 COCHITUATE RD	NO LOCATION AID	72 HR	5/27/1999	RAO	8/2/1999		A1	Oil	
3-0018944	WAYLAND	18 SYLVAN WAY	NO LOCATION AID	TWO HR	11/9/1999	RAO	11/8/2001	PHASE II	A2	Oil	
3-0019482	WAYLAND	430 BOSTON POST RD	NO LOCATION AID	TWO HR	4/26/2000	RTN CLOSED	11/28/2000			Hazardous Material	
3-0019688	WAYLAND	177 COMMONWEALTH RD	NO LOCATION AID	TWO HR	7/5/2000	RAO	9/5/2000		A1	Oil	
3-0020028	WAYLAND	177 COMMONWEALTH RD	BEHIND DONELANS MARKET	TWO HR	10/11/2000	RAO	11/10/2000		A1	Oil	
3-0020359	WAYLAND	47 POND DR	CREST RD	TWO HR	1/29/2001	RAO	5/1/2003	PHASE II	A2	Oil and Hazardous Material	
3-0022408	WAYLAND	430 BOSTON POST RD	FORMER RAYTHEON FACILITY	120 DY	12/17/2002	RTN CLOSED	6/9/2009	PHASE V		Hazardous Material	Files
3-0022665	WAYLAND	430 BOSTON POST RD	NO LOCATION AID	120 DY	3/12/2003	RTN CLOSED	12/10/2003			Hazardous Material	
3-0022753	WAYLAND	298 BOSTON POST RD	RTE 20	120 DY	6/9/2003	REMOPS	6/27/2011	PHASE V		Hazardous Material	Files
3-0022900	WAYLAND	RTE 90 W	42 19 14 N 71 20 28 W MM 119	TWO HR	6/3/2003	RAO	7/25/2003		A2	Oil	
3-0023283	WAYLAND	130 NORTH MAIN ST	NO LOCATION AID	120 DY	10/3/2003	RAO	10/3/2003		A1	Oil and Hazardous Material	
3-0023794	WAYLAND	6 SPENCER CIR	LOT NO 6	TWO HR	4/23/2004	RAO	6/14/2004		A1		
3-0024040	WAYLAND	315 COMMONWEALTH RD	MOBIL STA NO 12646 FMLY 01 515	120 DY	7/8/2004	RTN CLOSED	7/9/2005			Hazardous Material	
3-0024194	WAYLAND	NORTH MAIN ST (RT 27)	DCR COCHITUATE STATE PARK	72 HR	8/26/2004	DPS	10/25/2004			Oil	
3-0024592	WAYLAND	19 MAIN ST	SUNOCO STA	120 DY	1/28/2005	REMOPS	3/14/2011	PHASE V		Oil	Files
3-0024698	WAYLAND	484 BOSTON POST RD	WAYLAND SAND HILL LANDFILL	TWO HR	3/18/2005	RAO	5/17/2005		A1	Oil	
3-0025196	WAYLAND	304 BOSTON POST RD	NO LOCATION AID	120 DY	8/22/2005	DPS	3/30/2006			Hazardous Material	
3-0025287	WAYLAND	CLAYPIT HILL RD	POLE # 81/19 NEAR #54	TWO HR	10/2/2005	RAO	11/3/2005		A1	Oil	
3-0025637	WAYLAND	304 BOSTON POST RD	WAYLAND CLEANERS	TWO HR	2/2/2006	RTN CLOSED	4/3/2006			Hazardous Material	Files
3-0026027	WAYLAND	MBTA ROW NR400-440BOSTONPOSTRD	WAYLAND MBTA PROPERTY SITE	TWO HR	7/6/2006	DEPNFA	4/23/2009			Hazardous Material	Files
3-0026205	WAYLAND	62-78 BOSTON POST RD	@ ABANDONED GAS STATION	TWO HR	9/6/2006	RAO	11/6/2006		A2	Oil	
3-0026495	WAYLAND	12 WAYSIDE RD	RESIDENCE	TWO HR	12/28/2006	RAO	3/11/2010	PHASE III	A2	Oil	Files
3-0027651	WAYLAND	430 BOSTON POST RD	FMR RAYTHEON PROPERTY	120 DY	11/26/2007	DPS	11/26/2007			Hazardous Material	
3-0027717	WAYLAND	78 BOSTON POST RD	FMR SHELL-BRANDED SERVICE STATION	120 DY	5/23/2008	REMOPS	11/21/2011	PHASE V		Oil and Hazardous Material	Files
3-0027741	WAYLAND	484 BOSTON POST RD	NEAR LANDFILL	TWO HR	6/3/2008	RAO	7/29/2008		A2	Oil	Files
3-0027875	WAYLAND	BOSTON POST RD	MHD STAGING AREA - SUDBURY RIV BRIDGE	TWO HR	7/30/2008	RAO	10/3/2008		A2	Oil	Files
3-0028024	WAYLAND	134 BOSTON POST RD	134 BOSTON POST ROAD	72 HR	9/30/2008	TIER 2	7/14/2009	PHASE IV		Oil	Files
3-0028677	WAYLAND	57 MAIN ST	INTERDECTION OF RTES 27 AND 30	120 DY	8/13/2009	RAO	8/21/2009		B1	Hazardous Material	Files
3-0028937	WAYLAND	315 COMMONWEALTH RD	COMMERCIAL PROPERTY	120 DY	12/3/2009	RAO	11/23/2010		B2	Hazardous Material	Files
3-0029040	WAYLAND	325 BOSTON POST RD	NO LOCATION AID	120 DY	1/28/2010	DPS	2/26/2010			Oil and Hazardous Material	Files
3-0029309	WAYLAND	188 COMMONWEALTH RD	WAYLAND NURSING AND REHAB CENTER	TWO HR	6/3/2010	RAO	6/29/2010		A1	Hazardous Material	Files
3-0030287	WAYLAND	338 BOSTON POST ROAD	NO LOCATION AID	120 DY	9/14/2011	UNCLASSIFIED	9/14/2011			Oil and Hazardous Material	Files
3-0030293	WAYLAND	268 BOSTON POST ROAD	FORMER MOBIL GASOLINE STATION	72 HR	9/14/2011	RTN CLOSED	1/16/2012			Oil	Files

Site Information			
Site Number:	3-0003325	Category:	NONE
Site Name:	SHEPARDS MOBIL STATION	Release Type:	TIER 1C
Address:	268 BOSTON POST RD	Current date:	11/21/2003
Town:	WAYLAND	Phase:	PHASE IV
Zipcode:	01778	RAO Class:	
Official notification date:	10/15/1990	Locationtype:	
Initial status date:	8/2/1996	Source:	UST

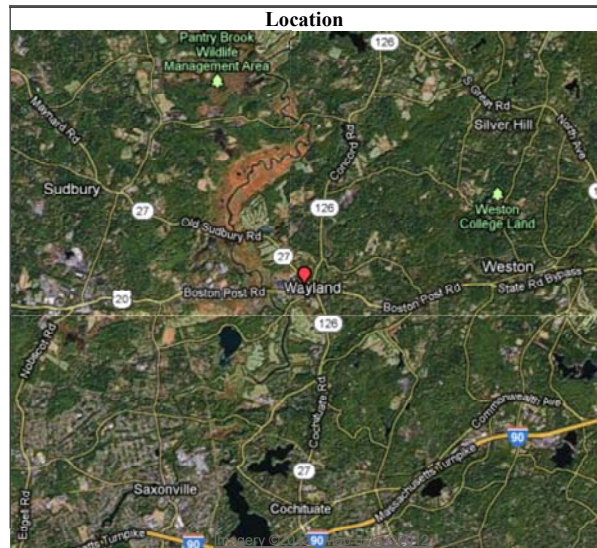
Response Action Information	
Response Action Type:	TCLASS Tier Classification
Status:	LNKVIC RTN Linked to TCLASS Via IRA Completion Statement
Submittal Date:	1/16/2012
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAM Release Abatement Measure
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/27/2011
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHSIII Phase 3
Status:	CSRCVD Completion Statement Received
Submittal Date:	11/30/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASIV Phase 4
Status:	PLANWR Written Plan Received
Submittal Date:	11/30/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASII Phase 2
Status:	CSRCVD Completion Statement Received
Submittal Date:	11/30/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEI Phase 1
Status:	CSRCVD Completion Statement Received
Submittal Date:	3/14/1997
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	TCTRNS Tier Classified Transition Sites
Submittal Date:	10/15/1990
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
UNKNOWN		

LSPs	
LSP#	Name
4141	BINGHAM, MICHAEL P
6786	NICKERSON, TODD W

Secondary RTNs	
3-0030293	

Tier Classification Detail							
NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
340	115	100	90	35	0	Y	N



Site Information			
Site Number:	3-0010389	Category:	120 DY
Site Name:	PRIVATE RESIDENCE	Release Type:	TIER 1C
Address:	42 GLEZEN LN	Current date:	2/24/2004
Town:	WAYLAND	Phase:	PHASE II
Zipcode:	01778	RAO Class:	
Official notification date:	12/21/1993	Location type:	
Initial status date:	12/21/1994	Source:	

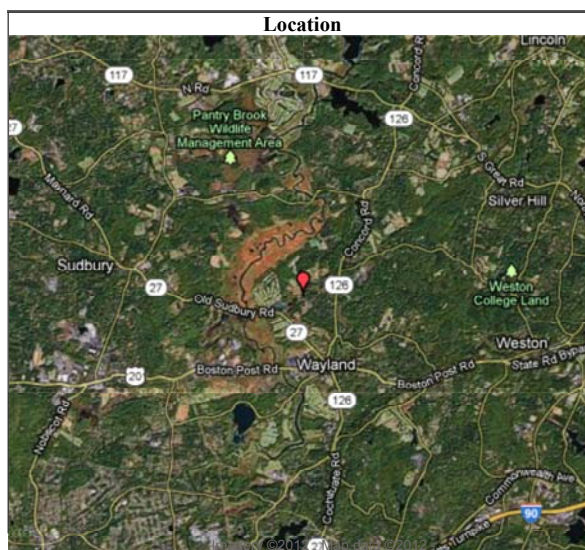
Response Action Information	
Response Action Type:	AUL Activity and Use Limitation
Status:	TERMIN Action Status or AUL Terminated
Submittal Date:	8/27/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAO Response Action Outcome - RAO
Status:	REVRCD Revised Statement or Transmittal Received
Submittal Date:	8/27/2004
RAO class:	A2
Activity & Use Limitation:	TERMNOT
Response Action Type:	TCLASS Tier Classification
Status:	PEREFF Permit Effective Date
Submittal Date:	4/10/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEII Phase 2
Status:	SOW Scope of Work Received
Submittal Date:	2/24/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEI Phase 1
Status:	CSRCVD Completion Statement Received
Submittal Date:	2/24/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAM Release Abatement Measure
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/5/1994
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	12/21/1993
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	12/21/1993
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
#2 FUEL OIL		

LSPs	
LSP#	Name
6105	ANDRONICO, ANTHONY F
4521	BALL, RAYMOND G

RAO Detail			
Class	Method	GW Category	Soil Category
A2	1	1	1

Tier Classification Detail							
NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
322	115	57	75	75	0	Y	N



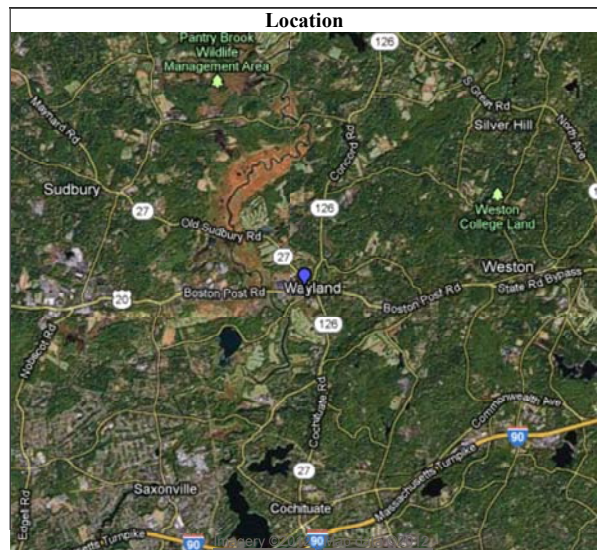
Site Information			
Site Number:	3-0012588	Category:	72 HR
Site Name:	US POSTAL SERVICE	Release Type:	RAO
Address:	277 BOSTON POST RD	Current date:	10/16/1995
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	A2
Official notification date:	6/16/1995	Locationtype:	FEDERAL
Initial status date:	6/16/1996	Source:	UST

Response Action Information	
Response Action Type:	RAO Response Action Outcome - RAO
Status:	RAORCD RAO Statement Received
Submittal Date:	10/16/1995
RAO class:	A2
Activity & Use Limitation:	NONE
Response Action Type:	IRA Immediate Response Action
Status:	APWRIT Written Approval of Plan
Submittal Date:	9/11/1995
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	9/5/1995
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	8/14/1995
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	6/16/1995
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
#2 FUEL OIL	1250	PPM
VOCS	110	PPMV

LSPs	
LSP#	Name
4966	MALLIO, WILLIAM J

RAO Detail			
Class	Method	GW Category	Soil Category
A2	1		1



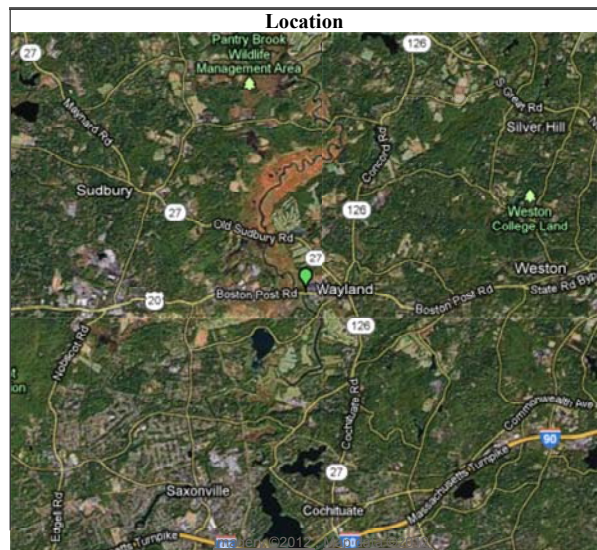
Site Information			
Site Number:	3-0013574	Category:	120 DY
Site Name:	RAYTHEON COMPANY	Release Type:	RTN CLOSED
Address:	430 BOSTON POST RD	Current date:	11/28/2000
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	
Official notification date:	3/15/1996	Locationtype:	
Initial status date:	3/15/1997	Source:	

Response Action Information	
Response Action Type:	AUL Activity and Use Limitation
Status:	PUBCOM Public Comment Period Initiated on Submittal
Submittal Date:	3/9/2005
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	LNKVTCL RTN Linked to TCLASS Via Tier Classification Submittal
Submittal Date:	6/9/2009
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAM Release Abatement Measure
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/17/2003
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAONR RAO Not Required
Status:	RTCLSS Linked to a Tier Classified Site
Submittal Date:	11/28/2000
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	3/15/1996
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	3/15/1996
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
BENZENE	25	UG/L
ETHENE, 1,1-DICHLORO-	4.8	UG/L
ETHENE, TETRACHLORO-	17	UG/L
ETHENE, TRICHLORO-	72	UG/L
NAPHTHALENE	30	UG/L

LSPs	
LSP#	Name
2196	DROBINSKI, JOHN C

Tier Classification Detail							
NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
477	160	127	100	90	0	Y	N



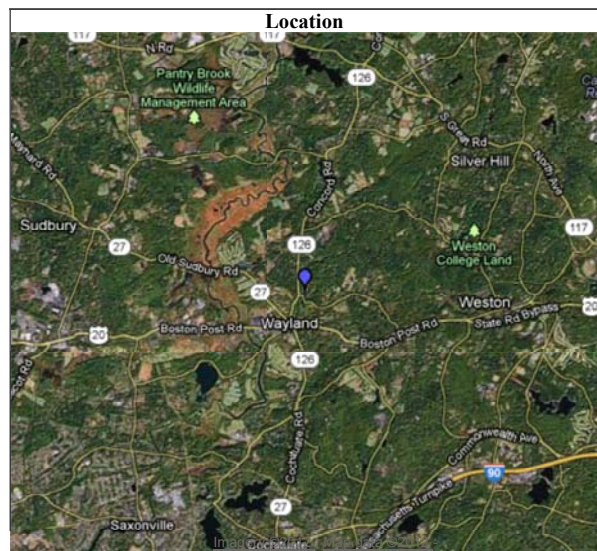
Site Information			
Site Number:	3-0015943	Category:	72 HR
Site Name:	RESIDENCE	Release Type:	RTN CLOSED
Address:	4 PLAIN RD	Current date:	11/13/1998
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	
Official notification date:	1/23/1998	Location type:	RESIDENTIAL
Initial status date:	1/23/1999	Source:	PIPE

Response Action Information	
Response Action Type:	IRA Immediate Response Action
Status:	STRCVD Status or Interim Report Received
Submittal Date:	5/2/2001
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	LNKVTC RTN Linked to TCLASS Via Tier Classification Submittal
Submittal Date:	11/13/1998
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAONR RAO Not Required
Status:	RTCLSS Linked to a Tier Classified Site
Submittal Date:	11/13/1998
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	3/23/1998
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	1/23/1998
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
#2 FUEL OIL	1	INCH
NAPL	1	INCH

LSPs	
LSP#	Name
N/A	STAMATOV, JOHN R
9923	GOULD, BENSON R
1847	SIMMONS, WILLIAM A

Tier Classification Detail							
NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
301	35	91	95	80	0	N	N



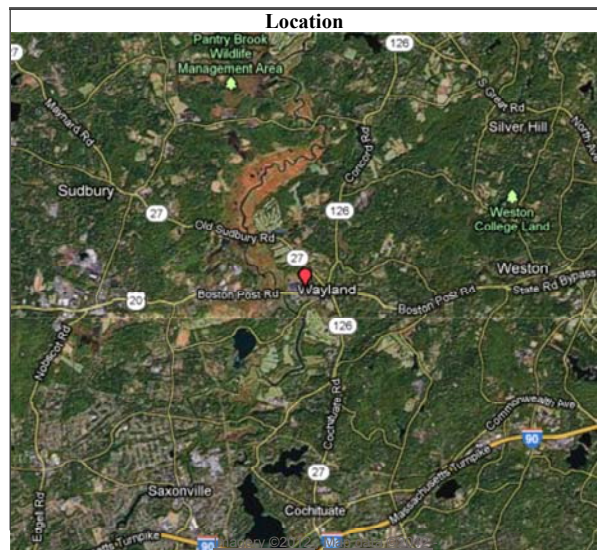
Site Information			
Site Number:	3-0017974	Category:	120 DY
Site Name:	COOKS AUTOMOTIVE OF WAYLAND INC	Release Type:	STMRET
Address:	356 BOSTON POST RD	Current date:	9/20/2007
Town:	WAYLAND	Phase:	PHASE V
Zipcode:	01778-0000	RAO Class:	
Official notification date:	2/4/1999	Location type:	
Initial status date:	2/4/2000	Source:	PIPE,UST

Response Action Information	
Response Action Type:	PHASEV Phase 5
Status:	ROSSTR Remedy Operation Status Report Received
Submittal Date:	9/19/2011
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAM Release Abatement Measure
Status:	CSRCVD Completion Statement Received
Submittal Date:	2/3/2011
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	STMRET Submittal Retracted
Submittal Date:	9/20/2007
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASIV Phase 4
Status:	CSRCVD Completion Statement Received
Submittal Date:	6/5/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHSIII Phase 3
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/31/2002
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASII Phase 2
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/31/2002
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEI Phase 1
Status:	CSRCVD Completion Statement Received
Submittal Date:	2/4/2000
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	2/4/1999
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	2/4/1999
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
C5 THRU C8 ALIPHATIC HYDROCARBONS	3930	MG/KG
C9 THRU C10 AROMATIC HYDROCARBONS	5620	MG/KG
C9 THRU C12 ALIPHATIC HYDROCARBONS	8220	MG/KG

LSPs	
LSP#	Name
8624	FALK, LINDA S
9819	MOONEY, JOEL S
5463	WOZMAK, RICHARD J

Tier Classification Detail							
NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
431	175	111	100	45	0	Y	N



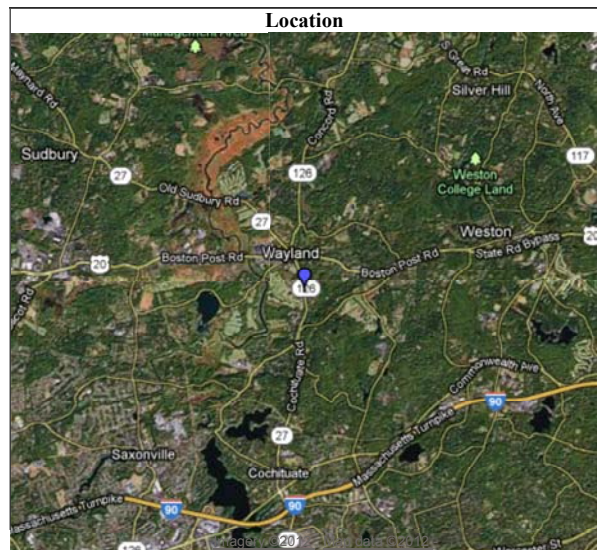
Site Information			
Site Number:	3-0018346	Category:	72 HR
Site Name:	NO LOCATION AID	Release Type:	RAO
Address:	103 COCHITUATE RD	Current date:	8/2/1999
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	A1
Official notification date:	5/27/1999	Location type:	COURSE,GOLF
Initial status date:	5/27/2000	Source:	UST

Response Action Information	
Response Action Type:	RAO Response Action Outcome - RAO
Status:	RAORCD RAO Statement Received
Submittal Date:	8/2/1999
RAO class:	A1
Activity & Use Limitation:	NONE
Response Action Type:	IRA Immediate Response Action
Status:	CSRCVD Completion Statement Received
Submittal Date:	8/2/1999
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	7/26/1999
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	5/27/1999
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
GASOLINE	100	PPMV
GASOLINE	1328	PPMV

LSPs	
LSP#	Name
3063	CUSHING, RICHARD J

RAO Detail			
Class	Method	GW Category	Soil Category
A1	N		



Site Information

Site Number:	3-0022408	Category:	120 DY
Site Name:	FORMER RAYTHEON FACILITY	Release Type:	RTN CLOSED
Address:	430 BOSTON POST RD	Current date:	6/9/2009
Town:	WAYLAND	Phase:	PHASE V
Zipcode:	01778-0000	RAO Class:	
Official notification date:	12/17/2002	Location type:	
Initial status date:	12/17/2003	Source:	

Response Action Information

Response Action Type:	AUL Activity and Use Limitation
Status:	LEGNOT Legal Notice Published
Submittal Date:	2/2/2012
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAONR RAO Not Required
Status:	RTCLSS Linked to a Tier Classified Site
Submittal Date:	6/9/2009
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	LNKVTCTN Linked to TCLASS Via Tier Classification Submittal
Submittal Date:	6/9/2009
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASIV Phase 4
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/23/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEV Phase 5
Status:	WORKST Work Started
Submittal Date:	12/23/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAO-P Partial RAO for this RTN
Status:	RAORCD RAO Statement Received
Submittal Date:	11/26/2007
RAO class:	B1
Activity & Use Limitation:	
Response Action Type:	PHSIII Phase 3
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/20/2005
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASII Phase 2
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/20/2005
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	PEREFF Permit Effective Date
Submittal Date:	2/6/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEI Phase 1
Status:	CSRCVD Completion Statement Received
Submittal Date:	12/17/2003
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	12/17/2002
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	12/17/2002
RAO class:	
Activity & Use Limitation:	

Chemicals

Chemical	Amount	Units
ARSENIC	158	UG/L
METHYL TERT-BUTYL ETHER	120	UG/L
TOLUENE	2600	PPB
TRICHLOROETHENE	17040	UG/L

LSPs

LSP#	Name
2196	DROBINSKI, JOHN C

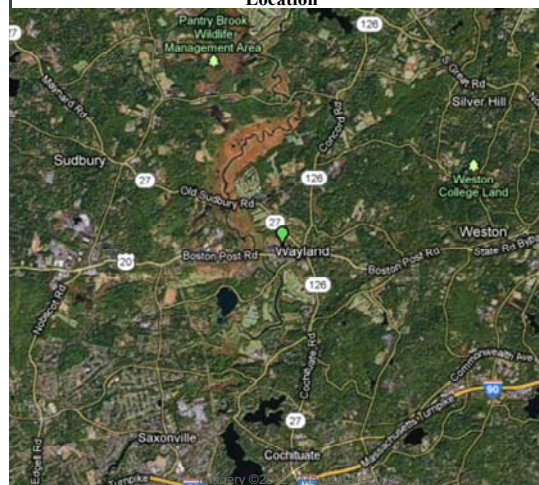
RAO Detail

Class	Method	GW Category	Soil Category
B1	N	1	2

Tier Classification Detail

NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
477	160	127	100	90	0	Y	N
511	150	131	95	135	0	Y	N

Location



Site Information

Site Number:	3-0022753	Category:	120 DY
Site Name:	RTE 20	Release Type:	REMOPS
Address:	298 BOSTON POST RD	Current date:	6/27/2011
Town:	WAYLAND	Phase:	PHASE V
Zipcode:	01778-0000	RAO Class:	
Official notification date:	6/9/2003	Location type:	COMMERCIAL
Initial status date:	4/9/2004	Source:	UNKNOWN

Response Action Information

Response Action Type:	PHASEV Phase 5
Status:	ROSSTR Remedy Operation Status Report Received
Submittal Date:	1/3/2012
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASIV Phase 4
Status:	CSRCVD Completion Statement Received
Submittal Date:	6/27/2011
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASII Phase 2
Status:	REVRCD Revised Statement or Transmittal Received
Submittal Date:	4/20/2010
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHSIII Phase 3
Status:	CSRCVD Completion Statement Received
Submittal Date:	4/20/2010
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	12/1/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	PEREXT Permit Extension Received
Submittal Date:	4/27/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	PHASEI Phase 1
Status:	CSRCVD Completion Statement Received
Submittal Date:	4/15/2004
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	6/9/2003
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	4/9/2003
RAO class:	
Activity & Use Limitation:	

Chemicals

Chemical	Amount	Units
ETHENE , 1,2-DICHLORO-	73	MG/L
ETHENE, TETRACHLORO-	2210	MG/L
ETHENE, TRICHLORO-	58	MG/L

LSPs

LSP#	Name
N/A	PATTERSON, JOHN H
2149	BORREBACH, JAMES R
5371	BROWN, ELISSA J
5800	STEVENSON, THOMAS J

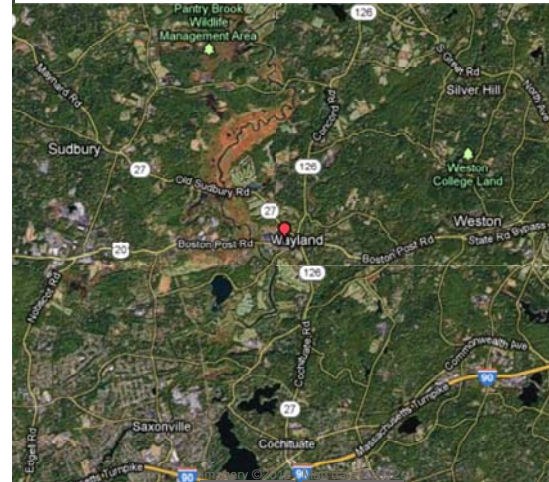
Secondary RTNs

3-0025637

Tier Classification Detail

NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
282	165	82	85	0	-50	Y	N

Location



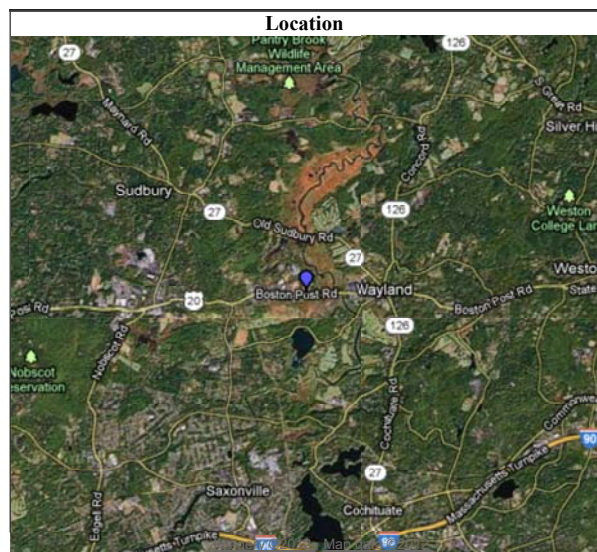
Site Information			
Site Number:	3-0024698	Category:	TWO HR
Site Name:	WAYLAND SAND HILL LANDFILL	Release Type:	RAO
Address:	484 BOSTON POST RD	Current date:	5/17/2005
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	A1
Official notification date:	3/18/2005	Location type:	LANDFILL, OPENSOURCE
Initial status date:	3/18/2006	Source:	DRUMS

Response Action Information	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	5/17/2005
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAO Response Action Outcome - RAO
Status:	RAORCD RAO Statement Received
Submittal Date:	5/17/2005
RAO class:	A1
Activity & Use Limitation:	NONE
Response Action Type:	IRA Immediate Response Action
Status:	APORAL Oral Approval of Plan or Action
Submittal Date:	3/18/2005
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	3/18/2005
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
MOTOR OIL	5	GAL
WASTE OIL	10	GAL

LSPs	
LSP#	Name
4620	NANGERONI, PETER E
7505	GITTEN, MICHAEL S

RAO Detail			
Class	Method	GW Category	Soil Category
A1	N		



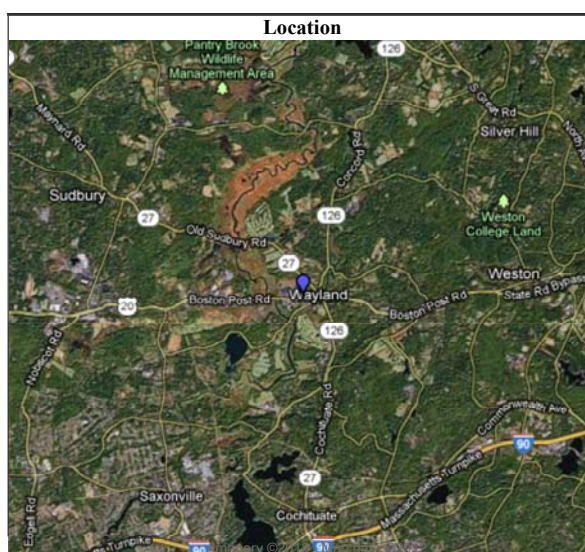
Site Information			
Site Number:	3-0025637	Category:	TWO HR
Site Name:	WAYLAND CLEANERS	Release Type:	RTN CLOSED
Address:	304 BOSTON POST RD	Current date:	4/3/2006
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	
Official notification date:	2/2/2006	Location type:	COMMERCIAL
Initial status date:	2/2/2007	Source:	UNKNOWN

Response Action Information	
Response Action Type:	IRA Immediate Response Action
Status:	TSAUD Level I - Technical Screen Audit
Submittal Date:	7/25/2011
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	1/30/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	6/20/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	TCLASS Tier Classification
Status:	LEGNOT Legal Notice Published
Submittal Date:	4/27/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAONR RAO Not Required
Status:	RTCLSS Linked to a Tier Classified Site
Submittal Date:	4/3/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	4/3/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	2/2/2006
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
PCE	130	UG/M3
TETRACHLOROETHYLENE	5.4	PPMV

LSPs	
LSP#	Name
5800	STEVENSON, THOMAS J
2149	BORREBACH, JAMES R

Tier Classification Detail							
NRS Totals	II	III	IV	V	VI	Zone 2	Imminent Hazard
282	165	82	85	0	-50	Y	N

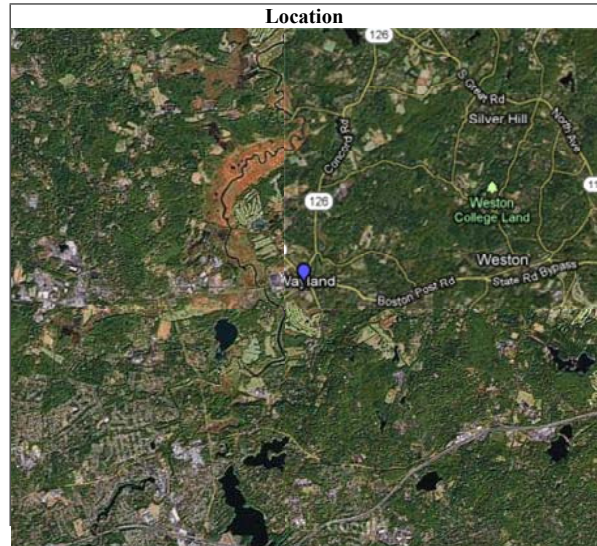


Site Information			
Site Number:	3-0026027	Category:	TWO HR
Site Name:	WAYLAND MBTA PROPERTY SITE	Release Type:	DEPNFA
Address:	MBTA ROW NR400-440BOSTONPOSTRD	Current date:	4/23/2009
Town:	WAYLAND	Phase:	
Zipcode:	01778-1824	RAO Class:	
Official notification date:	7/6/2006	Locationtype:	RIGHTOFWAY
Initial status date:	6/30/2008	Source:	UNKNOWN

Response Action Information	
Response Action Type:	RAONR RAO Not Required
Status:	DEPNFA No Further Action - DEP
Submittal Date:	4/23/2009
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	9/28/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	IRA Immediate Response Action
Status:	APWRIT Written Approval of Plan
Submittal Date:	9/26/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	9/6/2006
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	7/6/2006
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
ARSENIC	130	MG/KG

LSPs	
LSP#	Name
3606	PENZO, MICHAEL A

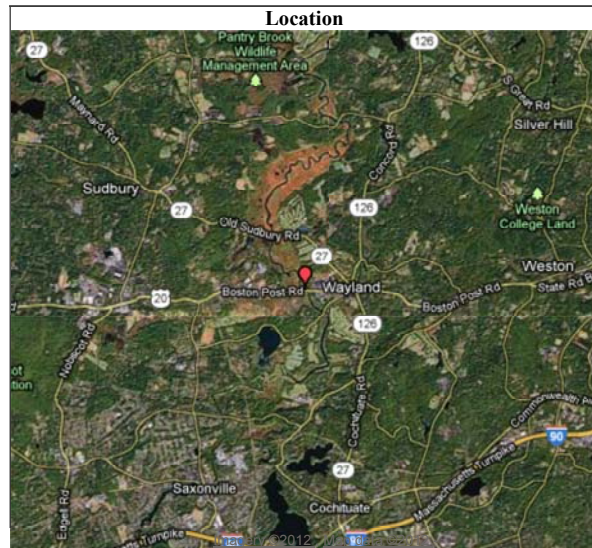


Site Information			
Site Number:	3-0027651	Category:	120 DY
Site Name:	FMR RAYTHEON PROPERTY	Release Type:	DPS
Address:	430 BOSTON POST RD	Current date:	11/26/2007
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	
Official notification date:	11/26/2007	Locationtype:	COMMERCIAL
Initial status date:	11/26/2008	Source:	UST

Response Action Information	
Response Action Type:	DPS Downgradient Property Status
Status:	TSAUD Level I - Technical Screen Audit
Submittal Date:	4/17/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	11/26/2007
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
METHYL TERT-BUTYL ETHER	280	UG/L

LSPs	
LSP#	Name
2196	DROBINSKI, JOHN C



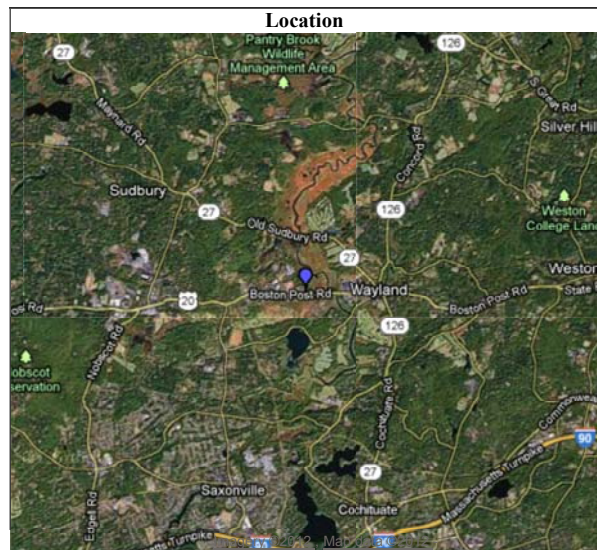
Site Information			
Site Number:	3-0027741	Category:	TWO HR
Site Name:	NEAR LANDFILL	Release Type:	RAO
Address:	484 BOSTON POST RD	Current date:	7/29/2008
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	A2
Official notification date:	6/3/2008	Locationtype:	MUNICIPAL
Initial status date:	6/3/2009	Source:	VEHICLE

Response Action Information	
Response Action Type:	RAO Response Action Outcome - RAO
Status:	TSAUD Level I - Technical Screen Audit
Submittal Date:	9/5/2008
RAO class:	A2
Activity & Use Limitation:	NONE
Response Action Type:	IRA Immediate Response Action
Status:	CSRCVD Completion Statement Received
Submittal Date:	7/29/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	7/29/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	6/3/2008
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
DIESEL	20	GAL
DIESEL FUEL	15	GAL

LSPs	
LSP#	Name
8435	MOORE, BRIAN D

RAO Detail			
Class	Method	GW Category	Soil Category
A2	1	N	1



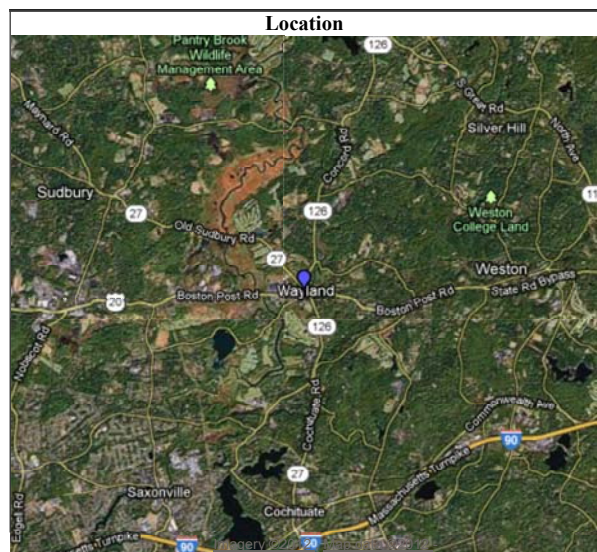
Site Information			
Site Number:	3-0027875	Category:	TWO HR
Site Name:	MHD STAGING AREA - SUDBURY RIV BRIDGE	Release Type:	RAO
Address:	BOSTON POST RD	Current date:	10/3/2008
Town:	WAYLAND	Phase:	
Zipcode:	01778-0000	RAO Class:	A2
Official notification date:	7/30/2008	Location type:	OPENSOURCE, RIGHT OF WAY, STATE
Initial status date:	7/30/2009	Source:	DRUMS, UNKNOWN

Response Action Information	
Response Action Type:	RAO Response Action Outcome - RAO
Status:	RAORCD RAO Statement Received
Submittal Date:	10/3/2008
RAO class:	A2
Activity & Use Limitation:	NONE
Response Action Type:	IRA Immediate Response Action
Status:	APWRIT Written Approval of Plan
Submittal Date:	8/26/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	8/13/2008
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	7/30/2008
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
PETROLEUM BASED OIL	10	GAL
PETROLEUM/COAL TAR	55	GAL
UNKNOWN OHM	55	GAL

LSPs	
LSP#	Name
6048	MCBRIDE, GREGG W

RAO Detail			
Class	Method	GW Category	Soil Category
A2	3	N	2

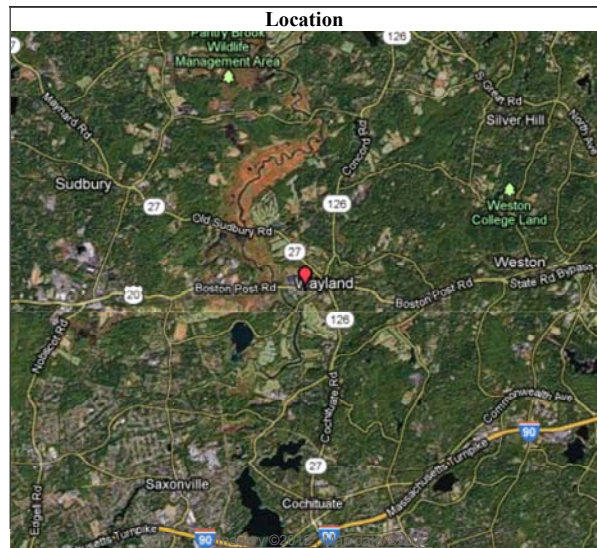


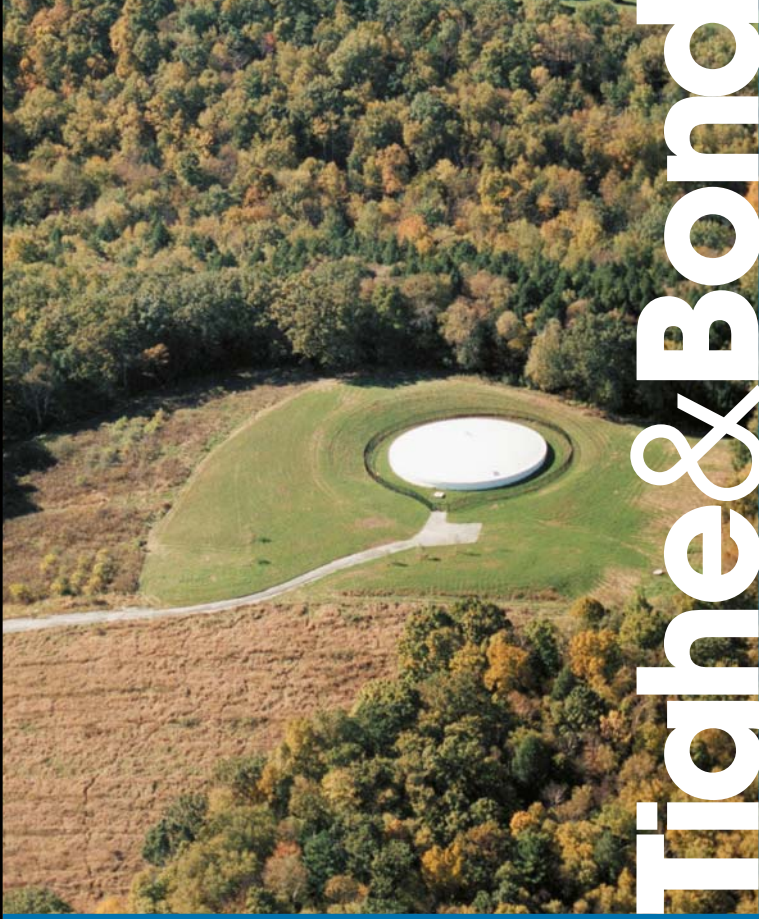
Site Information			
Site Number:	3-0029040	Category:	120 DY
Site Name:	NO LOCATION AID	Release Type:	DPS
Address:	325 BOSTON POST RD	Current date:	2/26/2010
Town:	WAYLAND	Phase:	
Zipcode:	01778-1802	RAO Class:	
Official notification date:	1/28/2010	Location type:	COMMERCIAL, UNKNOWN
Initial status date:	1/28/2011	Source:	UNKNOWN, UST

Response Action Information	
Response Action Type:	DPS Downgradient Property Status
Status:	TSAUD Level I - Technical Screen Audit
Submittal Date:	8/10/2011
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RAM Release Abatement Measure
Status:	CSRCVD Completion Statement Received
Submittal Date:	11/2/2010
RAO class:	
Activity & Use Limitation:	
Response Action Type:	RNF Release Notification Form Received
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	1/28/2010
RAO class:	
Activity & Use Limitation:	
Response Action Type:	REL Potential Release or Threat of Release
Status:	REPORT Reportable Release or Threat of Release
Submittal Date:	1/28/2010
RAO class:	
Activity & Use Limitation:	

Chemicals		
Chemical	Amount	Units
ARSENIC	97	UG/L
BENZENE	193	UG/L
C9 THRU C10 AROMATIC HYDROCARBONS	1410	UG/L
C9 THRU C12 ALIPHATIC HYDROCARBONS	1270	UG/L
METHYL TERT-BUTYL ETHER	2920	UG/L

LSPs	
LSP#	Name
9145	MCKINLAY, PAUL A





Tighe & Bond

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. MW-1

Page 1 of 1

File No.

Checked by:

Drilling Co.: TDS

Foreman:

T&B Rep.: ADM1

Date Start: 01/09/12 End: 01/09/12

Location: See Exploration Location Plan

GS. Elev. Datum:

Type

I.D./O.D.

Hammer Wt.

Hammer Fall

Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1400	2.2'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	N o t e s	Well Construction
5			0-1	3	Brown, SANDY LOAM			Road Box
				3				
			1-3	5	Brown, f SAND, some silt			2' Riser
				4				
				3				
			3-5	6	Brown, m-c SAND, Water @ 4'			8' Screen
				4				
				6				
			5-6	9	Brown, f SAND and silt			
				5				
10		6-10	3	Gray, SILT, trace f sand				
			6					
			6					
			5					
			3					
			3					
			7					
		6						
						Well Set at 10'		
15								
20								
25								
30								

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. MW-2

Page 1 of 1

File No.

Checked by:

Drilling Co.: TDS

Foreman:

T&B Rep.: ADM1

Date Start: 01/09/12 End: 01/09/12

Location See Exploration Location Plan

GS. Elev. Datum:

Type

I.D./O.D.

Hammer Wt.

Hammer Fall

Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1000	2'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
5			0-1	4	Brown, SANDY LOAM			Road Box
				4				
			1-3	7	Brown, f SAND, some silt			2' Riser
				6				
				5				
				4				
			3-4	4	Brown, c SAND, some m sand			
				4				
			4-6	7	Brown, f SAND and silt, Water @ 4'			
				7				
10			6-12	7	Gray, SILT			10' Screen
				7				
				4				
				3				
				3				
				3				
				6				
				7				
				7				
				5				
15				6				
20								
25								
30								

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. MW-3

Page 1 of 1

File No.

Checked by:

Drilling Co.: TDS

Foreman:

T&B Rep.: ADM1

Date Start: 01/09/12 End: 01/09/12

Location: See Exploration Location Plan

GS. Elev. Datum:

Type

I.D./O.D.

Hammer Wt.

Hammer Fall

Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1045	2.7'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction	
5			0-1	5	Brown, SANDY LOAM			Road Box	
				6					
			1-3	6	Brown, f SAND, some silt				2' Riser
				5					
				4					
			3-4	6	Brown, c SAND, some m sand				10' Screen
				4					
			4-6	7	Brown, f SAND and silt, Water @ 4'				
				13					
				8					
10			6-15	8	Gray, SILT, trace f sand				
				6					
				7					
				10					
				8					
				2					
				4					
				6					
				7					
15									
20									
25									
30									

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. MW-4

Page 1 of 1

File No.

Checked by:

Drilling Co.: TDS

Foreman:

T&B Rep.: ADM1

Date Start: 01/09/12 End: 01/09/12

Location: See Exploration Location Plan

GS. Elev. Datum:

Type

I.D./O.D.

Hammer Wt.

Hammer Fall

Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1245	3.5'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction	
5			0-1	4	Brown, SANDY LOAM			Road Box	
				4					
			1-3	6	Brown, f SAND, some silt			2' Riser	
				5					
				3					
			3-4	6	Brown, c SAND, some m sand			8' Screen	
				11					
				8					
			4-6	4	Brown, f SAND and silt, Water @ 4'				
				6					
		8							
10			6-10	7	Gray, SILT, trace f sand				
				6					
				6					
				7					
				5					
				3					
				4					
				6					
			8						
	15								
20									
25									
30									

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. **MW-5**
Page 1 of 1
File No.
Checked by:

Drilling Co.: TDS

Foreman:
T&B Rep.: ADM1
Date Start: 01/10/12 End: 01/10/12
Location: See Exploration Location Plan
GS. Elev. Datum:

Type
I.D./O.D.
Hammer Wt.
Hammer Fall
Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1450	7.55'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction		
5			0-1	4	Brown, SANDY LOAM			Road Box		
				4						
			1-3	6	Brown, f-m SAND, trace gravel				2' Riser	
				5						
				3						
				4						
			3-5	5	Light brown, f-m SAND, Water @ 4'				8' Screen	
				4						
				4						
				8						
			6-8	6	Brown, m-c SAND, trace gravel					
				6						
				6						
				6						
		10								
10			8-10	7	Gray, SILT, trace f sand					
				8						
				5						
				10						
				9			Well Set at 10'			
15										
20										
25										
30										

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. **MW-6**
Page 1 of 1
File No.
Checked by:

Drilling Co.: TDS

Foreman:
T&B Rep.: ADM1
Date Start: 01/10/12 End: 01/10/12
Location: See Exploration Location Plan
GS. Elev. Datum:

Type
I.D./O.D.
Hammer Wt.
Hammer Fall
Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1525	7.75'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
5			0-1	3	Brown, SANDY LOAM			Road Box
				4				
			1-3	4	Brown, f-m SAND, trace gravel			
				6				
				4				
			3-5	5	Light brown, f-m SAND, Water @ 4'			
				4				
				8				
			6-8	12	Brown, m-c SAND, trace gravel			
				14				
		10						
		7						
		6						
10			8-10	6	Gray, SILT, trace f sand			
				6				
				3				
				5			Well Set at 10'	
				6				
				12				
15								
20								
25								
30								

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. **MW-7**
Page 1 of 1
File No.
Checked by:

Drilling Co.: TDS

Foreman:
T&B Rep.: ADM1
Date Start: 01/09/12 End: 01/09/12
Location: See Exploration Location Plan
GS. Elev. Datum:

Type
I.D./O.D.
Hammer Wt.
Hammer Fall
Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1330	3.45'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction	
5			0-1	4	Brown, SANDY LOAM			Road Box	
				4					
			1-3	6	Brown, f SAND, some silt				2' Riser
				5					
				3					
				6					
			3-4	11	Brown, m-c SAND, trace gravel				8' Screen
				8					
			4-6	4	Brown, f SAND and silt, Water @ 4'				
				6					
		8							
		7							
10		6-10	6	Gray, SILT, trace f sand		Well Set at 10'			
							6		
							7		
							5		
							3		
							4		
							6		
							8		
	15								
20									
25									
30									

Notes:

Project: W-1396
Location: 41 Cochituate Rd, Wayland, MA
Client:

Boring No. **MW-8**

Page 1 of 1

File No.

Checked by:

Drilling Co.: TDS

Foreman: Type
T&B Rep.: ADM1 I.D./O.D.
Date Start: 01/10/12 End: 01/10/12 Hammer Wt.
Location See Exploration Location Plan Hammer Fall
GS. Elev. Datum: Other

Casing Sampler

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
1/13/2012	1600	5.60'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	N o t e s	Well Construction	
5			0-1	5	Brown, SANDY LOAM			Road Box	
				4					
			1-3	4	Brown, f-m SAND, Water @ 5'			8' Screen	
				3					
				8					
			6						
			7						
			10						
			3-5	11					
				11					
				5	Brown, m-c SAND				
		4							
		8							
		7							
		4							
10			8-10	3	Gray, SILT, trace f sand				
				3					
				3					
				11					
								Well Set at 10'	
			</						

Notes:



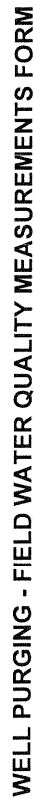
Tighe & Bond



1. Pump dial setting (for example: hertz, cycles/min., etc.)
2. μ Siemens per cm (same as $\mu\text{mhos/cm}$) at 250C).
3. Oxidation reduction potential (stand in for Eh).

NR is Not Recorded





1. Pump dial setting (for example: hertz, cycles/min., etc.)
2. μ Siemens per cm (same as μ mhos/cm) at 25oC).
3. Oxidation reduction potential (stand in for Eh).

NR is Not Recorded





Location (Site/Facility Name)	Wayland Town Offices 41 Cochituate Rd Wayland, Massachusetts		Depth to Water (ft):	5.60
			Depth to Bottom (ft):	9.65
Well Number	MW-8			
Field Personnel	ADM1		Pump Intake At (ft):	
Sampling Organization	Tighe & Bond		Purging Device:	GeoTech Peristaltic Pump
Identify PM	IBC			

[illegible]

1. Pump dial setting (for example: hertz, cycles/min., etc.)
2. μ Siemens per cm (same as μ mhos/cm) at 250C).
3. Oxidation reduction potential (stand in for Eh)

NR is Not Recorded



ANALYTICAL REPORT

Lab Number:	L1204174
Client:	Tighe & Bond, Inc. 446 Main Street Worcester, MA 01608
ATTN:	Karla King
Phone:	(508) 747-9644
Project Name:	WAYLAND TOWN OFFICES
Project Number:	W-1396
Report Date:	03/19/12

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Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

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



Project Name: WAYLAND TOWN OFFICES
Project Number: W-1396

Lab Number: L1204174
Report Date: 03/19/12

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1204174-01	MW-5	WAYLAND, MA	03/12/12 15:50
L1204174-02	MW-6	WAYLAND, MA	03/12/12 16:30
L1204174-03	MW-8	WAYLAND, MA	03/12/12 17:15

Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

MADEP MCP Response Action Analytical Report Certification

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

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

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



Project Name: WAYLAND TOWN OFFICES
Project Number: W-1396

Lab Number: L1204174
Report Date: 03/19/12

Case Narrative

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

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

Please contact Client Services at 800-624-9220 with any questions.

MCP Related Narratives

Sample Receipt

The samples were Field Filtered for Dissolved Metals only.

Metals

In reference to question I:

All samples were analyzed for a subset of MCP elements per the Chain of Custody.

Project Name: WAYLAND TOWN OFFICES
Project Number: W-1396

Lab Number: L1204174
Report Date: 03/19/12

Case Narrative (continued)

Non-MCP Related Narratives

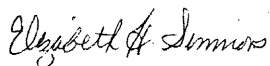
Nitrogen, Total Kjeldahl

L1204174-02 and -03 have elevated detection limits due to the dilutions required by the sample matrix.

L1204174-03: The Ammonia result is higher than the TKN result due to sample matrix therefore, no further action was taken.

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

Authorized Signature:



Elizabeth Simmons

Title: Technical Director/Representative

Date: 03/19/12

METALS

Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

SAMPLE RESULTS

Lab ID: L1204174-01

Date Collected: 03/12/12 15:50

Client ID: MW-5

Date Received: 03/12/12

Sample Location: WAYLAND, MA

Field Prep: See narrative

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Dissolved Metals - Westborough Lab											
Antimony, Dissolved	ND		mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 23:19	EPA 3005A	97,6020A	BM
Arsenic, Dissolved	ND		mg/l	0.005	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Beryllium, Dissolved	ND		mg/l	0.004	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Cadmium, Dissolved	ND		mg/l	0.004	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Chromium, Dissolved	ND		mg/l	0.01	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Copper, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Lead, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Mercury, Dissolved	ND		mg/l	0.0002	--	1	03/13/12 16:30	03/14/12 09:27	EPA 7470A	97,7470A	KL
Nickel, Dissolved	ND		mg/l	0.025	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Selenium, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Silver, Dissolved	ND		mg/l	0.007	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI
Thallium, Dissolved	ND		mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 23:19	EPA 3005A	97,6020A	BM
Zinc, Dissolved	ND		mg/l	0.050	--	1	03/14/12 12:00	03/19/12 09:52	EPA 3005A	97,6010B	AI



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

SAMPLE RESULTS

Lab ID: L1204174-02

Date Collected: 03/12/12 16:30

Client ID: MW-6

Date Received: 03/12/12

Sample Location: WAYLAND, MA

Field Prep: See narrative

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Dissolved Metals - Westborough Lab											
Antimony, Dissolved	ND		mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 23:26	EPA 3005A	97,6020A	BM
Arsenic, Dissolved	ND		mg/l	0.005	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Beryllium, Dissolved	ND		mg/l	0.004	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Cadmium, Dissolved	ND		mg/l	0.004	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Chromium, Dissolved	ND		mg/l	0.01	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Copper, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Lead, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Mercury, Dissolved	ND		mg/l	0.0002	--	1	03/13/12 16:30	03/14/12 09:29	EPA 7470A	97,7470A	KL
Nickel, Dissolved	ND		mg/l	0.025	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Selenium, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Silver, Dissolved	ND		mg/l	0.007	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI
Thallium, Dissolved	ND		mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 23:26	EPA 3005A	97,6020A	BM
Zinc, Dissolved	ND		mg/l	0.050	--	1	03/14/12 12:00	03/19/12 09:58	EPA 3005A	97,6010B	AI



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

SAMPLE RESULTS

Lab ID: L1204174-03

Date Collected: 03/12/12 17:15

Client ID: MW-8

Date Received: 03/12/12

Sample Location: WAYLAND, MA

Field Prep: See narrative

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Dissolved Metals - Westborough Lab											
Antimony, Dissolved	ND		mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 23:32	EPA 3005A	97,6020A	BM
Arsenic, Dissolved	ND		mg/l	0.005	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Beryllium, Dissolved	ND		mg/l	0.004	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Cadmium, Dissolved	ND		mg/l	0.004	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Chromium, Dissolved	ND		mg/l	0.01	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Copper, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Lead, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Mercury, Dissolved	ND		mg/l	0.0002	--	1	03/13/12 16:30	03/14/12 09:31	EPA 7470A	97,7470A	KL
Nickel, Dissolved	ND		mg/l	0.025	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Selenium, Dissolved	ND		mg/l	0.010	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Silver, Dissolved	ND		mg/l	0.007	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI
Thallium, Dissolved	ND		mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 23:32	EPA 3005A	97,6020A	BM
Zinc, Dissolved	ND		mg/l	0.050	--	1	03/14/12 12:00	03/19/12 10:01	EPA 3005A	97,6010B	AI



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Westborough Lab for sample(s): 01-03 Batch: WG522830-1									
Mercury, Dissolved	ND	mg/l	0.0002	--	1	03/13/12 16:30	03/14/12 09:18	97,7470A	KL

Prep Information

Digestion Method: EPA 7470A

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Westborough Lab for sample(s): 01-03 Batch: WG522988-1									
Arsenic, Dissolved	ND	mg/l	0.005	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Beryllium, Dissolved	ND	mg/l	0.004	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Cadmium, Dissolved	ND	mg/l	0.004	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Chromium, Dissolved	ND	mg/l	0.01	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Copper, Dissolved	ND	mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Lead, Dissolved	ND	mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Nickel, Dissolved	ND	mg/l	0.025	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Selenium, Dissolved	ND	mg/l	0.010	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Silver, Dissolved	ND	mg/l	0.007	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI
Zinc, Dissolved	ND	mg/l	0.050	--	1	03/14/12 12:00	03/19/12 09:25	97,6010B	AI

Prep Information

Digestion Method: EPA 3005A

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Westborough Lab for sample(s): 01-03 Batch: WG522989-1									
Antimony, Dissolved	ND	mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 22:42	97,6020A	BM
Thallium, Dissolved	ND	mg/l	0.0005	--	1	03/14/12 12:00	03/14/12 22:42	97,6020A	BM

Prep Information

Digestion Method: EPA 3005A



Lab Control Sample Analysis

Batch Quality Control

Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Parameter	LCS		LCSD		%Recovery		RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual	%Recovery	Limits			
MCP Dissolved Metals - Westborough Lab Associated sample(s): 01-03 Batch: WG522830-2 WG522830-3									
Mercury, Dissolved	110		113		80-120		3		20
MCP Dissolved Metals - Westborough Lab Associated sample(s): 01-03 Batch: WG522988-2 WG522988-3									
Arsenic, Dissolved	117		113		80-120		3		20
Beryllium, Dissolved	106		104		80-120		2		20
Cadmium, Dissolved	112		110		80-120		2		20
Chromium, Dissolved	105		105		80-120		0		20
Copper, Dissolved	105		102		80-120		3		20
Lead, Dissolved	108		105		80-120		3		20
Nickel, Dissolved	103		101		80-120		2		20
Selenium, Dissolved	115		114		80-120		1		20
Silver, Dissolved	107		104		80-120		3		20
Zinc, Dissolved	105		104		80-120		1		20
MCP Dissolved Metals - Westborough Lab Associated sample(s): 01-03 Batch: WG522989-2 WG522989-3									
Antimony, Dissolved	96		95		80-120		1		20
Thallium, Dissolved	104		102		80-120		2		20

INORGANICS & MISCELLANEOUS

Project Name: WAYLAND TOWN OFFICES
Project Number: W-1396

Lab Number: L1204174
Report Date: 03/19/12

SAMPLE RESULTS

Lab ID: L1204174-01
Client ID: MW-5
Sample Location: WAYLAND, MA
Matrix: Water

Date Collected: 03/12/12 15:50
Date Received: 03/12/12
Field Prep: See narrative

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Alkalinity, Total	10		mg CaCO ₃ /L	2.0	NA	1	-	03/15/12 09:21	30,2320B	SD
Solids, Total Dissolved	84		mg/l	10	--	1	-	03/14/12 11:35	30,2540C	DW
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/15/12 17:10	30,2540D	DW
Chloride	2.1		mg/l	1.0	--	1	-	03/15/12 21:41	1,9251	LA
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	03/14/12 10:00	03/14/12 22:00	30,4500NH ₃ -BH	AT
Nitrogen, Nitrite	ND		mg/l	0.05	--	1	-	03/13/12 22:16	30,4500NO ₃ -F	TH
Nitrogen, Nitrate	7.9		mg/l	0.10	--	1	-	03/13/12 22:16	30,4500NO ₃ -F	TH
Nitrogen, Total Kjeldahl	ND		mg/l	0.30	--	1	03/14/12 10:00	03/14/12 20:05	30,4500N-C	AT
Phosphorus, Total	0.028		mg/l	0.010	--	1	03/13/12 13:30	03/13/12 16:40	30,4500P-E	SD



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

SAMPLE RESULTS

Lab ID: L1204174-02

Date Collected: 03/12/12 16:30

Client ID: MW-6

Date Received: 03/12/12

Sample Location: WAYLAND, MA

Field Prep: See narrative

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Alkalinity, Total	9.7		mg CaCO ₃ /L	2.0	NA	1	-	03/15/12 09:21	30,2320B	SD
Solids, Total Dissolved	280		mg/l	10	--	1	-	03/14/12 11:35	30,2540C	DW
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/15/12 17:10	30,2540D	DW
Chloride	66		mg/l	1.0	--	1	-	03/15/12 21:42	1,9251	LA
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	03/14/12 10:00	03/14/12 22:01	30,4500NH ₃ -BH	AT
Nitrogen, Nitrite	ND		mg/l	0.05	--	1	-	03/13/12 22:18	30,4500NO ₃ -F	TH
Nitrogen, Nitrate	18		mg/l	0.50	--	5	-	03/13/12 23:23	30,4500NO ₃ -F	TH
Nitrogen, Total Kjeldahl	ND		mg/l	0.60	--	2	03/14/12 10:00	03/14/12 20:06	30,4500N-C	AT
Phosphorus, Total	0.014		mg/l	0.010	--	1	03/13/12 13:30	03/13/12 16:41	30,4500P-E	SD



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

SAMPLE RESULTS

Lab ID: L1204174-03

Date Collected: 03/12/12 17:15

Client ID: MW-8

Date Received: 03/12/12

Sample Location: WAYLAND, MA

Field Prep: See narrative

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Alkalinity, Total	13		mg CaCO3/L	2.0	NA	1	-	03/15/12 09:21	30,2320B	SD
Solids, Total Dissolved	140		mg/l	10	--	1	-	03/14/12 11:35	30,2540C	DW
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/15/12 17:10	30,2540D	DW
Chloride	25		mg/l	1.0	--	1	-	03/15/12 21:44	1,9251	LA
Nitrogen, Ammonia	0.953		mg/l	0.075	--	1	03/14/12 10:00	03/14/12 22:02	30,4500NH3-BH	AT
Nitrogen, Nitrite	ND		mg/l	0.05	--	1	-	03/13/12 22:19	30,4500NO3-F	TH
Nitrogen, Nitrate	10		mg/l	0.50	--	5	-	03/13/12 23:25	30,4500NO3-F	TH
Nitrogen, Total Kjeldahl	ND		mg/l	0.60	--	2	03/14/12 10:00	03/14/12 20:07	30,4500N-C	AT
Phosphorus, Total	ND		mg/l	0.010	--	1	03/13/12 13:30	03/13/12 16:41	30,4500P-E	SD



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Method Blank Analysis Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG522847-1										
Phosphorus, Total	ND		mg/l	0.010	--	1	03/13/12 13:30	03/13/12 16:32	30,4500P-E	SD
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG522887-2										
Nitrogen, Nitrate	ND		mg/l	0.10	--	1	-	03/13/12 21:57	30,4500NO3-F	TH
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG522888-2										
Nitrogen, Nitrite	ND		mg/l	0.05	--	1	-	03/13/12 22:04	30,4500NO3-F	TH
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG522945-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	03/14/12 10:00	03/14/12 21:45	30,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG522946-1										
Nitrogen, Total Kjeldahl	ND		mg/l	0.30	--	1	03/14/12 10:00	03/14/12 20:02	30,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG522993-1										
Solids, Total Dissolved	ND		mg/l	10	--	1	-	03/14/12 11:35	30,2540C	DW
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG523165-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/15/12 17:10	30,2540D	DW
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG523351-1										
Chloride	ND		mg/l	1.0	--	1	-	03/15/12 21:40	1,9251	LA
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG523463-1										
Alkalinity, Total	ND		mg CaCO3/L	2.0	NA	1	-	03/15/12 09:21	30,2320B	SD



Lab Control Sample Analysis Batch Quality Control

Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG522847-2						
Phosphorus, Total	97	-			80-120	-		
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG522887-1						
Nitrogen, Nitrate	102	-			90-110	-		
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG522888-1						
Nitrogen, Nitrite	98	-			90-110	-		
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG522945-2						
Nitrogen, Ammonia	99	-			80-120	-		20
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG522946-2						
Nitrogen, Total Kjeldahl	100	-			85-110	-		
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG522993-2						
Solids, Total Dissolved	92	-			80-120	-		
General Chemistry - Westborough Lab	Associated sample(s): 01-03	Batch: WG523351-2						
Chloride	100	-			90-110	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG523463-2					
Alkalinity, Total	100	-	90-110	-	10

Matrix Spike Analysis Batch Quality Control

Project Name: WAYLAND TOWN OFFICES
Project Number: W-1396

Lab Number: L1204174
Report Date: 03/19/12

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG522847-3 QC Sample: L1204174-03 Client ID: MW-8									
Phosphorus, Total	ND	0.5	0.507	101	-	-	75-125	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG522887-3 QC Sample: L1204174-01 Client ID: MW-5									
Nitrogen, Nitrate	7.9	4	12	102	-	-	83-113	-	17
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG522888-3 QC Sample: L1204174-01 Client ID: MW-5									
Nitrogen, Nitrite	ND	4	4.0	100	-	-	80-120	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG522945-4 QC Sample: L1203887-08 Client ID: MS Sample									
Nitrogen, Ammonia	1.39	4	4.98	90	-	-	80-120	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG522946-4 QC Sample: L1203888-01 Client ID: MS Sample									
Nitrogen, Total Kjeldahl	2.0	8	9.4	92	-	-	77-111	-	24
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG523351-3 QC Sample: L1204174-02 Client ID: MW-6									
Chloride	66	20	84	90	-	-	58-140	-	7
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG523463-3 QC Sample: L1204238-11 Client ID: MS Sample									
Alkalinity, Total	34	100	130	100	-	-	86-116	-	10

Lab Duplicate Analysis

Batch Quality Control

Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG522847-4	QC Sample: L1204174-03	Client ID: MW-8		
Phosphorus, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG522887-4	QC Sample: L1204174-01	Client ID: MW-5		
Nitrogen, Nitrate	7.9	8.0	mg/l	1		17
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG522888-4	QC Sample: L1204174-01	Client ID: MW-5		
Nitrogen, Nitrite	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG522945-3	QC Sample: L1203887-08	Client ID: DUP Sample		
Nitrogen, Ammonia	1.39	1.44	mg/l	4		20
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG522946-3	QC Sample: L1203888-01	Client ID: DUP Sample		
Nitrogen, Total Kjeldahl	2.0	2.1	mg/l	5		24
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG522993-3	QC Sample: L1204113-01	Client ID: DUP Sample		
Solids, Total Dissolved	360	380	mg/l	5		20
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG523165-2	QC Sample: L1203962-01	Client ID: DUP Sample		
Solids, Total Suspended	340	350	mg/l	3		20
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG523351-4	QC Sample: L1204174-02	Client ID: MW-6		
Chloride	66	66	mg/l	0		7
General Chemistry - Westborough Lab	Associated sample(s): 01-03	QC Batch ID: WG523463-4	QC Sample: L1204238-11	Client ID: DUP Sample		
Alkalinity, Total	34	34	mg CaCO3/L	0		10



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal

Cooler

A Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1204174-01A	Plastic 1000ml unpreserved	A	7	4	Y	Absent	TSS-2540(7)
L1204174-01B	Plastic 500ml unpreserved	A	7	4	Y	Absent	CL-9251(28),NO3-4500(2),NO2-4500NO3(2),TDS-2540(7)
L1204174-01C	Plastic 500ml H2SO4 preserved	A	<2	4	Y	Absent	TKN-4500(28),TPHOS-4500(28),NH3-4500(28)
L1204174-01D	Plastic 500ml HNO3 preserved	A	<2	4	Y	Absent	MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-SB-6020S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-TL-6020S-10(180),MCP-BE-6010S-10(180),MCP-PB-6010S-10(180),MCP-CU-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180)
L1204174-01E	Plastic 250ml unpreserved	A	N/A	4	Y	Absent	ALK-T-2320(14)
L1204174-02A	Plastic 1000ml unpreserved	A	7	4	Y	Absent	TSS-2540(7)
L1204174-02B	Plastic 500ml unpreserved	A	7	4	Y	Absent	CL-9251(28),NO3-4500(2),NO2-4500NO3(2),TDS-2540(7)
L1204174-02C	Plastic 500ml H2SO4 preserved	A	<2	4	Y	Absent	TKN-4500(28),TPHOS-4500(28),NH3-4500(28)
L1204174-02D	Plastic 500ml HNO3 preserved	A	<2	4	Y	Absent	MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-SB-6020S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-TL-6020S-10(180),MCP-BE-6010S-10(180),MCP-PB-6010S-10(180),MCP-CU-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180)
L1204174-02E	Plastic 250ml unpreserved	A	N/A	4	Y	Absent	ALK-T-2320(14)
L1204174-03A	Plastic 1000ml unpreserved	A	7	4	Y	Absent	TSS-2540(7)

*Values in parentheses indicate holding time in days



Project Name: WAYLAND TOWN OFFICES

Project Number: W-1396

Lab Number: L1204174

Report Date: 03/19/12

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1204174-03B	Plastic 500ml unpreserved	A	7	4	Y	Absent	CL-9251(28),NO3-4500(2),NO2-4500NO3(2),TDS-2540(7)
L1204174-03C	Plastic 500ml H2SO4 preserved	A	<2	4	Y	Absent	TKN-4500(28),TPHOS-4500(28),NH3-4500(28)
L1204174-03D	Plastic 500ml HNO3 preserved	A	<2	4	Y	Absent	MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-SB-6020S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-TL-6020S-10(180),MCP-BE-6010S-10(180),MCP-PB-6010S-10(180),MCP-CU-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180)
L1204174-03E	Plastic 250ml unpreserved	A	N/A	4	Y	Absent	ALK-T-2320(14)

*Values in parentheses indicate holding time in days



Project Name: WAYLAND TOWN OFFICES

Lab Number: L1204174

Project Number: W-1396

Report Date: 03/19/12

GLOSSARY

Acronyms

EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

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

Terms

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than five times (5x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The RPD between the results for the two columns exceeds the method-specified criteria; however, the lower value has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

Report Format: Data Usability Report



Project Name: WAYLAND TOWN OFFICES**Lab Number:** L1204174**Project Number:** W-1396**Report Date:** 03/19/12**Data Qualifiers**

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name: WAYLAND TOWN OFFICES**Lab Number:** L1204174**Project Number:** W-1396**Report Date:** 03/19/12

REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997.
- 30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.
- 97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

LIMITATION OF LIABILITIES

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

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



Certificate/Approval Program Summary

Last revised January 30, 2012 - Westboro Facility

The following list includes only those analytes/methods for which certification/approval is currently held.

For a complete listing of analytes for the referenced methods, please contact your Alpha Customer Service Representative.

Connecticut Department of Public Health Certificate/Lab ID: PH-0574. NELAP Accredited Solid Waste/Soil.

Drinking Water (Inorganic Parameters: Color, pH, Turbidity, Conductivity, Alkalinity, Chloride, Free Residual Chlorine, Fluoride, Calcium Hardness, Sulfate, Nitrate, Nitrite, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Total Dissolved Solids, Total Organic Carbon, Total Cyanide, Perchlorate. Organic Parameters: Volatile Organics 524.2, Total Trihalomethanes 524.2, 1,2-Dibromo-3-chloropropane (DBCP), Ethylene Dibromide (EDB), 1,4-Dioxane (Mod 8270). Microbiology Parameters: Total Coliform-MF mEndo (SM9222B), Total Coliform – Colilert (SM9223 P/A), E. Coli. – Colilert (SM9223 P/A), HPC – Pour Plate (SM9215B), Fecal Coliform – MF m-FC (SM9222D))

Wastewater/Non-Potable Water (Inorganic Parameters: Color, pH, Conductivity, Acidity, Alkalinity, Chloride, Total Residual Chlorine, Fluoride, Total Hardness, Silica, Sulfate, Sulfide, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, O-Phosphate, Total Phosphorus, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, Total Residue (Solids), Total Dissolved Solids, Total Suspended Solids (non-filterable), BOD, CBOD, COD, TOC, Total Cyanide, Phenolics, Foaming Agents (MBAS), Bromide, Oil and Grease. Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, 2,4-D, 2,4,5-T, 2,4,5-TP (Silvex), Acid Extractables (Phenols), Benzidines, Phthalate Esters, Nitrosamines, Nitroaromatics & Isophorone, Polynuclear Aromatic Hydrocarbons, Haloethers, Chlorinated Hydrocarbons, Volatile Organics, TPH (HEM/SGT), Extractable Petroleum Hydrocarbons (ETPH), MA-EPH, MA-VPH. Microbiology Parameters: Total Coliform – MF mEndo (SM9222B), Total Coliform – MTF (SM9221B), HPC – Pour Plate (SM9215B), Fecal Coliform – MF m-FC (SM9222D), Fecal Coliform – A-1 Broth (SM9221E).)

Solid Waste/Soil (Inorganic Parameters: pH, Sulfide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Vanadium, Zinc, Total Cyanide, Ignitability, Phenolics, Corrosivity, TCLP Leach (1311), SPLP Leach (1312 metals only), Reactivity. Organic Parameters: PCBs, PCBs in Oil, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Extractable Petroleum Hydrocarbons (ETPH), MA-EPH, MA-VPH, Dicamba, 2,4-D, 2,4,5-T, 2,4,5-TP (Silvex), Volatile Organics, Acid Extractables (Phenols), 3,3'-Dichlorobenzidine, Phthalates, Nitrosamines, Nitroaromatics & Cyclic Ketones, PAHs, Haloethers, Chlorinated Hydrocarbons.)

Maine Department of Human Services Certificate/Lab ID: 2009024.

Drinking Water (Inorganic Parameters: SM9215B, 9222D, 9223B, EPA 180.1, 353.2, SM2130B, 2320B, 2540C, 4500CI-D, 4500CN-C, 4500CN-E, 4500F-C, 4500H+B, 4500NO3-F, EPA 200.7, EPA 200.8, 245.1, EPA 300.0. Organic Parameters: 504.1, 524.2.)

Wastewater/Non-Potable Water (Inorganic Parameters: EPA 120.1, 1664A, 350.1, 351.1, 353.2, 410.4, 420.1, SM2320B, 2510B, 2540C, 2540D, 426C, 4500CI-D, 4500CI-E, 4500CN-C, 4500CN-E, 4500F-B, 4500F-C, 4500H+B, 4500Norg-B, 4500Norg-C, 4500NH3-B, 4500NH3-G, 4500NH3-H, 4500NO3-F, 4500P-B, 4500P-E, 5210B, 5220D, 5310C, 9010B, 9040B, 9030B, 7470A, 7196A, 2340B, EPA 200.7, 6010, 200.8, 6020, 245.1, 1311, 1312, 3005A, Enterolert, 9223D, 9222D. Organic Parameters: 608, 8081, 8082, 8330, 8151A, 624, 8260, 3510C, 3630C, 5030B, ME-DRO, ME-GRO, MA-EPH, MA-VPH.)

Solid Waste/Soil (Inorganic Parameters: 9010B, 9012A, 9014A, 9040B, 9045C, 6010B, 7471A, 7196A, 9050A, 1010, 1030, 9065, 1311, 1312, 3005A, 3050B. Organic Parameters: ME-DRO, ME-GRO, MA-EPH, MA-VPH, 8260B, 8270C, 8330, 8151A, 8081A, 8082, 3540C, 3546, 3580A, 3630C, 5030B, 5035.)

Massachusetts Department of Environmental Protection Certificate/Lab ID: M-MA086.

Drinking Water (Inorganic Parameters: (EPA 200.8 for: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl) (EPA 200.7 for: Ba,Be,Ca,Cd,Cr,Cu,Na,Ni) 245.1, (300.0 for: Nitrate-N, Fluoride, Sulfate); (EPA 353.2 for: Nitrate-N, Nitrite-N); (SM4500NO3-F for: Nitrate-N and Nitrite-N); 4500F-C, 4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, 2320B, SM2540C, SM4500H-B. Organic Parameters: (EPA 524.2 for: Trihalomethanes, Volatile Organics); (504.1 for: 1,2-Dibromoethane, 1,2-Dibromo-3-Chloropropane), EPA 332. Microbiology Parameters: SM9215B; ENZ. SUB. SM9223; ColilertQT SM9223B; MF-SM9222D.)

Non-Potable Water (Inorganic Parameters: (EPA 200.8 for: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn); (EPA 200.7 for: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn); 245.1, SM4500H,B, EPA 120.1,

SM2510B, 2540C, 2340B, 2320B, 4500CL-E, 4500F-BC, 426C, SM4500NH3-BH, (EPA 350.1 for: Ammonia-N), LACHAT 10-107-06-1-B for Ammonia-N, SM4500NO3-F, 353.2 for Nitrate-N, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, 4500P-B,E, 5220D, EPA 410.4, SM 5210B, 5310C, 4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.

Organic Parameters: (EPA 624 for Volatile Halocarbons, Volatile Aromatics),(608 for: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs-Water), (EPA 625 for SVOC Acid Extractables and SVOC Base/Neutral Extractables), 600/4-81-045-PCB-Oil. Microbiology Parameters: (Colilert/QT SM9223B;Enterolert-QT: SM9222D-MF.)

New Hampshire Department of Environmental Services Certificate/Lab ID: 200307. NELAP Accredited.

Drinking Water (Inorganic Parameters: SM 9222B, 9223B, 9215B, EPA 200.7, 200.8, 245.2, 300.0, SM4500CN-E, 4500H+B, 4500NO3-F, 2320B, 2510B, 2540C, 4500F-C, 5310C, 2120B, EPA 332.0. Organic Parameters: 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: SM9222D, 9221B, 9222B, 9221E-EC, EPA 3005A, 200.7, 200.8, 245.1, 245.2, SW-846 6010B, 6020, 7196A, 7470A, SM3500-CR-D, EPA 120.1, 300.0, 350.1, 350.2, 351.1, 353.2, 410.4, 420.1, 1664A, SW-846 9010, 9030, 9040B, SM426C, SM2120B, 2310B, 2320B, 2540B, 2540D, 4500H+B, 4500CL-E, 4500CN-E, 4500NH3-H, 4500NO3-F, 4500NO2-B, 4500P-E, 4500-S2-D, 5210B, 5220D, 2510B, 2540C, 4500F-C, 5310C, 5540C, LACHAT 10-204-00-1-A, LACHAT 10-107-06-2-D. Organic Parameters: SW-846 3510C, 3630C, 5030B, 8260B, 8270C, 8330, EPA 624, 625, 608, SW-846 8082, 8081A, 8151A.)

Solid & Chemical Materials (Inorganic Parameters: SW-846 6010B, 7196A, 7471A, 1010, 1030, 9010, 9012A, 9014, 9030B, 9040B, 9045C, 9050C, 9065,1311, 1312, 3005A, 3050B. Organic Parameters: SW-846 3540C, 3546, 3550B, 3580A, 3630C, 5030B, 5035, 8260B, 8270C, 8330, 8151A, 8015B, 8082, 8081A.)

New Jersey Department of Environmental Protection Certificate/Lab ID: MA935. NELAP Accredited.

Drinking Water (Inorganic Parameters: SM9222B, 9221E, 9223B, 9215B, 4500CN-CE, 4500NO3-F, 4500F-C, EPA 300.0, 200.7, 200.8, 245.2, 2540C, SM2120B, 2320B, 2510B, 5310C, SM4500H-B. Organic Parameters: EPA 332, 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: SM5210B, EPA 410.4, SM5220D, 4500CL-E, EPA 300.0, SM2120B, SM4500F-BC, EPA 200.7, 351.1, LACHAT 10-107-06-2-D, EPA 353.2, SM4500NO3-F, 4500NO2-B, EPA 1664A, SM5310B, C or D, 4500-PE, EPA 420.1, SM510ABC, SM4500P-B5+E, 2540B, 2540C, 2540D, EPA 120.1, SM2510B, SM15 426C, 9222D, 9221B, 9221C, 9221E, 9222B, 9215B, 2310B, 2320B, 4500NH3-H, 4500-S D, EPA 350.1, 350.2, SW-846 1312, 6020, 6020A, 7470A, 5540C, 4500H-B, EPA 200.8, SM3500Cr-D, 4500CN-CE, EPA 245.1, 245.2, SW-846 9040B, 3005A, 3015, EPA 6010B, 6010C, 7196A, 3060A, SW-846 9010B, 9030B. Organic Parameters: SW-846 8260B, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 3510C, EPA 608, 624, 625, SW-846 3630C, 5030B, 8081A, 8081B, 8082, 8082A, 8151A, 8330, NJ OQA-QAM-025 Rev.7, NJ EPH.)

Solid & Chemical Materials (Inorganic Parameters: SW-846, 6010B, 6010C, 7196A, 3060A, 9010B, 9030B, 1010, 1030, 1311, 1312, 3005A, 3050B, 7471A, 7471B, 9014, 9012A, 9040B, 9045C, 9050A, 9065. Organic Parameters: SW-846 8015B, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8330, 8260B, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 3540C, 3545, 3546, 3550B, 3580A, 3630C, 5030B, 5035L, 5035H, NJ OQA-QAM-025 Rev.7, NJ EPH.)

New York Department of Health Certificate/Lab ID: 11148. NELAP Accredited.

Drinking Water (Inorganic Parameters: SM9223B, 9222B, 9215B, EPA 200.8, 200.7, 245.2, SM5310C, EPA 332.0, SM2320B, EPA 300.0, SM2120B, 4500CN-E, 4500F-C, 4500H-B, 4500NO3-F, 2540C, SM 2510B. Organic Parameters: EPA 524.2, 504.1.)

Non-Potable Water (Inorganic Parameters: SM9221E, 9222D, 9221B, 9222B, 9215B, 5210B, 5310C, EPA 410.4, SM5220D, 2310B-4a, 2320B, EPA 200.7, 300.0, SM4500CL-E, 4500F-C, SM15 426C, EPA 350.1, SM4500NH3-BH, EPA 351.1, LACHAT 10-107-06-2, EPA 353.2, LACHAT 10-107-04-1-C, SM4500-NO3-F, 4500-NO2-B, 4500P-E, 2540C, 2540B, 2540D, EPA 200.8, EPA 6010B, 6020, EPA 7196A, SM3500Cr-D, EPA 245.1, 245.2, 7470A, SM2120B, LACHAT 10-204-00-1-A, EPA 9040B, SM4500-HB, EPA 1664A, EPA 420.1, SM14 510C, EPA 120.1, SM2510B, SM4500S-D, SM5540C, EPA 3005A, 9010B, 9030B.. Organic Parameters: EPA 624, 8260B, 8270C, 625, 608, 8081A, 8151A, 8330, 8082, EPA 3510C, 5030B.)

Solid & Hazardous Waste (Inorganic Parameters: 1010, 1030, EPA 6010B, 7196A, 7471A, 9012A, 9014, 9040B, 9045C, 9065, 9050, EPA 1311, 1312, 3005A, 3050B, 9010B, 9030B. Organic Parameters: EPA 8260B, 8270C, 8015B, 8081A, 8151A, 8330, 8082, 3540C, 3545, 3546, 3580, 5030B, 5035.)

North Carolina Department of the Environment and Natural Resources Certificate/Lab ID : 666. Organic Parameters: MA-EPH, MA-VPH.

Pennsylvania Department of Environmental Protection Certificate/Lab ID : 68-03671. **NELAP Accredited.**
Drinking Water (Organic Parameters: EPA 524.2, 504.1)

Non-Potable Water (Inorganic Parameters: EPA 1312, 200.7, 410.4, 1664A, SM2540D, 5210B, 5220D, 4500-P, BE. Organic Parameters: EPA 3510C, 3005A, 3630C, 5030B, 625, 624, 608, 8081A, 8081B, 8082, 802A, 8151A, 8260B, 8270C, 8270D, 8330)

Solid & Hazardous Waste (Inorganic Parameters: EPA 350.1, 1010, 1030, 1311, 1312, 3050B, 3060A, 6010B, 6010C, 7196A, 7471A, 9010B, 9012A, 9014, 9040B, 9045C, 9050, 9065, SM 4500NH3-H. Organic Parameters: 3540C, 3546, 3580A, 3630C, 5035, 8015B, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8260B, 8270C, 8270D, 8330)

Rhode Island Department of Health Certificate/Lab ID: LAO00065. **NELAP Accredited via NY-DOH.**
 Refer to MA-DEP Certificate for Potable and Non-Potable Water.
 Refer to NJ-DEP Certificate for Potable and Non-Potable Water.

Texas Commission on Environmental Quality Certificate/Lab ID: T104704476-09-1. **NELAP Accredited.**

Non-Potable Water (Inorganic Parameters: EPA 120.1, 1664, 200.7, 200.8, 245.1, 245.2, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1, 6010, 6020, 7196, 7470, 9040, SM 2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 426C, 4500CL-E, 4500CN-E, 4500F-C, 4500H+B, 4500NH3-H, 4500NO2B, 4500P-E, 4500 S2 D, 510C, 5210B, 5220D, 5310C, 5540C. Organic Parameters: EPA 608, 624, 625, 8081, 8082, 8151, 8260, 8270, 8330.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1311, 1312, 9012, 9014, 9040, 9045, 9050, 9065.)

Virginia Division of Consolidated Laboratory Services Certificate/Lab ID: 460195. **NELAP Accredited.**

Non-Potable Water (Inorganic Parameters: EPA 3005A, 3015, 1312, 6010B, 6010C, SM4500S-D, SM4500-CN-CE, Lachat 10-204-00-1-X. Organic Parameters: EPA 8260B)

Solid & Hazardous Waste (Inorganic Parameters: EPA 3050B, 1311, 1312, 6010B, 6010C, 9030B, 9010B, 9012A, 9014. Organic Parameters: EPA 5035, 5030B, 8260B.)

Department of Defense, L-A-B Certificate/Lab ID: L2217.

Drinking Water (Inorganic Parameters: SM 4500H-B. Organic Parameters: EPA 524.2, 504.1.)

Non-Potable Water (Inorganic Parameters: EPA 200.7, 200.8, 6010B, 6020, 245.1, 245.2, 7470A, 9040B, 300.0, 332.0, 6860, 353.2, 410.4, 9060, 1664A, SM 4500CN-E, 4500H-B, 4500NO3-F, 5220D, 5310C, 2320B, 2540C, 3005A, 3015, 9010B, 9056. Organic Parameters: EPA 8260B, 8270C, 8330A, 625, 8082, 8081A, 3510C, 5030B, MassDEP EPH, MassDEP VPH.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 200.7, 6010B, 7471A, 9010, 9012A, 6860, 1311, 1312, 3050B, 7196A, 9010B, 3500-CR-D, 4500CN-CE, 2540G, Organic Parameters: EPA 8260B, 8270C, 8330A/B-prep, 8082, 8081A, 3540C, 3546, 3580A, 5035A, MassDEP EPH, MassDEP VPH.)

The following analytes are not included in our current NELAP/TNI Scope of Accreditation:

EPA 8260B: Freon-113, 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene. **EPA 8330A**: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT. **EPA 8270C**: Methyl naphthalene, Dimethyl naphthalene, Total Methyl naphthalenes, Total Dimethyl naphthalenes, 1,4-Diphenylhydrazine (Azobenzene). **EPA 625**: 4-Chloroaniline, 4-Methylphenol. Total Phosphorus in a soil matrix, Chloride in a soil matrix, TKN in a soil matrix, NO2 in a soil matrix, NO3 in a soil matrix, SO4 in a soil matrix.

CHAIN OF CUSTODY

PAGE 1 OF 1



WESTBORO, MA
TEL: 508-898-9220
FAX: 508-898-9193

MANFIELD, MA
TEL: 508-822-9300
FAX: 508-822-3288

Client Information

Client: T, Kyle + Bond

Address: 446 Main St

Worcester, MA

Phone: (508) 754-2201

Fax:

Email: KKing@tlyebond.com

☐ These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

If MS is required, indicate in Sample Specific Comments which samples and what tests MS to be performed.
(Note: All CAM methods for inorganic analyses require MS every 20 soil samples)

Project Information

Project Name: Wayland Town Office

Project Location: Wayland, MA

Project #: W-1396

Project Manager: Ian Catlow

ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due: Time:

Date Rec'd in Lab:

3/12/12

Report Information - Data Deliverables

☐ FAX ☒ EMAIL

☐ ADEX ☐ Add'l Deliverables

Regulatory Requirements/Report Limits

State/Fed Program MCP

MA MCP PRESUMPTIVE CERTAINTY -- CT REASONABLE CONFIDENCE PROTO

☒ Yes ☐ No Are MCP Analytical Methods Required?

☐ Yes ☒ No Is Matrix Spike (MS) Required on this SDG? (If yes see note in Comments)

☐ Yes ☒ No Are CT RCP (Reasonable Confidence Protocols) Required?

ANALYSIS
Dissolved PP13 (Field Filter)
TSS
TPHos, NH3, TRN
Aik
TDS, Cl, NO3, NO2

SAMPLE HANDLING
Filtration Field Filter
☒ Done
☐ Not needed
☐ Lab to do
☐ Preservation
☐ Lab to do
(Please specify below)

Sample Specific Comments

TOTAL # BOTTLES

ALPHA Job #: 21204174

Billing Information

☐ Same as Client info PO #:

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT
MAMCP or CT RCP?

Relinquished By:

Amuel

Date/Time

3/12/12 1820

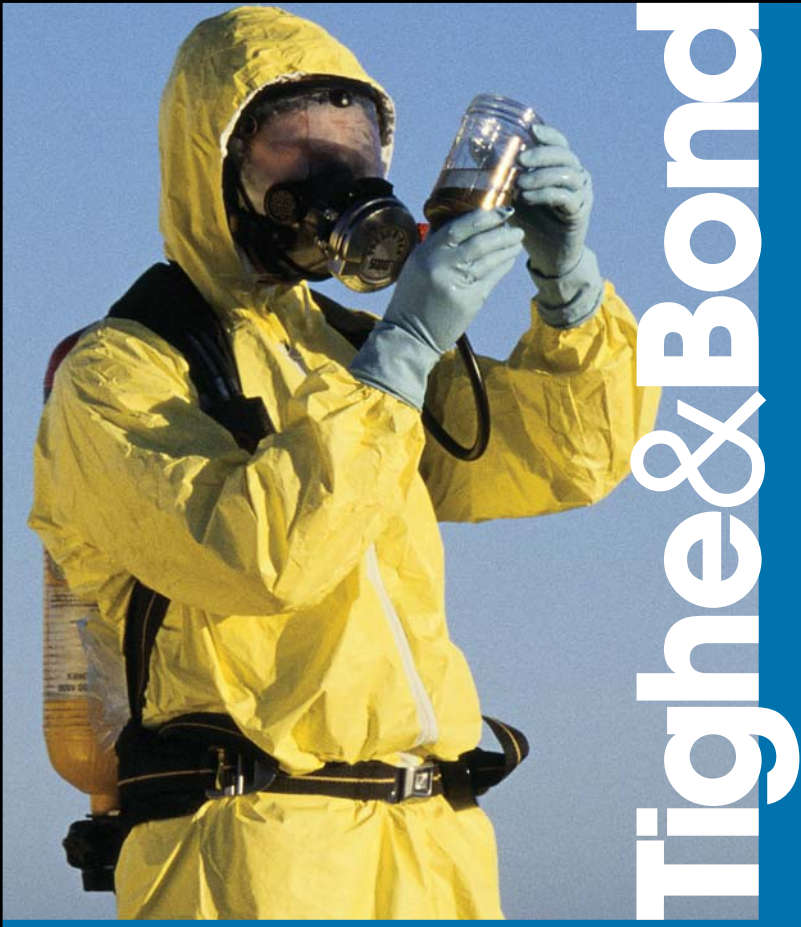
Received By:

C

Date/Time

3/12/12 1820

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.



Tighe & Bond

Yankee Engineering & Testing, Inc.

Letter of Transmittal

TO: Tighe & Bond, Inc.
 446 Main Street
 Worcester, MA 01608

DATE:	12/23/11	JOB NO#:	92047A
ATTN:	Mr. Zachary Baum (e-mail)		
CLIENT:	Tighe & Bond, Inc.		
JOB:	Wayland Town Offices		
TOWN:	Wayland, MA		

We Are Sending You The Following Information:

- ☐ Shop Drawings ☐ Attached ☐ Copy of Letter ☐ Samples
☐ Under Separate Cover ☐ Prints ☒ Test Reports ☐ Specifications

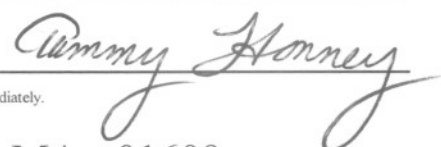
COPIES	DATE(S)	REPORT OR TEST DATA DESCRIPTION
3	12/22/11	Aggregate Gradation Chart (L-19779, L-19780, L-19781)
3	12/22/11	Aggregate Gradation Chart (L-19782, L-19783, L-19784)
1	12/22/11	Aggregate Gradation Chart (L-19785)

These Test Reports Are Being Transmitted As Checked Below:

- ☐ For Your Approval ☐ As Requested ☐ Approved As Noted
☐ For Review & Comment ☒ For Your Use ☐ Approved As Submitted

REMARKS: _____

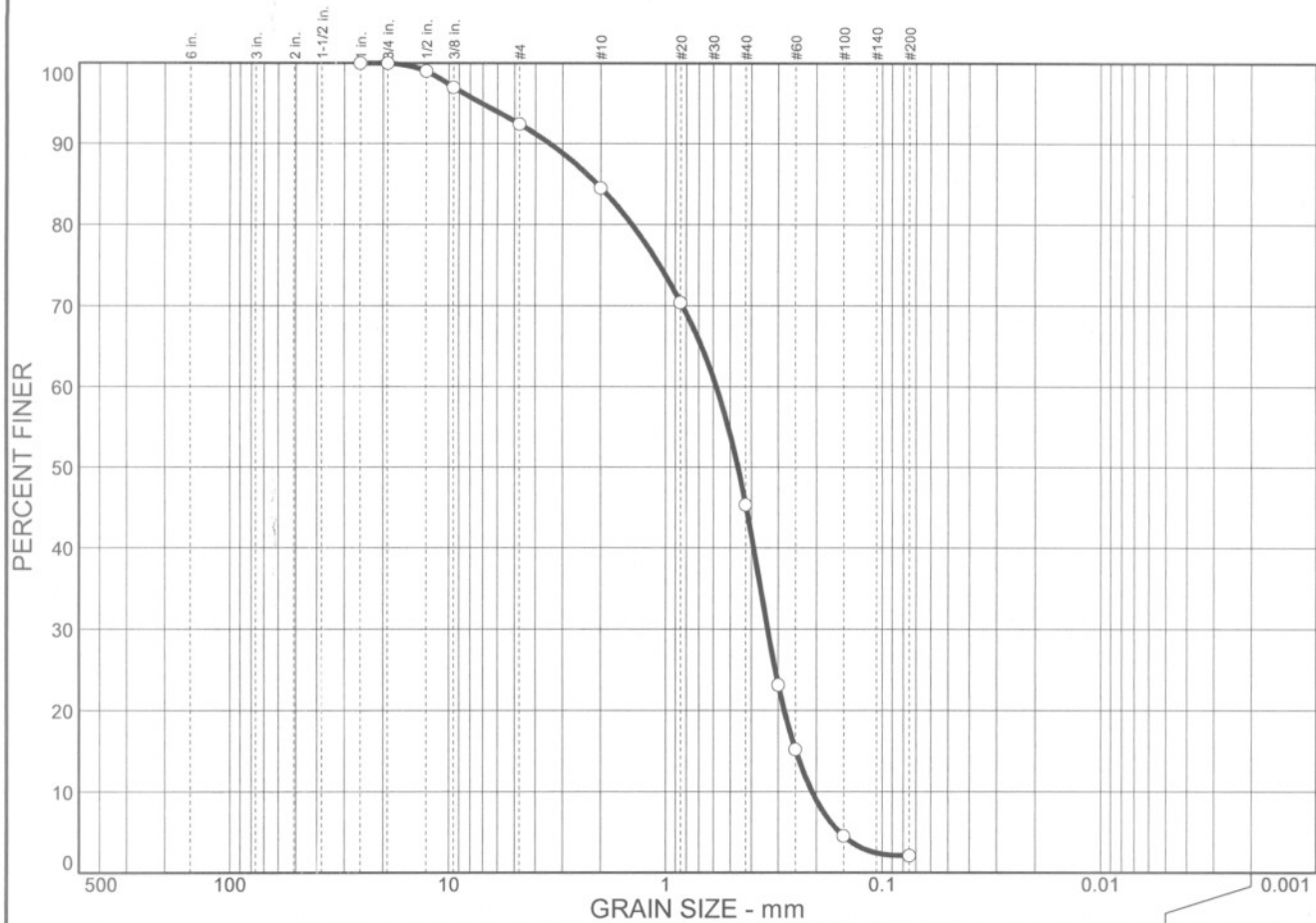
COPIES: _____

SIGNED: 

If The Referenced Enclosures Are Not As Noted, Kindly Notify Our Office Immediately.

10 MASON STREET • WORCESTER, MA • 01609
 phone 508-831-7404 fax 508-831-7388

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	7.6	90.3	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
3/4 in.	100.0		
1/2 in.	99.0		
3/8 in.	97.0		
#4	92.4		
#10	84.5		
#20	70.4		
#40	45.3		
#60	23.1		
#100	15.2		
#200	4.5		
	2.1		

* (no specification provided)

Soil Description

Light brown 1" max m/f sand trace gravel trace silt
Poorly graded sand

Atterberg Limits

PL= n/a LL= n/a PI= n/a

Coefficients

D₈₅= 2.09 D₆₀= 0.581 D₅₀= 0.462
D₃₀= 0.337 D₁₅= 0.249 D₁₀= 0.209
C_u= 2.77 C_c= 0.93

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample submitted by client on 12/21/11

Sample No.: L-19779
Location: TP-05 C-2

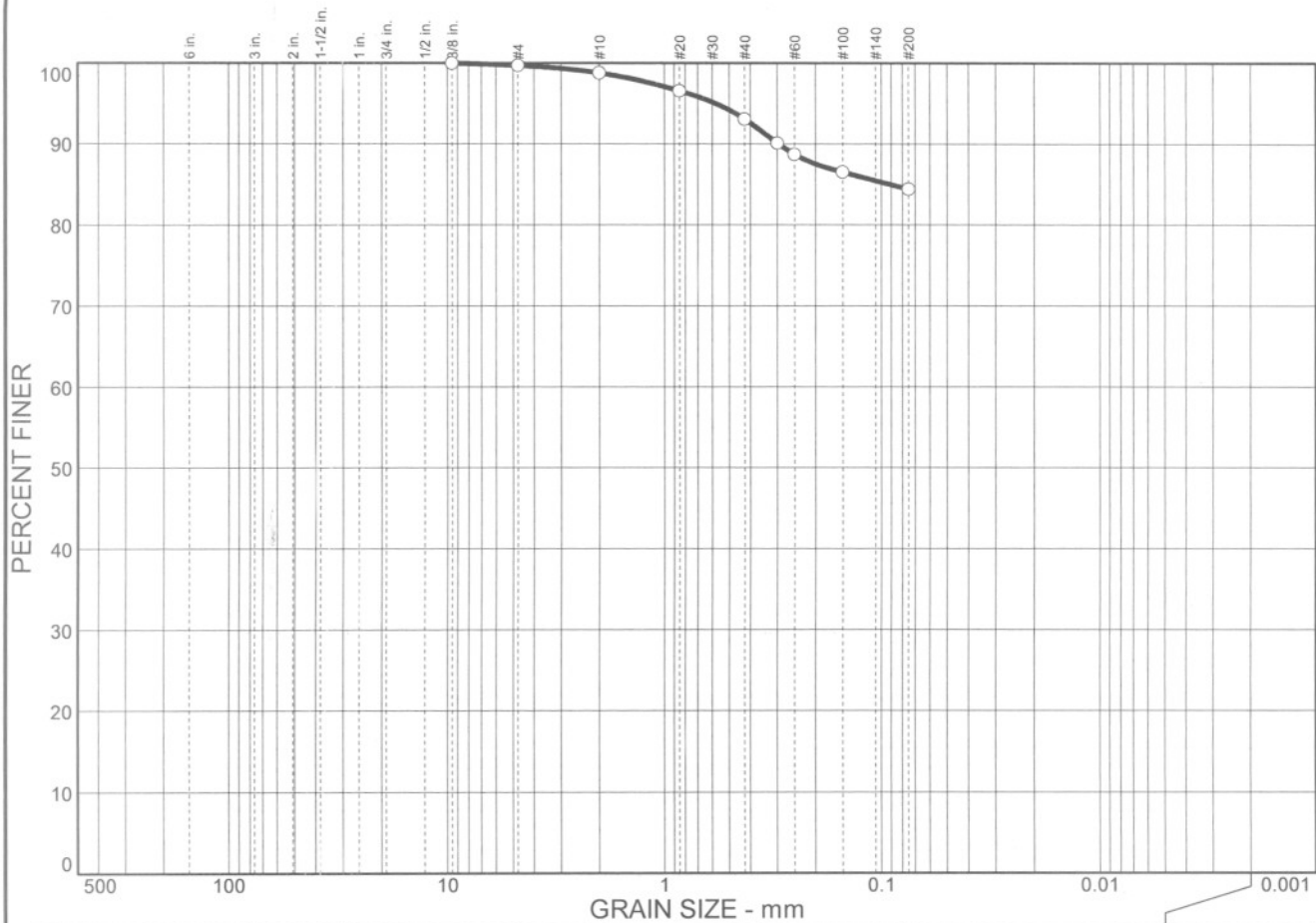
Source of Sample: Wayland Town Offices

Date: 12/22/11
Elev./Depth: submitted

**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers
Project: Tighe & Bond - Various Sites
Worcester MA Office
Project No: 92047A

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.3	15.3	84.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
#4	99.7		
#10	98.8		
#20	96.6		
#40	93.1		
#60	90.1		
#100	88.7		
#200	84.4		

* (no specification provided)

Soil Description

Light tan silty/clayey sand
Atterberg and hydrometer tests not requested

Atterberg Limits

PL= untested LL= untested PI= untested

Coefficients

D₈₅= 0.0916 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample submitted by client on 12/21/11

Sample No.: L-19780
Location: TP-7 C-3

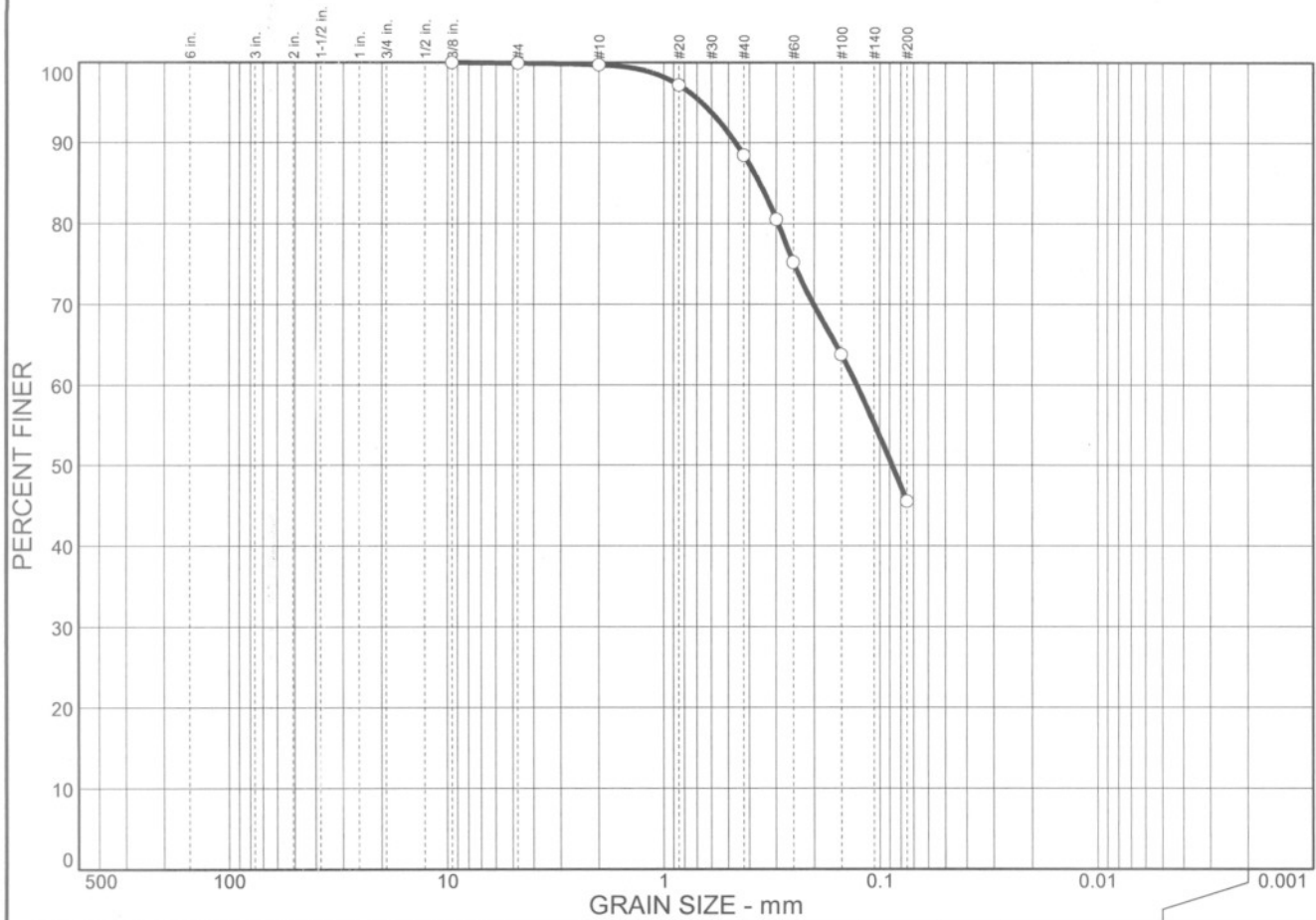
Source of Sample: Wayland Town Offices

Date: 12/22/11
Elev./Depth: submitted

**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers
Project: Tighe & Bond - Various Sites
Worcester MA Office
Project No: 92047A

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.1	54.4	45.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
#4	99.9		
#10	99.7		
#20	97.2		
#40	88.4		
#50	80.5		
#60	75.2		
#100	63.8		
#200	45.5		

* (no specification provided)

Soil Description

Tan silty fine sand
Atterberg and hydrometer tests not requested

Atterberg Limits

PL= untested LL= untested PI= untested

Coefficients

D₈₅= 0.359 D₆₀= 0.128 D₅₀= 0.0878
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample submitted by client on 12/21/11

Sample No.: L-19781

Location: TP-01 C-1

Source of Sample: Wayland Town Offices

Date: 12/22/11

Elev./Depth: submitted

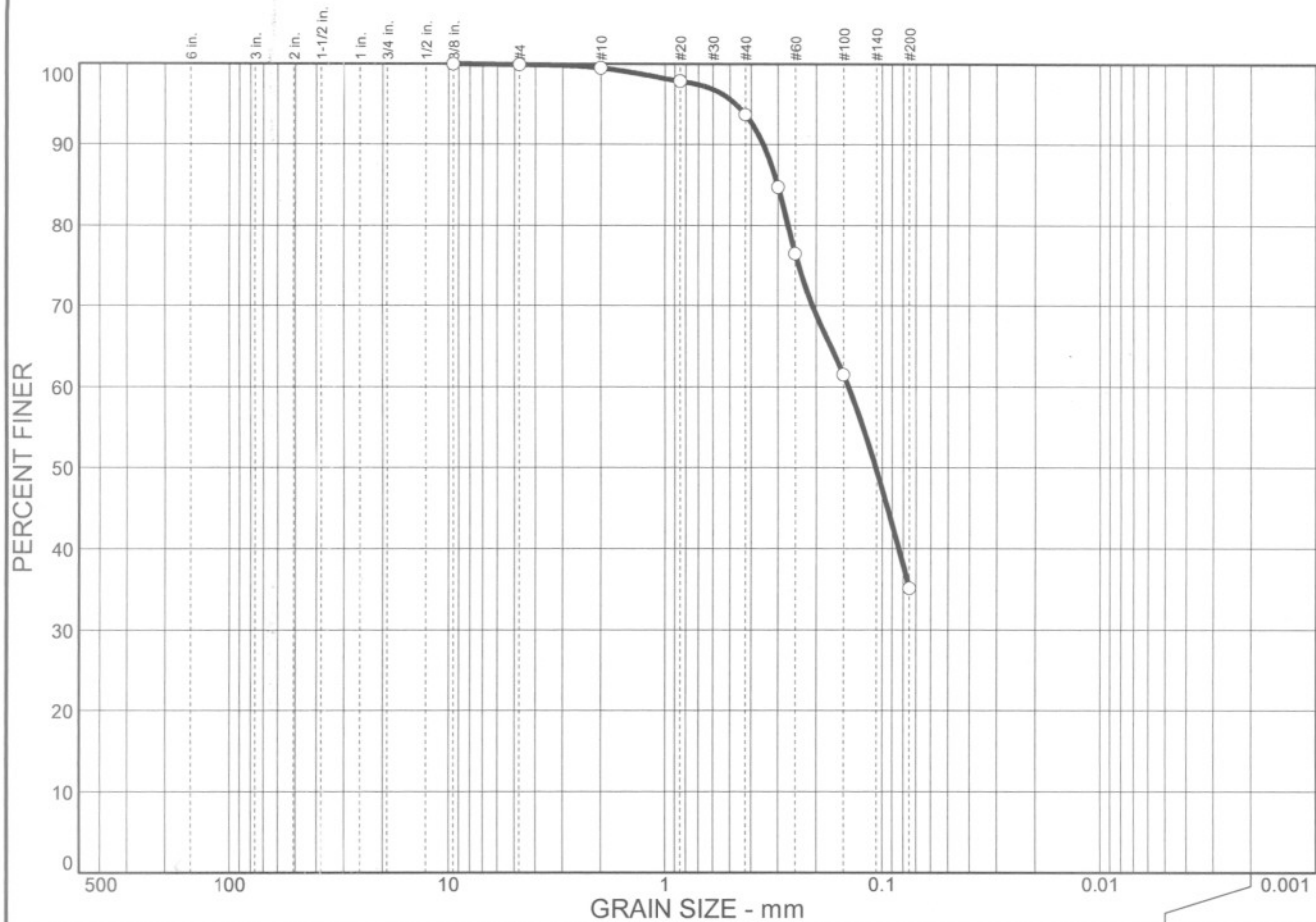
**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers

Project: Tighe & Bond - Various Sites
Worcester MA Office

Project No: 92047A

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.1	64.8	35.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
#4	99.9		
#10	99.5		
#20	97.9		
#40	93.7		
#60	84.7		
#100	76.4		
#200	61.5		
	35.1		

* (no specification provided)

Soil Description

Tan silty fine sand
Atterberg and hydrometer tests not requested

Atterberg Limits

PL= untested LL= untested PI= untested

Coefficients

D₈₅= 0.302 D₆₀= 0.142 D₅₀= 0.107
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample submitted by client on 12/21/11

Sample No.: L-19782
Location: TP-05 C-1

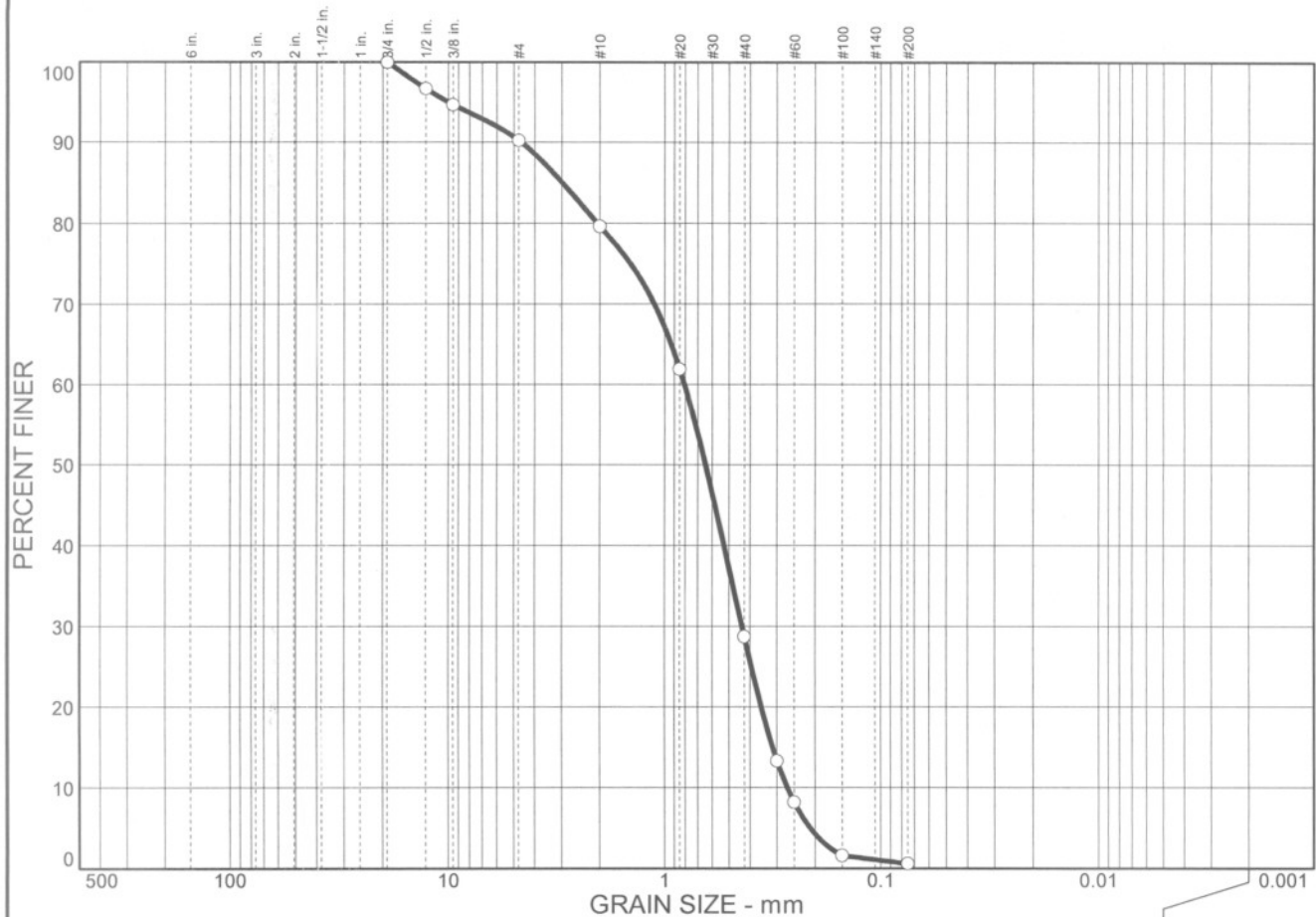
Source of Sample: Wayland Town Offices

Date: 12/22/11
Elev./Depth: submitted

**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers
Project: Tighe & Bond - Various Sites
Worcester MA Office
Project No: 92047A

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	9.8	89.6	0.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4 in.	100.0		
1/2 in.	96.7		
3/8 in.	94.7		
#4	90.2		
#10	79.6		
#20	61.9		
#40	28.7		
#60	13.3		
#100	8.2		
#200	1.6		
	0.6		

* (no specification provided)

Soil Description

Light brown 1" max m/f sand trace gravel trace silt
Poorly graded sand

Atterberg Limits

PL= n/a LL= n/a PI= n/a

Coefficients

D₈₅= 2.99 D₆₀= 0.809 D₅₀= 0.645
D₃₀= 0.436 D₁₅= 0.315 D₁₀= 0.269
C_u= 3.01 C_c= 0.87

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample submitted by client on 12/21/11

Sample No.: L-19783

Location: TP-06 C-2

Source of Sample: Wayland Town Offices

Date: 12/22/11

Elev./Depth: submitted

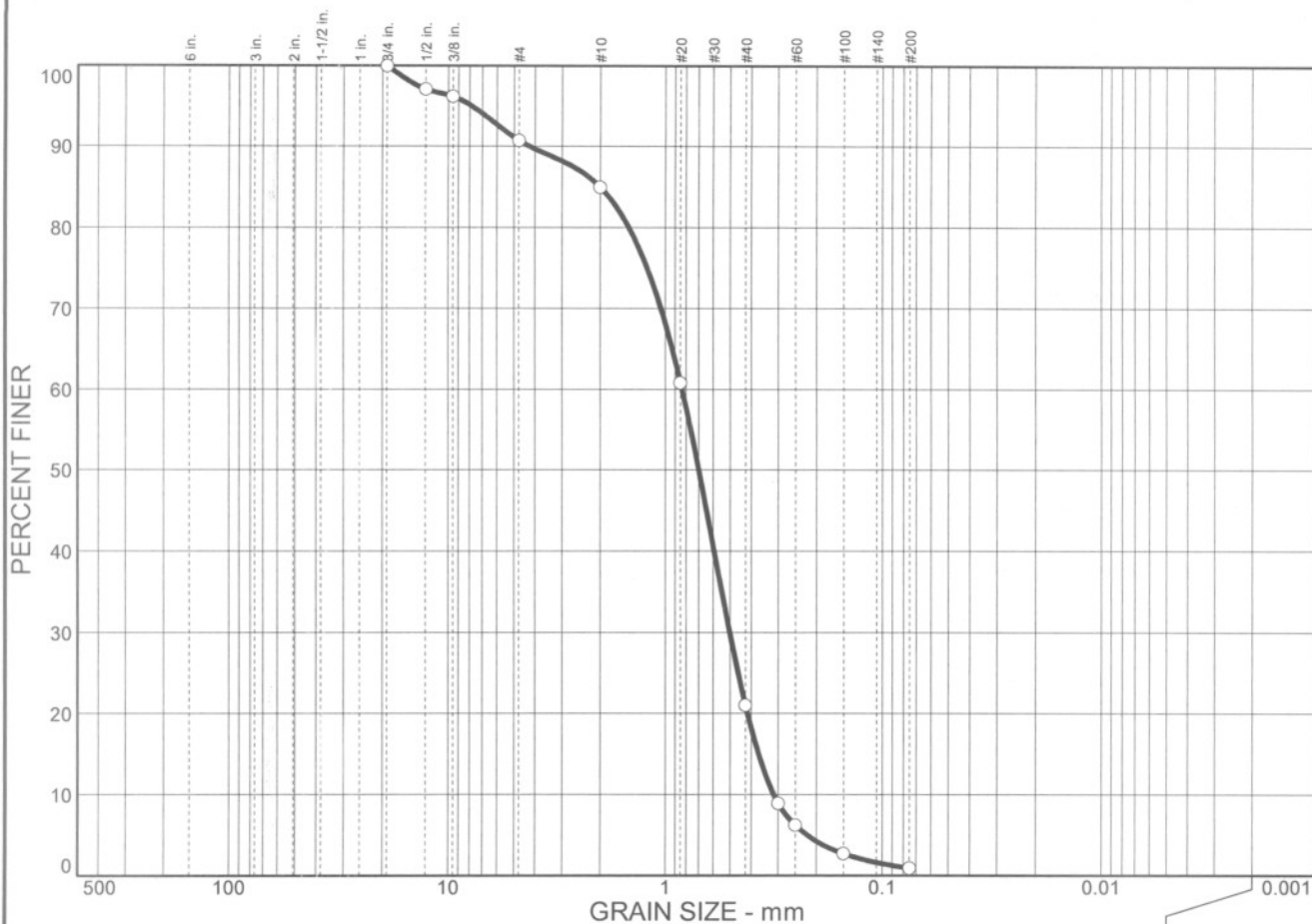
**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers

Project: Tighe & Bond - Various Sites
Worcester MA Office

Project No: 92047A

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	9.3	89.8	0.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4 in.	100.0		
1/2 in.	97.1		
3/8 in.	96.2		
#4	90.7		
#10	84.9		
#20	60.8		
#40	21.0		
#60	8.9		
#100	6.2		
#200	2.7		
	0.9		

* (no specification provided)

Soil Description

Light brown 1" max m/f sand trace gravel trace silt
Poorly graded sand

Atterberg Limits

PL= n/a LL= n/a PI= n/a

Coefficients

D₈₅= 2.02 D₆₀= 0.837 D₅₀= 0.700
D₃₀= 0.503 D₁₅= 0.370 D₁₀= 0.315
C_u= 2.66 C_c= 0.96

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample submitted by client on 12/21/11

Sample No.: L-19784

Location: TP-7 C-1-2

Source of Sample: Wayland Town Offices

Date: 12/22/11

Elev./Depth: submitted

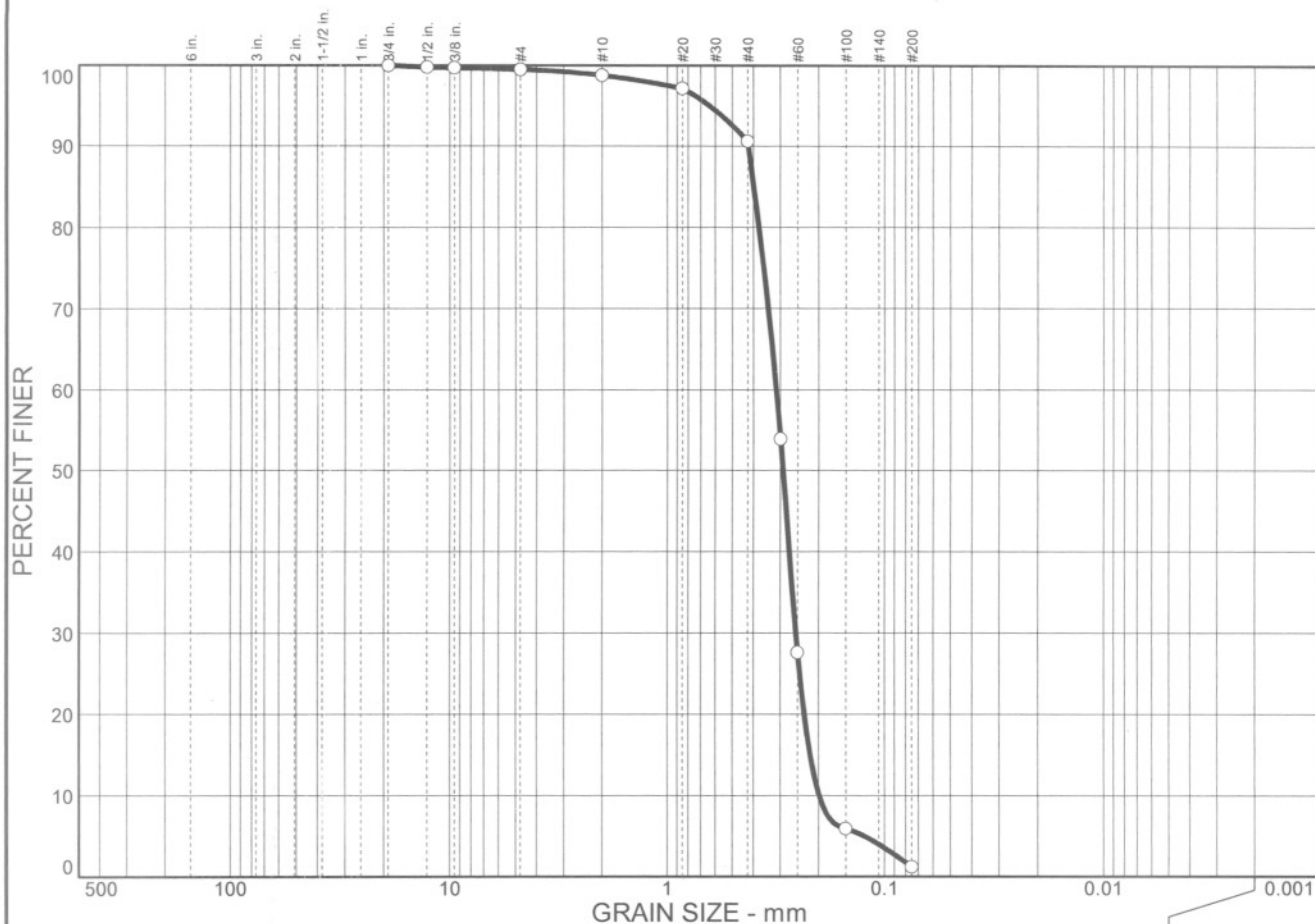
**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers

Project: Tighe & Bond - Various Sites
Worcester MA Office

Project No: 92047A

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.5	98.3	1.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4 in.	100.0		
1/2 in.	99.8		
3/8 in.	99.7		
#4	99.5		
#10	98.8		
#20	97.2		
#40	90.6		
#60	27.6		
#100	5.9		
#200	1.2		

* (no specification provided)

Soil Description

Light tan 1" max f/m sand trace gravel trace silt
Poorly graded sand

Atterberg Limits

PL= n/a LL= n/a PI= n/a

Coefficients

D₈₅= 0.399 D₆₀= 0.314 D₅₀= 0.292
D₃₀= 0.255 D₁₅= 0.219 D₁₀= 0.199
C_u= 1.58 C_c= 1.04

Classification

USCS= SP AASHTO= A-3

Remarks

Sample submitted by client on 12/21/11

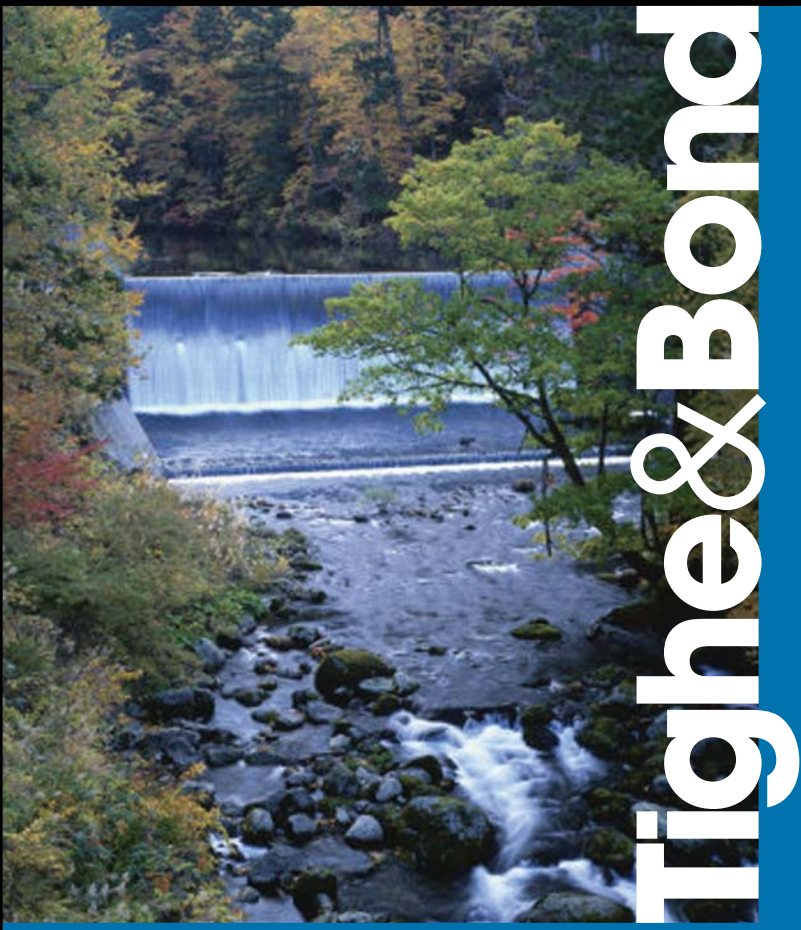
Sample No.: L-19785
Location: TP-06 C-1

Source of Sample: Wayland Town Offices

Date: 12/22/11
Elev./Depth: submitted

**YANKEE ENGINEERING
& TESTING, INC.**

Client: Tighe & Bond Consulting Engineers
Project: Tighe & Bond - Various Sites
Worcester MA Office
Project No: 92047A



Hydraulic Conductivity Data Summary

Wayland: Town Office Ball Fields

	Location	K ft/day	Data Source	Material Tested
Disposal Site	TP-01 C-1	8.1	Seive Analysis - Shephard	Tan silty fine sand
	TP-05 C-1	11.3	Seive Analysis - Shephard	Tan silty fine sand
	TP-05 C-2	111.5	Sieve Analysis - Hazen	Light brown 1" max m/f sand trace
	TP-05 C-2	125.9	Seive Analysis - Shephard	gravel trace silt; poorly graded sand
	TP-06 C-1	101.0	Sieve Analysis - Hazen	Light tan 1" max f/m sand trace gravel
	TP-06 C-1	59.0	Seive Analysis - Shephard	trace silt; poorly graded sand
	TP-06 C-2	184.6	Sieve Analysis - Hazen	Light brown 1" max m/f sand trace
	TP-06 C-2	218.3	Seive Analysis - Shephard	gravel trace silt; poorly graded sand
	TP-07 C-2	253.2	Sieve Analysis - Hazen	Light brown 1" max m/f sand trace
	TP-07 C-2	249.8	Seive Analysis - Shephard	gravel trace silt; poorly graded sand
	MW-1	246.1	Rising Head Slug Test	m-c sand 3-5', f sand/silt below
	MW-2	144.6	Rising Head Slug Test	c sand 3-4', f sand/silt below
	MW-3	57.3	Rising Head Slug Test	c sand 3-4', f sand/silt below
	MW-4	166.2	Rising Head Slug Test	c sand 3-4', f sand/silt below
	MW-5	302.5	Rising Head Slug Test	m-c sand 6-8', silt/f sand below
	MW-6	26.5	Rising Head Slug Test	m-c sand 6-8', silt/f sand below
	MW-7	56.6	Rising Head Slug Test	f sand/silt 4-6', silt/f sand below
	MW-8	153.5	Rising Head Slug Test	m-c sand 6-8', silt/f sand below
	Average:	137.6		
	Geometric Mean:	95.8		
Soccer Field Disposal Area	TP-01 C-1	8.1	Seive Analysis - Shephard	Tan silty fine sand
	TP-06 C-1	101.0	Sieve Analysis - Hazen	Light tan 1" max f/m sand trace gravel
	TP-06 C-1	59.0	Seive Analysis - Shephard	trace silt; poorly graded sand
	TP-06 C-2	184.6	Sieve Analysis - Hazen	Light brown 1" max m/f sand trace
	TP-06 C-2	218.3	Seive Analysis - Shephard	gravel trace silt; poorly graded sand
	TP-07 C-2	253.2	Sieve Analysis - Hazen	Light brown 1" max m/f sand trace
	TP-07 C-2	249.8	Seive Analysis - Shephard	gravel trace silt; poorly graded sand
	MW-1	246.1	Rising Head Slug Test	m-c sand 3-5', f sand/silt below
	MW-2	144.6	Rising Head Slug Test	c sand 3-4', f sand/silt below
	MW-3	57.3	Rising Head Slug Test	c sand 3-4', f sand/silt below
	MW-4	166.2	Rising Head Slug Test	c sand 3-4', f sand/silt below
	MW-7	56.6	Rising Head Slug Test	f sand/silt 4-6', silt/f sand below
	Average:	145.4		
	Geometric Mean:	107.5		

Hydraulic Conductivity Data Summary

Wayland: Town Office Ball Fields

Existing Leachfield	TP-05 C-1	11.3	Seive Analysis - Shephard	Tan silty fine sand
	TP-05 C-2	111.5	Sieve Analysis - Hazen	Light brown 1" max m/f sand trace
	TP-05 C-2	125.9	Seive Analysis - Shephard	gravel trace silt; poorly graded sand
	MW-5	302.5	Rising Head Slug Test	m-c sand 6-8', silt/f sand below
	MW-6	26.5	Rising Head Slug Test	m-c sand 6-8', silt/f sand below
	MW-8	153.5	Rising Head Slug Test	m-c sand 6-8', silt/f sand below
	Average:		121.9	
Geometric Mean:		76.1		
Notes:				

**Hydraulic Conductivity Estimation
Shepherd Grain Size Distribution Method
Wayland: Town Office Ball Fields**

Boring ID	Sample Depth	D ₅₀ <i>mm</i>	K <i>ft/day</i>
TP-01 C-1	39"-84"	0.0878	8.13
TP-05 C-1	48"-58"	0.107	11.26
TP-05 C-2	58"-100"	0.462	125.86
TP-06 C-1	13"-36"	0.292	59.03
TP-06 C-2	36"-52"	0.645	218.27
TP-07 C-2	25"-67"	0.7	249.82
TP-07 C-3	67"-90"		0.00
<p>Notes:</p> <p>1. Calculation assumes channel deposits</p> <p>2. Procedure based on Shepherd Method presented in <i>Applied Hydrogeology</i> by C. W. Fetter. (pg. 99)</p>			

**Hydraulic Conductivity Estimation
Hazen Grain Size Distribution Method
Wayland: Town Office Ball Fields**

Boring ID	Sample Depth	D ₁₀ <i>mm</i>	D ₁₀ <i>cm</i>	C	K <i>cm/sec</i>	K <i>ft/day</i>
TP-01 C-1	39"-84"		0	90	0.000000	0.00
TP-05 C-1	48"-58"		0	90	0.000000	0.00
TP-05 C-2	58"-100"	0.209	0.0209	90	0.039313	111.45
TP-06 C-1	13"-36"	0.199	0.0199	90	0.035641	101.04
TP-06 C-2	36"-52"	0.269	0.0269	90	0.065125	184.63
TP-07 C-2	25"-67"	0.315	0.0315	90	0.089303	253.17
TP-07 C-3	67"-90"		0	90	0.000000	0.00

Notes:

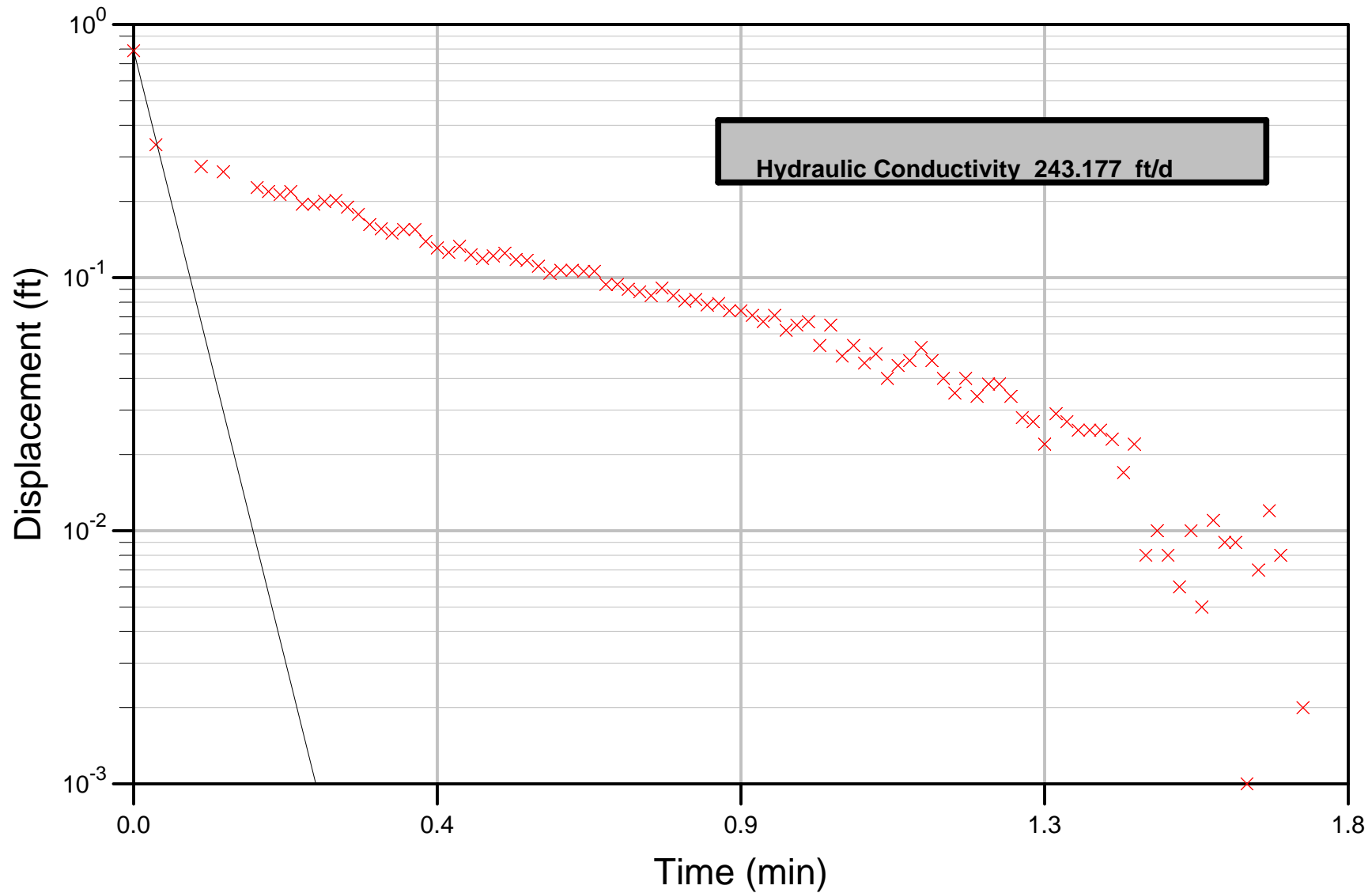
1. The Hazen Method is applicable to sands where the effective grain size (d₁₀) is between roughly 0.1 and 3.0 mm.

3. The coefficient, C, is based on the ranges shown in the table below.

	C
Very fine sand, poorly sorted	40 - 80
Fine sand with appreciable fines	40 - 80
Medium sand, well sorted	80 - 120
Coarse sand, poorly sorted	80 - 120
Coarse sand, well sorted, clean	120 - 150

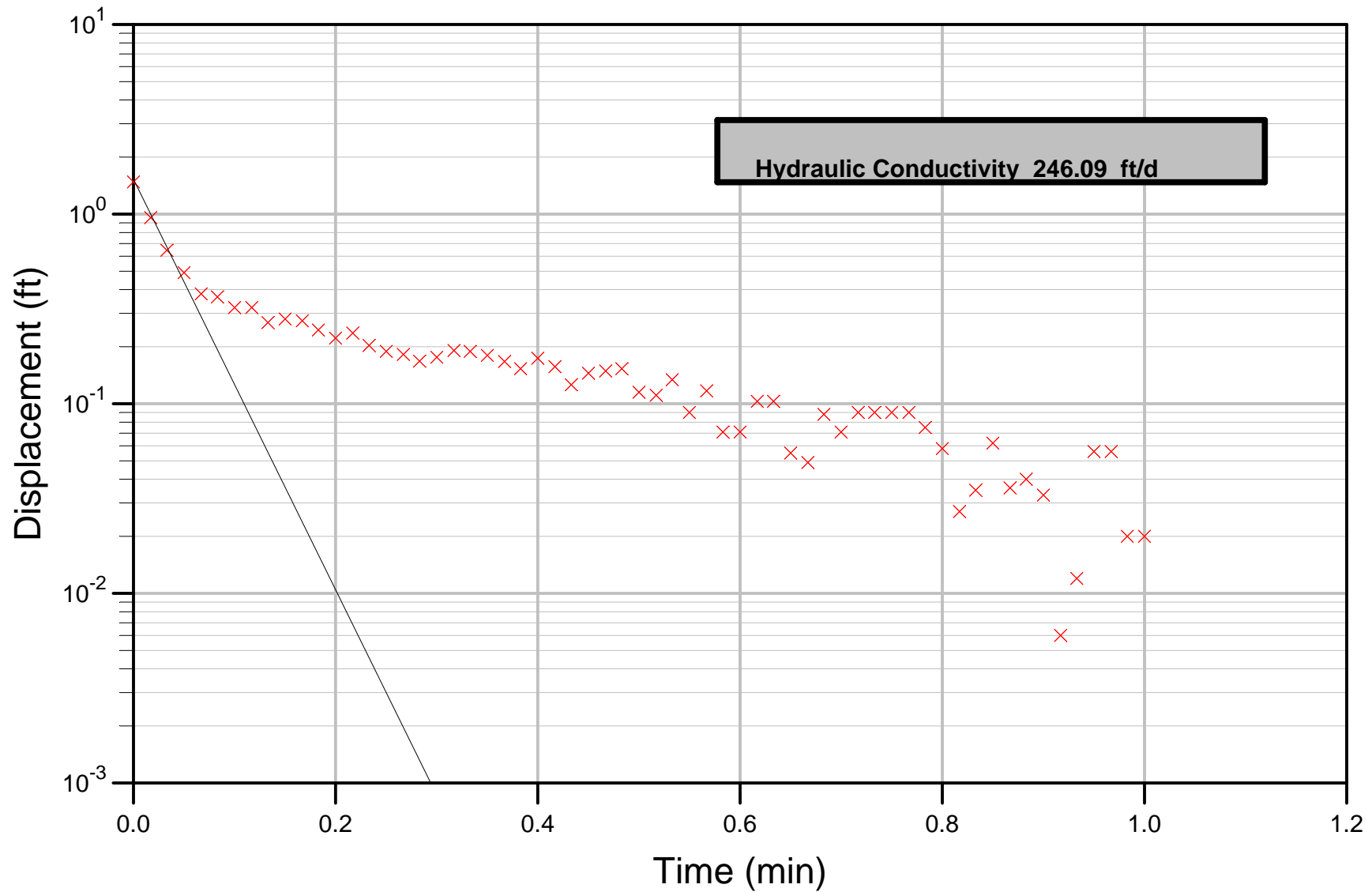
MW-1 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



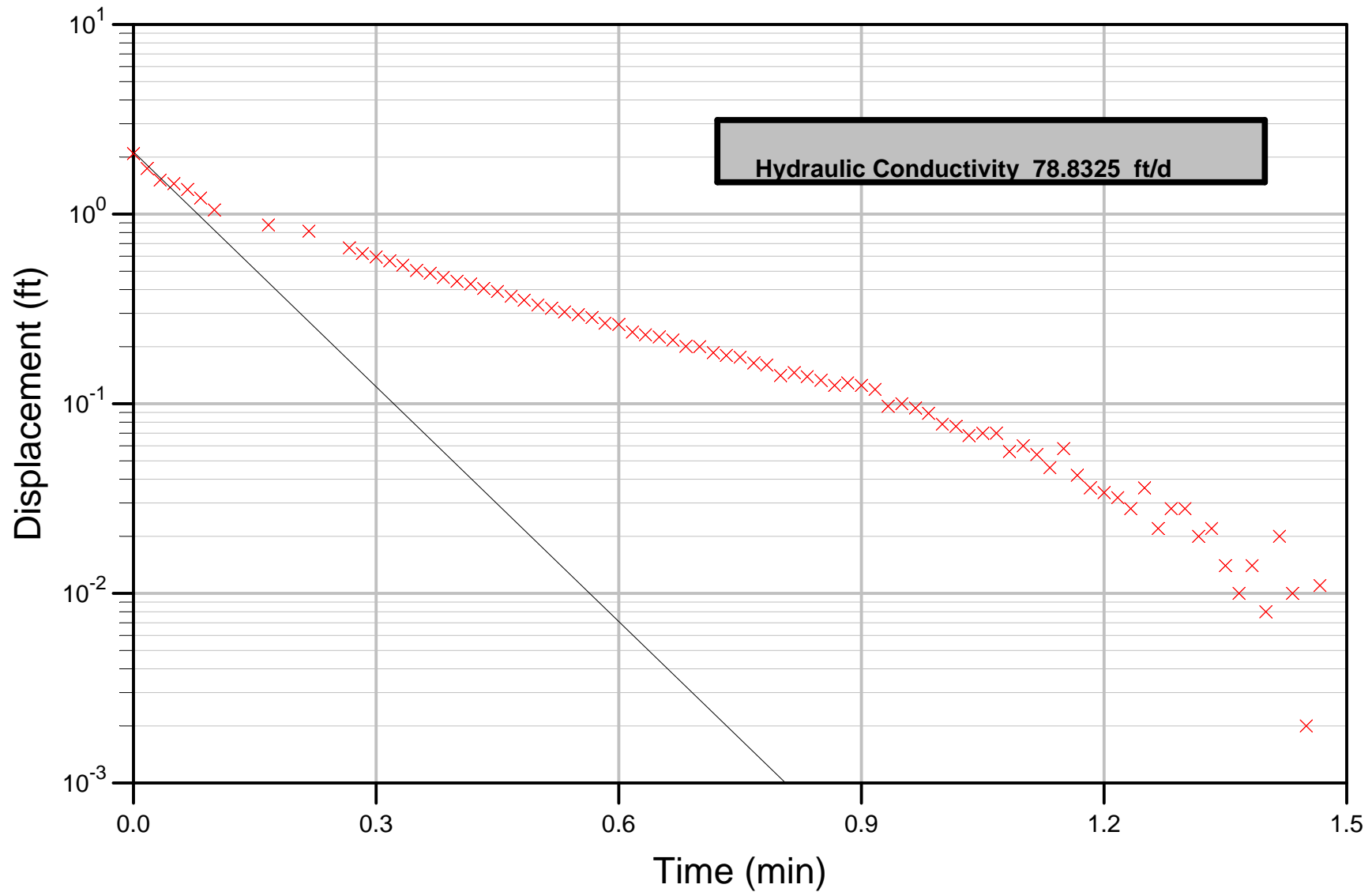
MW-1 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



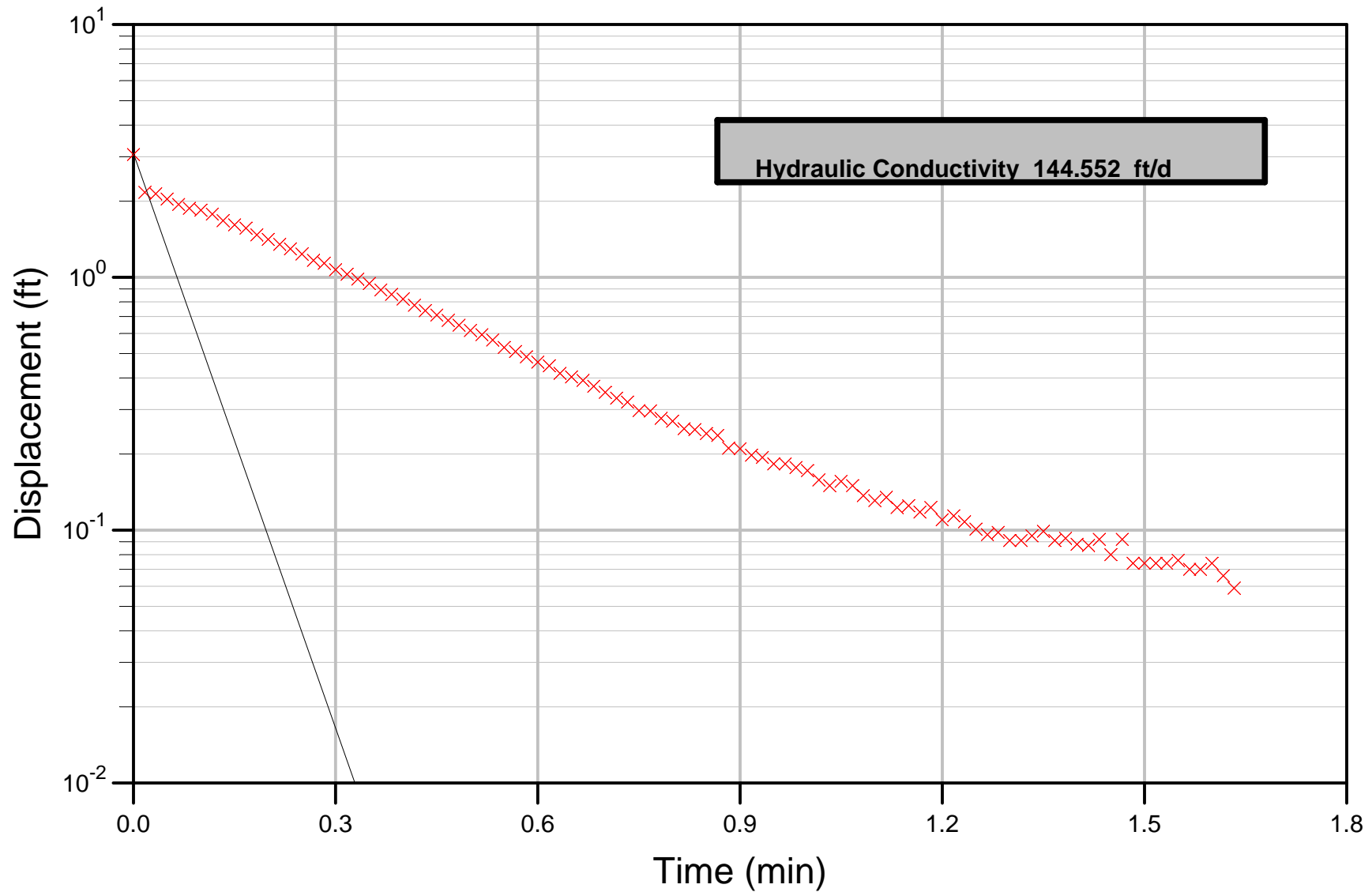
MW-2 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



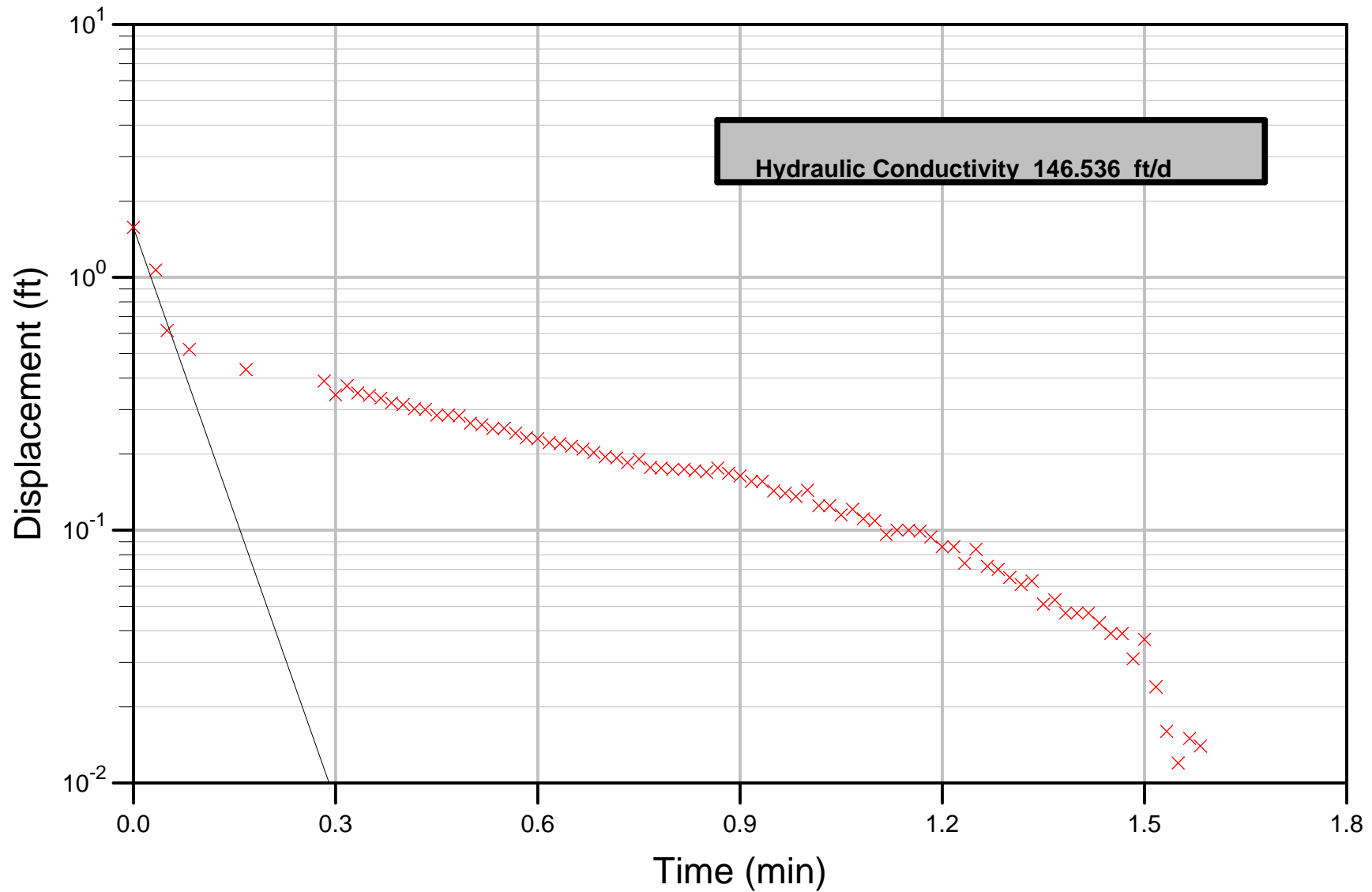
MW-2 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



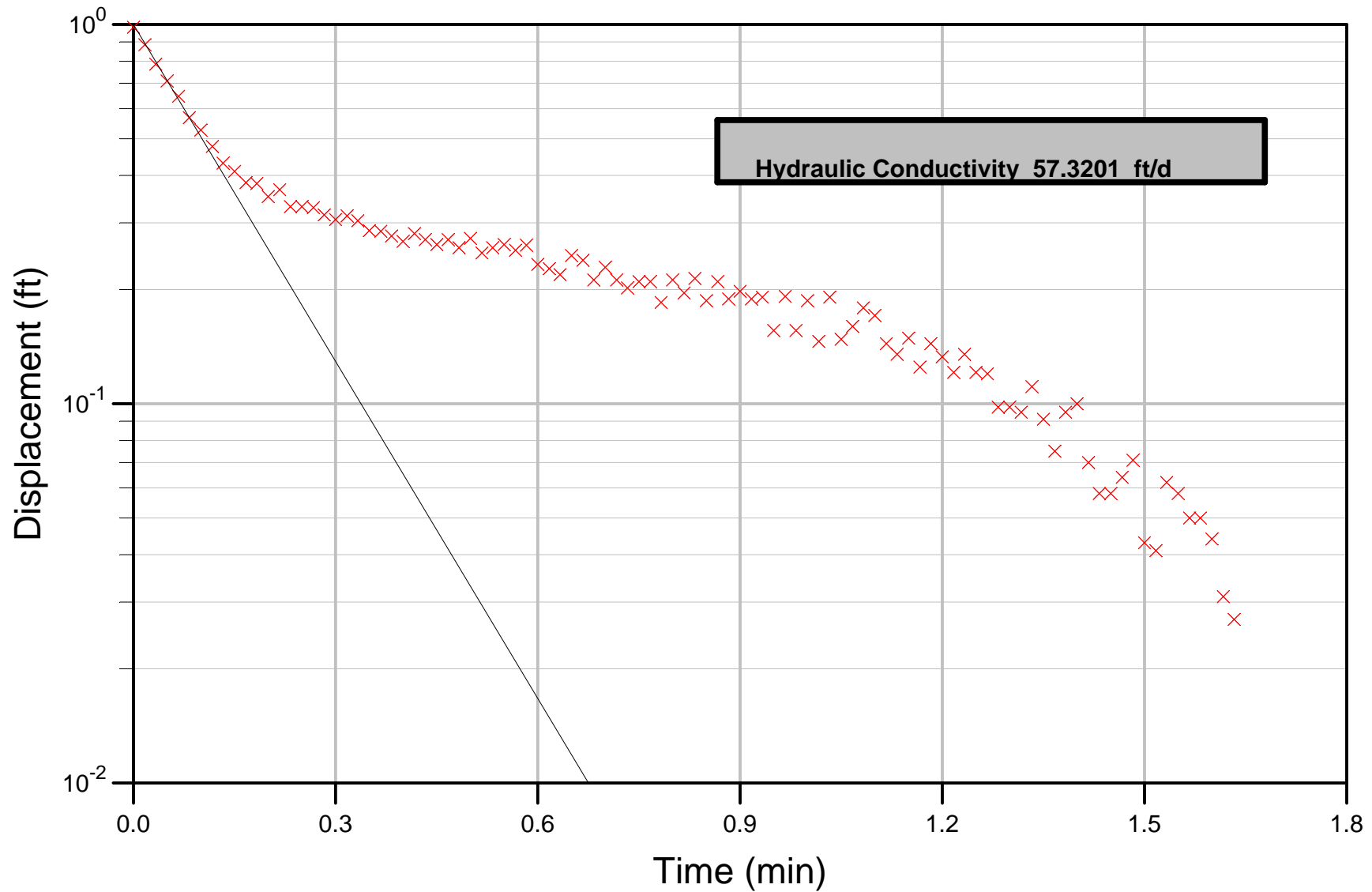
MW-3 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



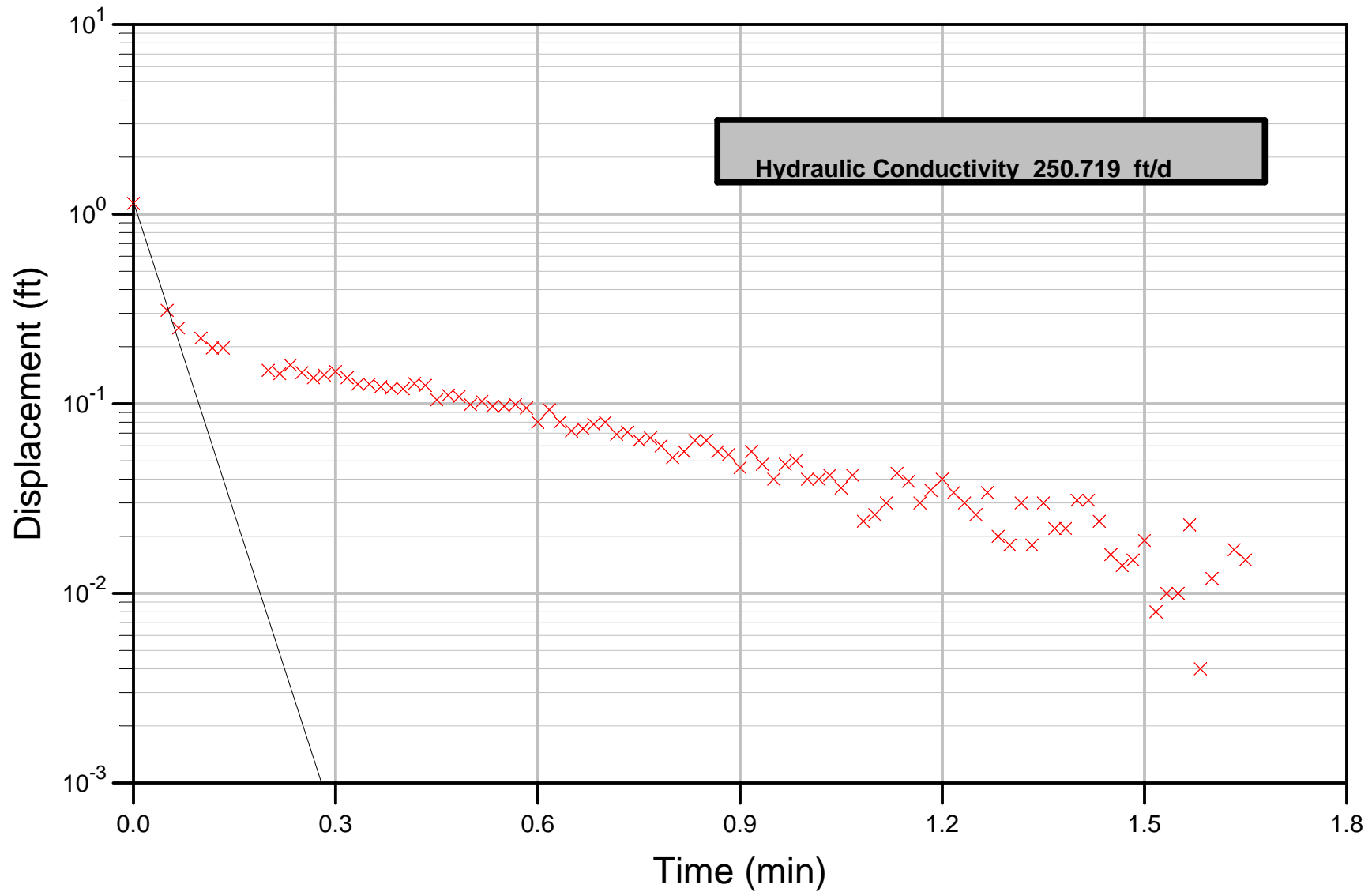
MW-3 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



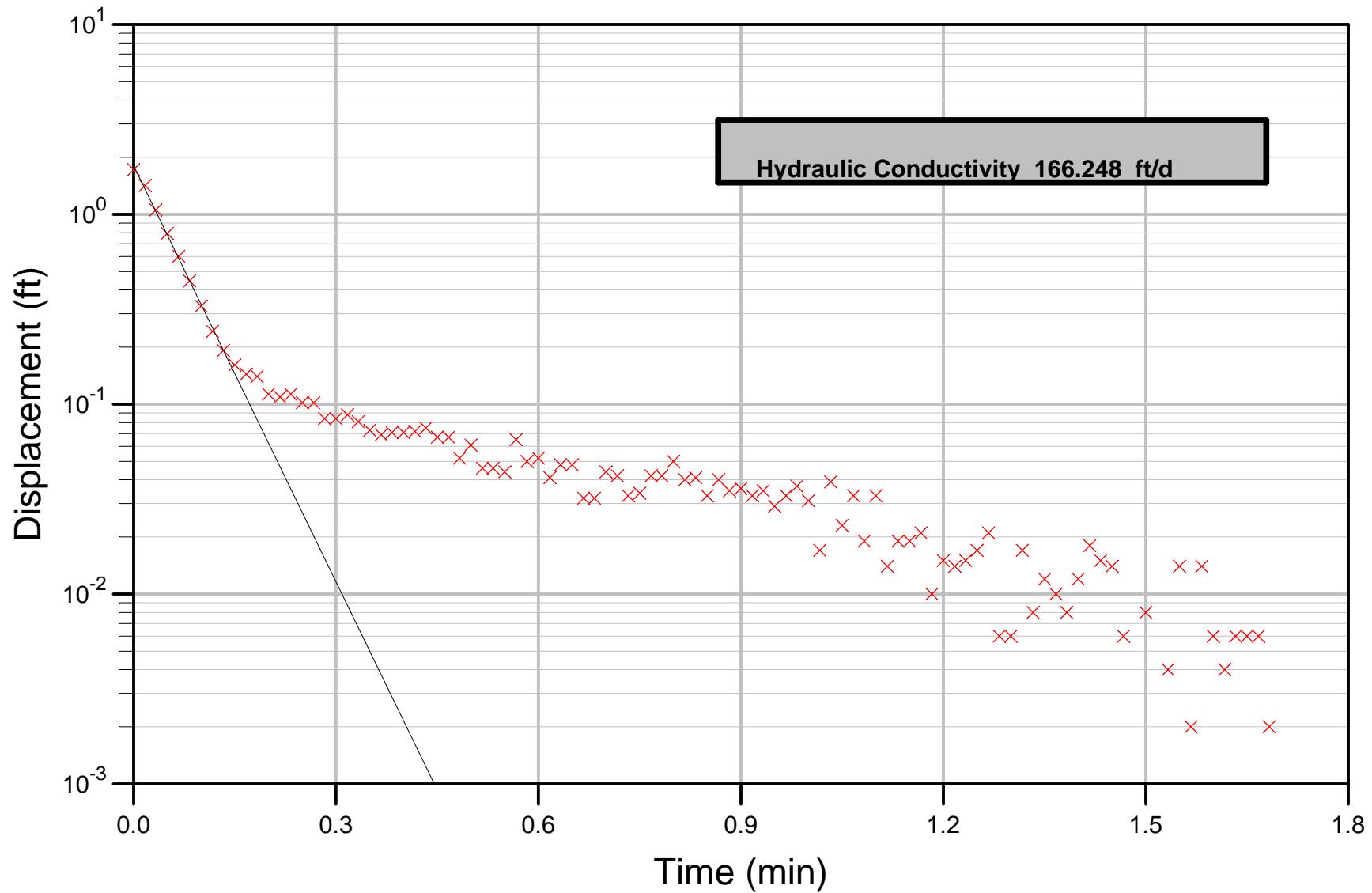
MW-4 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



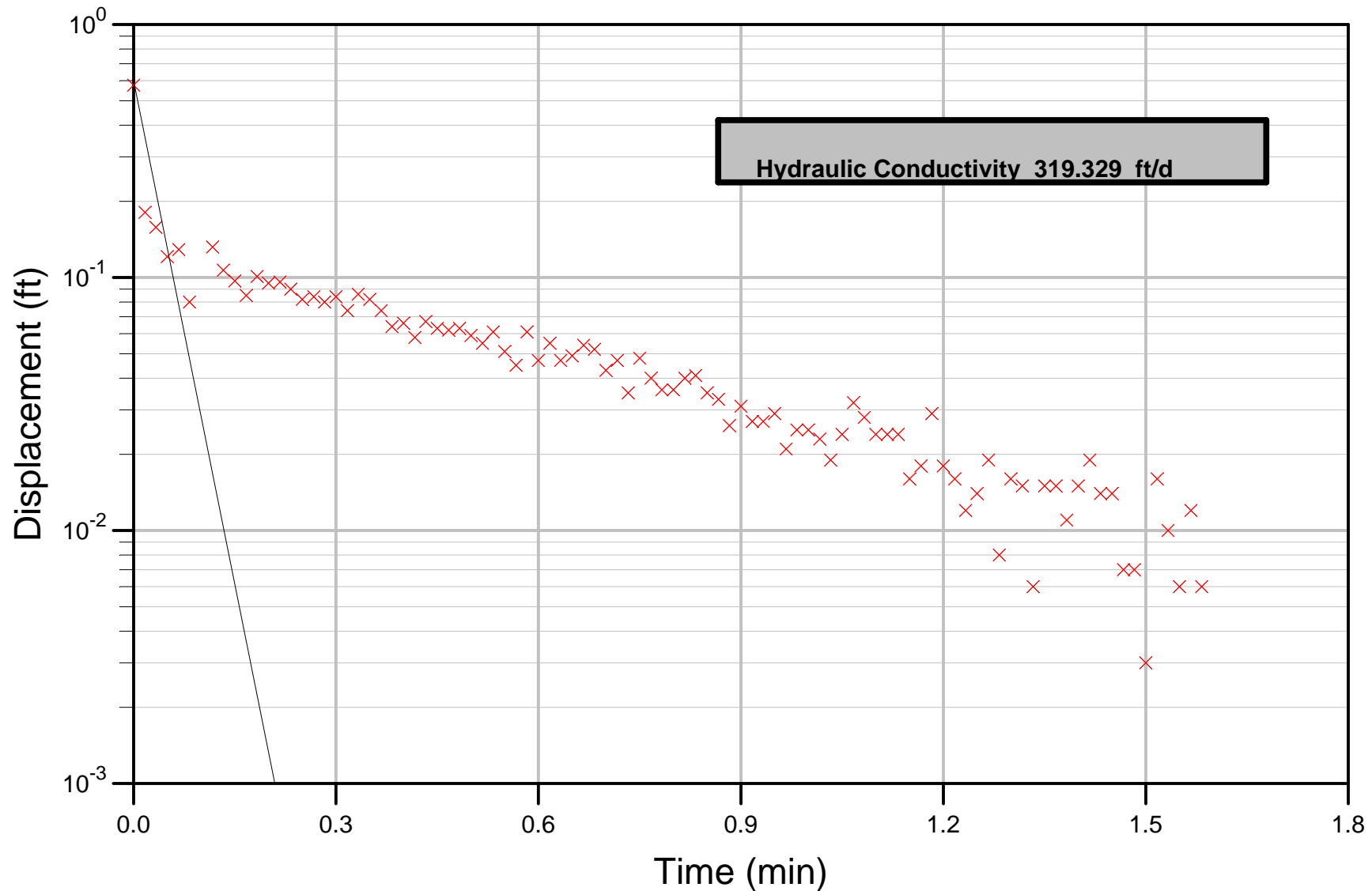
MW-4 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



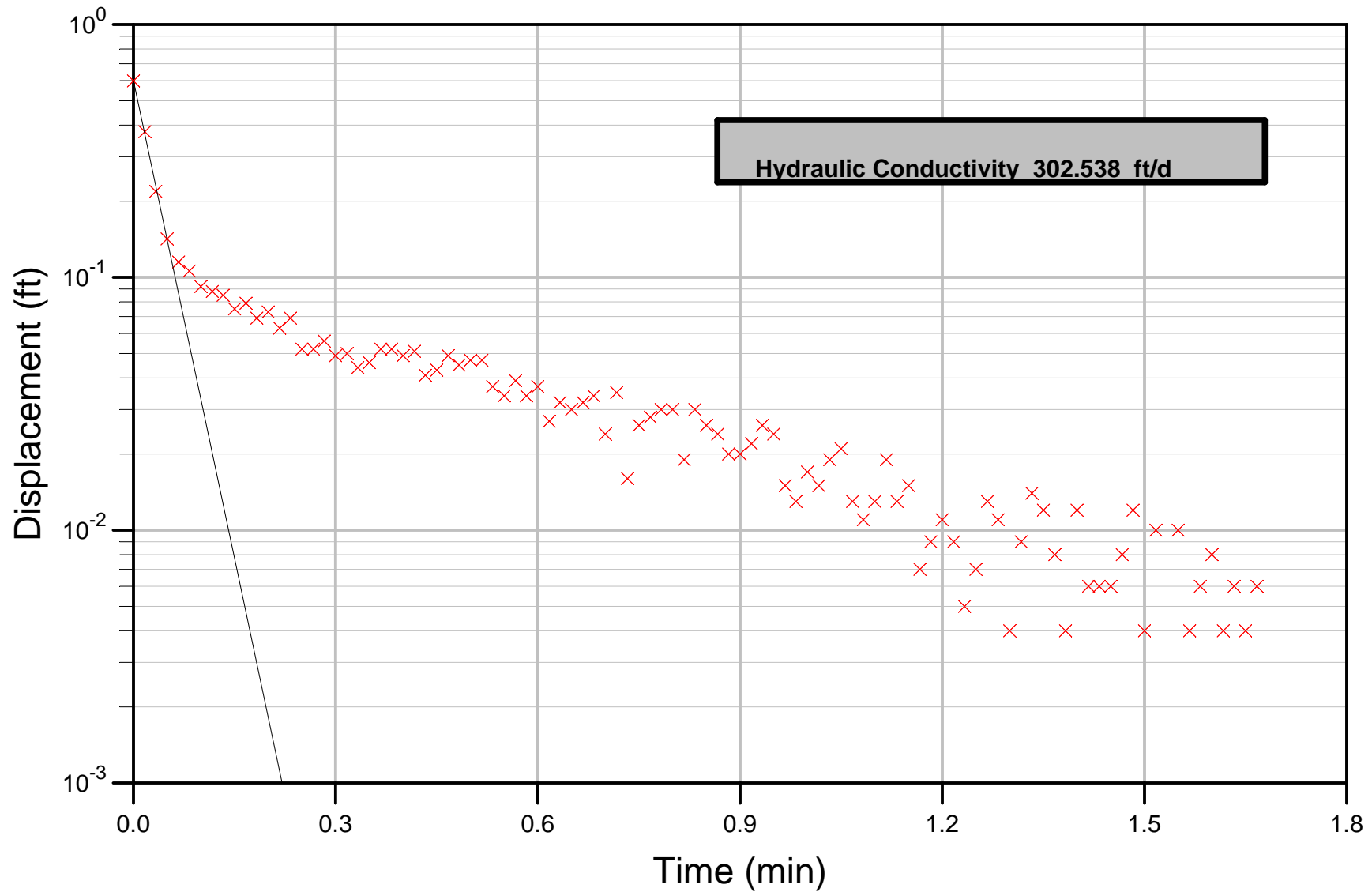
MW-5 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



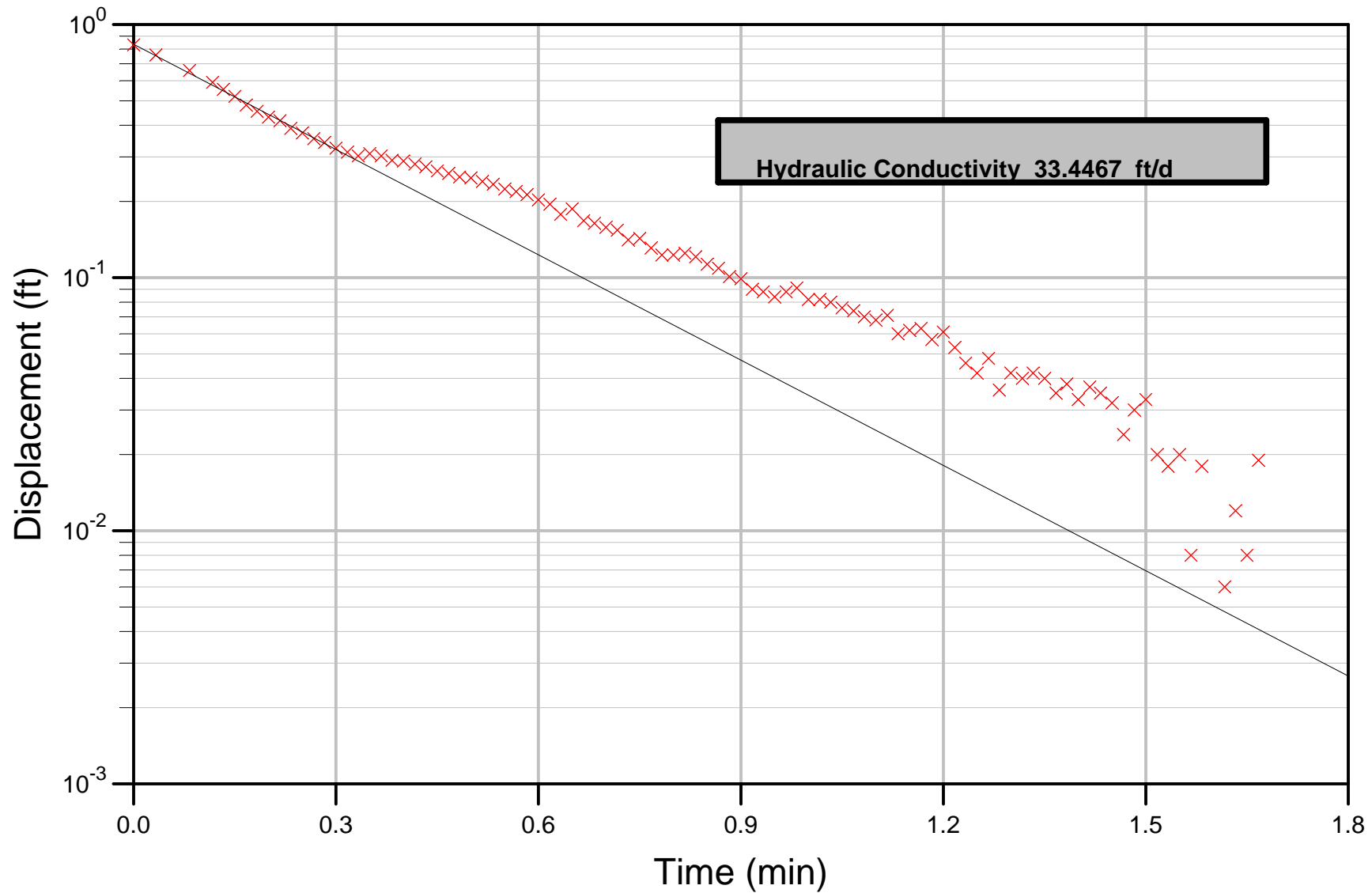
MW-5 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



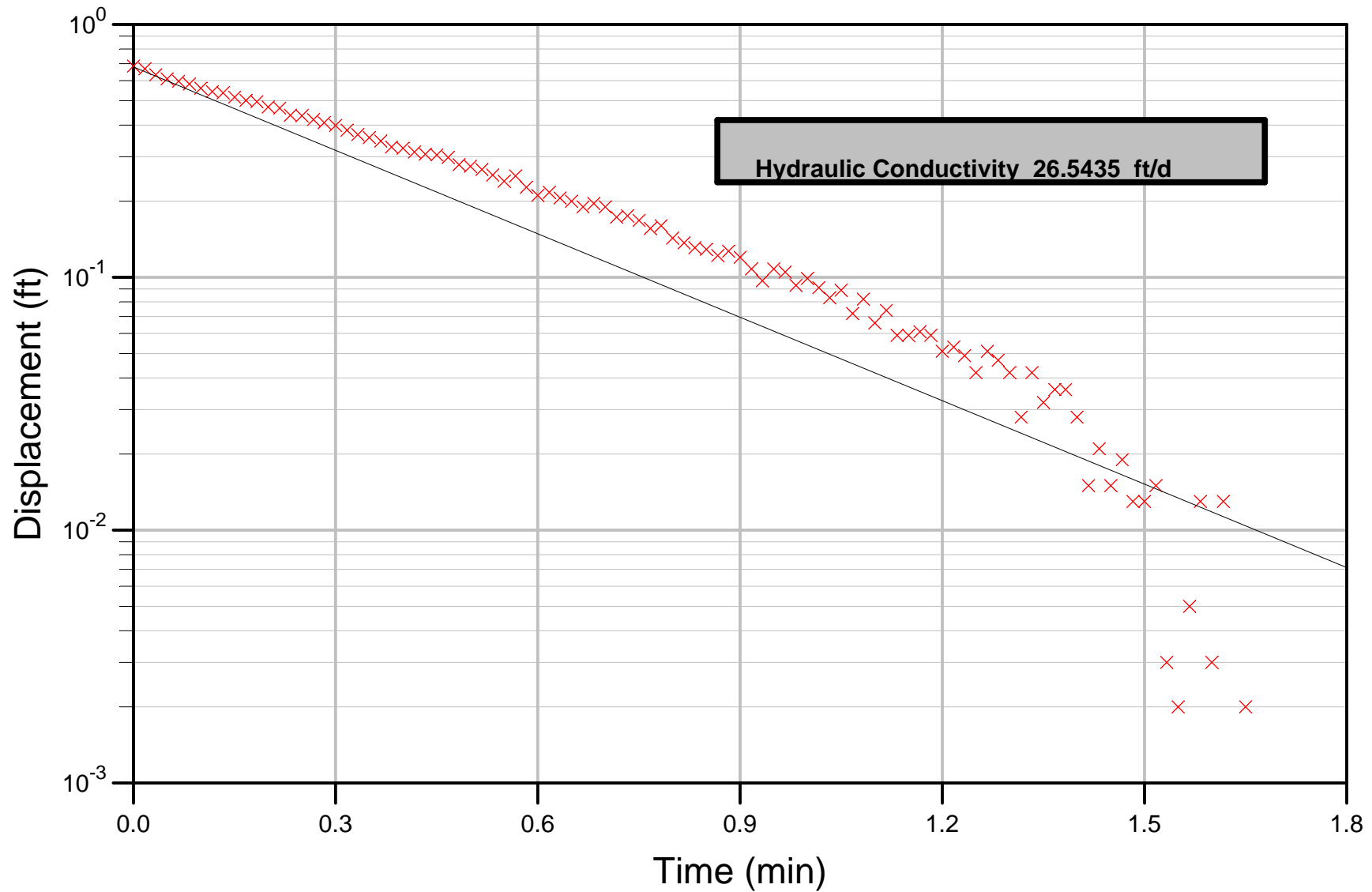
MW-6 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



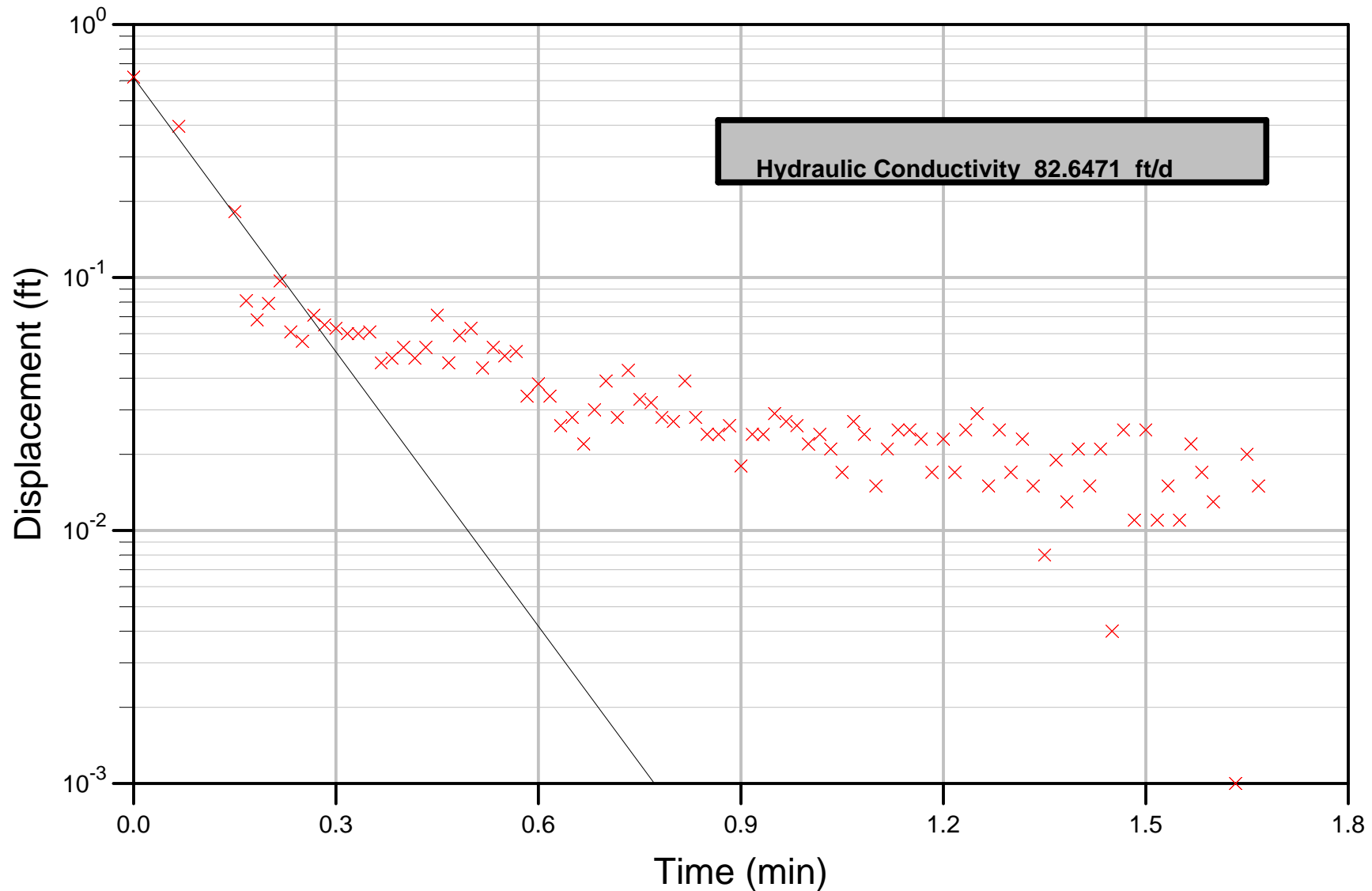
MW-6 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



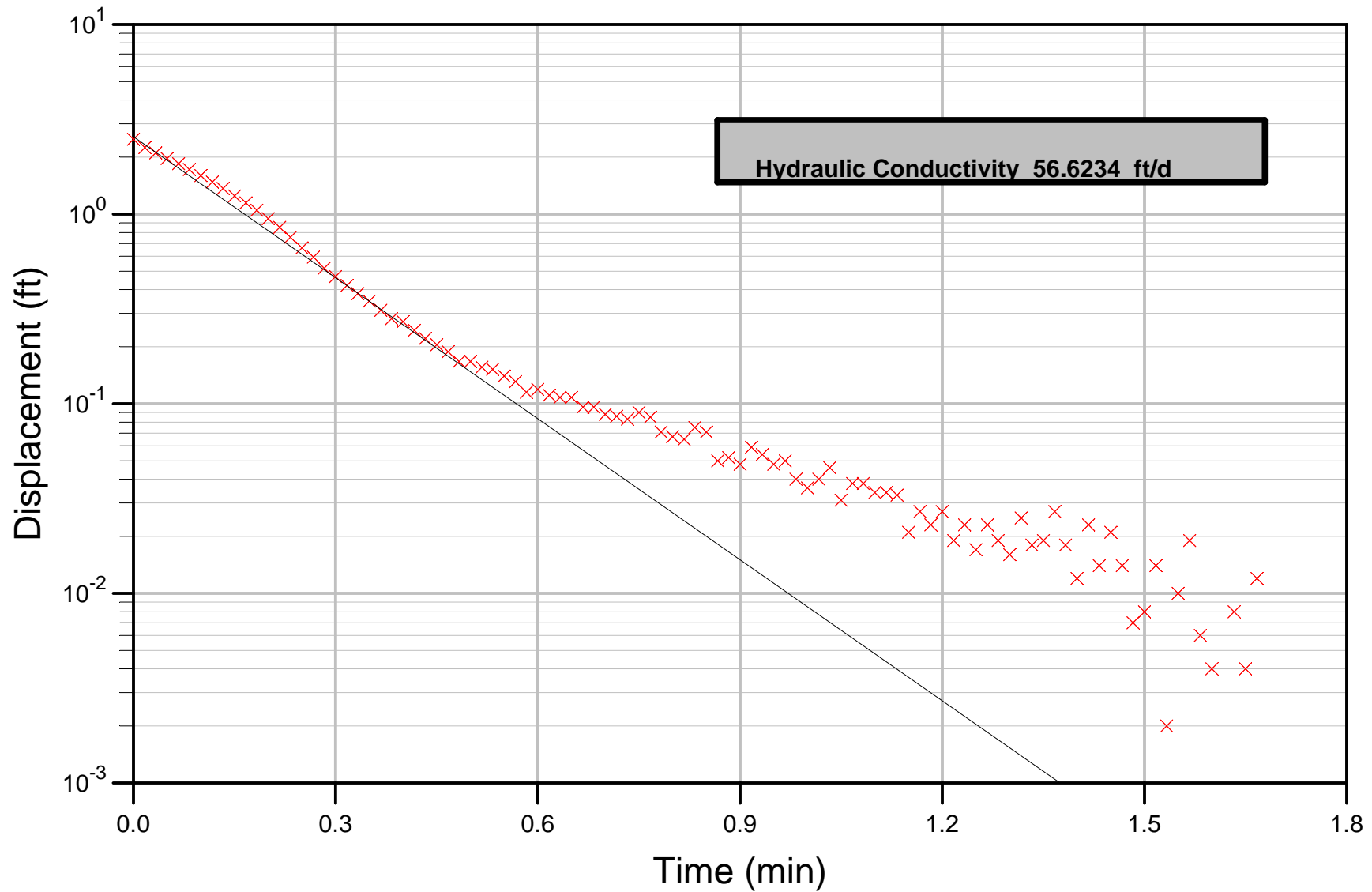
MW-7 Falling Head Slug Test Bouwer & Rice

Tighe & Bond



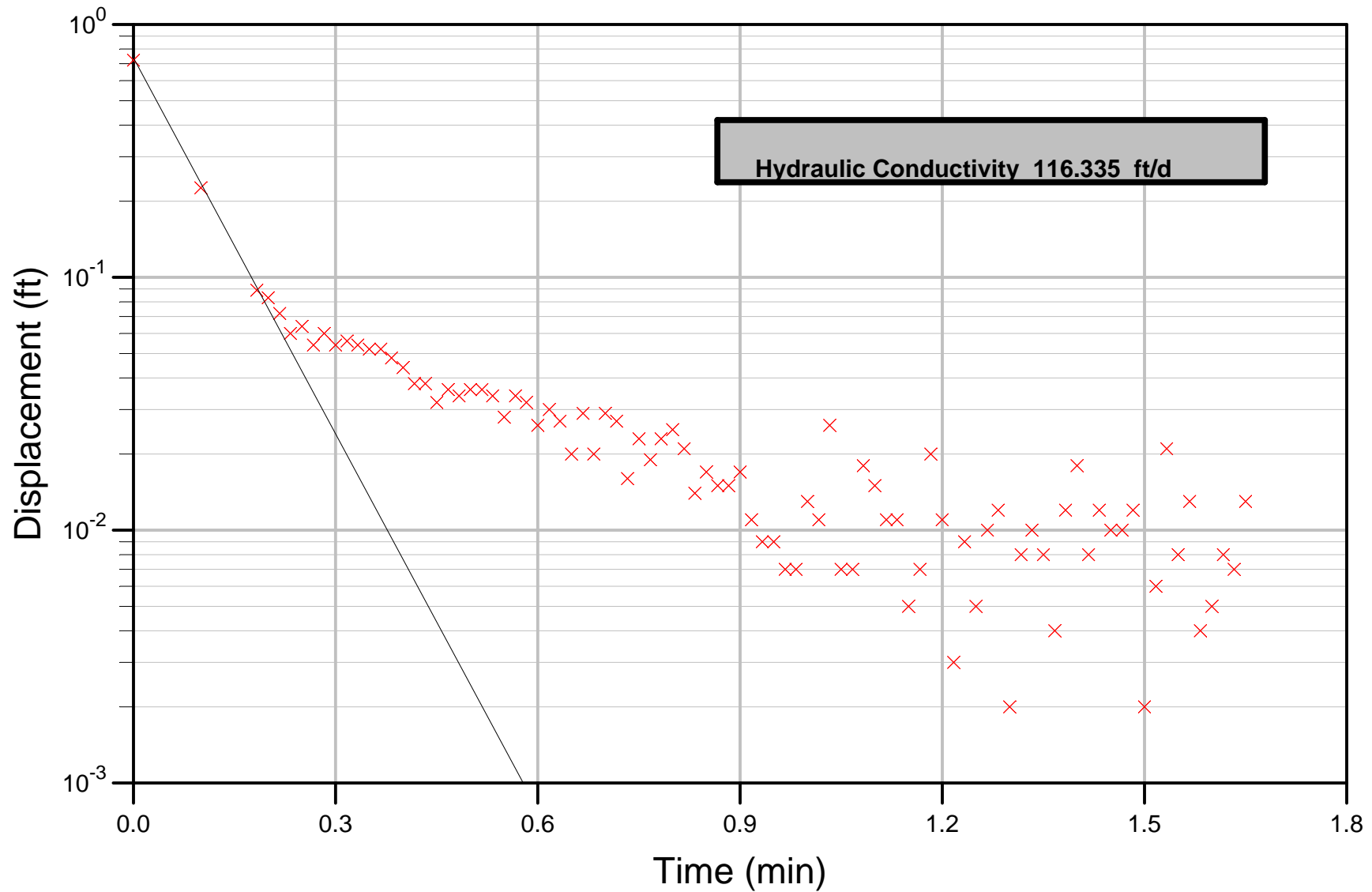
MW-7 Rising Head Slug Test Bouwer & Rice

Tighe & Bond



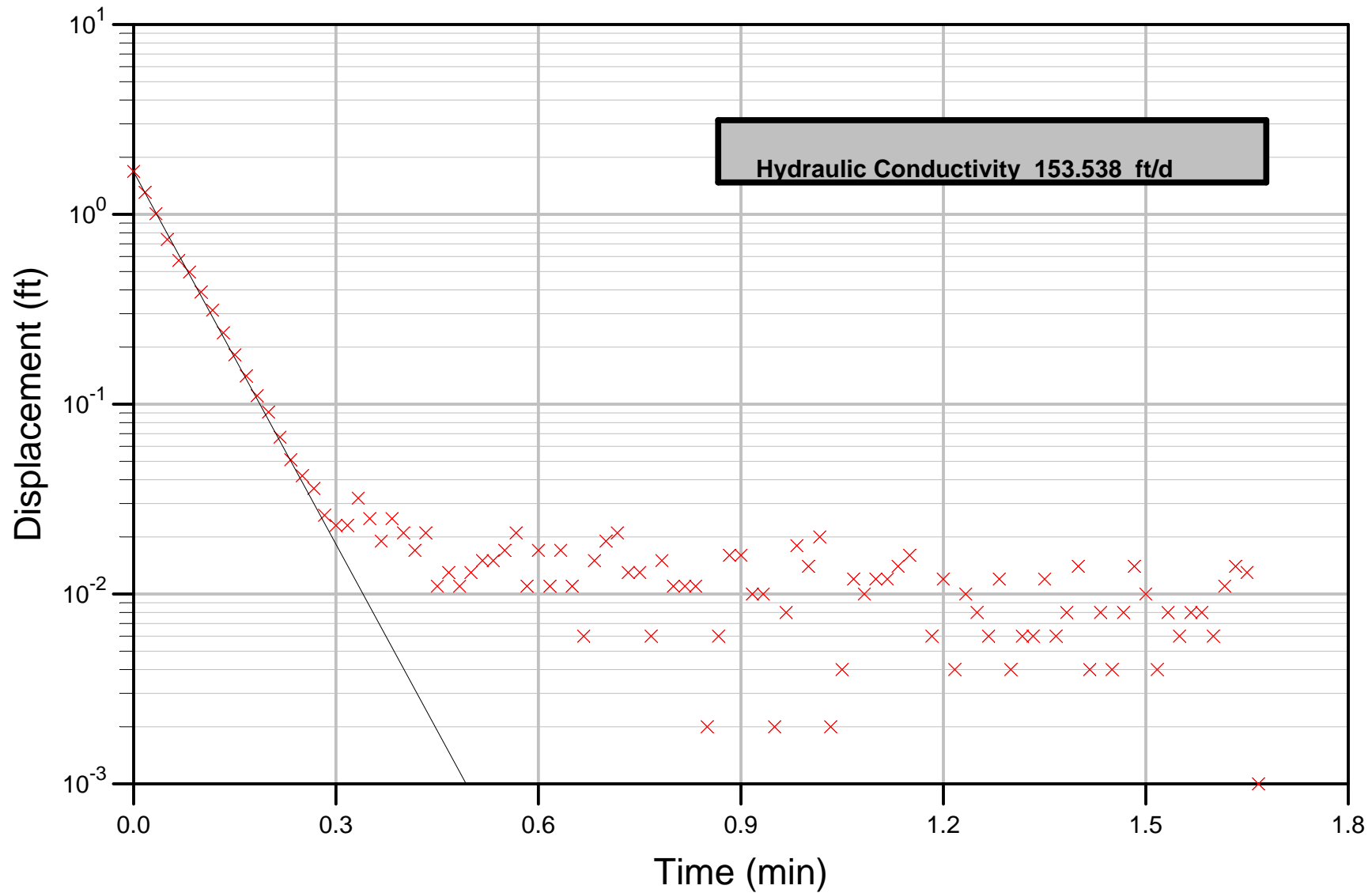
MW-8 Falling Head Slug Test Bouwer & Rice

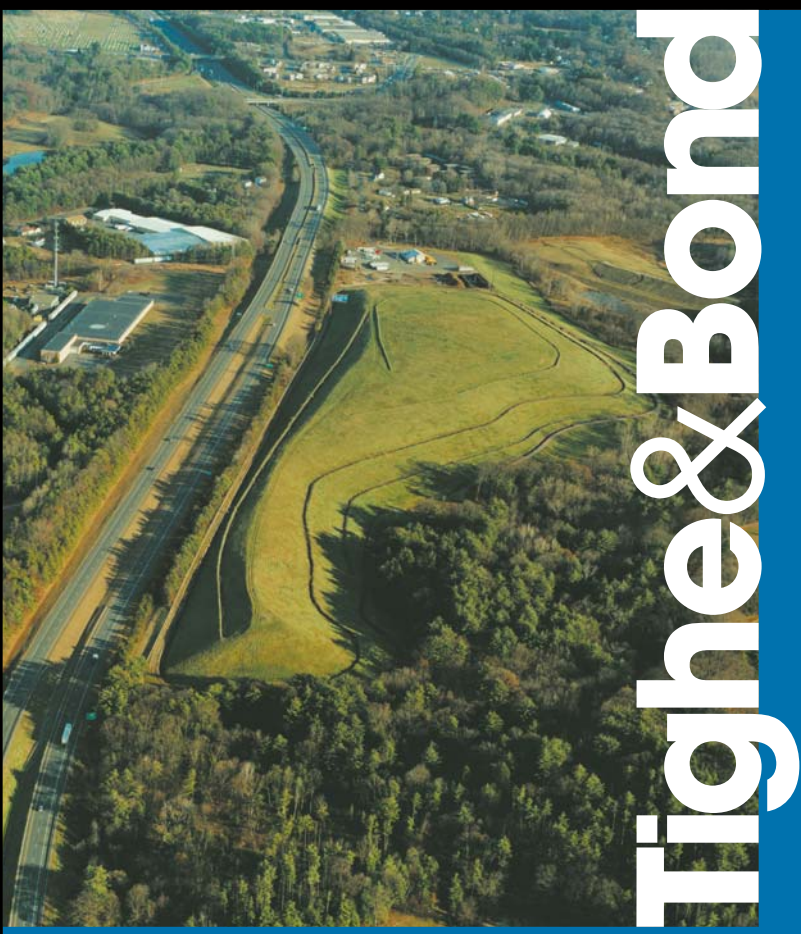
Tighe & Bond



MW-8 Rising Head Slug Test Bouwer & Rice

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Groundwater Mounding Analysis

Project: Wayland Town Offices
Performed By: KLK
Checked By: Joe

Project #: W-1396
Description: Existing Leachfield
Calculated Mound Height: 2.8 feet

Input Parameters (input only shaded areas):

Recharge Period	t	<u>90</u> days	Time to equilibrium
Width of Field	W	<u>100</u> feet	
Length of Field	L	<u>200</u> feet	
Hydraulic Conductivity	K	<u>76</u> ft/day	
Specific Yield	V	<u>0.24</u> ft ³ /ft ³	
Saturated Thickness	D	<u>1.67</u> feet	
Daily Flow	Q	<u>17,000</u> gpd	

Calculated Parameters:

1/2 width	$a =$	50 feet
1/2 length	$b =$	100 feet
Recharge Rate	$j =$	0.11 ft/day

$$\gamma = \frac{KD}{V} = 527.8 \text{ ft}^2/\text{day}$$

$$\text{Dimensionless width } \alpha = \frac{a}{\sqrt{4\gamma t}} = 0.1147$$

$$\text{Dimensionless length } \beta = \frac{b}{\sqrt{4\gamma t}} = 0.2294$$

Solution:

From Table 1 of Hantush (1967), attached:

Function $S^*(a, b) =$ 0.1228

$$\text{Water Table + Mound } h_m = \sqrt{h_i^2 + \left[\frac{2j}{K} \lambda t \cdot S^*(\alpha, \beta) \right]}$$

$$h_m = 4.5 \text{ feet}$$

Therefore:

Mound Height =	$h_m - D =$	2.8 feet
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Reference: Hantush, M.S. 1967. "Growth and Decay of Groundwater Mounds in Response to Uniform Percolation." Water Resources Research, 3, pp. 227-234.

Groundwater Mounding Analysis

Client Name:	Town of Wayland	Project Number:	W-1396
Description:	Existing Leachfield (Rectangle)	Project Location:	Wayland, MA
Performed By:		Checked By:	

Input Parameters:

H_n :	0	Height of groundwater table at control area. (ft)
Q :	2,273	Total daily flow. (ft ³ /day)
A :	20,000	Total recharge area. (ft ²)
W :	100	Width of recharge area. (ft)
L_n :	46	Distance between edge of recharge area and control area. (ft)
K :	76	Hydraulic conductivity. (ft/day)
b :	1.67	Saturated thickness. (ft)

Calculated Parameters:

T :	126.67	ft ² /day	Transmissivity
i :	0.11	gal/day/ft ²	Average infiltration rate in recharge area.
H_c :	3.18		Height of groundwater mound in center of recharge area. (ft)

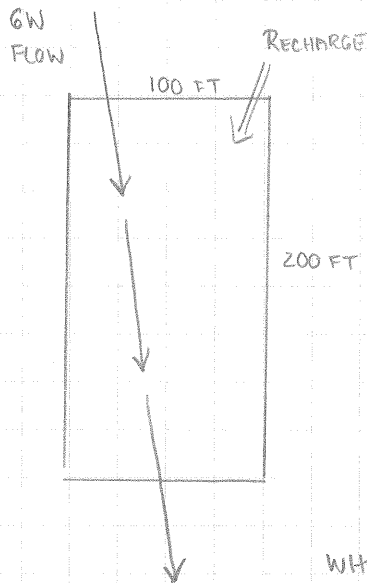
Where:
$$H_c = \left[\frac{iW}{2T} \left(\frac{W}{4} + L_n \right) \right] + H_n$$

This spreadsheet uses the method presented by Herman Bouwer in Chapter 24 of the Hydraulic Design Handbook. McGraw-Hill, New York, NY. 1999. The method is appropriate for rectangular infiltration basins with a length of at least five times the width.



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NITRATE LOADING CALCULATIONS



USING DUPUIT EQUATION FOR GROUNDWATER
 Flow UNDER DISPOSAL AREA

$$q' = \frac{1}{2} K \left(\frac{h_1^2 - h_2^2}{L} \right)$$

$$= \frac{1}{2} \left(76 \frac{\text{FT}}{\text{DAY}} \right) \left(\frac{123.5^2 - 121^2}{360} \right)$$

$$= 64.5 \frac{\text{FT}^2}{\text{DAY}}$$

WHERE:

q' = FLOW PER UNIT WIDTH

K = HYDRAULIC CONDUCTIVITY (FT/DAY)

h_1 = GROUNDWATER ELEVATION IN VICINITY
 OF FIELD (FT)

h_2 = GROUNDWATER ELEVATION OF WETLANDS (FT)

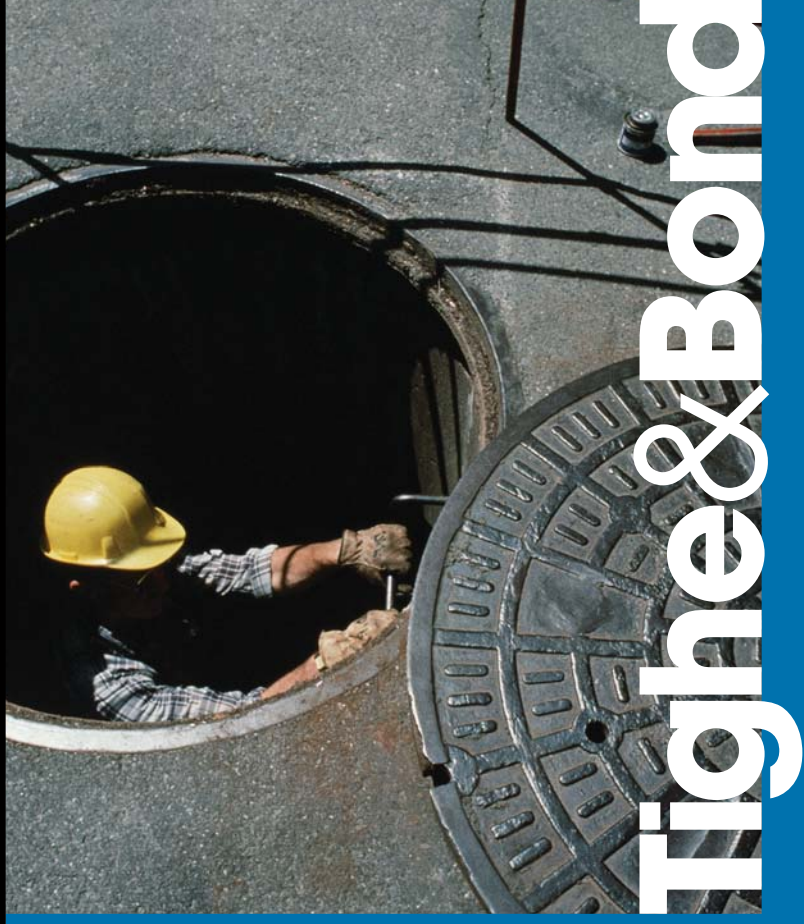
L = FLOW LENGTH $h_1 \rightarrow h_2$ (FT)

$$Q_{gw} = q' \cdot W = 64.5 \frac{\text{FT}^2}{\text{DAY}} (224 \text{ FT}) = 14,422 \text{ FT}^3/\text{DAY}$$

WHERE : W = WIDTH OF FIELD (FT)

q' = FLOW PER UNIT WIDTH (FT²/DAY)

Tighe & Bond 446 Main Street Worcester, MA 01608	Calculated By: <u>KLK</u> Checked By: _____ Date: <u>3/19/2012</u> Project Number: <u>W1396</u>																																				
Calculation Title: Nitrate Loading Calculations - Town of Wayland Town Office Building																																					
<div style="text-align: center; margin-bottom: 10px;"> $C_m = \frac{(C_{gw} Q_{gw}) + (C_{ww} Q_{ww})}{Q_m}$ </div> <p>Where:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">C_m:</td> <td style="width: 15%; text-align: right;">16.5</td> <td style="width: 15%; text-align: right;">mg / l</td> <td>Nitrate concentration in downgradient groundwater after mixing with wastewater.</td> </tr> <tr> <td>C_{gw}:</td> <td style="text-align: right;">18</td> <td style="text-align: right;">mg / l</td> <td>Background concentration of nitrate in groundwater. Value is based on the max value collected during baseline water quality sampling.</td> </tr> <tr> <td>Q_{gw}:</td> <td style="text-align: right;">14422</td> <td style="text-align: right;">ft³/day</td> <td>Based on attached GW recharge calculation.</td> </tr> <tr> <td>C_{ww}:</td> <td style="text-align: right;">7</td> <td style="text-align: right;">mg / l</td> <td>Nitrate concentration in wastewater. (Design condition)</td> </tr> <tr> <td>Q_{ww}:</td> <td style="text-align: right;">2273</td> <td style="text-align: right;">ft³/day</td> <td>Wastewater flowrate. (Average day = 17,000 gpd.)</td> </tr> <tr> <td>Q_m:</td> <td style="text-align: right;">16694.57</td> <td style="text-align: right;">ft³/day</td> <td>Total flowrate - $Q_{gw} + Q_{ww}$</td> </tr> </table> <div style="text-align: center; margin-top: 10px;"> $M_L = Q_m C_m$ </div> <p>Where:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">M_L:</td> <td style="width: 15%; text-align: right;">7.801391</td> <td style="width: 15%; text-align: right;">kg/day</td> <td>Daily mass loading.</td> </tr> <tr> <td>Q_m:</td> <td style="text-align: right;">472736.8</td> <td style="text-align: right;">l/day</td> <td>Total flowrate - $Q_{gw} + Q_{ww}$</td> </tr> <tr> <td>C_m:</td> <td style="text-align: right;">16.5</td> <td style="text-align: right;">mg / l</td> <td>Nitrate concentration in downgradient groundwater after mixing with wastewater.</td> </tr> </table> <p>Notes:</p> <ol style="list-style-type: none"> 1. The goal of these calculations is to predict the nitrate concentration in monitoring wells immediately downgradient of the disposal area. 2. As discussed in the Hydrogeologic Evaluation, there is a very limited amount of shallow groundwater flow under the leachfield. Consequently, this analysis assumes that all groundwater flow is attributable to rainwater infiltration over the field. 3. Average annual Boston rainfall is 41.7 inches. This value is distributed over 365 days for this analysis. 		C_m :	16.5	mg / l	Nitrate concentration in downgradient groundwater after mixing with wastewater.	C_{gw} :	18	mg / l	Background concentration of nitrate in groundwater. Value is based on the max value collected during baseline water quality sampling.	Q_{gw} :	14422	ft ³ /day	Based on attached GW recharge calculation.	C_{ww} :	7	mg / l	Nitrate concentration in wastewater. (Design condition)	Q_{ww} :	2273	ft ³ /day	Wastewater flowrate. (Average day = 17,000 gpd.)	Q_m :	16694.57	ft ³ /day	Total flowrate - $Q_{gw} + Q_{ww}$	M_L :	7.801391	kg/day	Daily mass loading.	Q_m :	472736.8	l/day	Total flowrate - $Q_{gw} + Q_{ww}$	C_m :	16.5	mg / l	Nitrate concentration in downgradient groundwater after mixing with wastewater.
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Bibliography

Ambient Engineering and SuAsCo Watershed Community Council. *Sudbury-Assabet-Concord River Watershed Actin Plan*. September 1, 2005.

Bouwer, Herman P.E. *Predicting Infiltration and Groundwater Mounds for Artificial Recharge*. *Journal of Hydrologic Engineering*, October, 1999.

Commonwealth of Massachusetts Executive Office of Environmental Affairs, Massachusetts Department of Environmental Protection, Bureau of Resource Protection, and Division of Watershed Management. *Technical Memorandum TM-82-9: Concord Watershed 2001 DWM Water Quality Monitoring Data*. February 2005.

Hantush, Mahdi S. *Growth and Decay of Groundwater Mounds in Response to Uniform Percolation*. *Water Resource Research*, Vol. 3, No. 1, First Quarter, 1967.

Fetter, C.W. *Applied Hydrogeology*. Prentice Hall, Upper Saddle River, NJ, 1994.

Massachusetts Department of Environmental Protection. *310 CMR 15.00 – Title 5 Regulations*. April 21, 2006.

Massachusetts Department of Environmental Protection. *Guidelines for Design, Construction, Operation, and Maintenance of Small Sewage Treatment Facilities with Land Disposal*. April, 2004.

Massachusetts Department of Environmental Protection. *Interim Guidelines on Reclaimed Water*. January 3, 2000.

Massachusetts Department of Environmental Protection. *Source Water Assessment and Protection (SWAP) Report for Wayland Water Department*. March 18, 2002.

U.S. Department of Agriculture, Natural Resources Conservation Service, and Massachusetts Agricultural Experiment Station. *Soil Survey of Middlesex County, Massachusetts*, 2005.

U.S. Department of the Interior and U.S. Geological Survey. *Effects of Water Use and Land Use on Streamflow and Aquatic Habitat in the Sudbury and Assabet River Basins, Massachusetts*, 2010.

U.S. Department of the Interior and Massachusetts Department of Environmental Mangagement, Office of Water Resources. *Estimated Availability of Water from Stratified-Drift Aquifers in the Concord River Basin, Massachusetts*. U.S. Geological Survey Water-Resources Investigations Report 94-4256.

Wayland Department of Public Works Water Division. *Annual Water Quality Report: Water Testing Performed in 2010*. PWSID# 3315000, 2011.

Young, Bruce W. and Wayland Wellhead Protection Committee. *Wellhead Protection Plan: Happy Hollow Wells #1 and #2, Baldwin Pond Wells #1, #2, and #3, Chamberlain Well #1, Campbell Well #1, and Meadowview Well #1*. PWSID # 3315000, June 2011.