Technical Memorandum

To: *Duane J. Martin, P.E., Town of West Hartford*

From: *Matt Gamache, P.E., CDM Smith*

Date: *March 10, 2023*

Subject: *Groundwater Evaluation Along Linbrook Road*

This technical memo (TM) describes the work completed to evaluate groundwater in the neighborhood west of Trout Brook that includes Montclair Drive, Linbrook Road, and Linnard Road. This scope of services was initiated in January 2022.

Background

A preliminary review of historic maps, topography, groundwater elevation data, and soil borings was completed and documented in the June 2020 report titled *Drainage System Evaluations in the Trout Brook Watershed* (CDM Smith, 2020) to provide some context for recent instances of apparent groundwater seepage into basements and yards in the neighborhood situated to the west of Trout Brook, including Montclair Drive, Linbrook Road, and Linnard Road. The objective of this review was to determine if high groundwater levels are expected in this neighborhood and to better understand potential next steps to take to lessen the impacts of high groundwater in the future.

The neighborhood is bound on the east, west, and north by Trout Brook and the south by Linnard Road is depicted and outlined in **Figure 1**. Trout Brook flows west to east, meandering to the north along the curve of Montclair Drive before joining with a northerly tributary and flowing south before joining up with the Park River (South Branch). Historic maps available from the USGS/ERSI's Living Atlas (https://livingatlas.arcgis.com) show this to be case since at least 1928. However, the USGS's Living Atlas contains two maps prior to that date, one in 1906 and one in 1892 that show the Noyes River (present in 1892/1906) oriented differently from Trout Brook (not present in 1892/1906), with the river flowing across present-day Montclair Drive, Linbrook Road, and Linnard Road as shown in the inset in Figure 1.

The Noyes River, which does not appear on modern maps was described as follows in a 1916 USGS Water Supply paper (Gregory and Ellis, 1916):

> "The drainage finds its way into the Connecticut River through Park River. Neither of these streams passes through West Hartford, but Park River is formed by the junction of Noyes River, which lies wholly within the town, and Hog River and South Fork, which lies across the northeast and southeast corners, respectively. Trout Brook receives all the drainage

> from the west half of the town and enters Noyes River about 1 mile north of West Hartford Center. The drainage of the east half is divided among Noyes River, South Fork, and Hog River. Noyes River joins South Fork in the southeast corner of the town."

Based on this information, it can be inferred that the neighborhood was once within the fluvial portion of the river system, from which it could be inferred that groundwater seepage within this area is not unexpected.

Ground surface topography data (2016 lidar DEM) used for the project were reviewed in the context of potential groundwater seepage. Five-foot topographic contours (NGVD29 datum) are shown in Figure 1 for the neighborhood, which sits in a regional topographic low. Ground surface elevations near boring B-E, just north of Linbrook Road are just over 105 feet, and decline to the east towards Trout Brook, which is shown to be at 75 feet. Ground surface elevations at the eastern intersection of Linbrook Road and Montclair Drive (near boring B-A) are approximately 95 feet.

Soil boring data provided by The Metropolitan District (District or MDC) included thirteen soil borings that were drilled along Montclair Drive in 2011 (Figure 1). The boring logs are provided in **Appendix A**. Each boring shows a similar profile, with shallow fill materials or sand overlying lower permeability materials on top of rock. Thicknesses of each soil unit varies from boring to boring.

In the June 2020 report a stepwise list of tasks were proposed to investigate the eastern portion of Linbrook Road and use the information collected there to draw inferences about the potential for groundwater lowering throughout the neighborhood. These tasks were performed under this scope of work and summarized as follows.

Well and Piezometer Installation

Four groundwater monitoring well/piezometer pairs were installed by the drilling contractor Geosearch, Inc. in February 2022. They are located along the eastern portion of Linbrook Road from Montclair Drive to the end of the road near Trout Brook and adjacent to the banks of Trout Brook, east of the end of Linbrook Road. Each well pair had a "shallow" (S) and "deep" (D) well/ piezometer installed to better understand vertical head gradients along Linbrook Road. The well pairs were labeled MW1, MW2, MW3, and PZ4, from west to east, and are shown in plan view and on cross section A-A' in **Figure 2**.

Well construction and boring logs for each well/piezometer are included in **Appendix B**. The logs generally showed a topmost layer of fine gravel and/or sand extending to 4-7 feet below ground surface (bgs), depending on the well. Beneath that lies a layer of clay and/or silt sitting on top of till or rock. For the purposes of this study, both the clay/silt layer and underlying till/rock are considered low permeability and low transmissivity and are included in the Clay/Silt zone shown in

the cross section. Water table lowering solutions would therefore be focused on the top 4-7 feet of soil where the higher permeability soils were observed. Cross section A-A' shown in Figure 2 includes the wells, their well screens (with S and D indicated at the well screen for each well in the monitoring well pair), an interpretation of the well logs, and an interpreted subsurface showing the shallow, higher permeability zone characterized by sand/gravel and fill, and the deeper, lower permeability zone characterized by clay/silt, till and rock. These interpretations are included in the screening level groundwater model described below. The February 2022 water table is also approximated on cross section A-A' in Figure 2. Based on these data, the water table is predominantly situated within the clay/silt unit, beneath the higher permeability sand/gravel unit, which means that the shallow sand/gravel unit is above the water table, in the unsaturated or vadose zone under these conditions.

Water Level Measurements

Depth to water measurements were taken at all eight wells on February 11th, February 22nd, and May 5th. The May 5th measurements were added to the project plan to determine if spring 2022 water levels differed from winter 2022 water levels. Depth to water measurements were converted to groundwater elevations (NGVD29) by subtracting the depth to water from the ground surface elevation. These data are included in **Table 1** and described in more detail below for each well pair.

Table 1 Well Information and Water Level Data

Well	Ground Surface Elevation (Feet)	Screened Depth (Feet BGS)	February 11, 2022		February 22, 2022		May 5, 2022	
			Depth to Water (Feet)	Water Level Elevation (Feet)	Depth to Water (Feet)	Water Level Elevation (Feet)	Depth to Water (Feet)	Water Level Elevation (Feet)
MW1S	93	3 – 8	7.53	85.5	6.93	86.1	4.42	88.6
MW1D	93	12 – 17	8.82	84.2	9.90	83.1	9.81	83.2
MW2S	90	3 – 8	2.65	87.4	4.13	85.9	5.88	84.1
MW2D	90	23 – 28	7.23	82.8	7.17	82.8	6.99	83.0
MW3S	86	2 – 10	6.77	79.2	6.75	79.3	6.91	79.1
MW3D	86	15 – 25	7.49	78.5	7.41	78.6	7.71	78.3
PZ4S	80	5 – 10	4.93	75.1	4.46	75.5	3.91	76.1
PZ4D	80	15 – 25	5.02	75.0	4.77	75.2	6.85	73.2

MW1 water levels exhibit a downward gradient between the S and the D depths, with higher groundwater elevations present at the S well in May (88.6 feet) than during the winter measurements. Water level elevations were relatively consistent at the D depth over the three measurements dates.

MW2 water levels also exhibit a downward gradient between the S and D depths, but water level elevations were lower in May at the S depth than in February. Similar to MW1D, MW2D showed relatively consistent water level elevations over the three measurement dates.

MW3 water levels exhibit a downward gradient between the S and D depths, though less pronounced than at MW1 or MW2. This is not unexpected as the well is closer to the local discharge point into Trout Brook. Water level elevations in this well pair remained relatively consistent over the three measurement dates.

PZ4 water levels showed very little vertical head gradients in February and a downward vertical head gradient in May. Groundwater elevations were relatively consistent across the three measurement dates at the S depth and dropped by 2 feet between February and May at the D depth.

The distance between MW1 and PZ4 is approximately 500 feet, between which a February and May gradient of 0.02 feet/foot (10.5 feet / 500 feet) and 0.03 feet/foot (12.5 feet / 500 feet), respectively, was observed in the S depth wells. In the D depth wells, the gradients were 0.02 feet/foot (8.6 feet / 500 feet) and 0.02 feet/foot (10.0 feet / 500 feet), in February and May, respectively. Groundwater flow is towards, and discharging to, Trout Brook.

It is surmised from these data that March-May 2022 rainfall was not sufficient to significantly increase water level elevations at these wells relative to what was measured in February 2022. Upon review of monthly precipitation totals from Hartford-Brainard Airport, the 11.0 inches that fell between February-April 2022 was relatively consistent with previous years' totals, which averaged 10.1 inches over these three months between 2018 and 2021.

These eight wells are permanently installed and can be measured in the future to better understand changes in groundwater elevations across different seasons and following large storms. Should understanding the response of groundwater elevations over the course of a large storm be sought, automatic water level recorders could be installed one or more wells. The data collected from these recorders can be collected to whatever time interval is desired.

Slug Testing

Slug testing was conducted on February 22, 2022 at MW1D, MW2D, MW3D, and PZ4D. One falling head (slug dropped into well) and rising head (slug removed from well) test was conducted at each well/piezometer, measuring the displacement over time of the piezometric head within each well, automatically recorded at 0.25 second intervals.

The slug test data were analyzed using the AQTESOLV software platform. Displacement over time data were plotted in AQTESOLV and hydraulic conductivity values were estimated for each test using the Bouwer-Rice solution. The results of the slug testing analyses are summarized in **Table 2**.

Table 2 Hydraulic Conductivity Estimates from February 22, 2022 Slug Testing

Well	Test	Method	Hydraulic Conductivity (ft/day)
MW1D	Falling	Bouwer-Rice	1.09
MW1D	Rising	Bouwer-Rice	1.03
MW2D	Falling	Bouwer-Rice	6.85
MW2D	Rising	Bouwer-Rice	14.57
MW3D	Falling	Bouwer-Rice	0.07
MW3D	Rising	Bouwer-Rice	0.07
PZ4D	Falling	Bouwer-Rice	0.05
PZ4D	Rising	Bouwer-Rice	0.04

Examination of the slug test results show the following:

- Horizontal hydraulic conductivities from MW1D, MW3D, and PZ4D are low, representative of the clay/silt materials that they are screened across.
- MW2D has higher estimated hydraulic conductivity, due to the presence of "coarse to fine sand" between 25 and 29 feet bgs, situated beneath 20 feet of clay/silt.
- Hydraulic conductivity estimates of the shallow sand/gravel layer could not be made because this layer was in the vadose zone (above the water table) at the time of the slug testing.

Overall, the clay/silt unit has low permeability and does not readily transmit water.

Screening Level Groundwater Model

A 3-dimensional screening level groundwater model (SLGM) was used to simulate current conditions and potential groundwater lowering alternatives within the study area. The SLGM had the following characteristics:

- The model domain spans the entire watershed upstream of Trout Brook at Beachland Park, for a total of 17.5 square miles. The model domain along with the computational grid mesh are shown in the bottom panel of **Figure 3**. The model grid mesh within the study area is shown in the top panel of Figure 3.
- Ground surface in the SLGM was interpolated from the topographic contours.
- The SLGM contains two layers.

- The model grid spacing varies between approximately 30 feet within the study area around Linbrook road and 500 feet outside of the study area, as shown in Figure 3.
- All model simulations are run in steady-state, which assumes conditions do not change with time.

The SLGM was constructed and run using DYNFLOW. DYNFLOW is a fully three-dimensional, finite element groundwater flow model code. This code has been developed over the past 40 years and has been applied to over 200 groundwater modeling studies within the United States. The DYNFLOW code has been reviewed and tested by the International Groundwater Modeling Center (IGWMC) (IGWMC 1985, van der Heijde 2000) and has been extensively tested and documented by CDM Smith.

Model features were refined in the study area, including:

- The elevation of the bottom of the sand/gravel unit (and consequently the top of the clay/silt unit) was estimated based on boring logs taken from the thirteen soil borings drilled along Montclair Drive in 2011 along with the boring logs from MW1, MW2, MW3, and PZ4 as part of this study. The contact elevation between these two units was interpolated between borings. While this interpolation utilizes the available data appropriately, there may be instances where the contact between these two units is higher or lower than what was interpolated. A higher contact elevation would reduce the transmissivity at that location, which could result in localized seepage of groundwater to the surface.
- The hydraulic conductivity of the clay/silt layer was set to 0.05-1.0 ft/day, based on the slug-test-derived hydraulic conductivities presented above, as well as trial-and-error matching of simulated and measured 2022 groundwater elevations.
- Recharge and the hydraulic conductivity of the sand/gravel layer were determined by trial-and-error matching of simulated and measured 2022 groundwater elevations. Values used to match February 2022 conditions were 10 inches per year of recharge and 25 ft/day hydraulic conductivity within the sand/gravel layer.

Simulated groundwater elevations were checked locally against the water level elevation measurements taken at the newly installed monitoring wells and regionally to those measured at the USGS monitoring well located on the University of Saint Joseph's campus (included on the bottom panel of Figure 3 for reference). Data for this monitoring well (ID number 414535072445501 CT-WH 130) are available on the USGS National Water Information System (NWIS) website. The simulated and measured groundwater elevations are shown in **Table 3**. Simulated 1-foot groundwater elevation contours representing the water table are shown in plan

view in the vicinity of the study area in **Figure 4**. This simulation represents February 2022 conditions.

An additional simulation was run to represent higher groundwater conditions for the purposes of screening groundwater lowering scenarios. This was done by increasing recharge and keeping the rest of the model inputs unchanged. The result is a higher water table, situated close to ground surface and within the sand/gravel layer. Figure 4 shows the simulated water tables for both baseline conditions and high groundwater conditions on cross section A-A'. To date, we do not have groundwater elevation data to support a water table as high as what is simulated in this scenario. However, these conditions are anecdotally consistent with reports of groundwater seepage to the surface within the study area during wet seasons.

Table 3 Simulated Groundwater Elevation Comparison

Well	Measured Groundwater Elevation (ft)	Date(s)	Simulated Groundwater Elevation (ft)
MW1S	86.1	2/22/2022	86.5
MW1D	83.1	2/22/2022	86.5
MW2S	85.9	2/22/2022	84.6
MW2D	82.8	2/22/2022	84.5
MW3S	79.3	2/22/2022	78.8
MW3D	78.6	2/22/2022	78.7
PZ4S	75.5	2/22/2022	75.6
PZ4D	75.2	2/22/2022	75.5
USGS Well	104.1	Average of 9 Measurements between 9/28/2006 and 9/17/2018	104.8

Under these higher groundwater conditions, there's potential for groundwater lowering via a perforated groundwater drain pipe. This pipe would be situated at the bottom of the sand/gravel unit, would collect groundwater when the water table rises into the sand/gravel unit, and would discharge the collected groundwater to Trout Brook. Two groundwater lowering scenarios were simulated to estimate the magnitude and extent of groundwater lowering within the study area. The details of the two scenarios (Scenario 1 and Scenario 2) are described below.

Scenario 1

In Scenario 1 an approximately 340 foot long perforated drain pipe is simulated between MW2 and Trout Brook at an approximate slope of 0.002 feet/foot, assuming a discharge invert elevation of 77 feet. The approximate location of the drain pipe is shown in plan view and on cross section A-A' in **Figure 5**. The model was run using the high groundwater conditions inputs with the drainpipe in

place. Contours of groundwater elevation change (decline due to the presence of the drain pipe) are also included in plan view on Figure 5. The simulated water table for Scenario 1 is shown in cross section A-A' on Figure 5 as well.
The 0.5-foot contour covers all of the houses on the section of Linbrook Road east of Montclair Drive. The maximum potential water table lowering in Scenario 1 is approximately 4 feet and there is potential to lower the water table by 1-2 feet beneath the houses and yards situated along Linbrook Road. Under February 2022 conditions this drain pipe would not lower the water table, which was situated predominantly within the clay/silt unit. As this unit does not readily transmit water, a drain pipe installed into it would not be effective.

Scenario 2

In Scenario 2 an approximately 540 foot long perforated drain pipe is simulated between MW1 and Trout Brook at an approximate slope of 0.003 feet/foot, assuming a discharge invert elevation of 77 feet. This pipe receives flow from a 340 foot long perforated drainpipe simulated along Montclair Drive between MW1 and Brookfield Road at a slope of 0.001 feet/foot.

The approximate locations of the drainpipes are shown in plan view and cross section B-B' in **Figure 6**. The model was run using the high groundwater conditions inputs with the drainpipes in place. Contours of groundwater elevation change (decline due to the presence of the drainpipe) are shown in Figure 6, along with cross section B-B' showing the lowered water table. The 0.5-foot contour covers a larger portion of the neighborhood than in Scenario 1, with a maximum potential water table lowering of approximately 5 feet. There is potential to lower the water table by 1-2 feet beneath the houses and yards situated along Linbrook Road As noted above, under February 2022 conditions this drain pipe would not lower the water table, which was situated predominantly within the clay/silt unit. As this unit does not readily transmit water, a drain pipe installed into it would not be effective.

Potential Synergies with Proposed Drainage Pipe Layouts

Potential synergies between the proposed layouts of the drainage pipes and where perforated drain pipes could be placed to provide some water table control in the neighborhood around Linbrook Road were examined. The profiles of the drain pipes were compared to the estimated contacts between the sandy soils near the surface and the deeper, clay/silt layer, as determined from boring logs taken from both the newly installed groundwater monitoring wells and previously taken boreholes. As noted above, perforated drain pipes would be installed in the sandy soils, preferably just above the transition to the clay/silt materials.

Figure 7 shows the profile of the proposed drain pipe along Linbrook Road, crossing Montclair Drive, turning south and discharging approximately 800 feet from the end of Linbrook Road. The elevations of the top of the clay/silt layer are marked with red circles in three locations: at MW1,

MW3, and where the pipe discharges to Trout Brook. These markings are connected with a line, representing the estimated contact between the sandy and clay/sit materials between the points. In Figure 7, the proposed drain pipe is situated within the clay/silt materials between Montclair Drive and nearly the end of Linbrook Drive. The drain pipe is situated within the sandy materials at the end of Linbrook road and throughout the 800 foot stretch to the discharge.

Figure 8 includes the same comparison along Montclair Drive between the intersection with Brookfield Road and the proposed discharge to Trout Brook. Similar to what was observed in Figure 7, the proposed drain pipes shown are partially situated within the clay/silt materials and partially within the sandy materials.

Figure 9 shows the same comparison along Linnard Road. In this case, the proposed drainage pipe is situated within the sandy materials for the entire stretch from Montclair Drive to the discharge point. However, there are fewer boring logs in this area (only B-L is nearby) so the estimated contact between the sand and clay/silt materials is more uncertain.

It is anticipated that more information, including the location of other utilities, will be incorporated into this analysis during the final design phase, with the intention of installing perforated drains in these areas where feasible.

Summary and Recommendations

The work completed as part of this contract and documented in this TM has provided information on the current conditions of groundwater and subsurface materials along Linbrook Road, east of Montclair Drive. Model simulations incorporating the data collected from the site have provided insights into the potential for groundwater lowering during high groundwater conditions. The following was learned or verified as part of this study:

- The installation of 8 monitoring wells along Linbrook Road between Montclair Drive and Trout Brook provided data on the groundwater elevation, depth to groundwater, horizontal flow gradients, and vertical gradients in this area, which has been sensitive to high groundwater conditions in the past. These wells are permanent and can be used to collect additional data as needed (either by periodic manual measurements or continuously through the deployment of automatic data collectors) in the future. All three rounds of groundwater elevation measurements produced relatively consistent results, and showed that the shallow, sand/gravel unit to be predominantly within the vadose zone. Prior to the installation of these wells, the closest monitoring well to the study area was the USGS monitoring well at the University of Saint Joseph, 0.6 miles to the northeast.

- Boring logs associated with the new monitoring wells were used to supplement existing stratigraphic interpretations based on soil borings drilled along Montclair Drive in 2011. These new boring logs were the first taken east of Montclair drive and improve the understanding of the thickness of the sand/gravel unit where groundwater lowering could occur.
- Slug testing confirmed the relatively low transmissivity of the clay/silt unit situated beneath the shallow sand/gravel. This clay/silt unit is not expected to readily transmit water and is therefore not recommended for groundwater lowering. Based on the data collected, the water table was situated within, or just above, this unit during February and May.
- Two model scenarios were run to estimate the potential for groundwater lowering via perforated groundwater drain pipes installed along Linbrook Road and Montclair Drive within the sand/gravel unit. Simulation results indicated that while the groundwater could only be lowered to the bottom of the shallow sand/gravel unit, there is potential to lower the water table by 1-2 feet beneath the houses and yards situated along Linbrook Road.
- The model, which incorporates the data collected in this study and represents current conditions relatively well, can be used in the future, as needed, to test additional scenarios.

Based on these findings, the following is recommended:

- The feasibility and cost of installing perforated groundwater drain pipes associated with scenarios 1 and 2 should be examined. It is expected that these pipes would be installed concurrently with planned storm drain replacement work to save on cost and minimize neighborhood disruption. Alternatively, the planned storm drains can be converted to perforated pipes and upsized slightly (approximately 6 inches larger in diameter) to accommodate the additional flows associated with the groundwater.
- The vertical placement of the drain pipes in the model were based on the interpreted contact between the sand/gravel unit and the clay/silt unit, as well as an assumed discharge elevation to Trout Brook. It is recommended that the discharge elevation be field verified.
- High groundwater conditions, with the water table very close to ground surface and the potential for seepage to occur, were not evident at the monitoring wells in February or May when the groundwater measurements were taken. It is recommended that additional rounds of water level elevations be taken when higher groundwater and/or seepage to the surface is reported in the future. On these occasions, it is recommended that the water surface stage of Trout Brook be documented (via photograph of the banks of the brook) as well.

- In order to better understand the time varying response of the water table to storm events, it is recommended that data be collected automatically via transducer at one of the monitoring wells. MW3S is likely the best choice, based on its relative position along Linbrook Road.

References

CDM Smith (2020). *Drainage System Evaluations in the Trout Brook Watershed.*

Gregory, Herbert E., and Ellis, Arthur J. (1916). *Ground water in the Hartford, Stamford, Salisbury, Willimantic and Saybrook areas, Connecticut.* State Geological and Natural History Survey of Connecticut.

International Ground Water Modeling Center (1985). *Review of DYNFLOW and DYNTRACK Groundwater Simulation Computer Codes*. Report of Findings by Paul K.M. van der Heijde for U.S. Environmental Protection Agency. IGWMC 85-17

van der Heijde, Paul K.M. (1999). *DYNFLOW Version 5.18: Testing and Evaluation of Code Performance.*

Comments Received January 6, 2023 with Responses

1. How was the "model extent" shown on Figure 3 established outside of the area where MDC borings and CDM Smith monitoring wells were performed/installed? If an area outside the study area needed to be investigated would additional subsurface testing be required to verify model?

Response: The screening level model was created to cover the entire watershed upstream of Trout Brook at Beachland Park, for a total of 17.5 square miles. It uses ground surface elevation data to establish the top of the model, boundary conditions to set the groundwater outflow conditions, and makes broad assumptions about the aquifer thickness and hydraulic properties outside of the site. It uses one regional well to verify that simulated heads are reasonable outside of the site. The intention of making the model this big is to use 'natural' boundary conditions, with the understanding that any detailed analysis outside of our study area would require additional data and model refinements.

2. What is the functional difference between deep and shallow wells in the well pairs? How separated are they? What explains the difference in groundwater elevation if they are at the same location? Is the boundary between the sand/gravel and clay/silt driving this?

While the term 'water level elevation' is used in the memo, a more accurate term is 'piezometric head'. Pressure differences within an aquifer cause the water level at one depth horizon to be different from those at other depth horizons. In the case of our measurements, the shallow screens produced higher piezometric heads than the deeper screens at all wells, with the magnitude of that difference decreasing near Trout Brook. As noted in the comment, while there are likely several reasons for this, the contrast in permeability between the sand/gravel unit and the clay/silt unit is a factor.

3. Has there been any additional readings taken since memo was issued?

No.

4. It could be useful if we could take our own readings as conditions warrant. How would we do these ourselves (manual/automatic)?

Yes, this would be useful to continue to develop an understanding of things, particularly when flooding happens again. The process requires use of a water level recorder, but is otherwise straight forward. Please let us know if CDM Smith can assist with the initial round or rounds of measurements and/or advise on how to rent or buy the instrument.

5. It could be useful for us to have the clay/silt layer "TIN" for use in future drainage designs in the future. Is this available in a format we can import into CAD and use as a surface?

It can be, but we would want to clip it to only the areas where we have data.

6. Are we able to use and update the groundwater model and run the simulation ourselves?

In theory yes, there's no restrictions to using the software and it runs on a standard computer. However, unless you have staff who have some experience in groundwater modeling, the training and oversight costs could be greater than the costs to have CDM Smith make periodic updates and simulations for you.

7. Within the study area, were basement floor elevations taken for comparison against model results?

No.

8. What is the horizontal zone of influence for the perforated pipes?

The zone of influence will depend on the depth of the pipes, which unit it is in, and the water table elevation. Figures 5 and 6 show the extent of the area where the water table is lowered by at least 0.5 feet for Scenarios 1 and 2.

9. Where should the perforated pipes be located within the Right of Way? Or is the location to be wherever it can fit given adjacent utilities?

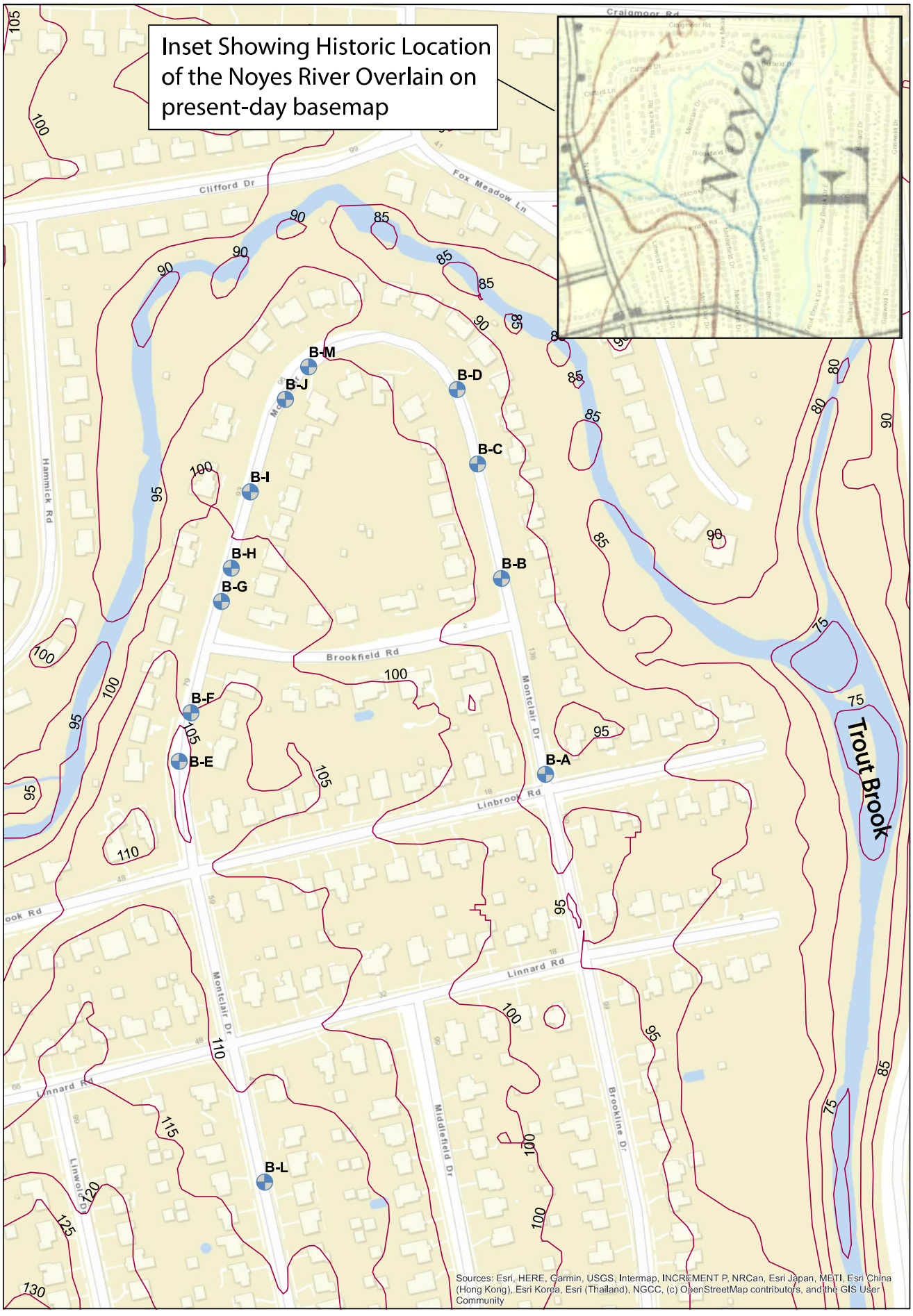
I suspect the location will be limited by where it can fit.

10. What are the perforated pipe diameters?

If these perforated pipes are to be installed to replace existing drain pipes (as part of the upsizing recommendations) then we expect the pipes to be 6 inches larger than the planned solid pipe recommendations.

11. Can private property owners connect drainage pipes to the perforated pipes? Is there enough capacity to accept the private property flow?

Yes, there should be enough capacity because these flows were already factored into the new pipe sizes. Please note that they will likely need to pump into the drains.



CDM Smith

Legend

Soil Borings from 2011

Ground Surface Contours (Feet)

Scale

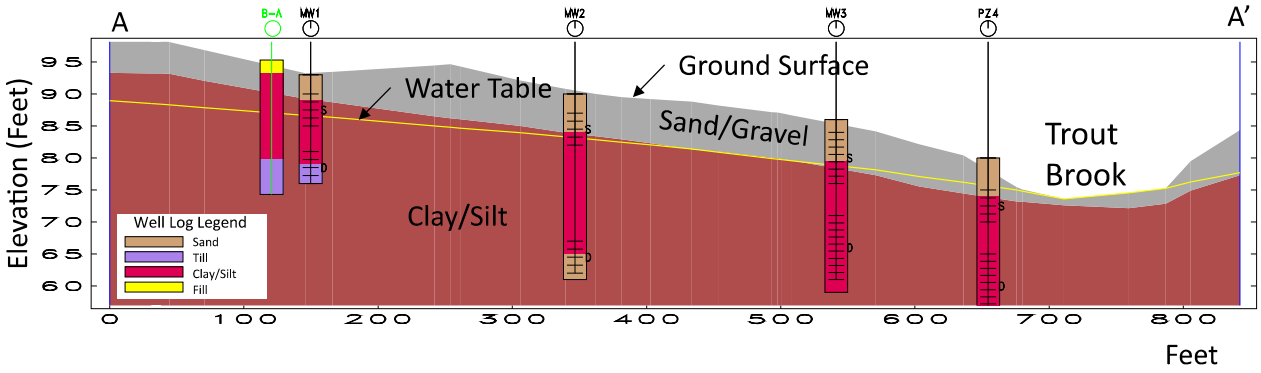
N

Feet

0 125 250

Figure 1
Study Area
TOWN OF WEST HARTFORD, CONNECTICUT
Groundwater Evaluation Along Linbrook Road

Cross Section A-A'



CDM Smith

Legend

2022 Monitoring Well Sites

Soil Borings from 2011

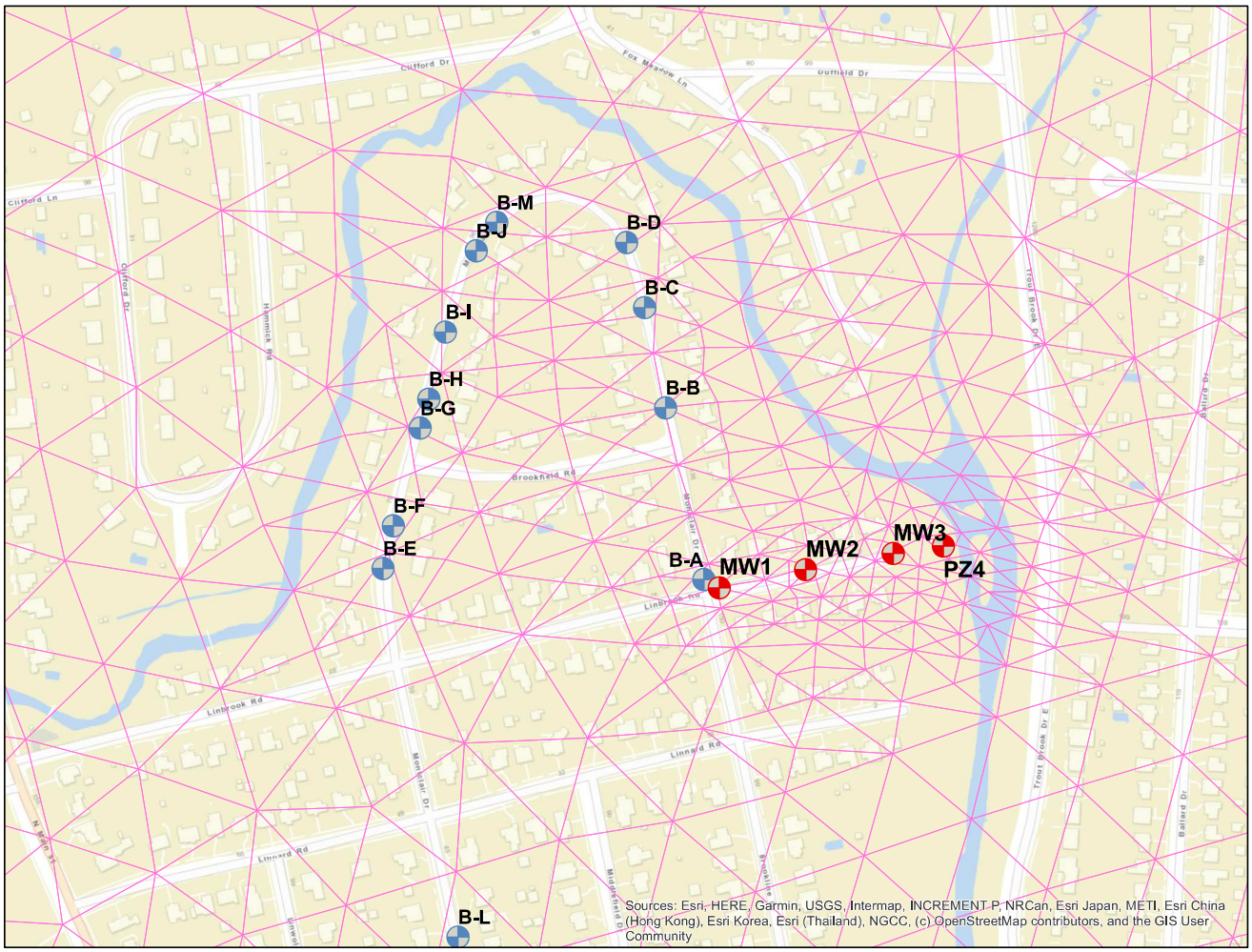
Scale

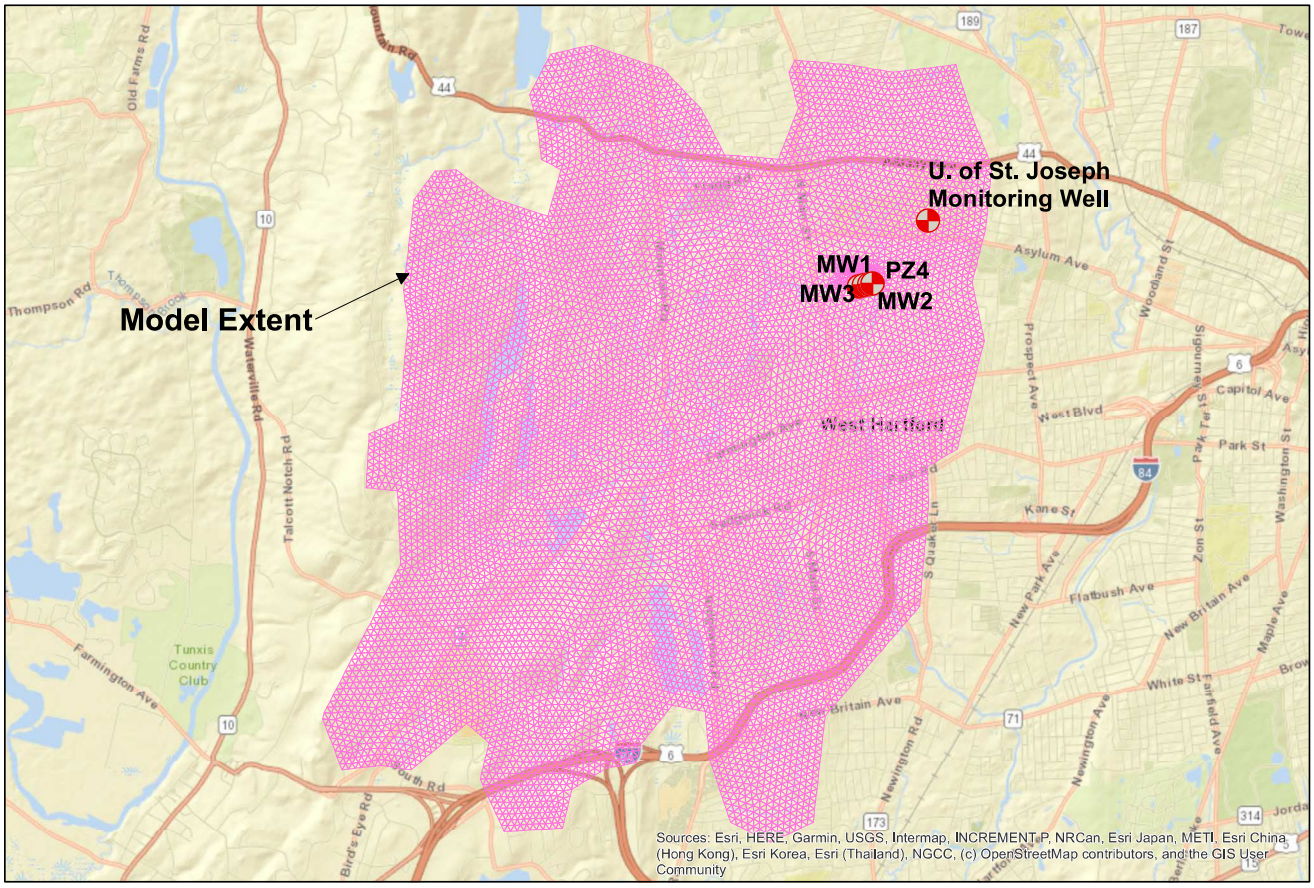
N

Feet

0 60 120

Figure 2
New Monitoring Locations and Cross Section A-A'
TOWN OF WEST HARTFORD, CONNECTICUT
Groundwater Evaluation Along Linbrook Road





CDM Smith

Legend

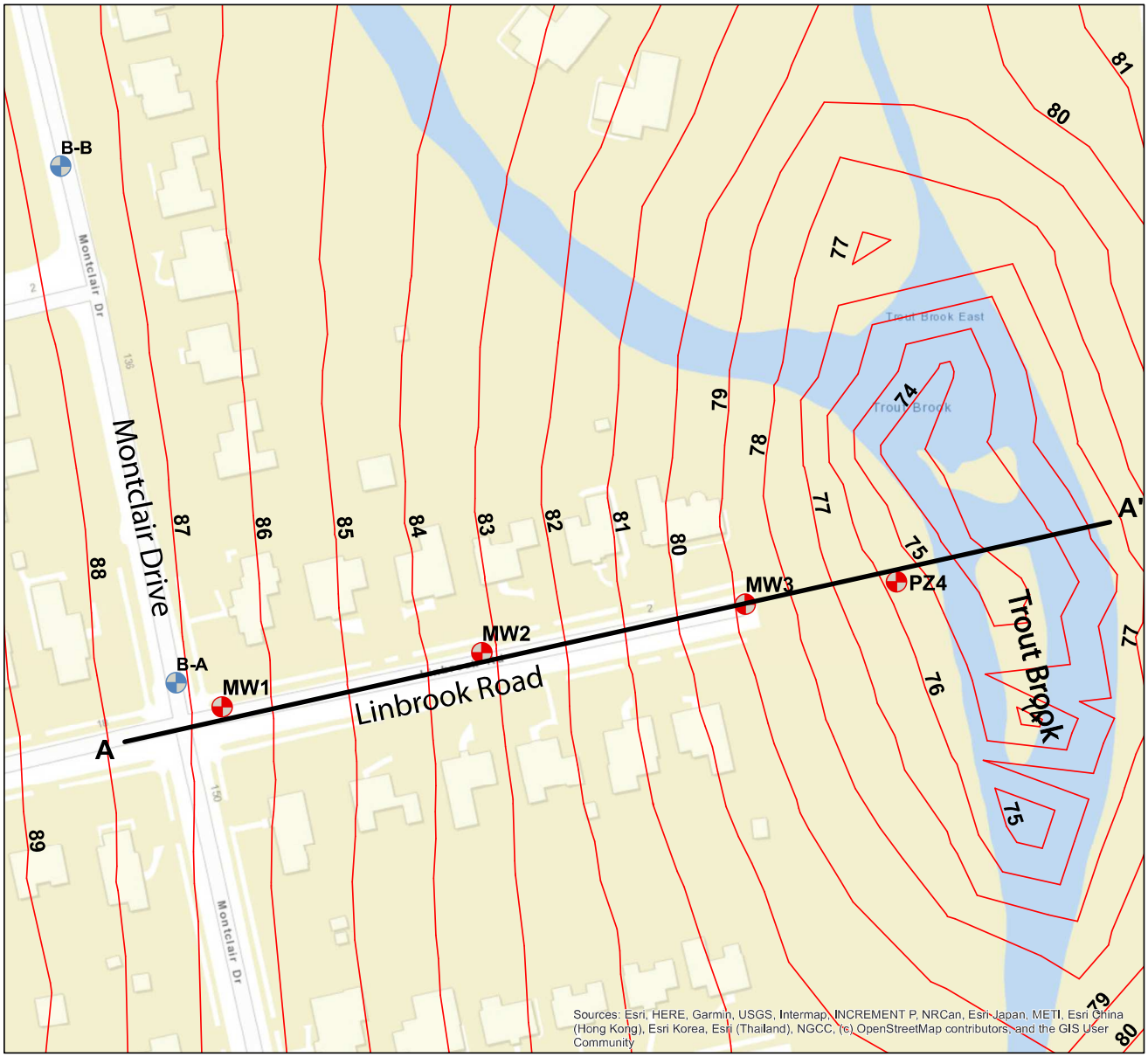
- 2022 Monitoring Well Sites
- Soil Borings from 2011
- Model Grid Mesh

Scale

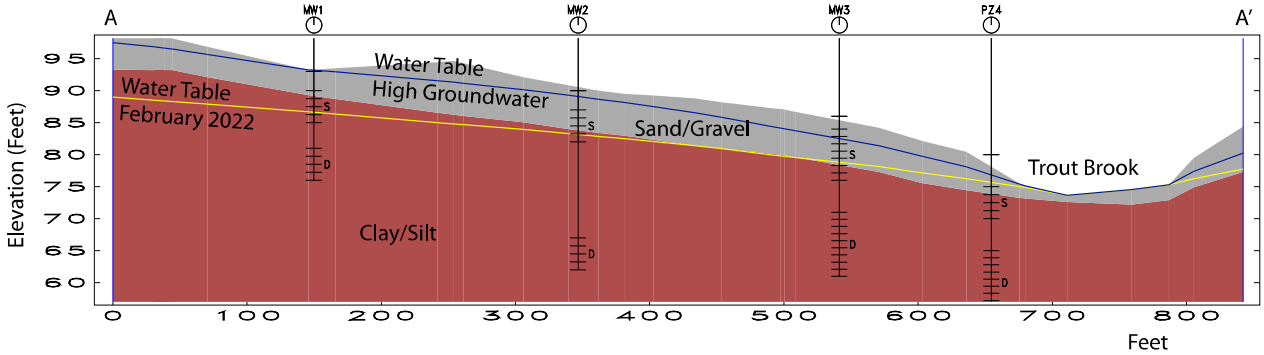
N

Feet
0 195 390

Figure 3
Model Domain and Grid Mesh
TOWN OF WEST HARTFORD, CONNECTICUT
Groundwater Evaluation Along Linbrook Road



Cross Section A-A'



Legend

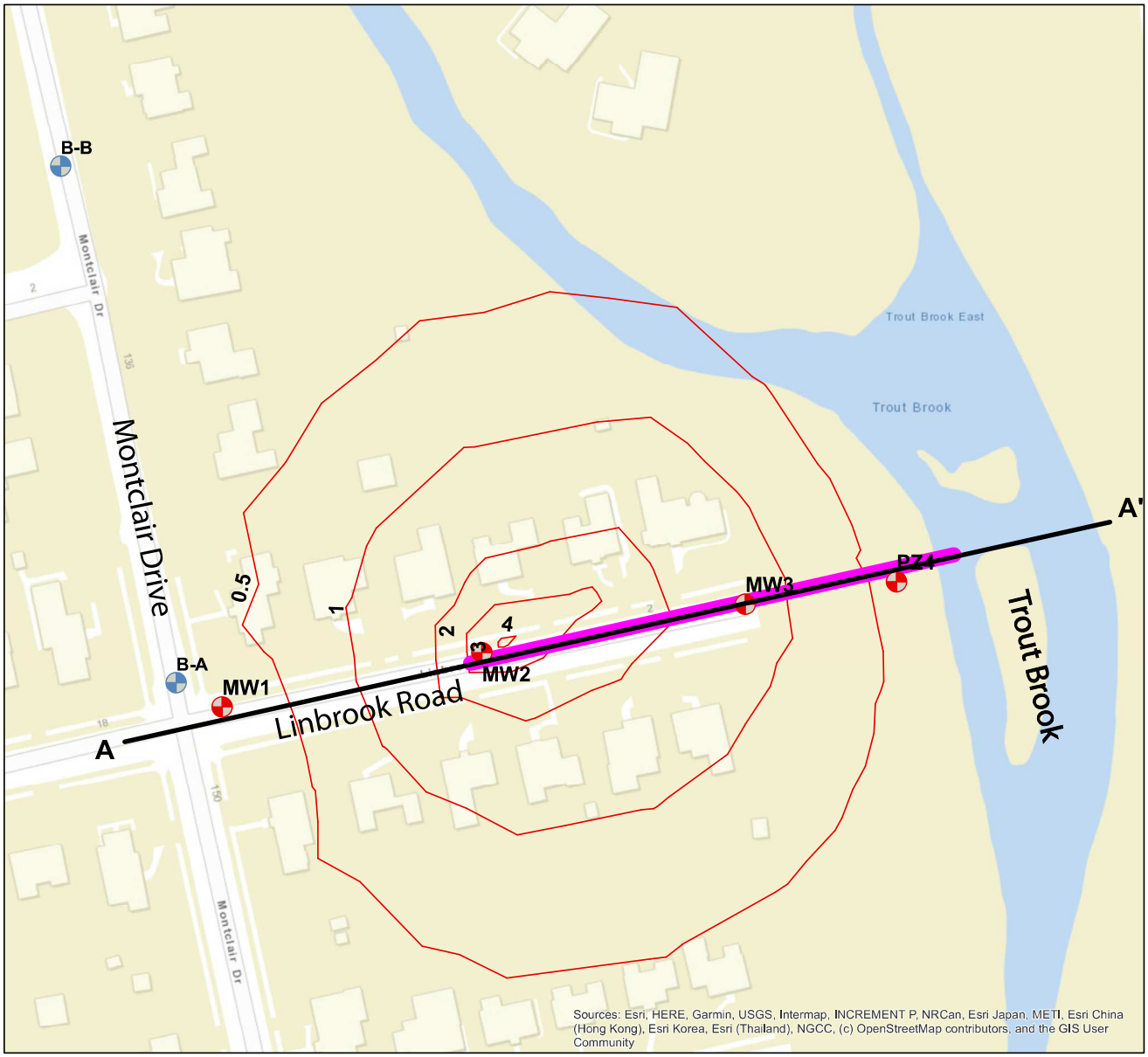
- 2022 Monitoring Well Sites
- Soil Borings from 2011
- Simulated Water Table Contours (Feet), February 2022 Conditions

Scale

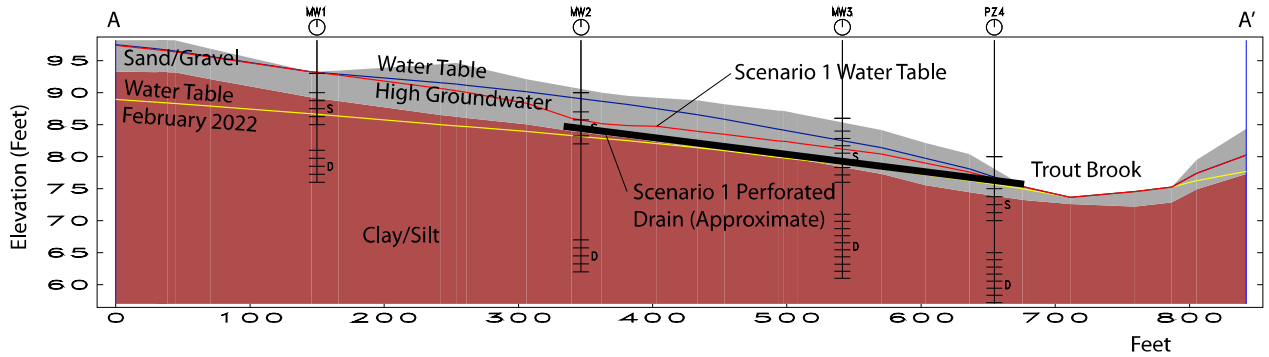
N

Feet
0 60 120

Figure 4
Simulated Water Table Contours
TOWN OF WEST HARTFORD, CONNECTICUT
Groundwater Evaluation Along Linbrook Road



Cross Section A-A'



Legend

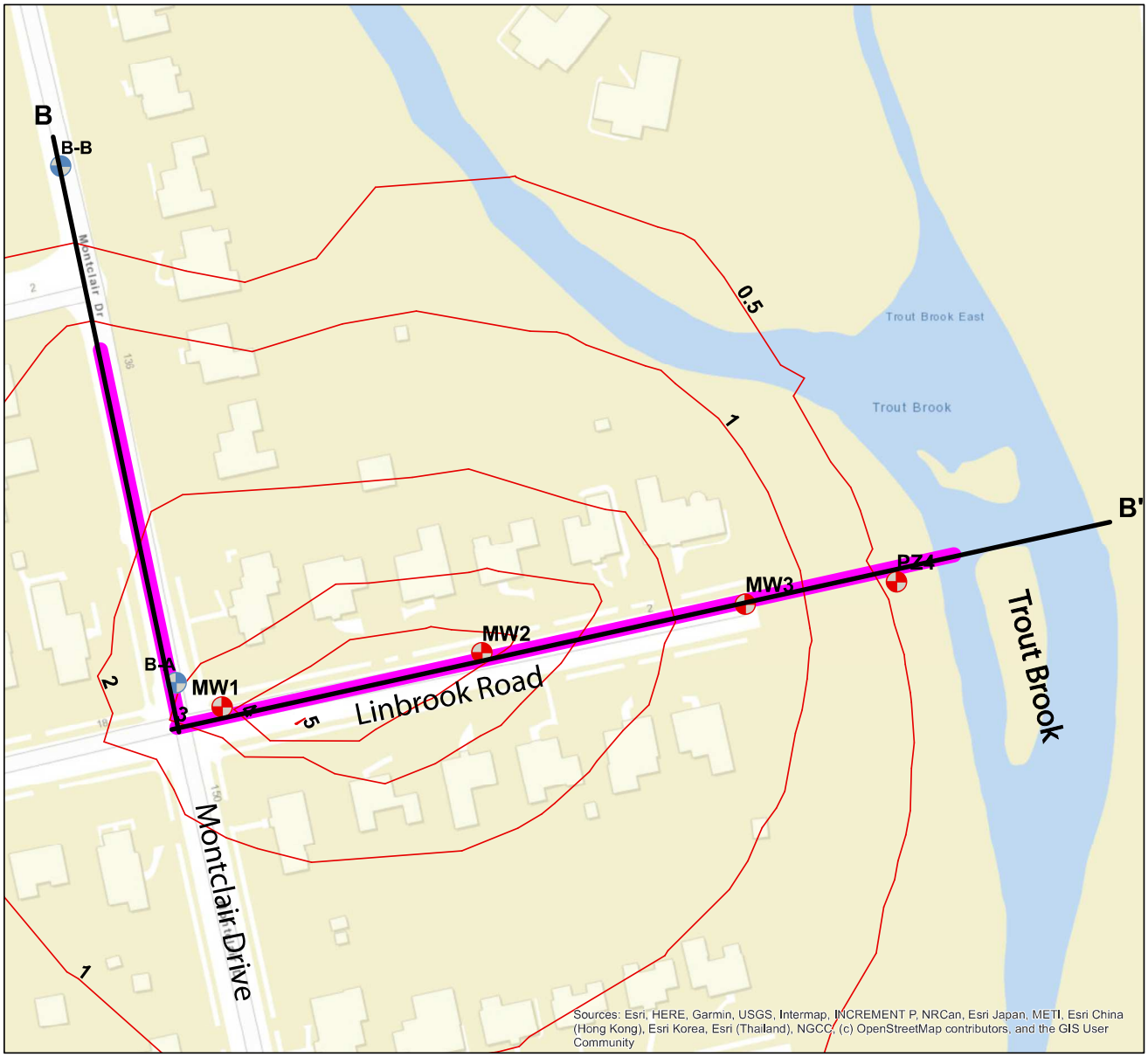
- 2022 Monitoring Well Sites
- Soil Borings from 2011
- Scenario 1 Simulated Drain
- Simulated Groundwater Decline (Feet), Scenario 1

Scale

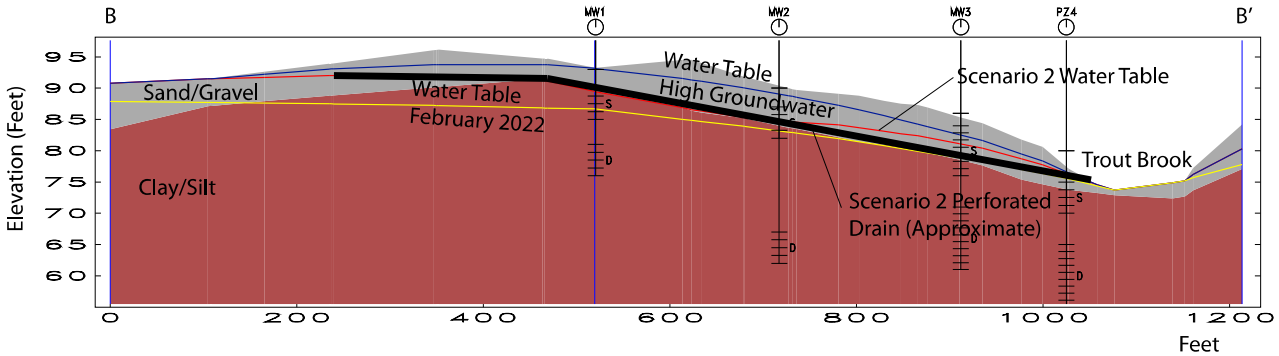
N

Feet
0 60 120

Figure 5
Scenario 1 Results
TOWN OF WEST HARTFORD, CONNECTICUT
Groundwater Evaluation Along Linbrook Road



Cross Section A-A'



Legend

- 2022 Monitoring Well Sites
- Soil Borings from 2011
- Simualted Groundwater Decline (Feet), Scenario 2
- Scenario 2 Simulated Drain

Scale

N

0 60 120 Feet

Figure 6
Scenario 2 Results
TOWN OF WEST HARTFORD, CONNECTICUT
Groundwater Evaluation Along Linbrook Road

Figure 7 – Profile Along Linbrook Road

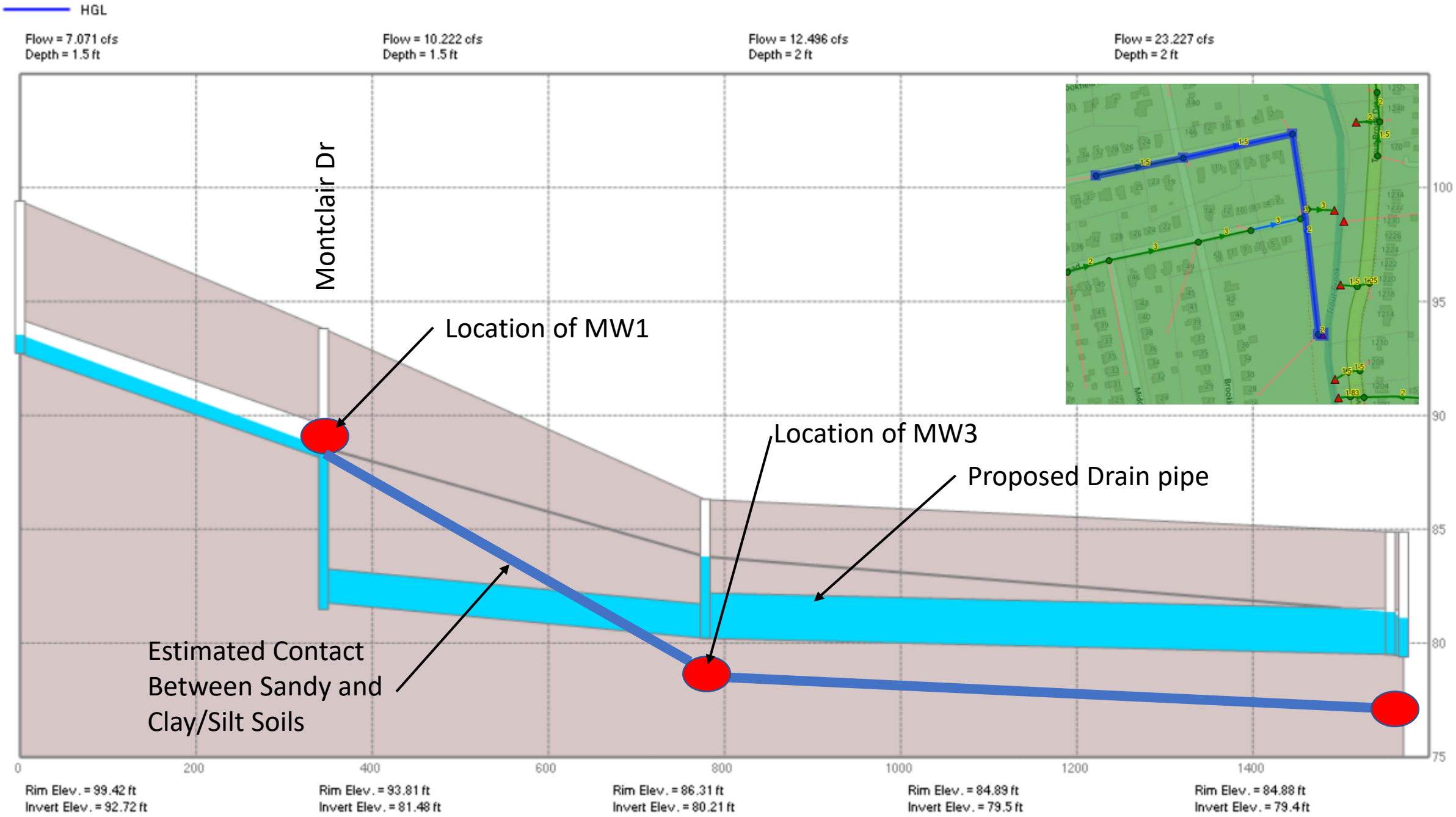


Figure 8 – Profile Along Montclair Drive

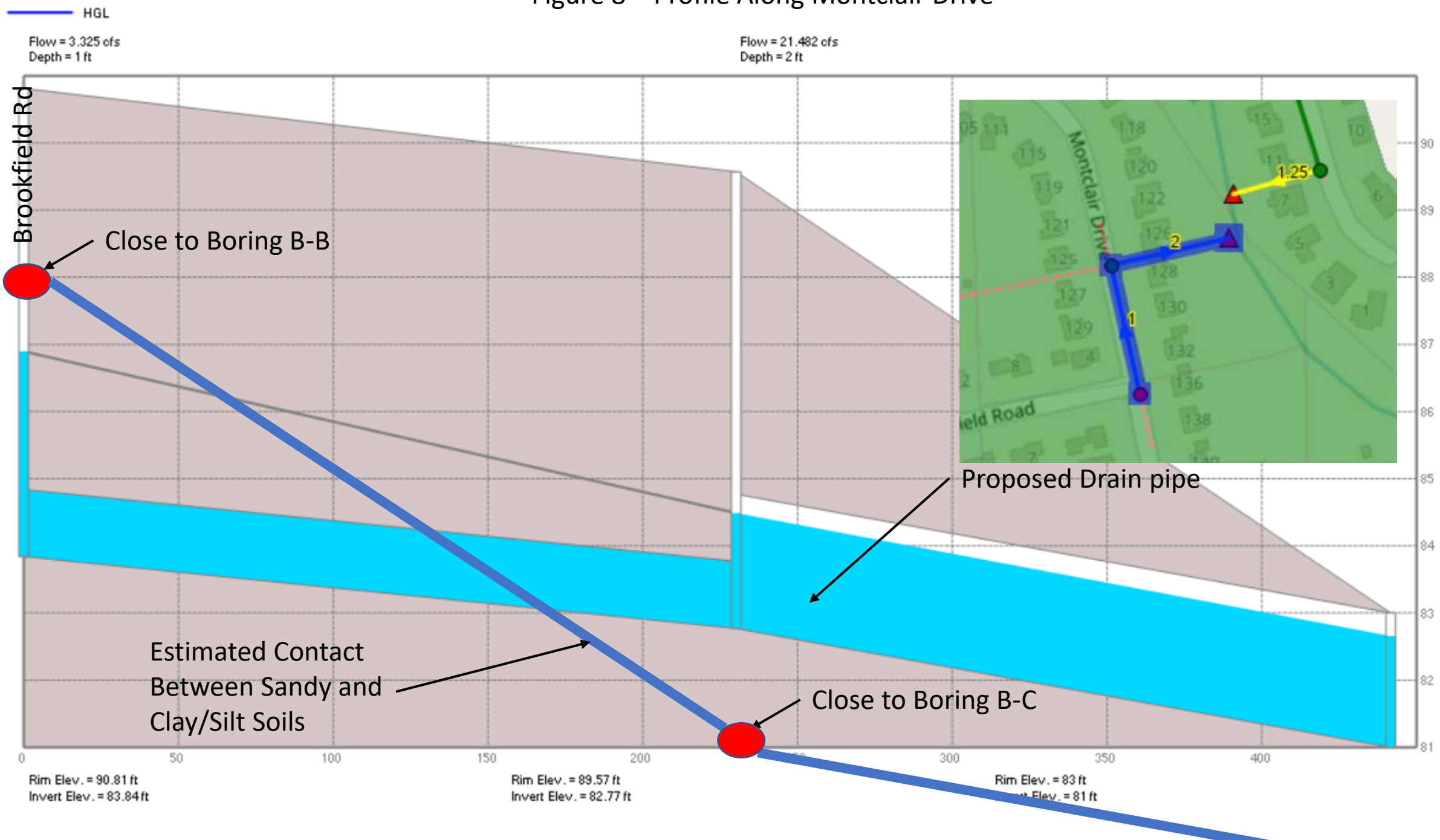
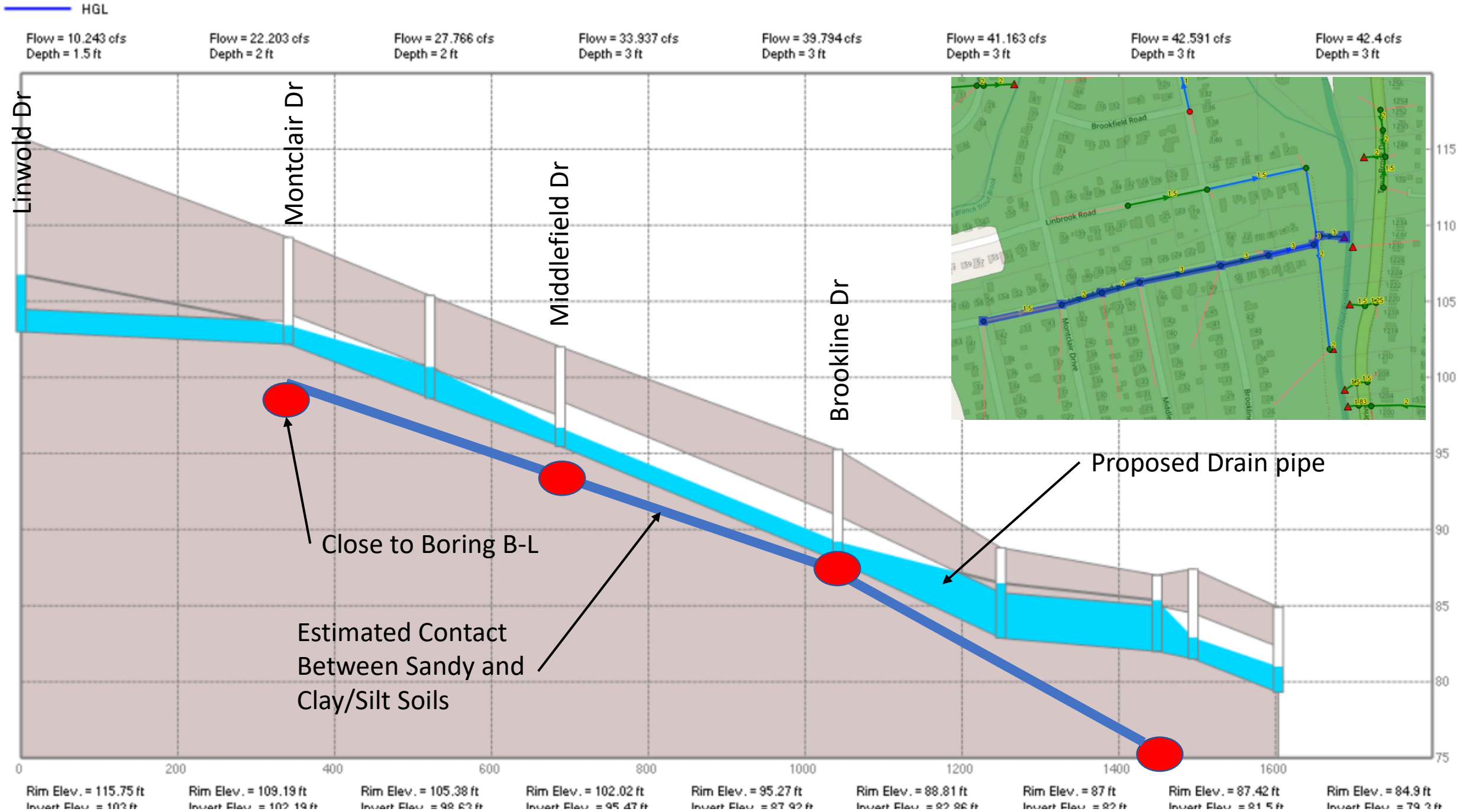


Figure 9 – Profile Along Linnard Road



Appendix A

Boring Logs from 2011 Along Montclair Drive

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

Friday, 18 March 2011

Jessica Coelho
The Metropolitan District
555 Main Street
Hartford, CT 06142

Re: **Soil Borings**
Montclair Drive, West Hartford, CT

Dear Jessica,

Enclosed is the SITElog® Report for the work completed at the above referenced site.

Thank you for providing us the opportunity to serve you. We hope the work our company has performed exceeded your expectations and that you are pleased. If so, recommending us to your associates would be appreciated.

Should you have any questions or concerns, please feel free to contact us at (203) 490-4777.

We look forward to working with you again in the near future.

Visit us on the web! www.site-llc.com

Sincerely,

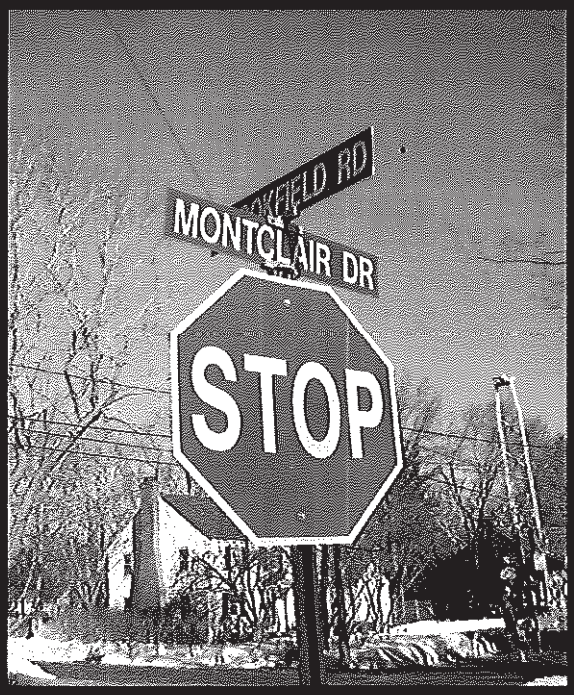
SITE, LLC

John A. DeAngelis, Jr.

John A. DeAngelis, Jr.
Managing Member

SITE LLC

Sub-surface Investigations, Technology & Experience



Client:

The Metropolitan District

Project:

Montclair Drive, West Hartford, CT

Date:

Thursday, 3 March 2011

SITE LLC
Sub-surface Investigations, Technology & Experience

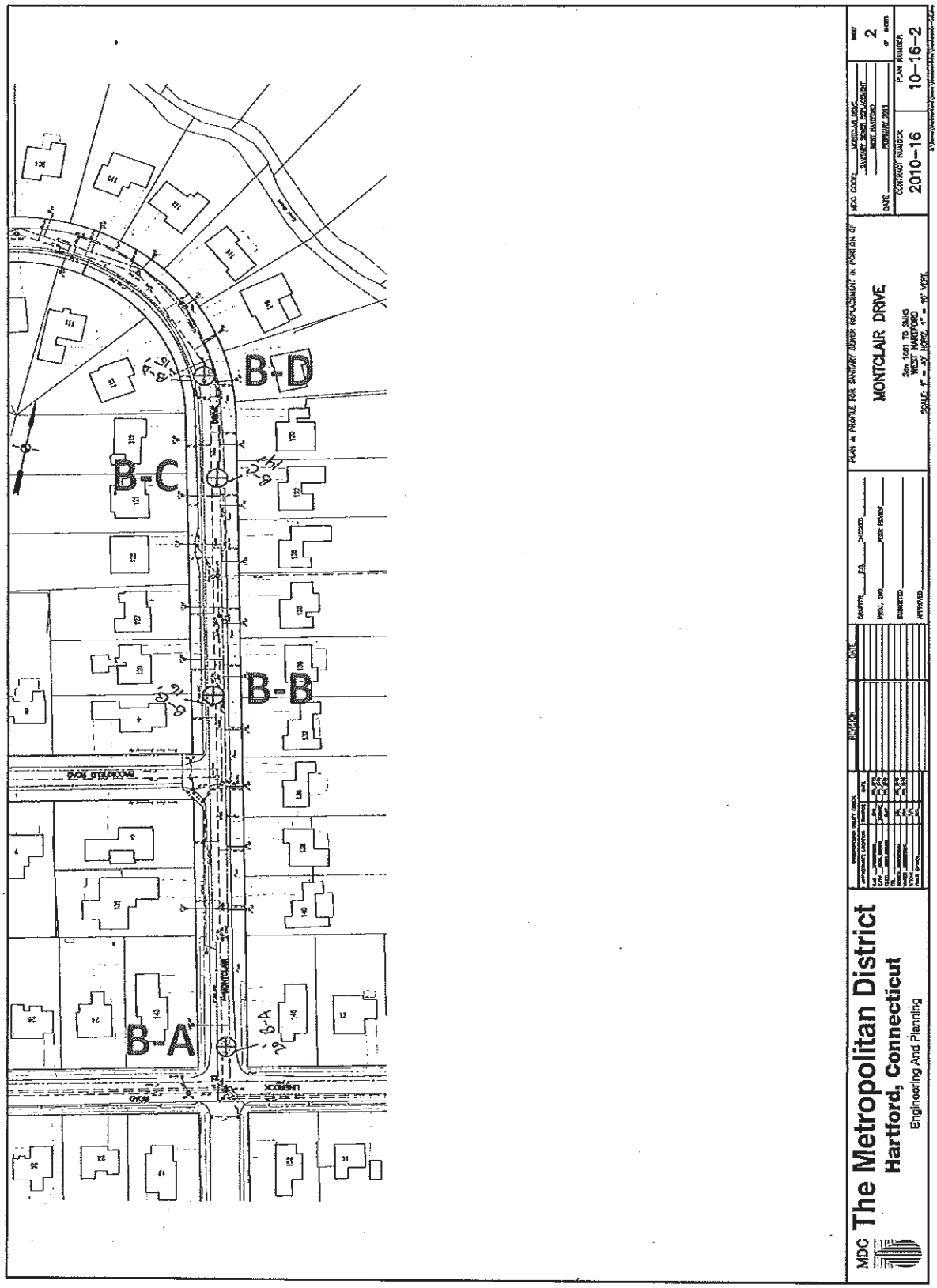
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011

Project Manager: Jessica Coelho Contract #2009-19

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

SITElog® Report SITEmap

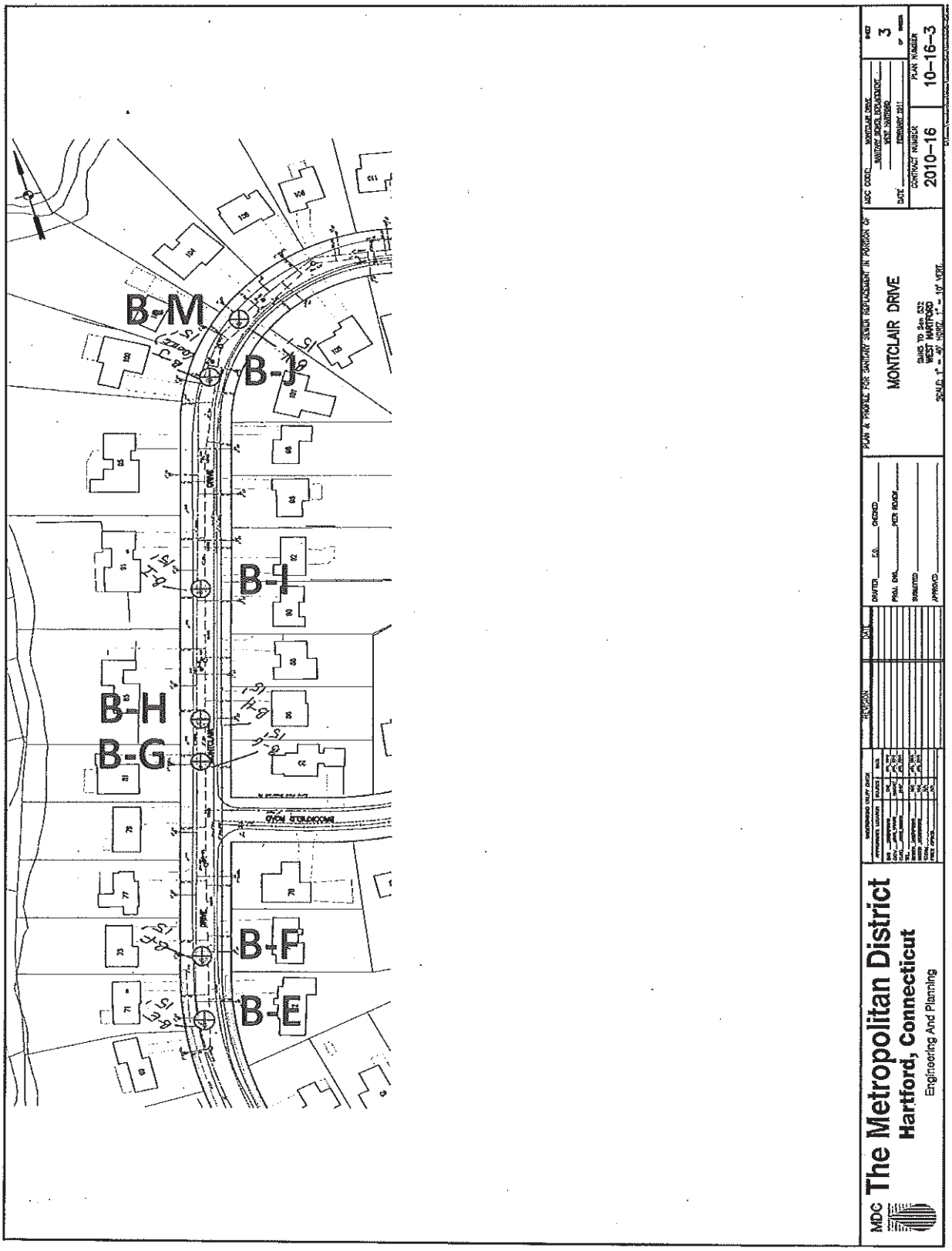


SITE LLC
Sub-surface Investigations, Technology & Experience
(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **SITEmap**



SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

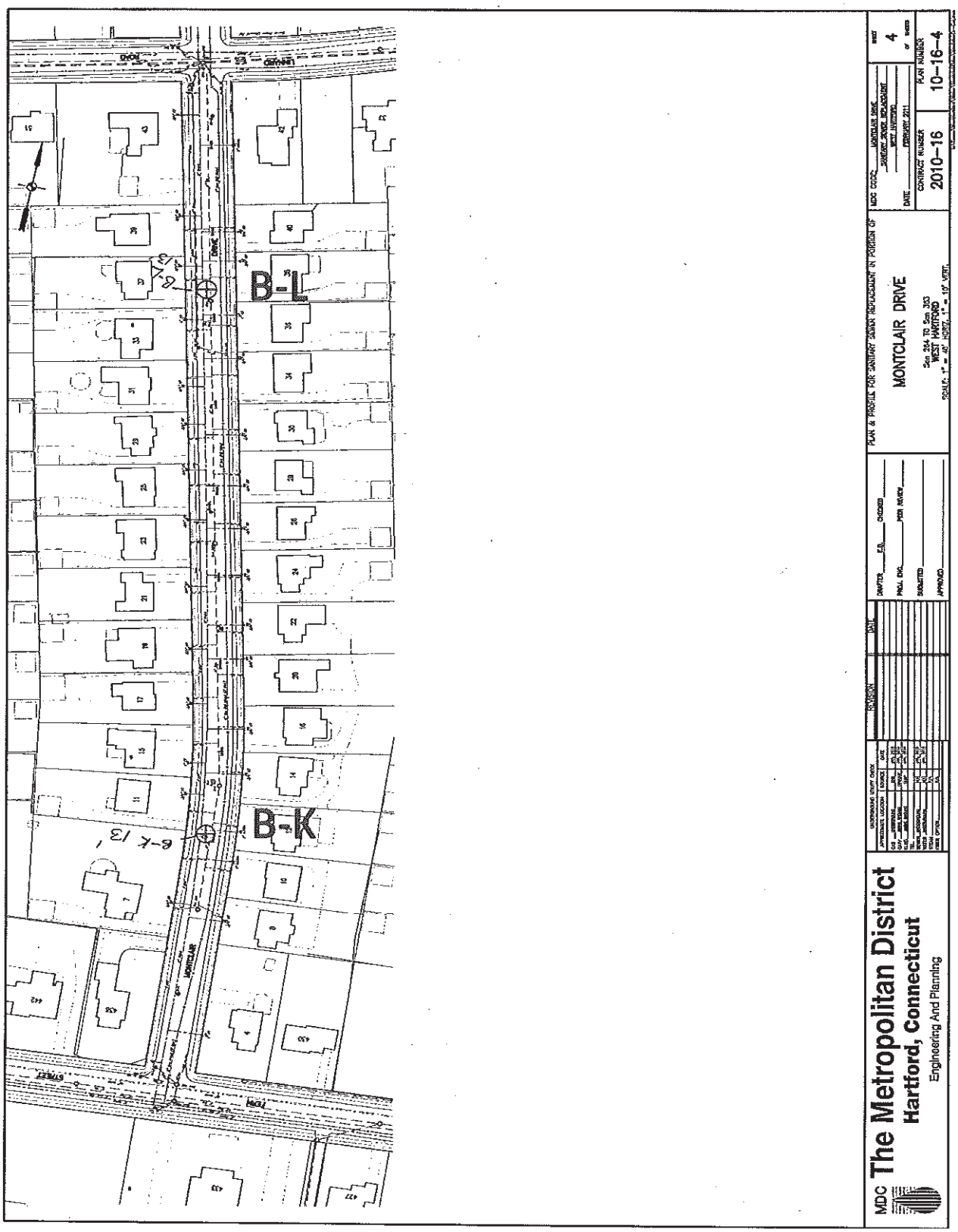
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: Montclair Drive, West Hartford, CT

Date: Thursday, 3 March 2011

Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **SITEmap**



Sub-surface Investigations, Technology + Experience

Soil Borings * Rock Coring * Concrete Coring * Monitor Wells * Geoprobe * Recovery Wells * SITELog Reports

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

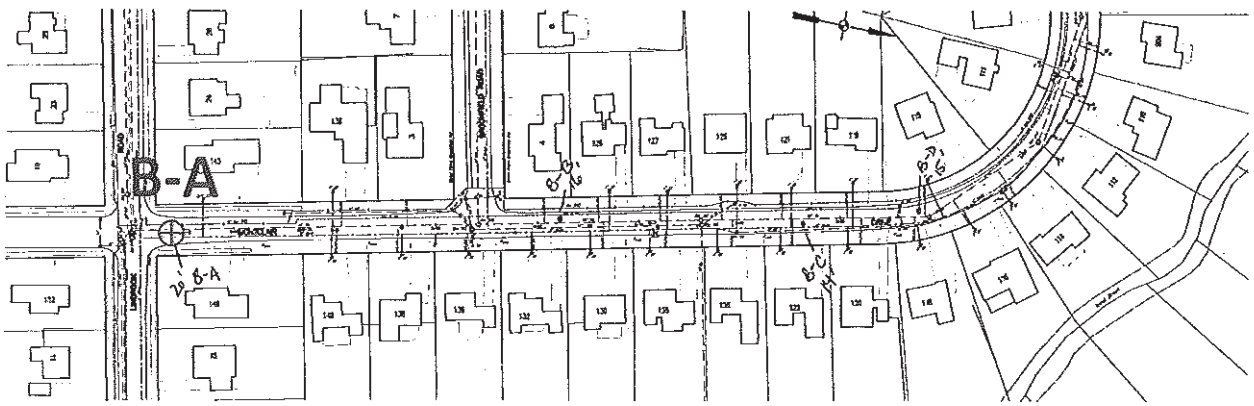
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 146 Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011
Water: 1'-8"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-A**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	8	8	5	4	Wet	0.50	bl	**ASPHALT (6" thick)**		1	24"	8"
						1.00	og	**STONE (Processed Basalt)**	FILL			
						2.75	br	**SAND(c-f), little Gravel, Stone**				
5' to 7'	2	2	3	3	Wet		og/rb	**CLAY varved w/Silt (thin beds)**		2	24"	23"
10' to 12'	2	3	4	3	Wet	13.00	rb	**CLAY layered w/Silt, occas. Pebbly/Sandy zone**	FINES	3	24"	19"
15' to 17'	3	6	8	11	Damp	16.50	rb	**SILT, trace Pea-Stone, Clay**		4	24"	22"
20' to 22'	16	53	26	25	Wet	22.00	rb	**SAND & SILT, some Basalt & Sandstone Fragments, trace Clay**	TILL	5	24"	18"
								End of Exploration @ 22.00				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.443N 72°44.357W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

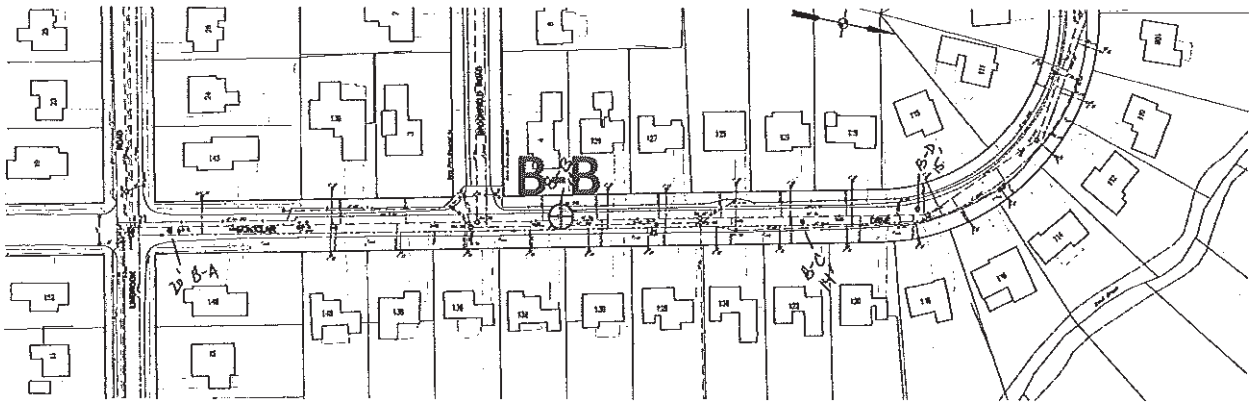
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 132 Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011
Water: 5'-0"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-B**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	11	6	4	5	Damp	0.25	bl	ASPHALT (3" thick)		1	24"	16"
						0.58	gy	STONE (Oiled?)				
						1.50	og	SAND, little Processed Basalt Stone	FILL			
							l.rb/tn	SILT, little Clay				
5' to 7'	2	2	3	2	Wet ▼	5.50				2	24"	16"
						5.75	d.br	SAND m/w Silt, Pebbles				
							rb	CLAY, some Silt				
10' to 12'	0	1	1	1	Wet		rb/gy	CLAY varved w/Silt	FINES	3	24"	24"
							rb	CLAY varved w/Silty Clay				
						14.00						
15' to 17'	5	6	7	7	Damp		rb	SILT, little Pebble-Gravel, trace Clay	TILL	4	24"	23"
						17.00						
								End of Exploration @ 17.00				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.506N 72°44.373W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

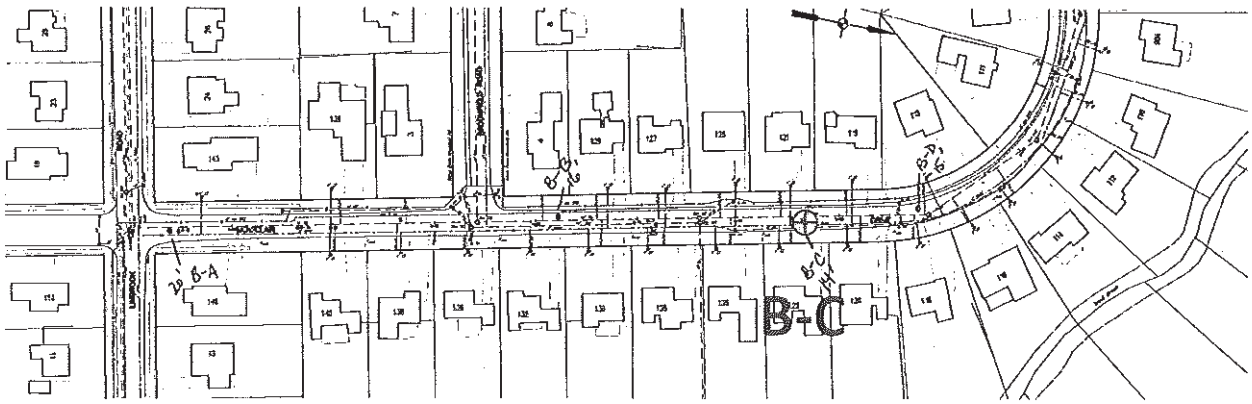
Project: 122 Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011
Water: 6'-6"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

SITElog® Report **B-C**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	7	5	7	7	Damp	0.29	bl	**ASPHALT (3¼" thick)**		1	24"	19"
						0.92	d.gy	**STONE (Basalt - Oiled?)**				
						1.08	og	**SAND, little Processed Stone (Dust)**				
							d.br/gy	**SILT, some Sand, trace Gravel, Wood**				
5' to 7'	1	2	3	3	Moist			**SILT & CLAY, little Sand, Pebble-Gravel**	FILL	2	24"	21"
10' to 12'	2	4	4	4	Wet	10.25	d.gy	**SILT, some Sand**		3	24"	14"
							d.rb	**SAND(c-f), little Gravel(f-m), Clay**				
12' to 14'	2	2	3	4	Wet	12.25				4	24"	20"
							rb	**SILT & CLAY**	FINES			
						14.00						
								End of Exploration @ 14.00				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.542N 72°44.382W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

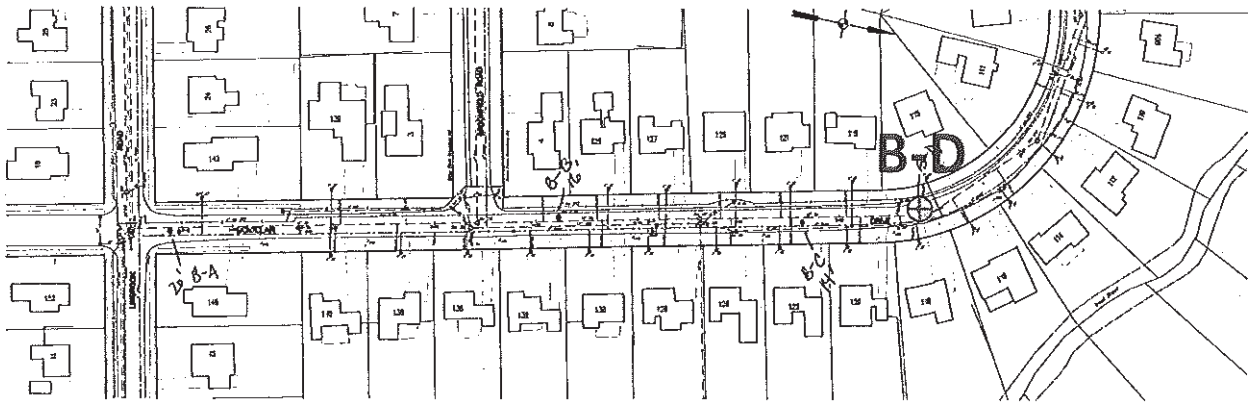
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 115 Montclair Drive, West Hartford, CT
Date: Friday, 4 March 2011
Water: 5'-6"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-D**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	13	6	6	6	Damp	0.25	bl	**ASPHALT (3" thick)**		1	24"	20"
						0.58	gy	**STONE (Processed Basalt - Oiled)**				
						0.92	gy	**SAND, little Processed Basalt Stone**				
						1.25	og	**SAND, little Processed Stone**				
5' 5' to 7'	1	1	2	2	Moist		d.rb/gy	**SILT, some Sand(f), little Gravel, Wood**		2	24"	15"
							br	**CLAY, some Silt, Sand, trace Gravel**	FILL			
10' 10' to 12'	2	3	2	2	Wet	10.50	gy	**CLAY, trace Gravel**		3	24"	15"
						10.75	d.gy	**SAND(m-f), trace Fibers**				
							rb	**SAND, some Gravel, Clay**				
13' to 15'	2	3	3	5	Moist	13.00				4	24"	16"
15'							rb	**SILT, trace Clay, Gravel(f)**	TILL			
						15.00						
								End of Exploration @ 15.00				
20'												
25'												
30'												
35'												

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.558N 72°44.393W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC Sub-surface Investigations, Technology & Experience

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

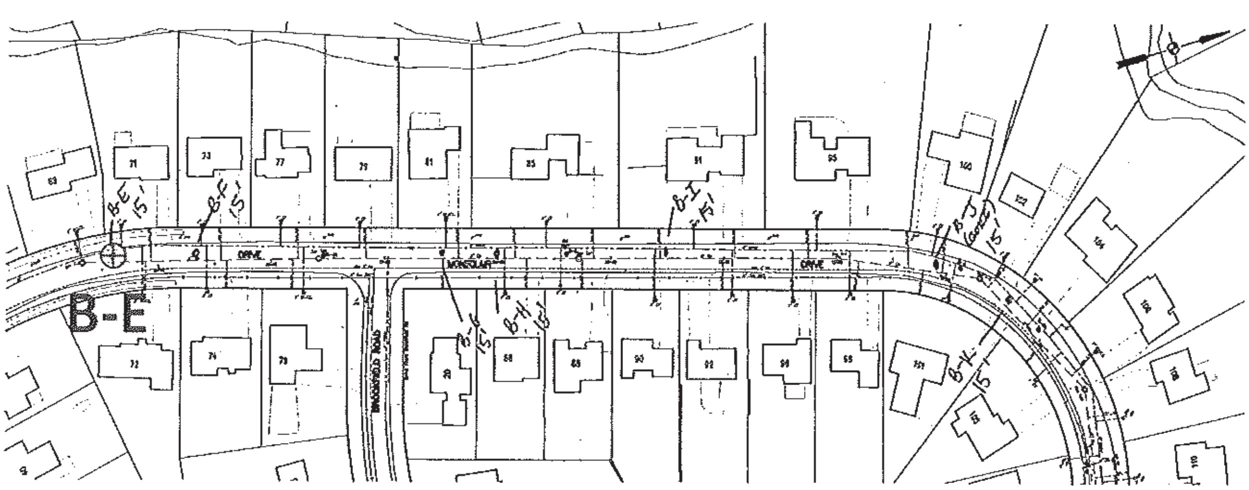
Project: 72 Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011
Water: 9'-9"
Ground Elev.:
Project Manager: Jessica Coelho — Contract #2009-19

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

SITElog® Report **B-E**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	12	21	18	12	Damp	0.29	bl	**ASPHALT (3½" thick)**		*1	24"	16"
						0.62	og	**STONE, little Sand**				
3' to 5'	15	10	10	9	Damp	0.92	og	**SAND, little Processed Stone (Dust)**		*2	24"	11"
							rb	**SAND & SILT, some Weathered Stone Fragments (some large)**	FILL			
5' to 7'	5	3	2	2	Damp					3	24"	3"
7' to 9'	5	9	15	10	Dry	7.50				4	24"	15"
9' to 11'	15	9	13	24	Wet		rb	**SILTSTONE (Highly Fragmented?)**	ROCK	5	24"	22"
11' to 11'-3"	50/3"					11.00				6	3"	3"
						12.00	rb	**SILTSTONE (Firmer)**				
								Auger Refusal @ 12.00				
								*** 3" Spoon**				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w - layered with m/w - mixed with



Fill, Organics, Subsoil, Silt, Silty Sand, Clay, Sand, Gravel, Cobble, Till, Rock, Water, SPT, Curb Box, Riser, Bentonite, Screen

GPS Coor: 41°46.452N 72°44.513W

Driller Name: J. DeAngelis, III

Helper Name: J. DeAngelis, Jr.

Drill Equip: CME 75

Hammer Wgt: 140# CME Auto

Sampler: 2" O.D. Lynac

Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

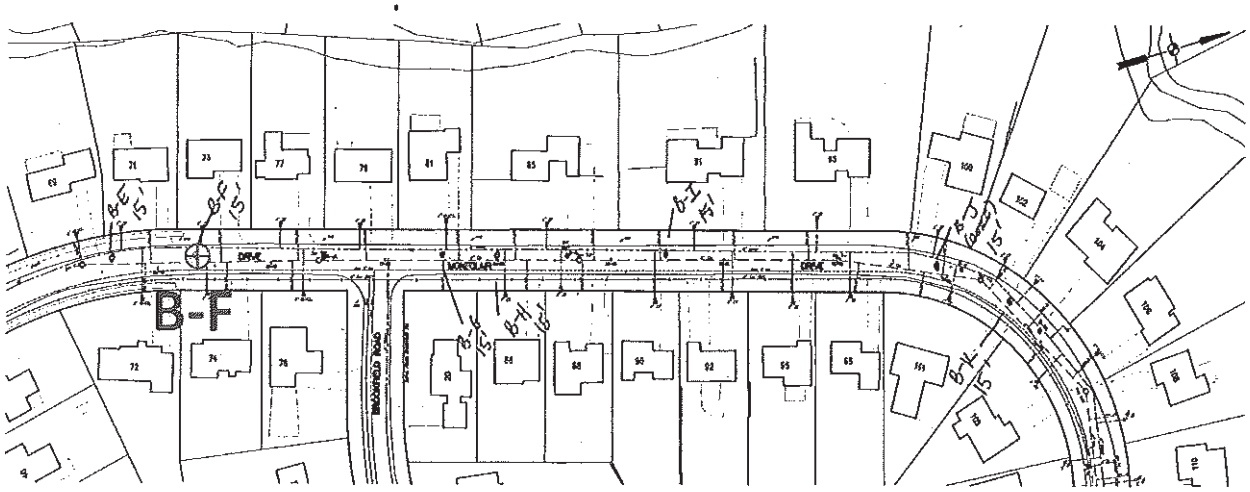
Project: 74 Montclair Drive, West Hartford, CT
Date: Monday, 7 March 2011
Water: 8'-6"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-F**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	11	12	11	11	Damp	0.25	bl	**ASPHALT (3" thick)**		1	24"	20"
						0.50	gy	**STONE (Oiled)**				
						0.83	br	**SAND, some Processed Basalt Stone**				
						1.00	og	**SAND, trace Stone(f) (Dust)**	FILL			
5' 5' to 7'	1	1	3	1	Moist	5.00	rb	**SAND & SILT & Frag. Siltstone (some large)**		2	24"	11"
							rb	**SAND & SILT, little Clay, Stone**				
7' to 9'	4	4	6	4	Wet	7.00				3	24"	6"
							rb	**SILTSTONE Rock Fragments, little Sand & Clay**	FRAGMENTED ROCK			
10' 10' to 11'	13	55/6"			Wet					*4	12"	12"
						10.75						
12' to 17'	C	O	R	E	Min.	12.00	d.rb	**SILTSTONE (less fractured)**		**5	60"	60"
					4.50		d.rb	**Auger Refusal @ 12.00**				
					3.00			** Nx Cored 12.00 to 17.00	COMPETENT ROCK			
15'					4.50			**Recovered 60" of slightly fractured**				
					4.00			**Siltstone/Shale**				
					3.50	17.00		**RQD = 75%**				
								End of Exploration @ 17.00				
20'												
25'												
30'												
35'												

*** 3" Spoon**
**** Rock Core Strength Test Performed**

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.460N 72°44.515W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 4.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

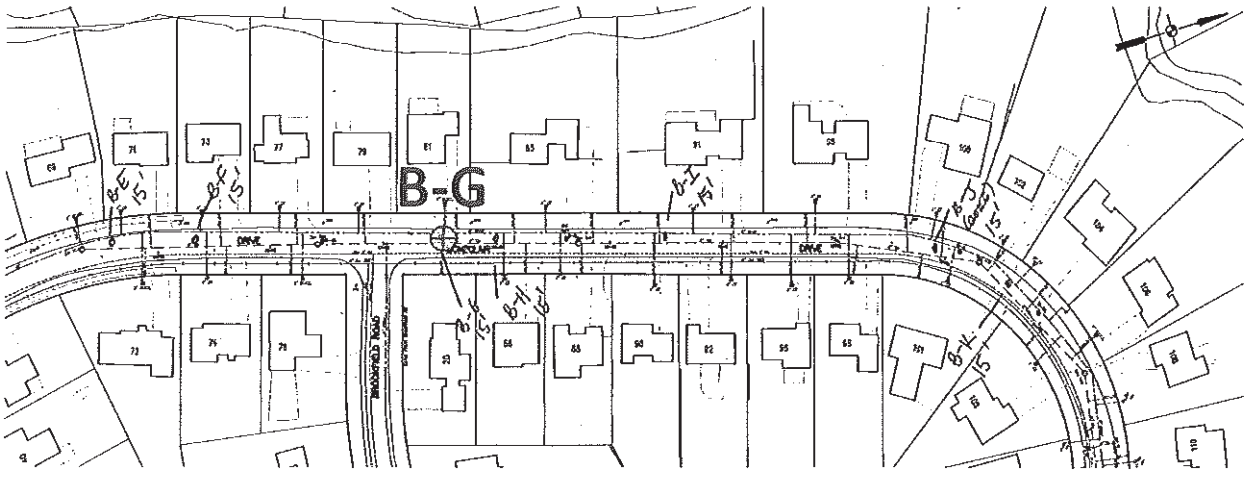
Project: 81 Montclair Drive, West Hartford, CT
Date: Friday, 4 March 2011
Water: 9'-0"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

SITElog® Report **B-G**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	19	15	6	6	Damp	0.25	bl	**ASPHALT (3" thick)**		1	24"	16"
						0.83	gy	**STONE (Coarse Basalt - Oiled)**	FILL			
						1.67	og	**STONE, some Sand**				
							rb	**SILT & SAND(f), some Gravel**				
5' to 7'	6	5	4	6	Damp			**SILT & SAND & Fragmented SILTSTONE, tr. Clay**	TILL	2	24"	12"
7' to 8'-4"	18	9	50/4"		Damp			**SILTSTONE Rock Fragments, little Silty Sand**		3	16"	12"
						8.00						
10' to 10'-2"	50/2"				Dry		rb	**SILTSTONE**	ROCK	4	2"	2"
						10.75						
								Auger Refusal @ 10.75				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.490N 72°44.497W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 85 Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011
Water: None
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

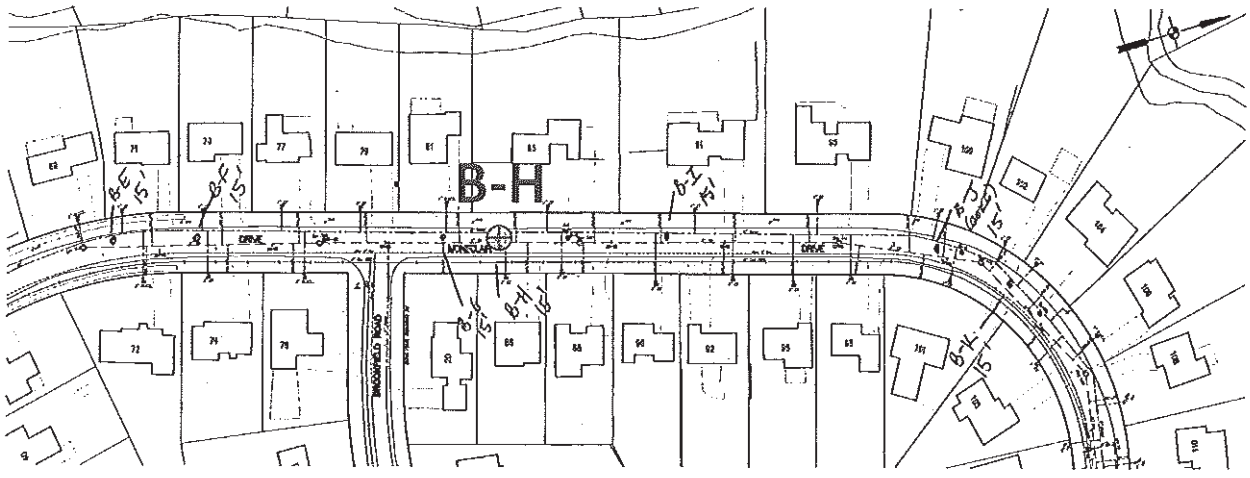
(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

SITElog® Report **B-H**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	14	10	8	7	Damp	0.21	bl	ASPHALT (2½" thick)		1	24"	3"
						0.54	bl	STONE (Oiled)	FILL			
						1.25	og	STONE (Processed Basalt), little Sand				
5' 5' to 7'	4	8	9	29	Moist		rb	SILT & SAND, some Weathered Siltstone Frags., trace Clay	TILL	2	24"	22"
						6.50						
							rb	SILTSTONE	ROCK			
10' 10' to 10'-2"	50/2"				Dry	10.42				3	2"	2"

Auger Refusal @ 10.42

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.498N 72°44.494W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

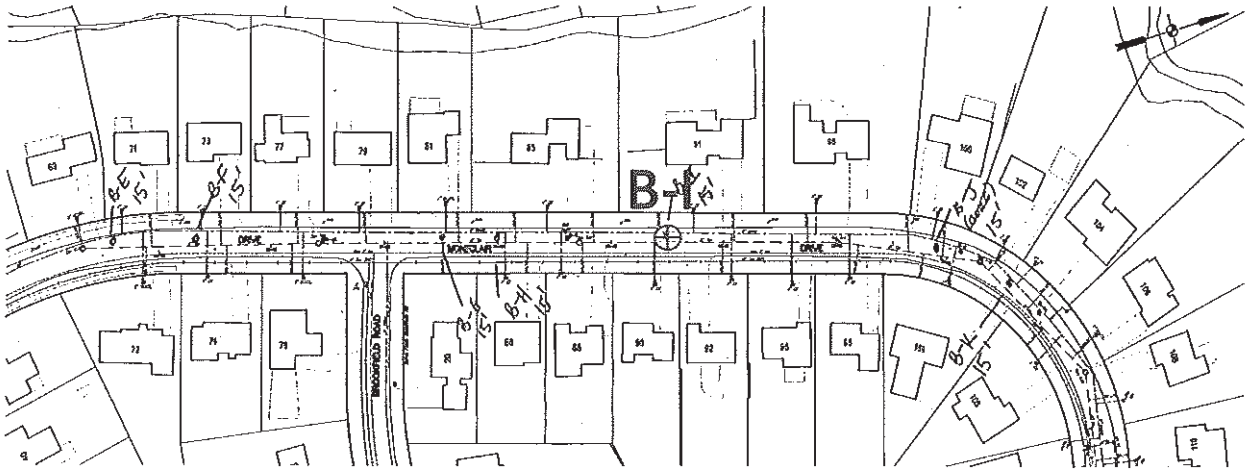
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 91 Montclair Drive, West Hartford, CT
Date: Friday, 4 March 2011
Water: 6'-0"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-1**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	5	8	7	8	Damp	0.25	bl	ASPHALT (3" thick)		1	24"	22"
						0.67	gy/br	STONE, little Sand (Oiled)				
						1.17	og	SAND, little Processed Stone	FILL			
						2.50	rb	SAND(f) & SILT, little Stone				
5' 5' to 7'	3	4	5	8	Moist	4.00	br	SAND(f), some Silt, little Gravel		2	24"	23"
							br	SILT, trace Clay				
							rb	SILT, trace Clay	FINES			
						7.75						
							rb	SAND & SILT, some Fragmented Stone, Clay				
10' 10' to 10'-9"	8	50/3"			Wet				TILL	3	9"	9"
						10.50						
						11.50	rb	SILTSTONE	ROCK			
								Auger Refusal @ 11.50				
15'												
20'												
25'												
30'												
35'												

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.524N 72°44.485W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

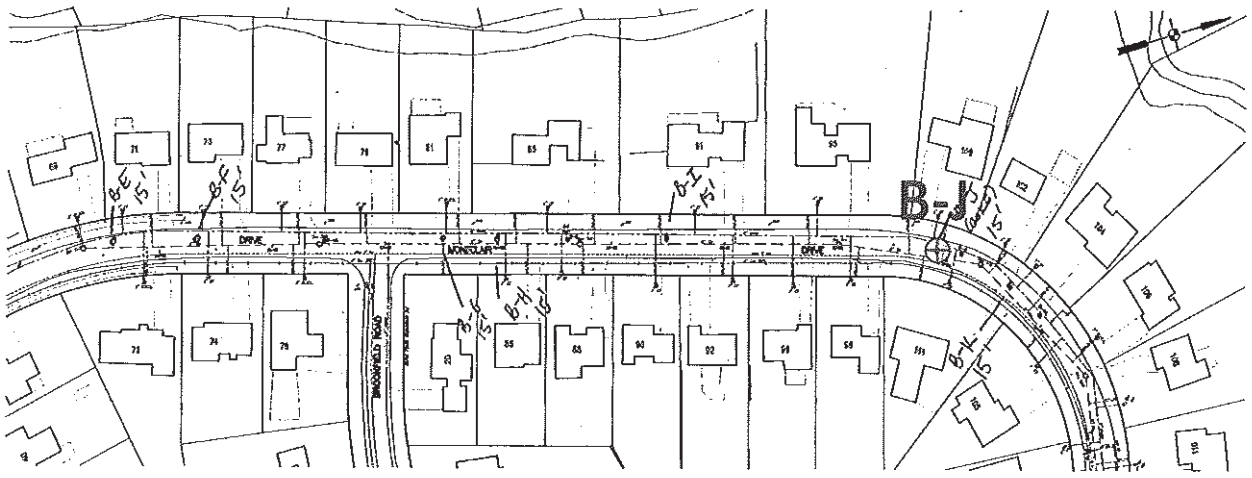
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 100 Montclair Drive, West Hartford, CT
Date: Monday, 7 March 2011
Water: 1'-3" * Perched?
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-J**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	5	5	4	2	Wet	0.33	bl	ASPHALT (4" thick)		1	24"	17"
						0.67	gy	STONE (Basalt - Oiled)				
						1.50	og	SAND, some Processed Basalt Stone				
							xb	SILT & SAND, some Stone, little Clay	FILL			
5' 5' to 7'	0	1	1	1	Wet			CLAY & SILT, some Sand, little Gravel		2	24"	7"
						8.00						
							xb	SAND(f) & SILT, some Stone Fragments (Siltstone & Basalt)	TILL			
10' 10' to 12'	11	21	25	36	Damp					3	24"	22"
						12.17						
							xb	SILTSTONE				
14' to 19'	C	O	R	E	Min.	14.00				*4	60"	60"
15'					4.00		d,xb	Auger Refusal @ 14.00				
					3.50			* Nx Cored 14.00 to 19.00	ROCK			
					3.00			Recovered 60" of moderately fractured				
					3.00			Siltstone/Shale				
					4.00	19.00		RQD = 31%				
20'								End of Exploration @ 19.00				
25'												
30'												
35'								* Rock Core Strength Test Performed				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.546N 72°44.460W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 4.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 11 Montclair Drive, West Hartford, CT
Date: Friday, 4 March 2011
Water: 10'-6"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

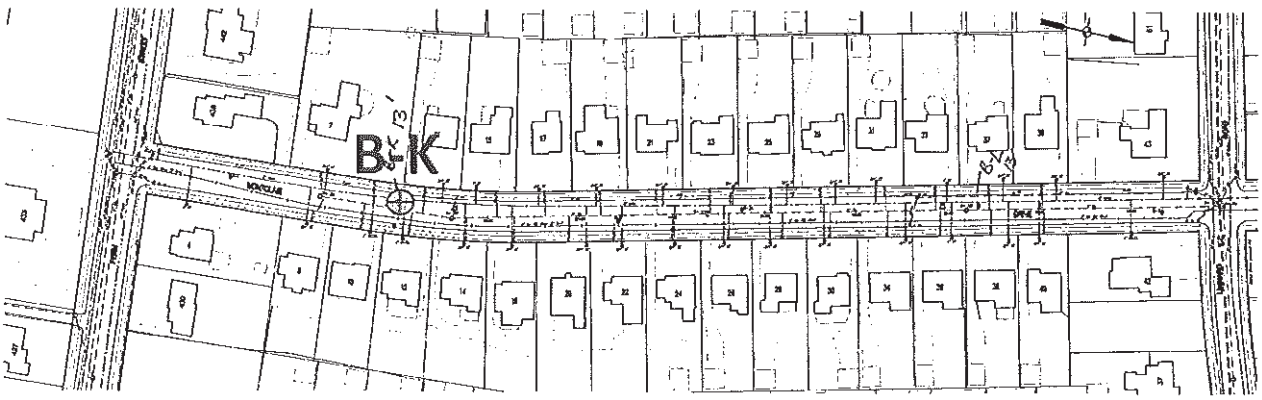
SITElog® Report **B-K**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	6	6	8	8	Damp	0.21	bl	ASPHALT (2½" thick)		1	24"	19"
						0.58	gy/br	STONE (Processed Basalt), little Sand	FILL			
						2.50	br	SAND(c-f), trace Gravel				
5' 5' to 7'	7	8	15	16	Damp		rb	SAND & SILT, little Stone Fragments		2	24"	24"
									TILL			
10' 10' to 12'	15	15	18	68	Damp			SAND(f) & SILT & Fragmented STONE (Siltstone)		3	24"	23"
						11.75						
						12.50	rb	SILTSTONE	ROCK?			

Auger Refusal @ 12.50

15' 20' 25' 30' 35'

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.212N 72°44.452W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

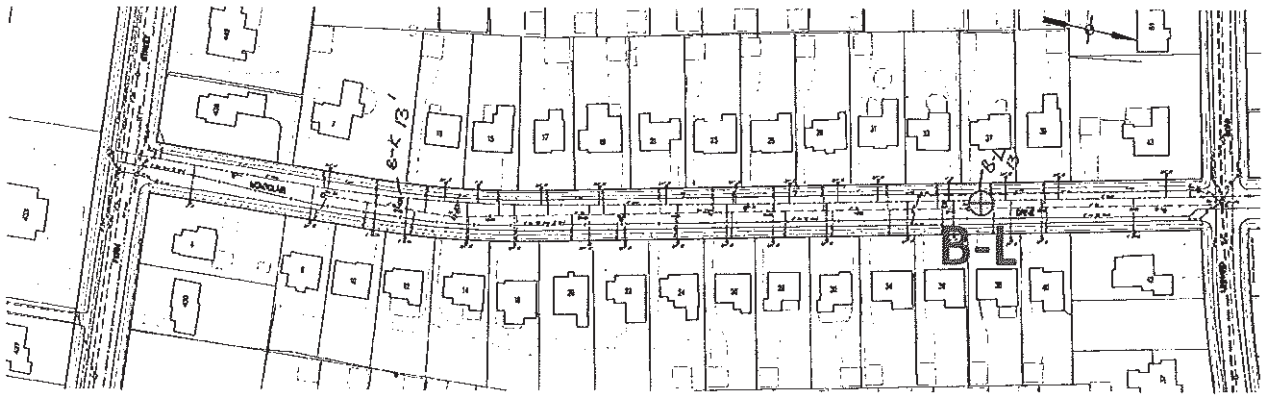
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 38 Montclair Drive, West Hartford, CT
Date: Friday, 4 March 2011
Water: 8'-6"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-L**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	7	7	24	14	Damp	0.25	bl	**ASPHALT (3" thick)**		1	24"	15"
						0.58	d.br	**SAND, some Silt, Basalt Stone**				
							rb/br	**SAND & SILT, little Stone, Gravel, occas. Cobble**	FILL			
5' 5' to 7'	4	6	7	10	Damp	4.50				2	24"	24"
							rb	**SILT, trace Gravel, Clay**				
7' to 9'	12	17	21	18	Damp	6.75				3	24"	22"
							rb	**SAND, some Silt, Stone Fragments**				
10' 10' to 12'	6	7	9	8	Wet			**SAND(c-f), some Silt, Gravel, little Clay**	TILL	4	24"	23"
12' to 14'	12	18	26	23	Moist			**SAND(m-f) & SILT, some Stone Frags., trace Clay**		5	24"	23"
						14.00						
15'								**End of Exploration @ 14.00**				

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.313N 72°44.474W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

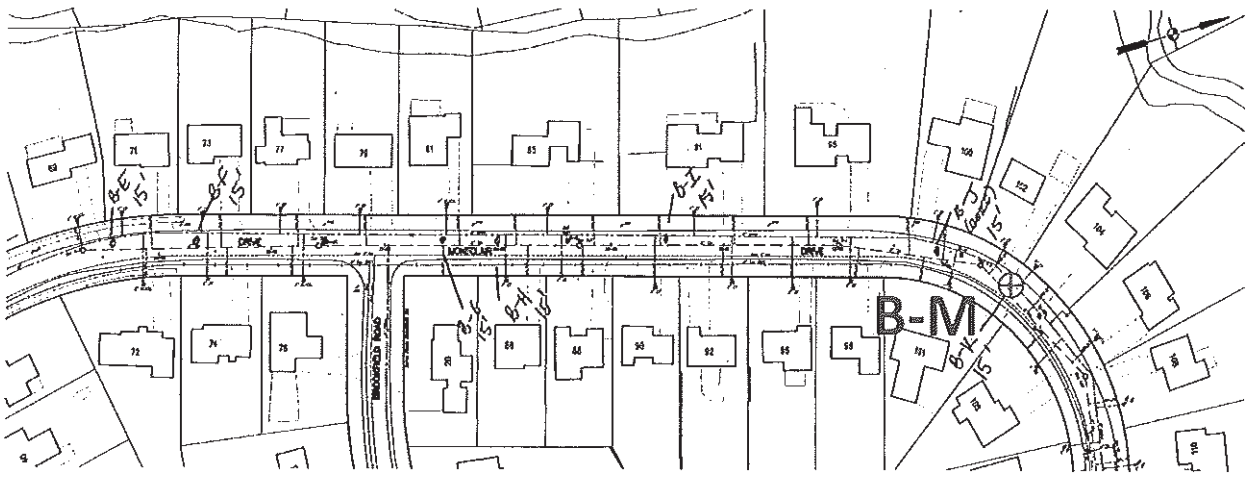
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: 101 Montclair Drive, West Hartford, CT
Date: Friday, 4 March 2011
Water: 8'-3"
Ground Elev.:
Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **B-M**

Depth	Blows per 6"				Moisture	Changes	Color	DESCRIPTION OF FINDINGS	General	No.	Pen.	Rec.
1' to 3'	10	15	12	7	Dry	0.37	bl	ASPHALT (4½" thick)		1	24"	3"
						0.83	gy/br	STONE, little Sand (Oiled)				
						2.50	og	SAND, some Processed Basalt Stone				
5' 5' to 7'	5	3	2	2	Dry		rb	SAND, some Gravel, Clay	FILL	2	24"	16"
						5.50						
							br	SAND(c-m), little Gravel(f) Bedding Material?				
						8.75						
10' 10' to 11'-9"	8	8	17	50/3"	Wet		d.rb	SAND & Fragmented SILTSTONE, Clay	TILL?	3	21"	18"
						11.00						
							rb	SILTSTONE	ROCK			
						12.50						
15'								Auger Refusal @ 12.50				
20'												
25'												
30'												
35'												

KEY bl - black w - white gy - grey tn - tan ro - rust/orange ob - olive/brown og - olive/grey d. - dark l. - light l/w -layered with m/w -mixed with



Fill
Organics
Subsoil
Silt
Silty Sand
Clay
Sand
Gravel
Cobble
Till
Rock
Water
SPT
Curb Box
Riser
Bentonite
Screen

GPS Coor: 41°46.568N 72°44.455W
Driller Name: J. DeAngelis, III
Helper Name: J. DeAngelis, Jr.
Drill Equip: CME 75
Hammer Wgt: 140# CME Auto
Sampler: 2" O.D. Lynac
Casing: 2.25" H.S.A.

DISCLAIMER: Some GPS coord., descriptions and boundaries are not guaranteed.

MT Group
MATERIALS TESTING

Client:	Site, LLC	**Report #:**	001
	63 Lancaster Drive	**Date**	03/11/11
	Beacon Falls, CT 06403	**WO#**	
Project:	Montclair Drive West Hartford, CT Project # 11005		
Sample:	Mudstone/Shale Stone Core		
Sampled By:	Client, John DeAngelis	**Lab #:**	10358
Inspector	Core samples were supplied by client		

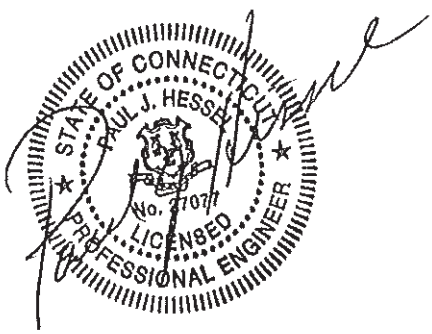
CONCRETE CORE SAMPLES COMPRESSION TEST

PROCEDURE: The submitted samples were tested dry

Core #	Dia. Inch.	Original length Inch.	Length Capped Inch.	L/D Ratio	Area sq. Inch	Max. Load lbs.	P.S.I	L/D Factor	Comp. Strength Psi
BF	1.87	8.50	3.53	1.89	2.75	17370	6320	1.00	6320
BJ-1	1.87	5.75	2.85	1.52	2.75	22570	8210	0.96	7880
BJ-2	1.87	4.50	2.85	1.52	2.75	31380	11410	0.96	10950

Reported To: Site, LLC

Submitted By: MT Group, LLC



SITE LLC
Sub-surface Investigations, Technology & Experience

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

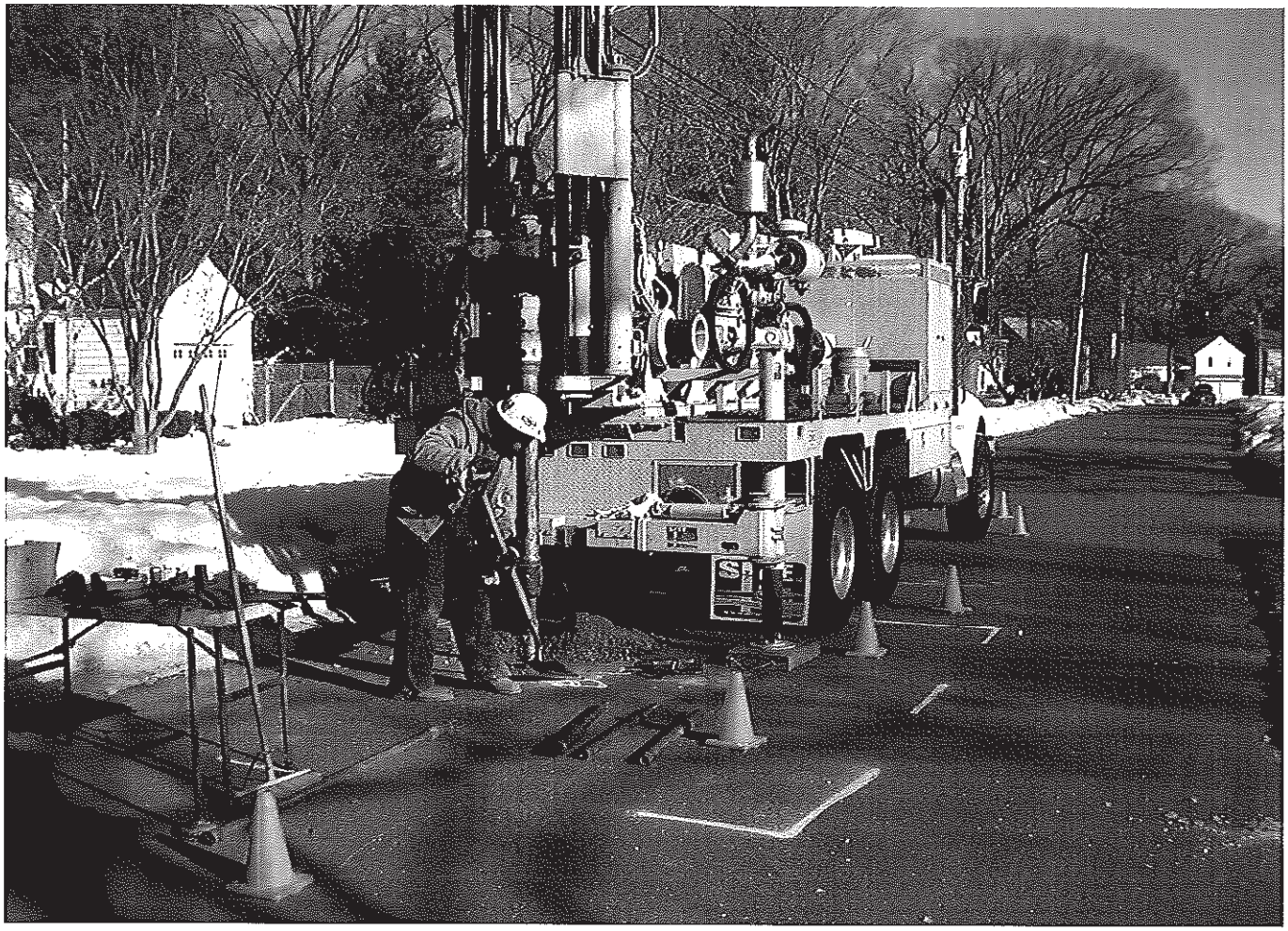
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: Montclair Drive, West Hartford, CT

Date: Thursday, 3 March 2011

Project Manager: Jessica Coelho Contract #2009-19

SITElog® Report **SITEpics**



Sub-surface Investigations, Technology + Experience

Soil Borings * Rock Coring * Concrete Coring * Monitor Wells * Geoprobe * Recovery Wells * SITELog Reports

SITE LLC
Sub-surface Investigations Technology & Experience

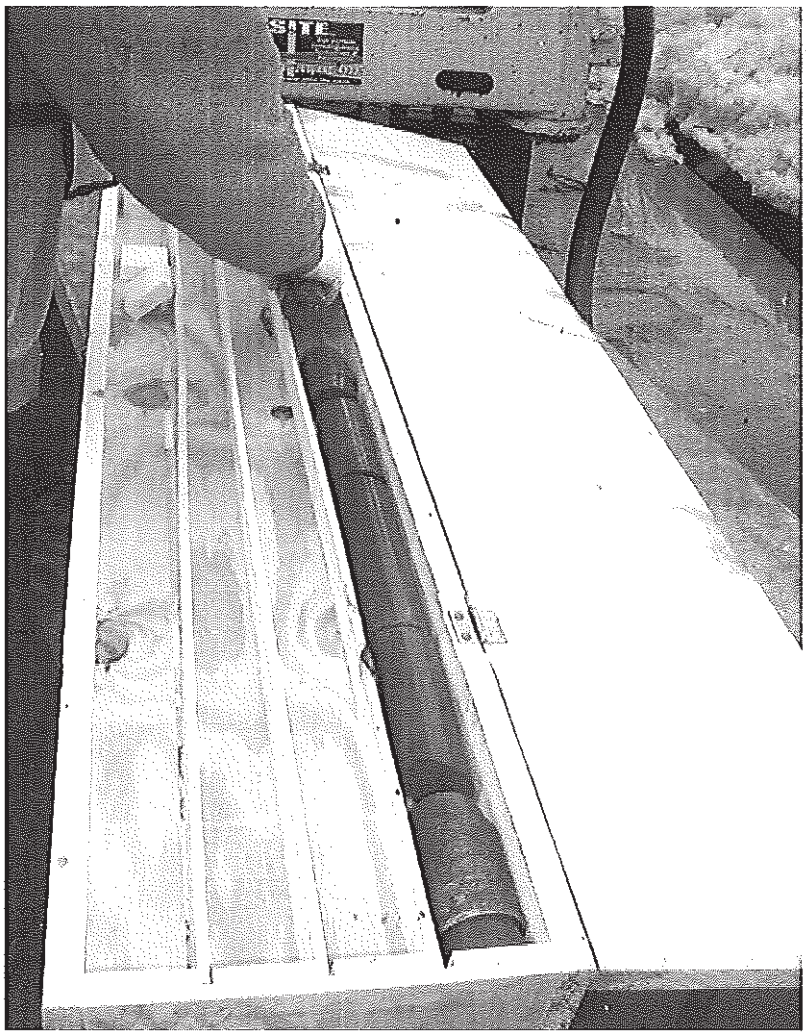
Client: **THE METROPOLITAN DISTRICT**
555 MAIN STREET
HARTFORD, CT 06142

Project: Montclair Drive, West Hartford, CT
Date: Thursday, 3 March 2011

Project Manager: *Jessica Coelho* Contract #2009-19

(203) 490-4777 63 Lancaster Drive, Beacon Falls Connecticut 06403 www.site-llc.com

SITElog® Report **SITEpics**



Sub-surface Investigations, Technology + Experience

Soil Borings * Rock Coring * Concrete Coring * Monitor Wells * Geoprobe * Recovery Wells * SITELog Reports

Appendix B

Well Construction and Boring Logs from MW1, MW2, MW3, and PZ4

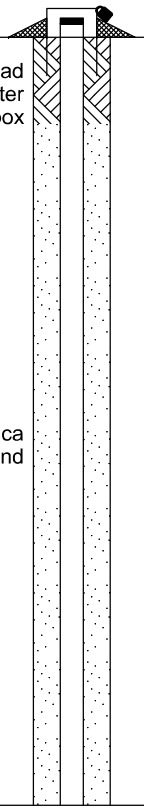
CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-1D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Surface Elevation (ft.): 93.00
Drilling Method/Rig: Drive & Wash/CME 55LC
Top of PVC Riser Elevation (ft.): 92.69
Drillers: P. McClenahan, C. Stamas
Total Depth (ft.): 20
Drilling Date: Start: 2/3/2022 **End:** 2/3/2022
Depth to Initial Water Level (ft. BGS): 8.82
Logged By: D. Roth
Development Method: Surge and Purge via Whale Pump
Field Screening Instrument: PID

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)
								93.0 / 0 Ground Surface
						ASPHALT(0-0.8') ASPHALT		
						(0.8-2') No sample collected, airknife/vac to 2' BGS.		
HA	S-1	0.0	NA	6/6	ML	(2-2.5') Moist to wet, brown, SILT, little clay, trace fine sand.		
						(2.5-4) No sample collected, airknife/vac to 4' BGS.		
HA	S-2	0.0	NA	6/6	CL-ML	(4-4.5') Moist to wet, light brown, CLAYEY SILT.		
						(4.5-6') No sample collected, airknife/vac to 6' BGS.		88.0 / 5
HA	S-3	0.0	NA	6/6	CL-ML	(6-6.5') Moist to wet, light brown, CLAYEY SILT.		
						(6.5-14') Terminate airknife/vac at 6.5' BGS. Drive temporary steel casing (4" ID) and rollerbit (3.785") to 14' BGS.		



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-1D was installed in the same borehole as MW-1S
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-1D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								83.0 / 10	(9-11') Medium Bentonite Chips
									(11-17') #2 Silica Sand
SS	S-4	0.0	5 15 36 18	24/16	CLG	(14-16') Top 6": Wet, hard, light brown, SILT & CLAY, trace fine sand. Bottom 10": Wet, very dense, red-brown, coarse to fine GRAVEL (weathered rock), some coarse to fine sand, little silt and clay.		78.0 / 15	(12-17') 2" (.01") Slot Schedule 40 PVC Screen
SS	S-5	0.0	9 14 39 50/0"	24/0		(16-18') No Recovery			Bottom of Well at 17' BGS
						(18-20') Advance rollerbit (3.785") to refusal at 20' BGS. Borehole collapsed 18-20' BGS.			(17-20') Slough Backfill
						End of Exploration at 20' BGS		73.0 / 20	
								68.0 / 25	

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

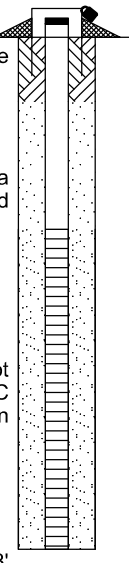
MONITORING WELL DETAIL
MW-1S

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Drilling Method/Rig: Drive & Wash/CME 55LC
Drillers: P. McClenahan, C. Stamas
Drilling Date: Start: 2/3/2022 **End:** 2/3/2022
Logged By: D. Roth
Field Screening Instrument: PID

Surface Elevation (ft.): 93.00
Top of PVC Riser Elevation (ft.): 92.73
Total Depth (ft.): 8
Depth to Initial Water Level (ft. BGS): 7.72
Development Method: Surge and Purge via Whale Pump

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)
								93.0 / 0
						ASPHALT(0-0.8') ASPHALT		
						(0.8-2') No sample collected.		
HA	S-1	0.0	NA	6/6	ML	(2-2.5') Moist to wet, brown, SILT, little clay, trace fine sand.		
						(2.5-4') No sample collected.		
HA	S-2	0.0	NA	6/6	CL-ML	(4-4.5') Moist to wet, light-brown, CLAYEY SILT.		
						(4.5-6') No sample collected.		88.0 / 5
HA	S-3	0.0	NA	6/6	CL-ML	(6-6.5') Moist to wet, light-brown, CLAYEY SILT.		
						(6.5-8') No sample collected.		
						End of Exploration at 8' BGS.		83.0 / 10



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-1S was installed in the same borehole as MW-1D
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

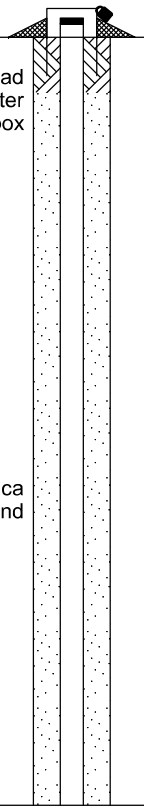
CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-2D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Surface Elevation (ft.): 90.00
Drilling Method/Rig: Drive & Wash/CME 55LC
Top of PVC Riser Elevation (ft.): 89.67
Drillers: P. McClenahan, C. Stamas
Total Depth (ft.): 31
Drilling Date: Start: 2/3/2022 **End:** 2/3/2022
Depth to Initial Water Level (ft. BGS): 7.23
Logged By: D. Roth
Development Method: Surge and Purge via Whale Pump
Field Screening Instrument: PID

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
									Protective Casing Top of Riser @ 89.67 ft.
								90.0 0	*Ground Surface*
					ASPHALT	(0-0.7') ASPHALT			
						(0.7-2') No sample collected, airknife/vac to 2' BGS.			(0-1') Concrete pad with 8" diameter roadbox
HA	S-1	0.0	NA	6/6	GW	(2-2.5') Dry, brown to light-brown, coarse to fine GRAVEL, some coarse to fine sand, little silt.			
						(2.5-4') No sample collected, airknife/vac to 4' BGS.			
HA	S-2	0.0	NA	6/6	CL-ML	(4-4.5') Wet, light-brown, CLAYEY SILT.			
						(4.5-6') No sample collected, airknife/vac to 6' BGS. Terminate vac at 6' BGS. Drive temporary steel casing (4" ID) and rollerbit (3.785") to 6' BGS.		85.0 5	
SS	S-3	0.0	WOH WOH 2 2	24/18	CL-ML	(6-8') Wet, very soft, red-brown, SILT & CLAY.			
SS	S-4	0.0	1 2 2 1	24/16	CL-ML	(8-10') Wet, very soft, red-brown, SILT & CLAY.			(1-18') #2 Silica Sand
								80.0 10	
						(10-14') Advance rollerbit (3.785") to 14' BGS.			



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-2D was installed in the same borehole as MW-2S
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

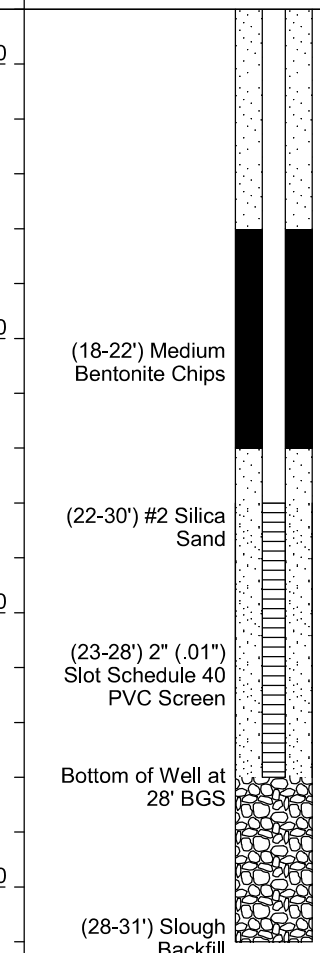
BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-2D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)
SS	S-5	0.0	WOH WOH WOH WOH	24/20	CL-ML	(14-16') Wet, very soft, red-brown, SILT & CLAY.		75.0 15
						(16-19') Advance rollerbit (3.785") to 19' BGS.		
SS	S-6	0.0	WOH 2 2 3	24/17	CL-ML	(19-21') Top 11": Wet, very soft to medium stiff, red-brown, SILT & CLAY. Bottom 6": Wet, very soft, red-brown, SILT & CLAY to CLAYEY SILT, little fine sand, trace fine gravel.		70.0 20
						(21-25') Advance rollerbit (3.785") to 25' BGS.		
SS	S-7	0.0	13 12 12 12	24/12	SW	(25-27') Top 3" Wet, medium dense, red-brown, coarse to fine SAND, little medium to fine gravel and silt. Middle 6": Wet, stiff, red-brown, SILT, little fine gravel.		65.0 25
SS	S-8	0.0	12 10 8 5	24/11	SW	Bottom 3": Wet, medium dense, red-brown, coarse to fine SAND, little silt.		
						(27-29') Wet, medium dense, light-brown, coarse to fine SAND, some silt.		60.0 30
						(30-31') Advance rollerbit (3.785") to 31' BGS. Borehole collapsed from 28-31' BGS.		
						End of Exploration at 31' BGS.		55.0 35
								50.0 40



Well Construction Detail

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-2S

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Drilling Method/Rig: Drive & Wash/CME 55LC
Drillers: P. McClenahan, C. Stamas
Drilling Date: Start: 2/3/2022 **End:** 2/3/2022
Logged By: D. Roth
Field Screening Instrument: PID

Surface Elevation (ft.): 90.00
Top of PVC Riser Elevation (ft.): 89.25
Total Depth (ft.): 8
Depth to Initial Water Level (ft. BGS): 2.65
Development Method: Surge and Purge via Whale Pump

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
									Protective Casing Top of Riser @ 89.25 ft.
								90.0 0	*Ground Surface*
					ASPHALT	(0-0.7') ASPHALT			(0-1') Concrete
						(0.7-2') No sample collected.			
HA	S-1	0.0		6/6	GW	(2-2.5') Dry, brown to light-brown, coarse to fine GRAVEL, some coarse to fine sand, little silt.			(1-8') #2 Silica Sand
						(2.5-4') No sample collected.			
HA	S-2	0.0		6/6	CL-ML	(4-4.5') Wet, light-brown, CLAYEY SILT.			
						(4.5-6') No sample collected.		85.0 5	(3-8') 1" (.01") Slot Schedule 40 PVC Screen
SS	S-3	0.4	WOH WOH 2 2	24/18	CL-ML	(6-8') Wet, very soft, red-brown, SILT & CLAY.			
						End of Exploration at 8' BGS.			Bottom of Well at 8' BGS
								80.0 10	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
AH - Air Hammer
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-2S was installed in the same borehole as MW-2D
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

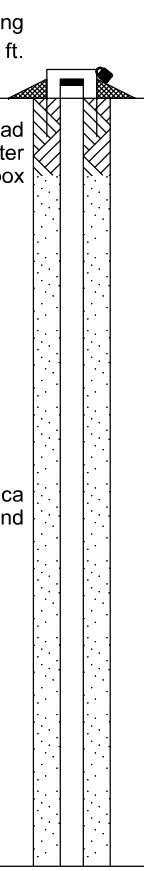
MONITORING WELL DETAIL
MW-3D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Drilling Method/Rig: HSA/CME 55LC
Drillers: P. McClenahan, C. Stamas
Drilling Date: Start: 2/2/2022 **End:** 2/2/2022
Logged By: D. Roth
Field Screening Instrument: PID

Surface Elevation (ft.): 86.00
Top of PVC Riser Elevation (ft.): 85.46
Total Depth (ft.): 27
Depth to Initial Water Level (ft. BGS): 7.49
Development Method: Surge and Purge via Whale Pump

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)
								86.0 / 0
						ASPHALT(0-0.8') ASPHALT		
						(0.8-2') No sample collected, airknife/vac to 2' BGS.		
HA	S-1	0.0	NA	6/6	GW	(2-2.5') Dry, brown to light-brown, coarse to fine GRAVEL, some coarse to fine sand, little silt.		
						(2.5-4') No sample collected, airknife/vac to 4' BGS.		
HA	S-2	0.0	NA	6/6	CL-ML	(4-4.5') Wet, light brown, CLAYEY SILT.		
						(4.5-6') No sample collected, airknife/vac to 6' BGS. Terminate vac at 6' BGS. Advance HSA (4.25" ID) to 6' BGS.		81.0 / 5
SS	S-3	0.0	WOH 3 15/3"	24/8	SW-SM	(6-8') Top 2": Moist to wet, stiff, CLAYEY SILT, trace fine gravel. Bottom 6": Moist, red-brown, very dense, coarse to fine SAND, some silt.		
						(8-10') Advance HSA (4.25" ID) to 10' BGS.		76.0



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-3D was installed in the same borehole as MW-3S
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-3D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								76.0	
SS	S-4	0.0	1 1 2 1	24/18	CL-ML	(10-12') Wet, brown to grey, very soft, SILT & CLAY.		10	
						(12-15') Advance HSA (4.25" ID) to 15' BGS.			(11-13') Medium Bentonite Chips
								71.0	
SS	S-5	0.0	WOH WOH WOH WOH	24/18	CL-ML	(15-17') Wet, brown to grey, very soft, SILT & CLAY, little fine sand. FeO staining in bottom 2".		15	(13-25') #2 Silica Sand
						(17-20') Advance HSA (4.25" ID) to 20' BGS.			
								66.0	
SS	S-6	0.0	WOH WOH WOH WOH	24/20	CL-ML	(20-22') Wet, red-brown, very soft, SILT & CLAY.		20	
						(22-25') Advance HSA (4.25" ID) to 25' BGS.			(15-25') 2" (.01") Slot Schedule 40 PVC Screen
								61.0	Bottom of Well at 25' BGS
SS	S-7	0.0	WOH WOH WOH WOH	24/20	CL-ML	(25-27') Wet, red-brown, very soft, SILT & CLAY.		25	(25-27') Slough Backfill
						End of Exploration at 27' BGS.			
								56.0	

CDM Smith
75 State Street Suite 701
Boston, MA 02109

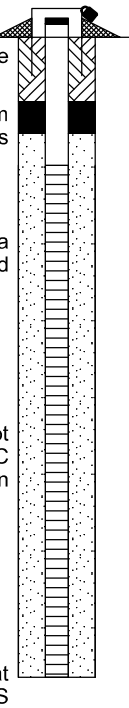
MONITORING WELL DETAIL
MW-3S

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Drilling Method/Rig: HSA/CME 55LC
Drillers: P. McClenahan, C. Stamas
Drilling Date: Start: 2/2/2022 **End:** 2/2/2022
Logged By: D. Roth
Field Screening Instrument: PID

Surface Elevation (ft.): 86.00
Top of PVC Riser Elevation (ft.): 85.75
Total Depth (ft.): 10
Depth to Initial Water Level (ft. BGS): 6.77
Development Method: Surge and Purge via Whale Pump

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Elev. / Depth (ft.)
					ASPHALT	(0-0.8') ASPHALT	86.0 / 0
						(0.8-2') No sample collected.	
HA	S-1	0.0	NA	6/6	GW	(2-2.5') Dry, brown to light-brown, corase to fine GRAVEL, some coarse to fine sand, little silt.	
						(2.5-4') No sample collected.	
HA	S-2	0.0	NA	6/6	CL-ML	(4-4.5') Wet, light brown, CLAYEY SILT.	
						(4.5-6') No sample collected.	81.0 / 5
SS	S-3	0.0	WOH 3 15/3"	24/8	SW-SM	(6-8') Top 2": Moist to wet, stiff, CLAYEY SILT, trace fine gravel. Bottom 6": Moist, red-brown, very dense, coarse to fine SAND, some silt.	
						(8-10') No sample collected.	
						End of Exploration at 10' BGS.	76.0 / 10



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-3S was installed in the same borehole as MW-3D
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-4D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

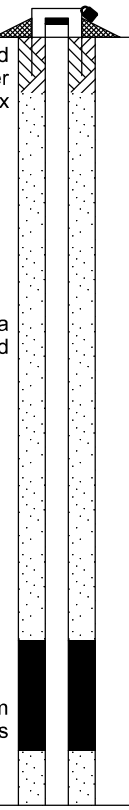
Drilling Contractor: Geosearch, Inc
Drilling Method/Rig: HSA/CME 55LC
Drillers: P. McClenahan, C. Stamas
Drilling Date: Start: 2/2/2022 **End:** 2/2/2022
Logged By: D. Roth/N. Castonguay
Field Screening Instrument: PID

Surface Elevation (ft.): 80.00
Top of PVC Riser Elevation (ft.): 79.52
Total Depth (ft.): 34
Depth to Initial Water Level (ft. BGS): 5.02
Development Method: Surge and Purge via Whale Pump

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Elev. / Depth (ft.)
SS	S-1	NM	16 15 11 11	24/24	SP-SM	(0-2') Top 3": Dry, medium dense, light-brown, fine SAND & SILT, trace organic material. Bottom 21": Dry, medium dense, red-rown, fine SAND & SILT, little coarse to medium sand, trace coarse to fine gravel.	80.0 / 0
SS	S-2	NM	7 6 9 7	24/14	SW	(2-4') Top 7": Dry, medium dense, red-brown, fine SAND, some silt, trace fine gravel. Bottom 7": Dry, medium dense, red-brown, coarse to fine SAND.	
SS	S-3	NM	5 9 5 3	24/17	SW	(4-6') Dry to moist, medium dense, red-brown, coarse to fine SAND, some silt, little fine gravel.	75.0 / 5
SS	S-4	NM	1 1 1 1	24/24	CL-ML	(6-8') Top 5": Dry to moist, very loose, red-brown, coarse to fine SAND, some silt, little fine gravel. Bottom 19": Wet, very soft, light grey to red-brown, SILT & CLAY. Perched water table ~ 7 ft BGS.	
SS	S-5	NM	WOH WOH WOH WOH	24/22	CL-ML	(8-10') Wet, very soft, light-grey to red-brown, SILT & CLAY.	70.0 / 10
SS	S-6	NM	WOH WOH WOH WOH	24/17	CL-ML	(10-12') Wet, very soft, light-grey to red-brown, SILT & CLAY.	
SS	S-7	NM	WOH WOH WOH WOH	24/24	CL-ML	(12-14') Wet, very soft, light-grey to red-brown, SILT & CLAY.	

Graphic Log

Well Construction Detail



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
NM= Not Measured
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-4D was installed in the same borehole as MW-4S
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

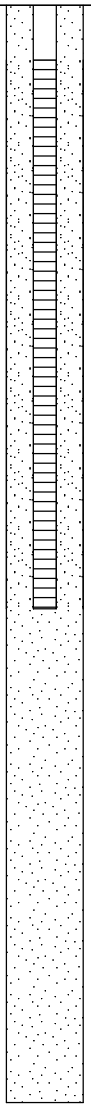
BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-4D

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
SS	S-8	NM	WOH WOH WOH WOH	24/22	CL-ML	(14-16') Wet, very soft, light-grey to red-brown, SILT & CLAY.		65.0 15	
SS	S-9	NM	WOH WOH WOH 2	24/24	CL-ML	(16-18') Wet, very soft, light-grey to red-brown, SILT & CLAY.			(13-34') #2 Silica Sand
SS	S-10	NM	WOH WOH WOH WOH	24/24	CL-ML	(18-20') Wet, very soft, light-grey to red-brown, SILT & CLAY.		60.0 20	
SS	S-11	NM	WOH WOH WOH WOH	24/24	CL-ML	(20-22') Wet, very soft, light-grey to red-brown, SILT & CLAY.			(15-25') 2" (.01") Slot Schedule 40 PVC Screen
SS	S-12	NM	WOH WOH WOH WOH	24/24	CL-ML	(22-24') Wet, very soft, light-grey to red-brown, SILT & CLAY.			
SS	S-13	NM	WOH WOH WOH WOH	24/24	CL-ML	(24-26') Wet, very soft, light-grey to red-brown, SILT & CLAY.		55.0 25	Bottom of Well at 25' BGS
SS	S-14	NM	2 2 3 2	24/24	CL-ML	(26-28') Wet, medium stiff, light-grey to red-brown, SILT & CLAY.			
SS	S-15	NM	WOH WOH WOH 3	24/14	CL-ML	(28-30') Top 12": Wet, very soft, red-brown, SILT & CLAY. Bottom 2": Wet, very soft, red-brown, SILT, some clay.		50.0 30	
SS	S-16	NM	2 4 9 10	24/15	CL-ML	(30-32') Wet, medium stiff, red-brown, SILT, some to little clay.			
SS	S-17	NM	10 12 36 36	24/12	CL-ML	(32-34') Wet, very dense, red-brown, fine SAND & SILT, some clay, little to trace fine gravel & coarse sand (TILL).			
						End of Exploration 34' BGS.		45.0 35	Bottom of Borehole at 34' BGS
								40.0 40	



BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22

CDM Smith

75 State Street Suite 701
Boston, MA 02109

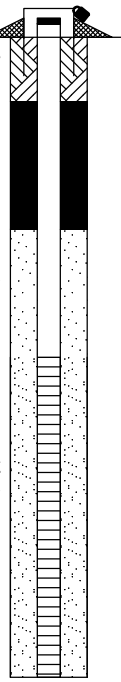
MONITORING WELL DETAIL
MW-4S

Client: Town of West Hartford, CT
Project Name: Linbrook Road Area Groundwater Study
Project Location: Linbrook Road
Project Number: 268609

Drilling Contractor: Geosearch, Inc
Drilling Method/Rig: HSA/CME 55LC
Drillers: P. McClenahan, C. Stamas
Drilling Date: Start: 2/2/2022 **End:** 2/2/2022
Logged By: D. Roth/N. Castonguay
Field Screening Instrument: PID

Surface Elevation (ft.): 80.00
Top of PVC Riser Elevation (ft.): 79.21
Total Depth (ft.): 10
Depth to Initial Water Level (ft. BGS): 4.93
Development Method: Surge and Purge via Whale Pump

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Elev. / Depth (ft.)
							80.0 / 0
SS	S-1	NM	16, 15, 11, 11	24/24	SP-SM	(0-2') Top 3": Dry, medium dense, light-brown, fine SAND & SILT, trace organic material. Bottom 21": Dry, medium dense, red-rown, fine SAND & SILT, little coarse to medium sand, trace coarse to fine gravel.	
SS	S-2	NM	7, 6, 9, 7	24/14	SW	(2-4') Top 7": Dry, medium dense, red-brown, fine SAND, some silt, trace fine gravel. Bottom 7": Dry, medium dense, red-brown, coarse to fine SAND.	
SS	S-3	NM	5, 9, 5, 3	24/17	SW	(4-6') Dry to moist, medium dense, red-brown, coarse to fine SAND, some silt, little fine gravel.	75.0 / 5
SS	S-4	NM	1, 1, 1, 1	24/24	CL-ML	(6-8') Top 5": Dry to moist, very loose, red-brown, coarse to fine SAND, some silt, little fine gravel. Bottom 19": Wet, very soft, light grey to red-brown, SILT & CLAY. Perched water table ~ 7 ft BGS.	
SS	S-5	NM	WOH, WOH, WOH, WOH	24/22	CL-ML	(8-10') Wet, very soft, light-grey to red-brown, SILT & CLAY.	70.0 / 10
						End of Exploration at 10' BGS.	



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS= Below Ground Surface
PID= Photoionization Detector
ID= Inside Diameter
NM= Not Measured
Depth to initial water level recorded on 2/11/2022 prior to well development
MW-4S was installed in the same borehole as MW-4D
Ground surface and top of PVC riser elevations are approximate

Reviewed by: N.Castonguay, PG **Date:** 05/25/22

BEEBE MW LOG LINBROOK RD MW LOGS.GPJ CDM_MA.GDT 5/27/22