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CH2MHILL

May 1, 2015

Ms. Gail Dieter
New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau E, Section B
625 Broadway, 12th Floor
Albany, NY 12233-7017

Subject: Results of the Sediment Post-Removal Verification Sample Core Collection, Former Hampshire Chemical Corp. Facility Area of Concern A – Sediment Removal Project, Waterloo, New York

Dear Ms. Dieter:

Hampshire Chemical Corp. (HCC) is pleased to submit the attached technical memorandum titled *Results of the Sediment Post-Removal Verification Sample Collection, Former Hampshire Corp. Facility Area of Concern A – Sediment Removal Project, Waterloo, New York.* As discussed by telephone earlier this week, this document summarizes the scope of work and results of a limited coring program that was performed in the Gorham Street and Downstream deposits of the AOC A – Sediment Removal Project to determine the reason for shallower than anticipated refusal during the removal action.

HCC would like to schedule a conference call for early next week to discuss the conclusions and plan to complete the removal within these two areas. We will be in contact to determine a mutually agreeable time.

If you have any questions regarding this proposal or need additional information, please do not hesitate to call me at (610) 384-0747 or you can contact Jerome Cibrik at (304) 747-7788.

Sincerely,

CH2M HILL

Brian S. Carling, P.G.
Site Manager

cc: Denise Radtke, NYSDEC
Jerome Cibrik, HCC
CH2M HILL Project File

# Sediment Post-removal Verification Sample Core Collection, Former Hampshire Chemical Corp. Facility, Area of Concern A — Sediment Removal Project, Waterloo, New York

| | | |
|---|---|---|
| PREPARED FOR: | Hampshire Chemical Corp. | New York State Department of Environmental Conservation |
| PREPARED BY: | CH2M HILL | |
| DATE: | May 1, 2015 | |
| PROJECT NUMBER: | 482750 | |

This memorandum summarizes the coring conducted in April 2015 at the Former Hampshire Chemical Corp. (HCC) site, Area of Concern (AOC) A – Cayuga-Seneca Canal sediment removal project in Waterloo, New York. AOC A is a portion of Cayuga-Seneca Canal (canal), which also is known as the Seneca River and is part of the New York State canal system. The portion of AOC A where corrective measures are being performed is separated into three sediment depositional areas referred to as the North Shore Deposit, the Gorham Street Deposit, and the Downstream Deposit (Figure 1). Sediment removal activities were performed in 2014 and based on the sediment verification process, additional investigation was warranted in the Gorham Street and Downstream Deposits to determine the reason for shallower-than-anticipated refusal during dredging within these two areas.

The overall objective of the field investigation was to collect sediment core samples to determine if the material causing refusal within the Gorham Street and Downstream dredge management units (DMUs) of the AOC A sediment removal project is soil of glacial origin (either lacustrine deposits or till) that would constitute completion of dredging in these DMUs or if it is soft sediment that requires additional removal.

## Field Investigation Activities

CH2M HILL subcontracted Atlantic Testing Laboratories (ATL) of Canton, New York, to conduct the coring and analyze the samples collected for select geotechnical parameters. CH2M HILL staff onboard the vessel provided sampling oversight and recorded relevant information (e.g., field physical parameters, logging cores, and photographs).

Prior to sampling, a utility check was performed using the one-call utility-locating service, Dig Safely New York, Inc., to mark utility lines crossing the investigation reach. Sample cores were collected from locations with sufficient clearance from the identified utilities.

### Sediment Probing and Sampling Activities

The coring activities were performed on April 9 and 10, 2015. ATL performed global positioning system (GPS) calibrations and performed quality control (QC) checks twice a day, against the benchmark (BM5937) provided by CH2M HILL. The QA/quality control (QC) checks resulted in acceptable deviation within a 0.1-foot accuracy. Prior to mobilizing to the field, the coordinate locations for each sampling location were uploaded to the vessel's and personnel's Trimble R8 RTK-GPS.

**Sediment Thickness Assessment.** Soft sediment thickness at each sample location was measured using a push probe aboard ATL's 25-foot pontoon vessel. Sediment probing was conducted at each core location prior to collecting a sample using a 0.5-inch-diameter steel rod; the steel rod was pushed into the sediments up to refusal and the thickness was measured to 0.1-foot accuracy. Probing locations were geospatially positioned across the deposits and the final location was selected based on the presence of sufficient sediment for sampling. The sediment thicknesses measured using the probe rod are presented in Table 1.

In addition, water depths were measured at each location using a leveling rod with a 4- x 2-inch-rectangular plate affixed to the bottom of the pole. Water depth was measured from the water surface to the sediment surface (river bed) with 0.1-foot accuracy. All locations were surveyed with a Trimble R8 RTK-GPS (real-time kinetic-GPS). The Northing (x), Easting (y), and water surface elevation (z) of the probed/sampled locations, along with the sediment thickness, water depths, and observations are shown in Table 1.

Based on the probing, the sediment thickness ranged from 0.3 to 3.4 feet and the water depth ranged from 6.5 to 16.4 feet at probed/sampled locations. Although the core sampler could be driven further than the probe rod, sediment thickness values measured using probe rods were recorded to evaluate the presence of soft sediments.

**Sediment Coring and Sampling.** Nine sediment cores were collected from the Gorham Street and Downstream Deposits at locations presented on Figure 1. The coring was performed using a vessel-mounted tri-pod rig and a 140-pound cathead hammer that was used to advance a split soon sampler. A 3-inch diameter by 2.5-feet long Lexan-lined split spoon sampler was used to collect the samples. The split spoon was fitted with a nose cone and a core retainer to improve core retention and sample retrieval. This method utilizes a modified split spoon sampler (different length and diameter of split spoon than specified for Standard Penetration Tests [SPT]) designed to enhance sample volume recovery, thus SPT numbers could not be obtained. However, the blow counts from the modified method do represent the relative hardness encountered. The blow count number, geotechnical results, and visual lithologic descriptions provide the information needed to adequately assess the material encountered in the Gorham Street and Downstream Deposits.

Refusal was defined as a penetration rate of less than 3 inches of penetration at 50 blow counts. The number of cat head hammer blows (blow counts) were recorded and this blow count number was used to interpret the relative hardness of the material encountered. Core penetration depths ranged from 0.8 foot to 4.3 feet in length; however, the core recovery lengths ranged from 0.5 foot to 3.1 feet. The maximum penetration depth (4.3 feet) and recovery lengths (3.1 feet) were recorded in the “Finger area” of the Gorham Street Deposit.

Once the refusal depth was reached, the core sampler was pulled out and the split spoon sampler was opened for characterization. Opened cores were photographed and described with respect to general stratigraphy, sediment/soil type, apparent grain size, color, odor, plasticity, consistency, density, moisture, and any notable characteristics; the field core logs are contained in Attachment 1. The sediment characterization details were recorded in the field book and on the core logs.

The sediment sample locations, sample IDs, sample intervals, core penetration and refusal depths, water depths, latitude, longitude, and the visual observations noted are summarized in Table 1. If recoveries were limited, up to two attempts were made to collect the core sample from the proposed location. The second attempt was made within a 5-foot-diameter area of the planned core location if the first attempt did not achieve acceptable recovery.

After the core characterization was completed, the core was divided into appropriate sample intervals based on the lithologic stratifications. A total of 16 samples was collected from the nine core locations for geotechnical parameters following the procedures outlined in the previous section. Of the nine locations sampled, six sample locations were at the Gorham Street Deposit and three sample locations were at the Downstream Deposit. The material from each sample interval was transferred into Ziploc® plastic bags, labeled, and bagged for laboratory pickup. The samples were submitted to the laboratory for analysis of geotechnical parameters including grain size distribution with hydrometer (ASTM D422), Atterberg limits (ASTM D4318), and moisture content (ASTM 2216). All samples collected were sent to ATL for analysis and the results from the laboratory are presented in Attachment 2.

### Investigation-derived Waste and Decontamination

All solid and liquid wastes generated during this investigation were collected and placed within the sediment stockpiles at the staging area and will be disposed of at an appropriate landfill. All nondisposable sampling equipment was decontaminated using the following protocol:

- All equipment that was in direct contact with potentially impacted media was lightly decontaminated by ATL prior to beginning work, between locations, and prior to leaving the project area using Liquinox® and water wash.
- Miscellaneous investigation-derived waste (IDW) and personal protection equipment (PPE) was disposed at the temporary water treatment system by CH2M HILL.

## Site Geologic Conditions

Based on the geomorphic history of the Finger Lakes region and the associated surficial geology map (Muller and Caldwell, 1986), the Village of Waterloo area and the area of the site is expected to be underlain by lacustrine silt and clay. There are also several nearby contacts where alluvium, glacial till, and lacustrine sand lithologies are present. The local lithologic units are described on the legend of the surficial geologic map, which is presented as within Figure 2.

## Evaluation of Lithology and Geotechnical Results

Based on the field investigation results, the material encountered in the Gorham Street and Downstream areas was primarily glacial till, which was overlain by very thin to thin-soft sediment material (dredging remnants) that was largely observed only in the thinner "finger area" portion of the Gorham Street Deposit. The encountered material that was defined as glacial till was composed mainly of silt and clay with angular to subangular clasts throughout the matrix, which suggests an error in the local surficial geologic mapping (the area is underlain by till rather than lacustrine silt and clay).

The geotechnical results, provided in Attachment 2, agreed favorably with the onsite visual characterization of the glacial till with one exception; the geotechnical results indicate the till material is more silty than described in the field logs. Additionally, the presence of the glacial clasts are clearly represented in the gravel portions of the grain size distribution curves. By contrast, the soft sediment samples are more indicative of a sand or silt lithology. A few samples collected from the surface of the canal bottom were skewed to the gravel classification and are likely indicative of areas where the till material was thinner and broken bedrock was encountered.

**Soft Sediment Evaluation. *Gorham Street Deposit.*** The distribution of soft sediment is discussed in terms of the DMU segments within the Gorham Street and Downstream areas, which are presented on Figure 1. In general, the soft sediment thickness ranged from 0.1 to 1.66 feet, with the maximum of 1.66 feet encountered in the "finger area" of the Gorham Street Deposit-1 (GSD-1) – the "finger area" is defined as the thin, elongated portion of the Gorham Street area that runs along the north bank of the canal. The thinnest remnant sediment thickness within the Gorham Street area was observed in the Gorham Street Deposit-2 (GSD-2) area with thicknesses ranging from no soft sediment to 0.6 feet of soft sediment at location CSC-4. Most of the soft sediment found in the GSD-2 area was soft, brownish black sandy silt with trace gravel. Significant soft sediment thicknesses were observed in the GSD-1 deposit (finger area), ranging from 1.0 to 1.66 feet and the material encountered was very soft, black, silt or fine sand, with natural organic odor and some produced gas.

**Soft Sediment Evaluation. *Downstream Deposit.*** By contrast, only thin layers of soft sediment were encountered in the Downstream Deposit, typically less than 1 inch. Soft sediments in the Downstream Depost-2 (DS-2) area were very soft, black/brown sandy silt with some gravel and rocks, most likely residuals from the dredging activities. No coring was necessary in the Downstream Depost-1 (DS-1) because dredging achieved the shallow removal depth of 1 foot.

**Till Evaluation. *Gorham Street Deposit.*** In the four locations (CSC-01 through -04) sampled in the GSD-2 area, glacial till/till moraine was encountered. At the GSD-2 deposit locations, the till layer started at approximately 0.2 feet beneath the soft sediment surface and extended down to the refusal depth. Most of the till material observed in the GSD-2 area consisted of low permeability, pale reddish brown, very high plasticity, hard and dense silt and clay that contained clasts throughout the core. Photographs of these samples are presented in Attachment 3.

In the GSD-1 deposit locations (CSC-05 and -06), a relatively thick layer of soft sediment was observed. The till material was encountered at depths of 1 to 1.6 feet below the soft sediment surface at the cored locations. The till material encountered in GSD-1 deposit was very similar to the GSD-2 area.

The till material encountered in both Gorham Street Deposits was moist within the top intervals and with depth, the moisture content dropped and was dry, conforming to the typical till description. The moisture content in the till material ranged from 9 to 15%, whereas the soft sediment's moisture content ranged from 38 to 56% (see Attachment 2).

**Till Evaluation. *Downstream Deposit.*** In general, similar glacial till was encountered in the Downstream Deposits. Till was encountered in two (CSC-08 and -09) of the three core locations in the Downstream area. The till layer was located at approximately 0.2 feet beneath the soft sediment surface and extended down to the refusal depths (maximum penetrable depth). Most of the till material observed in the Downstream area was low permeabilty, pale reddish brown, very high plasticity, hard and dense silt and clay that contained clasts throughout the core (see Attachment 3). The grain size distribution data for the downstream locations indicate that the percent fines outweigh the sand and gravel classification. The geotechnical parameters (i.e., Atterberg limits, moisture content, and grain size distribution) of the samples collected are presented in Attachment 2.

The CSC-07 location encountered a very thin layer of black sediment that was underlain by a silty sand rather than the glacial till; this material was hard and may represent local variation in the till body or the presence of the lacustrine sand noted on the surficial geologic map (Figure 2). This location encountered rocks and boulders at the bottom of the core which were likely indicative of the bedrock interface or glacial material.

## Conclusions

The investigation concluded through multiple lines of evidence, including visual and geotechnical data, that glacial till material is present throughout the areas were shallow refusal was encountered. Therefore, the objective of dredging program (removal to glacial till or the bedrock interface) has been achieved and no further removal is required in the Downstream and Gorham Street areas, with the exception of the finger portion of Gorham Street. The combination of coring data and recently collected bathymetric data indicates that 0.6 to 1.6 feet of soft sediment remains within the deposit and must be removed to achieve the Verification Plan goals. The results of this investigation will be used to identify the elevation of the glacial till interface within the Gorham Street and Downstream Deposits so that the post-dredge cross-sections reflect that the glacial till interface has been encountered and at this elevation, no further removal is required. Once the additional removal within the Gorham Street finger area has been completed, an additional post-excavation bathymetric survey will be performed to confirm the conditions of the Verification Plan have been achieved.

## Reference

Muller, E.H. and D.H. Cadwell. 1986. *Surficial Geologic Map of New York*. New York State Museum – Geological Survey. Map and Chart Series #40.

# Tables

TABLE 1

**Post Dredge Confirmation Investigation - Field Data**

*Cayuga-Seneca Canal Sediment Removal - AOC A, Waterloo, NY*

| Project Area | Location ID | Sample ID | Start Depth (ft) | End Depth (ft) | Summary - Sediment Description | Sample Date | Northing (NYSPC-NAD83) | Easting (NYSPC-NAD83) | Top of Water-Elevation (ft) (NAVD 88) | Water Depth (ft) | Top of Sediment Surface - Elevation (ft) | Probed - Sediment Depth -BSS (ft) | Core Penetration Depth-BSS (ft) | Recovered Sediment Thickness (ft) | Blowcounts (140 lbs Cat Head Sampler)[7,8] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gorham Street | CSC-SED-01 | CSC-SED-01/0002 | 0 | 0.2 | 0.0-0.2 - Soft, Brown/black, Sandy Silt- ML -SW-SM, no plasticity, Wet, trace angular gravel, loosely packed. | 4/9/2015 | 1056927.42 | 748210.933 | 428.9 | 6.5 | 422.4 | 1.5 | 4.0 | 2.0 | 3, 3, 4, 4, 15, 34, 48, 50 |
| | | CSC-SED-01/0211 | 0.2 | 1.1 | 0.2-1.1 - V.Firm, Pale reddish Brown, Lean Clay/CL w/ trace angular gravel (NOT like glacial); H.plasticity, Dense, Moist. | | | | | | | | | | |
| | | CSC-SED-01/1120 | 1.1 | 2 | 1.1-2.0 - V.Firm, Brown, Fat Clay/ CH- w/trace sub-angular gravel (glacial till), H.plasticity, Dense,Moist - Dry | | | | | | | | | | |
| Gorham Street | CSC-SED-02 | CSC-SED-02/0005 | 0 | 0.5 | 0.0-0.2 - Soft, Brown, silty clay/SP-SC - w/trace fine Sand - Well Sorted, L.plasticity, Loosely packed, moist, trace gravel. 0.2-0.5 - Hard, Pale reddish Brown, Fat Clay /CH - w/trace sub-angular gravel (glacial till), H.plasticity, Dense, Moist - Dry | 4/9/2015 | 1056837.211 | 748175.258 | 428.806 | 15.3 | 413.5 | 0.3 | 0.8 | 0.5 | 70, 50 |
| Gorham Street | CSC-SED-03 | CSC-SED-03/0007 | 0 | 0.7 | 0.0-0.6 - Hard, Pale reddish Brown, Lean Clay-Fat Clay/CL-CH -w/ rounded & sub-angular rocks (glacial till); H.plasticity, Dense, Moist - Dry. | 4/9/2015 | 1056818.702 | 748252.012 | 428.807 | 16.3 | 412.5 | 1.0 | 0.8 | 0.7 | 14, 50 |
| Gorham Street | CSC-SED-04 | CSC-SED-04/0006 | 0 | 0.6 | 0.0-0.6 - Soft, Brownish black, Silty Sand/SM, Fine Sand - Well Sorted, no plasticity, Wet, loosely packed, trace gravel. | 4/9/2015 | 1056896.107 | 748336.479 | 428.891 | 10.5 | 418.4 | 1.0 | 3.8 | 2.0 | 7, 10, 25, 32, 24, 30, 46, 50 |
| | | CSC-SED-04/0620 | 0.6 | 2 | 0.6-2.0 - V.Firm-Hard, Pale reddish Brown, Lean Clay-Fat Clay/CL-CH -w/ trace rounded gravel (glacial till); H.plasticity, Dense, Moist - Dry. | | | | | | | | | | |
| Gorham Street | CSC-SED-05 | CSC-SED-05/0010 | 0 | 1 | 0.0-0.85 - V.Soft, Black, Sandy Silt/ML-SW-SM Organic Odor, No plasticity, Wet 0.85-1.0 - L.firm, Brown, Fine Sand-SP - Well Sorted w/trace silt, loosely packed, moist. | 4/10/2015 | 1056877.934 | 748472.689 | 429.077 | 10.0 | 419.1 | 3.4 | 2.5 | 1.3 | 1, 2, 2, 27, 50 |
| | | CSC-SED-05/1013 | 1 | 1.3 | 1.0-1.3 - M.Firm, Pale Reddish Brown, Lean Clay/ CL w/trace sand, M.plasticity, Dense,Moist, Chunks of fat clay/CH at bottom | | | | | | | | | | |
| Gorham Street | CSC-SED-06 | CSC-SED-06/0016 | 0 | 1.6 | 0.0-1.33 - V.Soft, Black, Sandy Silt- ML -SW-SM, Organic Odor, no plasticity, Loose, Wet (gas ebullition) 1.33-1.66 - Firm, brown, Fine Sand / SP - Well Sorted w/trace silt, no plasticity, loosely packed,moist. | 4/10/2015 | 1056882.022 | 748617.558 | 429.198 | 11.4 | 417.8 | 0.7 | 4.3 | 3.1 | 37, 17, 2, 4, 26, 31, 41, 44, 50 |
| | | CSC-SED-06/1631 | 1.6 | 3.1 | 1.66-3.1 - Hard, Pale Reddish Brown, Fat Clay /CH- w/trace rounded gravel (glacial till), H.plasticity, Dense, Moist - Dry. | | | | | | | | | | |
| Downstream | CSC-SED-07 | CSC-SED-07/0009 | 0 | 0.85 | 0.0-0.1 - V.Soft, Black, Silt/SM - w/trace fine sand, organic odor, no plasticity, Wet. 0.1-0.85 - Soft-Firm, Brown, Silty Sand/SM - w/trace Coarse sand, SW-SC, No plasticity, stratified. | 4/10/2015 | 1056897.9 | 748971.046 | 429.081 | 13.8 | 415.3 | 0.8 | 1.0 | 0.9 | 3, 50 |
| Downstream | CSC-SED-08 | CSC-SED-08/0010 | 0 | 1 | Less than 1 inch of v.soft residual sediment(black) observed at top 0.0-1.0 - Hard, Pale Reddish Brown, Lean Clay/CL-CH -w/trace sub-angular gravel (glacial till); H.plasticity, Dense, Moist-Dry | 4/10/2015 | 1056920.235 | 749085.897 | 428.947 | 15.8 | 413.1 | 0.5 | 1.3 | 1.0 | 19, 41, 50 |
| Downstream | CSC-SED-09 | CSC-SED-09/0005 | 0 | 0.5 | 0.0-0.5 - V. Soft, Brown, Sandy Silt- ML/SW-SM- w/trace organics,no plasticity, Wet, trace rocks (sub-angular). | 4/10/2015 | 1056938.799 | 749190.887 | 428.911 | 15.7 | 413.2 | 0.5 | 1.0 | 1.2 | 20, 50 |
| | | CSC-SED-09/0509 | 0.5 | 0.9 | 0.5-0.9 - V,Firm, Brown, Lean Clay CL w/trace rounded gravel (glacial till); H.plasticity, Dense,Moist. | | | | | | | | | | |
| | | CSC-SED-09/0912 | 0.9 | 1.2 | 0.9-1.2 - Firm, Brown, fine Sand SP - Well Sorted, w/traces of coarse sand, trace gravel, no plasticity, Moist. | | | | | | | | | | |

Notes:

1. Red highlight indicates potential for being glacial till material.
2. Coordinates are to be recorded/documented in NY State Plane Coordinates - NAD83 and NAVD88
3. Surface Elevation represents elevation of sediment/ soil/ water/ collected by Sampler using Trimble R8 RTK
4. Probed Sediment thickness represents the sediment thickness measured using a 0.5 inch ID steel probe rod.
5. Water depth measurement collected from water/ice surface to top of sediment with survey rod.
6. Geotech samples and Blowcounts collected using a 140 lbs CAT HEAD Split Spoon Sampler.
7. Green highlight indicates end blowcount - Less than 3 inches of peneration per 50 blows
8. Based on the split spoon dimensions (3" diameter/ 7 ft long) and based on the modified CAT head of 140 lbs hammer, a normal SPT number cannot be calculated, but the blowcount values represent relative hardness.

# Figures

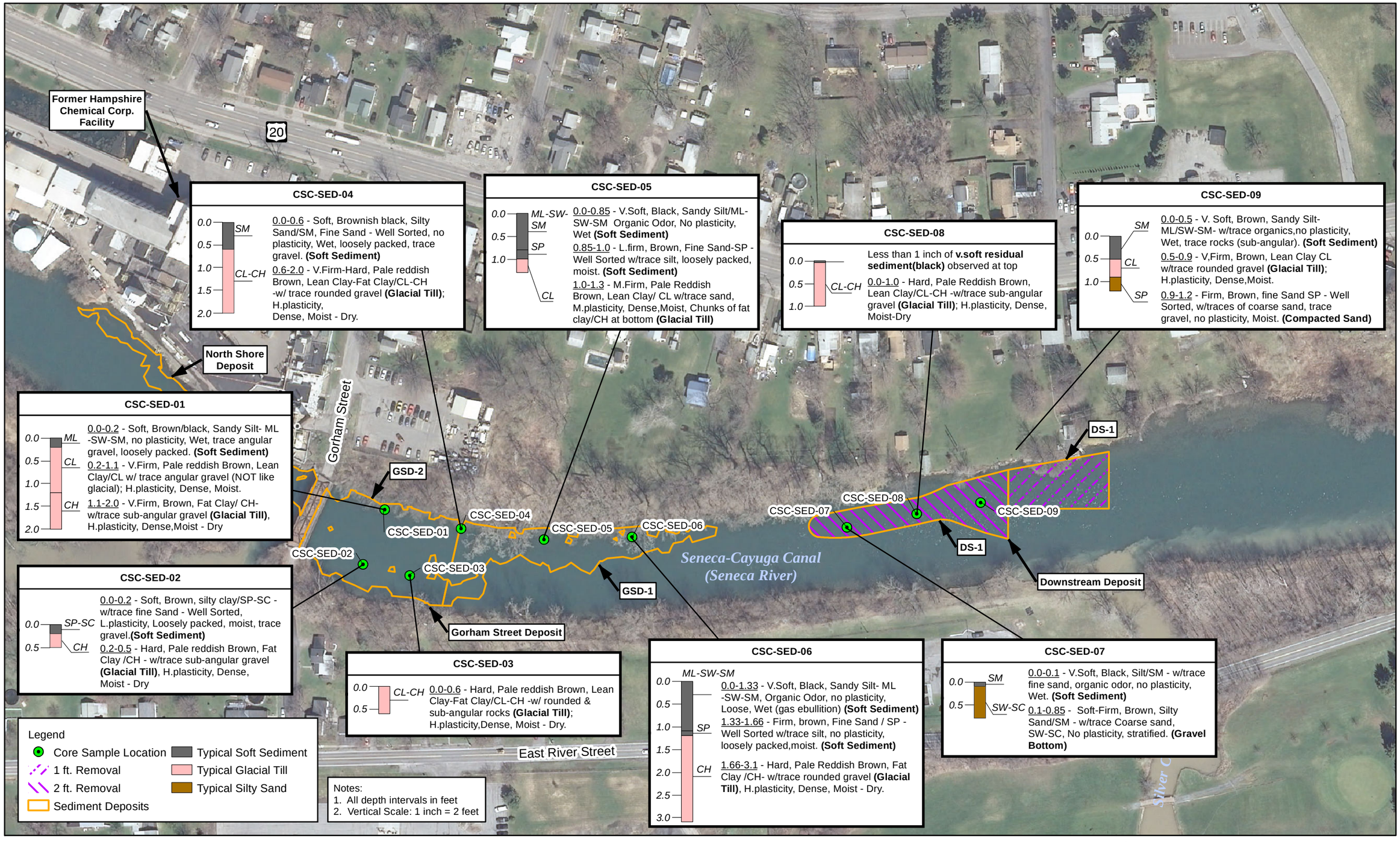


**Figure 1**
Sediment Core Verification
*AOC A Sediment Removal Verification Technical Memorandum*
*Former Hampshire Chemical Corp. Facility*
*Waterloo, New York*



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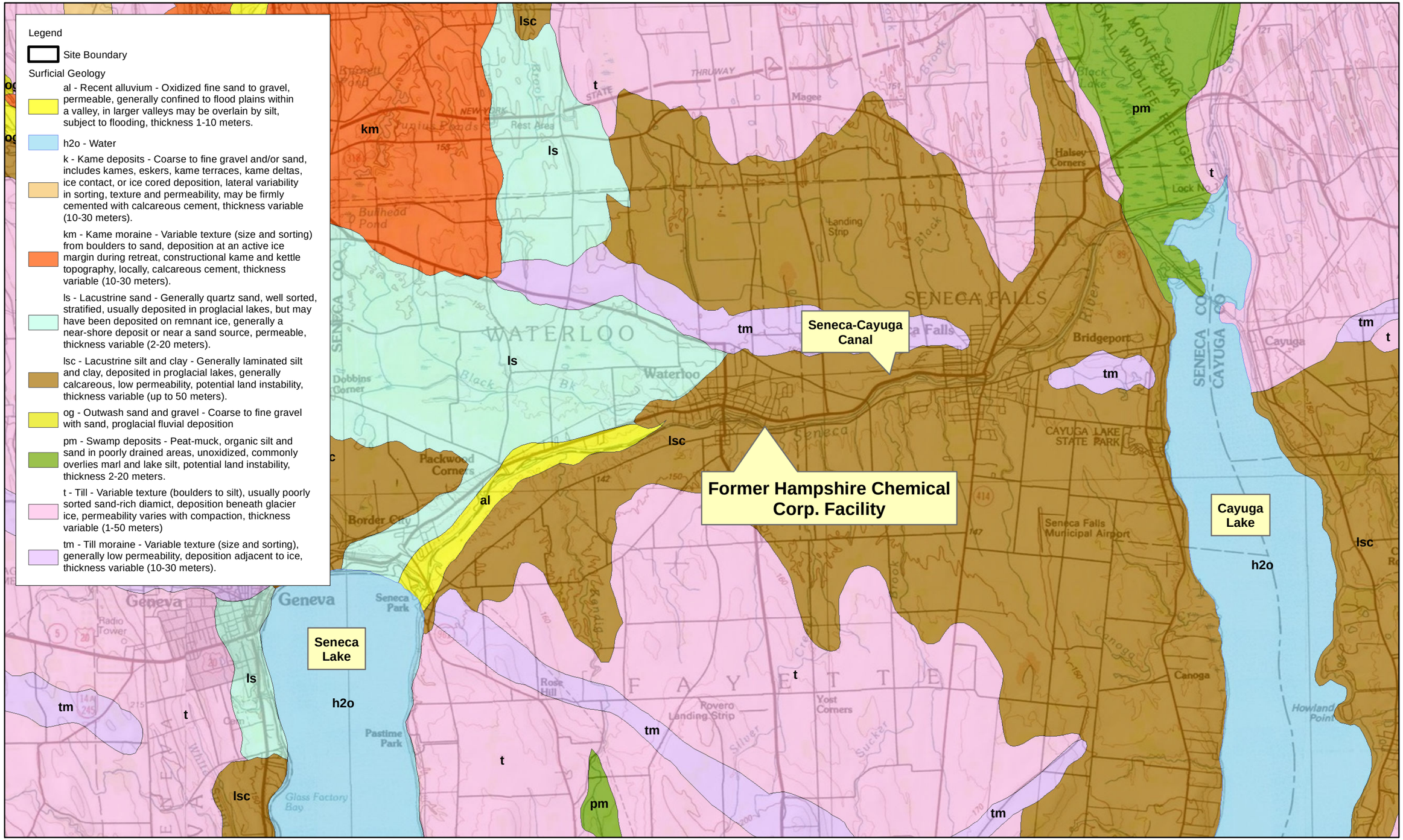


Source: Surficial Geologic Map of New York, Finger Lakes Sheet, 1:250,000 scale, New York State Museum - Geological Survey, Map and Chart Series No. 40, Compiled and Edited by Ernest H. Muller and Donald H. Cadwell, 1986.

**Figure 2**
Regional Surficial Geology Map
*AOC A Sediment Removal Verification Technical Memorandum*
*Former Hampshire Chemical Corp. Facility*
*Waterloo, New York*

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# Attachment 1
# Core Log Forms

# SEDIMENT CORE LOG

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SHEET 1 OF 1

STATION ID: CSC-SED-01

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Gorham Street |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 6.5 |
| CONTRACTOR : | ATL | TOP ELEVATION (ELEV.FT) | 428.9 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 1.5 |
| DATE : | 4/9/15 START : 10:00 END : 11:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6"-6" (N) | SEDIMENT DESCRIPTION<br>SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS<br>SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| | | | | 0.0-0.2 - Soft, Brown/black (7.5YR-2/1), Sandy Silt- ML -SW-SM, no plasticity, Wet, trace angular gravel, loosely packed. | CSC-SED-01/0002 |
| 0.5 | | | | 0.2-1.1 - Very Firm, Pale reddish Brown (10R-5/2), Lean Clay/CL with trace angular gravel (NOT like glacial); High plasticity, Dense, Moist. | CSC-SED-01/0211 |
| 1.0 | 4 | | 3 -3- 4- 4- 15- 34 - 48 - 50/3" | | |
| 1.5 | | | | 1.1-2.0 - Very Firm, Brown (7.5 YR-3/2), Fat Clay/ CH- with trace sub-angular gravel **(Glacial Till),** High plasticity, Dense,Moist - Dry | CSC-SED-01/1120 |
| 2.0 | | | | | |
| | | | | **END OF BORING** | |
| 2.5 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 428.9

X - COORDINATE : 748210.933

Y - COORDINATE : 1056927.42

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# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-02

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Gorham Street |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 15.3 |
| CONTRACTOR : | ATL | TOP ELEVATION (ELEV.FT) | 428.806 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 0.3 |
| DATE : | 4/9/15 START : 12:00 END : 12:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6" (N) | SEDIMENT DESCRIPTION<br>SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS<br>SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | 0.8 | | 70 - 50/3" | 0.0-0.2 - Soft, Brown (7.5 YR-3/2), silty clay/SP-SC - with trace fine Sand - Well Sorted, Low plasticity, Loosely packed, moist, trace gravel.<br><br>0.2-0.5 - Hard, Pale reddish Brown (10R-5/2), Fat Clay /CH - with trace sub-angular gravel (glacial till), High plasticity, Dense, Moist - Dry | CSC-SED-02/0005 |
| | | | | END OF BORING | |
| 1.0 | | | | | |
| 1.5 | | | | | |
| 2.0 | | | | | |
| 2.5 | | | | | |
| 3.0 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 428.806
X - COORDINATE : 748175.258
Y - COORDINATE : 1056837.211

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# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-03

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Gorham Street |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 16.3 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 428.807 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 1.0 |
| DATE : | 4/9/15 START : 13:00 END : 13:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6" (N) | SEDIMENT DESCRIPTION: SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS: SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | 0.8 | | 14 - 50/3" | 0.0-0.6 - Hard, Pale reddish Brown (10R-5/2), Lean Clay-Fat Clay/CL-CH -with rounded & sub-angular rocks (**glacial till**); High plasticity, Dense, Moist - Dry. | CSC-SED-03/0007 |
| 1.0 | | | | **END OF BORING** | |
| 1.5 | | | | | |
| 2.0 | | | | | |
| 2.5 | | | | | |
| 3.0 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 428.807

X - COORDINATE : 748252.012

Y - COORDINATE : 1056818.7

CH2MHILL

# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-04

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Gorham Street |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 10.5 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 428.891 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 1 |
| DATE : | 4/9/15 START : 14:00 END : 14:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6"-6" (N) | SEDIMENT DESCRIPTION: SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS: SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | | | | 0.0-0.6 - Soft, Brownish black (7.5YR-2/1), Silty Sand/SM, Fine Sand - Well Sorted, no plasticity, Wet, loosely packed, trace gravel. | CSC-SED-04/0006 |
| 1.0 | 3.8 | | 7 -10 - 25 - 32- 24- 30- 46- 50 | 0.6-2.0 - Very Firm-Hard, Pale reddish Brown (10R-5/2), Lean Clay-Fat Clay/CL-CH -with trace rounded gravel (glacial till); High plasticity, Dense, Moist - Dry. | CSC-SED-04/0620 |
| 1.5 | | | | | |
| 2.0 | | | | **END OF BORING** | |
| 2.5 | | | | | |
| 3.0 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 428.891

X - COORDINATE : 748336.479

Y - COORDINATE : 1056896.11

CH2MHILL

# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-05

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Gorham Street |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 10.0 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 429.077 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 3.4 |
| DATE : | 4/10/15 START : 11:00 END : 11:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6" (N) | SEDIMENT DESCRIPTION: SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS: SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | 2.5 | | 1-2- 2- 27- 50 | 0.0-0.85 - Very Soft, Black (10 YR-2/1), Sandy Silt/ML-SW-SM Organic Odor, No plasticity, Wet | CSC-SED-05/0010 |
| 1.0 | | | | 0.85 -1.0 - Low firm, Brown, Fine Sand-SP - Well Sorted with trace silt, loosely packed, moist. | |
| | | | | 1.0-1.3 - Medium Firm, Pale Reddish Brown, Lean Clay/ CL with trace sand, Medium plasticity, Dense,Moist, Chunks of fat clay/CH at bottom | CSC-SED-05/1013 |
| 1.5 | | | | END OF BORING | |
| 2.0 | | | | | |
| 2.5 | | | | | |
| 3.0 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 429.077

X - COORDINATE : 748472.689

Y - COORDINATE : 1056877.934

CH2MHILL

# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-06

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Gorham Street |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 11.4 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 429.198 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 0.7 |
| DATE : | 4/10/15 START : 12:00 END : 12:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6" (N) | SEDIMENT DESCRIPTION (SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE) | COMMENTS (SAMPLE ID, QA/QC, ETC) |
|---|---|---|---|---|---|
| 0.5 | 4.3 | 4.3 | 37- 17- 2- 4- 26- 31- 41- 44- 50/3" | 0.0-1.33 - Very Soft, Black (10 YR-2/1), Sandy Silt- ML -SW-SM, Organic Odor, no plasticity, Loose, Wet (gas ebullition) | CSC-SED-06/0016 |
| 1.0 | | | | | |
| 1.5 | | | | 1.33-1.66 - Firm, brown (7.5 YR-3/2), Fine Sand / SP - Well Sorted with trace silt, no plasticity, loosely packed,moist. | |
| 2.0 | | | | 1.66-3.1 - Hard, Pale Reddish Brown, Fat Clay /CH- with trace rounded gravel **(glacial till)**, High plasticity, Dense, Moist - Dry. | CSC-SED-06/1631 |
| 2.5 | | | | | |
| 3.0 | | | | END OF BORING | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

| | |
|---|---|
| WATER ELEVATION : | 429.198 |
| X - COORDINATE : | 748617.56 |
| Y - COORDINATE : | 1056882 |

CH2MHILL

# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-07

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Downstream |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 13.8 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 429.081 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 0.8 |
| DATE : | 4/10/15 START : 13:00 END : 13:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6" (N) | SEDIMENT DESCRIPTION: SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS: SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | 1 | | 3 - 50/3" | 0.0-0.1 - Very Soft, Black (10 YR-2/1), Silt/SM - with trace fine sand, organic odor, no plasticity, Wet.<br>0.1-0.85 - Soft-Firm, Brown (7.5 YR-3/2), Silty Sand/SM - with trace Coarse sand, SW-SC, No plasticity, stratified. | CSC-SED-07/0009 |
| 1.0 | | | | END OF BORING | |
| 1.5 | | | | | |
| 2.0 | | | | | |
| 2.5 | | | | | |
| 3.0 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 429.081

X - COORDINATE : 748971.05

Y - COORDINATE : 1056897.9

CH2MHILL

# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-08

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Downstream |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 15.8 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 428.947 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 0.5 |
| DATE : | 4/10/15 START : 14:00 END : 14:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6" (N) | SEDIMENT DESCRIPTION<br>SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS<br>SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | 1 | | 19- 41- 50/3" | 0.0-1.0 - Hard, Pale Reddish Brown (10R-5/2), Lean Clay/CL-CH -with trace sub-angular gravel (glacial till); High plasticity, Dense, Moist-Dry | Less than 1 inch of very soft residual sediment (black) observed at top<br>CSC-SED-08/0010 |
| 1.0 | | | | END OF BORING | |
| 1.5 | | | | | |
| 2.0 | | | | | |
| 2.5 | | | | | |
| 3.0 | | | | | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

WATER ELEVATION : 428.947

X - COORDINATE : 749085.897

Y - COORDINATE : 1056920.24

CH2MHILL

# SEDIMENT CORE LOG

SHEET 1 OF 1

STATION ID: CSC-SED-09

| | | | |
|---|---|---|---|
| PROJECT : | Former HCC Property - AOC-A Sediment Removal | PROJECT AREA | Downstream |
| PROJECT NUMBER : | 482750.01.CM.LB.03 | TOP OF BARGE TO WATER (FT) : | NA |
| EQUIPMENT: | 3" Split Spoon Sampler with 140 lb CAT Head Hammer - Safety Method | WATER DEPTH (FT) : | 15.7 |
| CONTRACTOR : | ATL Labs | TOP ELEVATION (ELEV.FT) | 428.911 |
| LOGGER : | S. Ramamurthy | SED THICKNESS PROBE MEASURED (FT) : | 0.5 |
| DATE : | 4/10/15 START : 15:00 END : 15:30 | | |

| DEPTH BELOW SURFACE (FT) | PENETRATION (FT) | RECOVERY (FT) | BLOWCOUNTS 6"-6"-6"-6" (N) | SEDIMENT DESCRIPTION<br>SEDIMENT TEXTURE, COLOR, RELATIVE DENSITY OR CONSISTENCY, & STRUCTURE | COMMENTS<br>SAMPLE ID, QA/QC, ETC |
|---|---|---|---|---|---|
| 0.5 | 1 | | 20-50/3" | 0.0-0.5 - Very Soft, Brown (7.5 YR-3/2), Sandy Silt- ML/SW-SM- with trace organics,no plasticity, Wet, trace rocks (sub-angular). | CSC-SED-09/0005 |
| | | | | 0.5-0.9 - Very Firm, Brown (7.5 YR-3/2), Lean Clay CL with trace rounded gravel (glacial till); H.plasticity, Dense,Moist | CSC-SED-09/0509 |
| 1.0 | | | | 0.9-1.2 - Firm, Brown(7.5 YR-3/2), fine Sand SP - Well Sorted, with traces of coarse sand, trace gravel, no plasticity, Moist. | CSC-SED-09/0912 |
| | | | | END OF BORING | |

NOTES : The blowcount values represent only relative hardness - SPT cannot be calculated based on this number.

| | |
|---|---|
| WATER ELEVATION : | 428.911 |
| X - COORDINATE : | 749190.887 |
| Y - COORDINATE : | 1056938.799 |

# Attachment 2
# Geotechnical Results

# ATLANTIC TESTING LABORATORIES

*WBE certified company*

## LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS
**ASTM D 2216**



**PROJECT INFORMATION**

Client: CH2M Hill
Project: Post-dredge Investigation
Waterloo, Cayuga County, New York

ATL Report No.: CD3831SL-01-02-15
Report Date: April 17, 2015
Date Received: April 13, 2015

**TEST DATA**

| Sample No. | Depth (ft) | Moisture Content (%) |
|---|---|---|
| CSC-SED-01A [1] | 0.0-0.2 | 38.0 |
| CSC-SED-01B [1] | 0.0-0.2 | 25.0 |
| CSC-SED-01 [1] | 0.2-1.1 | 28.3 |
| CSC-SED-01 [1] | 1.1-2.0 | 14.7 |
| CSC-SED-02 [1] | 0.0-0.5 | 10.8 |
| CSC-SED-03 [1] | 0.0-0.66 | 14.0 |
| CSC-SED-04 [1] | 0.0-0.6 | 10.8 |
| CSC-SED-04 [1] | 0.6-2.0 | 12.5 |
| CSC-SED-05 [1] | 0.0-1.0 | 56.9 |
| CSC-SED-05 [1] | 1.0-1.3 | 15.6 |
| CSC-SED-06 [1] | 0.0-1.66 | 19.3 |
| CSC-SED-06 [1] | 1.66-3.1 | 8.9 |
| CSC-SED-07 [1] | 0.0-0.85 | 21.3 |
| CSC-SED-08 [1] | 0.0-1.0 | 17.7 |
| CSC-SED-09 [1] | 0.0-0.5 | 58.9 |
| CSC-SED-09 [1] | 0.5-0.85 | 12.7 |
| CSC-SED-09 [1] | 0.85-2.0 | 16.4 |

**REMARKS**

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By: _____ Date: 4/17/15

# ATLANTIC TESTING LABORATORIES

*WBE certified company*

## LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX
**ASTM D 4318**



**PROJECT INFORMATION**

| | | | |
|---|---|---|---|
| Client: | CH2M Hill | ATL Report No.: | CD3831SL-02-04-15 |
| Project: | Post-dredge Investigation | Report Date: | April 17, 2015 |
| | Waterloo, Cayuga County, New York | Date Received: | April 13, 2015 |

**TEST DATA**

| Client Sample No. | LL | PL | PI |
|---|---|---|---|
| CSC-SED-01A 0.0-0.02 | 33 | 19 | 14 |
| CSC-SED-01B 0.0-0.2 | 24 | 21 | 3 |
| CSC-SED-01 0.2-1.1 | 22 | 15 | 7 |
| CSC-SED-01 1.1-2.0 | 16 | 14 | 2 |
| CSC-SED-02 0.0-0.5 | 24 | 14 | 10 |
| CSC-SED-03 0.0-0.66 | 17 | 13 | 4 |
| CSC-SED-04 0.0-0.6 | NP | NP | NP |
| CSC-SED-04 0.6-2.0 | 17 | 13 | 4 |
| CSC-SED-05 0.0-1.0 | NP | NP | NP |
| CSC-SED-05 1.0-1.3 | NP | NP | NP |
| CSC-SED-06 0.0-1.66 | NP | NP | NP |
| CSC-SED-06 1.66-3.1 | NP | NP | NP |
| CSC-SED-07 0.0-0.85 | NP | NP | NP |
| CSC-SED-08 0.0-1.0 | 21 | 13 | 8 |
| CSC-SED-09 0.0-0.5 | 31 | 27 | 4 |
| CSC-SED-09 0.5-0.85 | NP | NP | NP |
| CSC-SED-09 0.85-2.0 | 17 | 15 | 2 |

Client: CH2M Hill
Project: Post-dredge Investigation

Report No.: CD3831SL-02-04-15
Report Date: April 17, 2015

## SAMPLE INFORMATION

| ATL Sample No. | Maximum Grain Size (mm) | Amount of Sample Retained on No. 40 Sieve % | As Received Moisture Content % |
|---|---|---|---|
| CSC-SED-01A 0.0-0.02 | 9.5 | 26 | 38.0 |
| CSC-SED-01B 0.0-0.2 | 12.7 | 16 | 25.0 |
| CSC-SED-01 0.2-1.1 | 19.0 | 17 | 28.3 |
| CSC-SED-01 1.1-2.0 | 12.7 | 2 | 14.7 |
| CSC-SED-02 0.0-0.5 | 19.0 | 25 | 10.8 |
| CSC-SED-03 0.0-0.66 | 50.8 | 74 | 14.0 |
| CSC-SED-04 0.0-0.6 | 38.1 | 73 | 10.8 |
| CSC-SED-04 0.6-2.0 | 19.0 | 15 | 12.5 |
| CSC-SED-05 0.0-1.0 | 12.7 | 8 | 56.9 |
| CSC-SED-05 1.0-1.3 | 12.7 | 28 | 15.6 |
| CSC-SED-06 0.0-1.66 | 38.1 | 55 | 19.3 |
| CSC-SED-06 1.66-3.1 | 38.1 | 40 | 8.9 |
| CSC-SED-07 0.0-0.85 | 76.2 | 65 | 21.3 |
| CSC-SED-08 0.0-1.0 | 25.4 | 19 | 17.7 |
| CSC-SED-09 0.0-0.5 | 19.0 | 16 | 58.9 |
| CSC-SED-09 0.5-0.85 | 12.7 | 11 | 12.7 |
| CSC-SED-09 0.85-2.0 | 19.0 | 29 | 16.4 |

## PREPARATION INFORMATION

| ATL Sample No. | Preparation | Method of Removing Oversized Material |
|---|---|---|
| CSC-SED-01A 0.0-0.02 | Air Dry | Pulverizing and Screening |
| CSC-SED-01B 0.0-0.2 | Air Dry | Pulverizing and Screening |
| CSC-SED-01 0.2-1.1 | Air Dry | Pulverizing and Screening |
| CSC-SED-01 1.1-2.0 | Air Dry | Pulverizing and Screening |
| CSC-SED-02 0.0-0.5 | Air Dry | Pulverizing and Screening |
| CSC-SED-03 0.0-0.66 | Air Dry | Pulverizing and Screening |
| CSC-SED-04 0.0-0.6 | Air Dry | Pulverizing and Screening |
| CSC-SED-04 0.6-2.0 | Air Dry | Pulverizing and Screening |
| CSC-SED-05 0.0-1.0 | Air Dry | Pulverizing and Screening |
| CSC-SED-05 1.0-1.3 | Air Dry | Pulverizing and Screening |
| CSC-SED-06 0.0-1.66 | Air Dry | Pulverizing and Screening |
| CSC-SED-06 1.66-3.1 | Air Dry | Pulverizing and Screening |
| CSC-SED-07 0.0-0.85 | Air Dry | Pulverizing and Screening |
| CSC-SED-08 0.0-1.0 | Air Dry | Pulverizing and Screening |
| CSC-SED-09 0.0-0.5 | Air Dry | Pulverizing and Screening |
| CSC-SED-09 0.5-0.85 | Air Dry | Pulverizing and Screening |
| CSC-SED-09 0.85-2.0 | Air Dry | Pulverizing and Screening |

## EQUIPMENT INFORMATION

| | | | | |
|---|---|---|---|---|
| Liquid Limit Procedure | X | Multipoint – Method A | | One-Point – Method B |
| Liquid Limit Apparatus | X | Manual | | Motor Driven |
| Liquid Limit Grooving Tool Material | X | Plastic | | Metal |
| Liquid Limit Grooving Tool Shape | X | Flat | | Curved (AASHTO Only) |
| Plastic Limit | X | Hand Rolled | | Mechanical Rolling Device |

Reviewed By: 

Date: 4/17/15

# ATLANTIC TESTING LABORATORIES

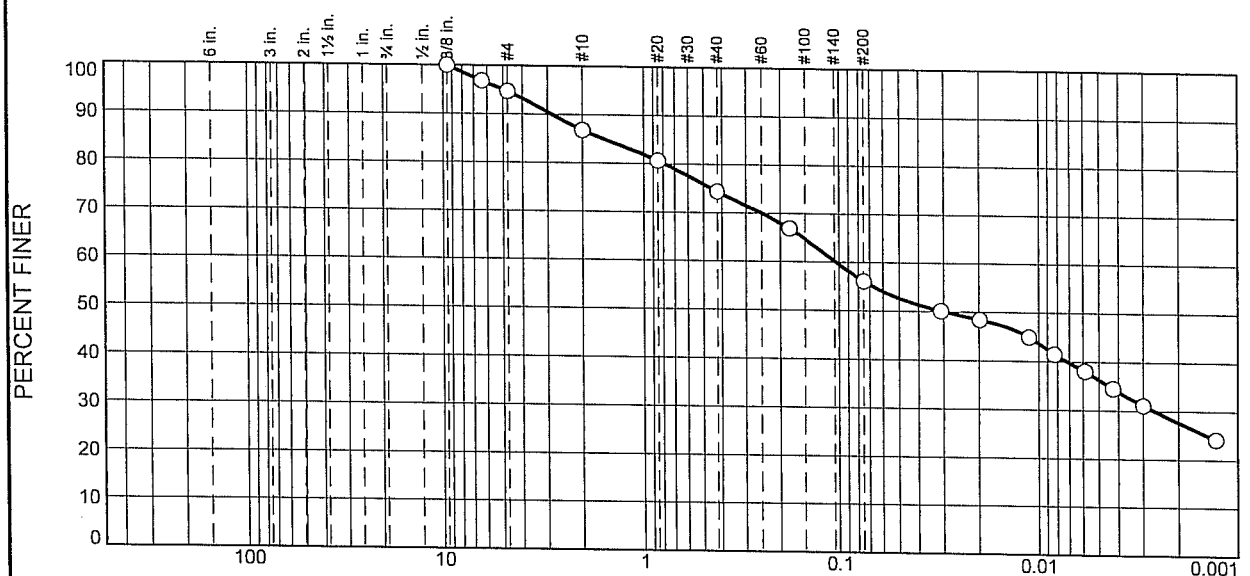
*WBE certified company*

## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-03-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-01A **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.2'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 5 | 8 | 13 | 18 | 20 | 36 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3/8" | 100 | | |
| 1/4" | 97 | | |
| #4 | 95 | | |
| #10 | 87 | | |
| #20 | 81 | | |
| #40 | 74 | | |
| #80 | 67 | | |
| #200 | 56 | | |

* (no specification provided)

**Soil Description**

Brown cmf SAND; and CLAY; some SILT; trace f GRAVEL

**Atterberg Limits**

PL= 19 LL= 33 PI= 14

**Coefficients**

$D_{85}$= 1.5747 $D_{60}$= 0.1040 $D_{50}$= 0.0300
$D_{30}$= 0.0026 $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL AASHTO=

**Remarks**

Moisture content 38.0%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 4/17/15

# ATLANTIC TESTING LABORATORIES

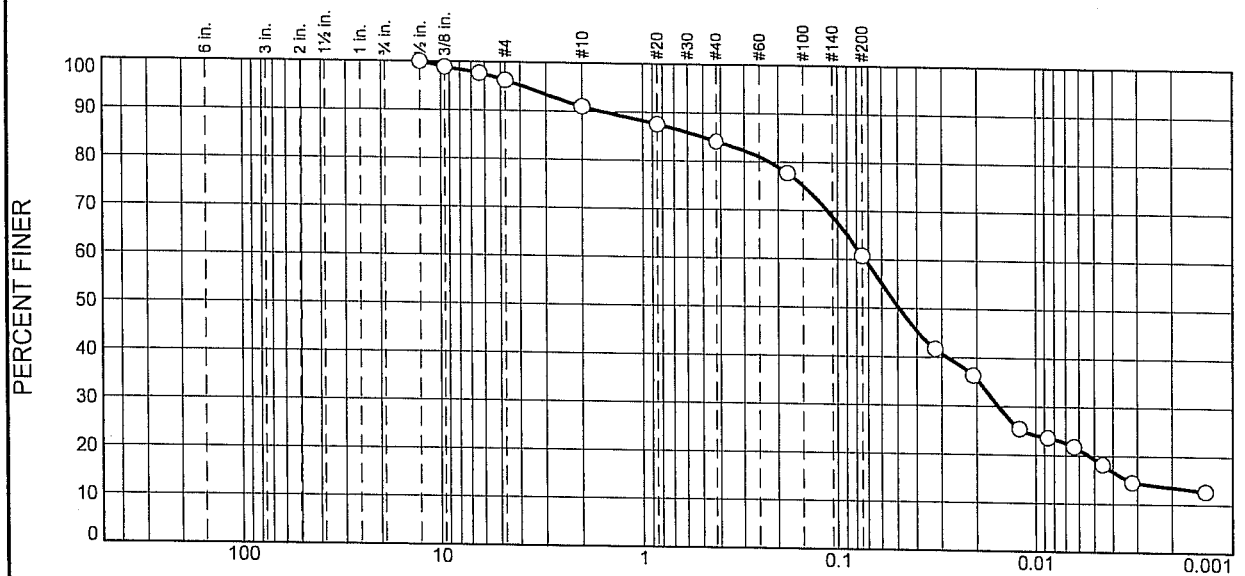
*WBE certified company*

## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-04-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-01B **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.2'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 4 | 5 | 7 | 23 | 42 | 19 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1/2" | 100 | | |
| 3/8" | 99 | | |
| 1/4" | 98 | | |
| #4 | 96 | | |
| #10 | 91 | | |
| #20 | 88 | | |
| #40 | 84 | | |
| #80 | 78 | | |
| #200 | 61 | | |

* (no specification provided)

**Soil Description**

Brown SILT; some cmf SAND; little CLAY; trace f GRAVEL

**Atterberg Limits**

PL= 21 LL= 24 PI= 3

**Coefficients**

$D_{85}$= 0.4994 $D_{60}$= 0.0725 $D_{50}$= 0.0490
$D_{30}$= 0.0156 $D_{15}$= 0.0034 $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= ML AASHTO=

**Remarks**

Moisture content 25.0%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 4/17/15

# ATLANTIC TESTING LABORATORIES

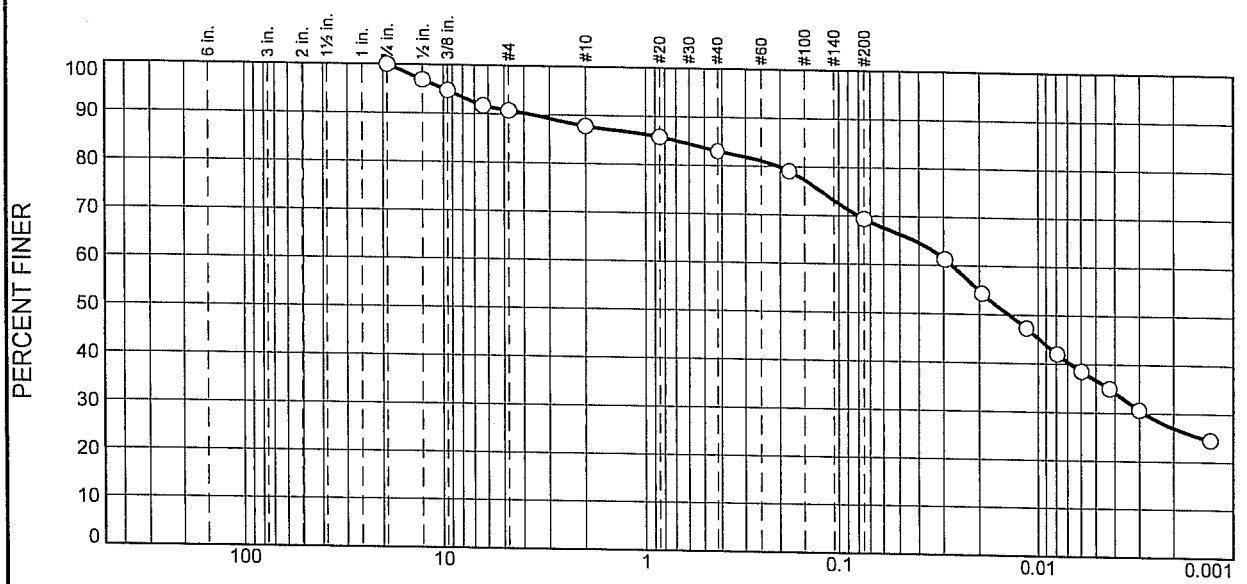
*WBE certified company*

## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-05-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-01 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.2-1.1'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 9 | 3 | 5 | 14 | 32 | 37 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3/4" | 100 | | |
| 1/2" | 97 | | |
| 3/8" | 95 | | |
| 1/4" | 92 | | |
| #4 | 91 | | |
| #10 | 88 | | |
| #20 | 86 | | |
| #40 | 83 | | |
| #80 | 79 | | |
| #200 | 69 | | |

* (no specification provided)

**Soil Description**

Brown CLAY; some SILT; some cmf SAND; trace mf GRAVEL

**Atterberg Limits**

PL= 15 LL= 22 PI= 7

**Coefficients**

$D_{85}$= 0.6885 $D_{60}$= 0.0272 $D_{50}$= 0.0142
$D_{30}$= 0.0028 $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL-ML AASHTO=

**Remarks**

Moisture content 28.3%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

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# ATLANTIC TESTING LABORATORIES

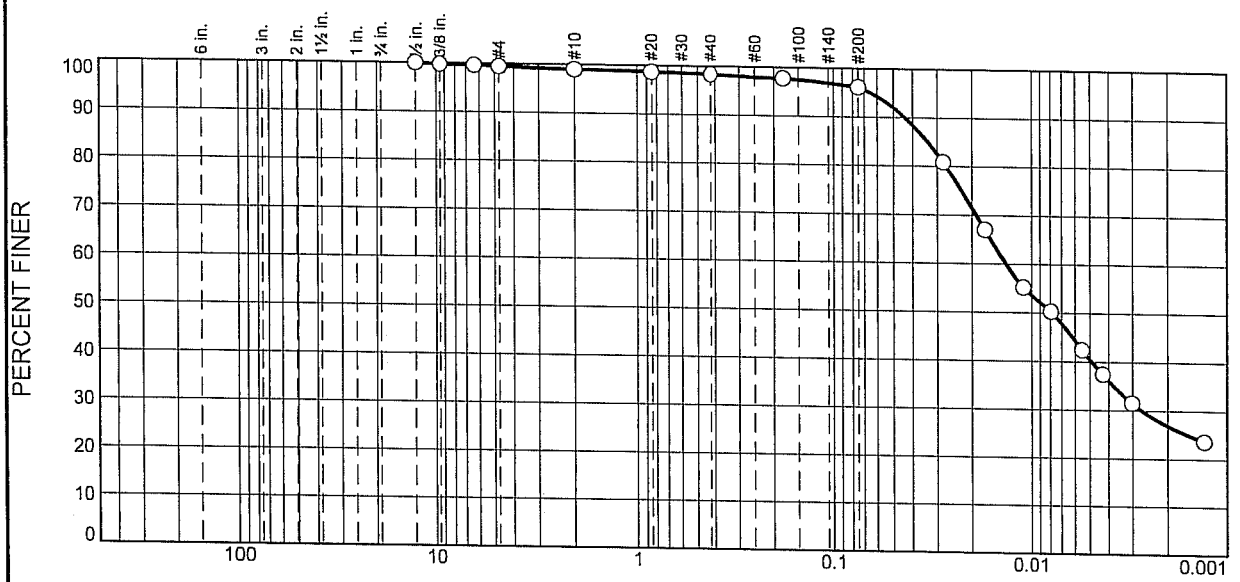
*WBE certified company*

## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-06-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-01 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 1.1-2.0'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 1 | 0 | 1 | 2 | 56 | 40 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1/2" | 100 | | |
| 3/8" | 100 | | |
| 1/4" | 100 | | |
| #4 | 99 | | |
| #10 | 99 | | |
| #20 | 99 | | |
| #40 | 98 | | |
| #80 | 98 | | |
| #200 | 96 | | |

* (no specification provided)

**Soil Description**

Brown SILT; and CLAY; trace mf SAND; trace f GRAVEL

**Atterberg Limits**

PL= 14 LL= 16 PI= 2

**Coefficients**

$D_{85}$= 0.0335 $D_{60}$= 0.0135 $D_{50}$= 0.0078
$D_{30}$= 0.0027 $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= ML AASHTO=

**Remarks**

Moisture content 14.7%

**Figure**

ATLANTIC TESTING LABORATORIES, LIMITED

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# ATLANTIC TESTING LABORATORIES

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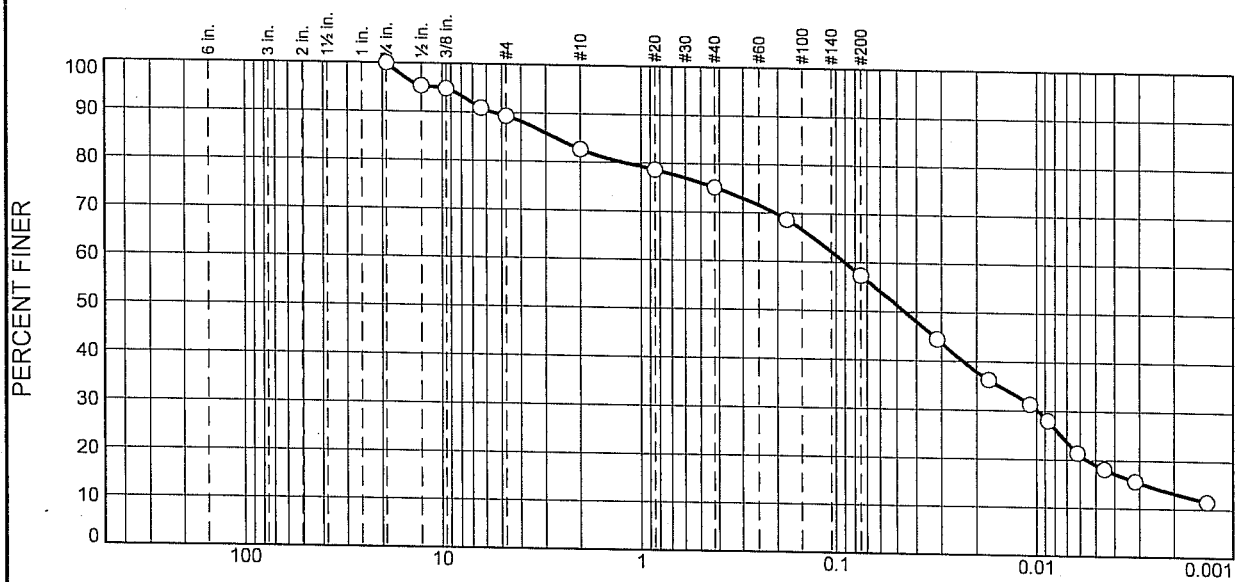
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-07-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-02 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.5'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 11 | 6 | 8 | 18 | 38 | 19 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3/4" | 100 | | |
| 1/2" | 95 | | |
| 3/8" | 95 | | |
| 1/4" | 91 | | |
| #4 | 89 | | |
| #10 | 83 | | |
| #20 | 79 | | |
| #40 | 75 | | |
| #80 | 69 | | |
| #200 | 57 | | |

* (no specification provided)

**Soil Description**

Brown SILT; some cmf SAND; little CLAY; little mf GRAVEL

**Atterberg Limits**

PL= 14 LL= 24 PI= 10

**Coefficients**

$D_{85}$= 2.6823 $D_{60}$= 0.0903 $D_{50}$= 0.0454
$D_{30}$= 0.0098 $D_{15}$= 0.0028 $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL AASHTO=

**Remarks**

Moisture content 10.8%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

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# ATLANTIC TESTING LABORATORIES

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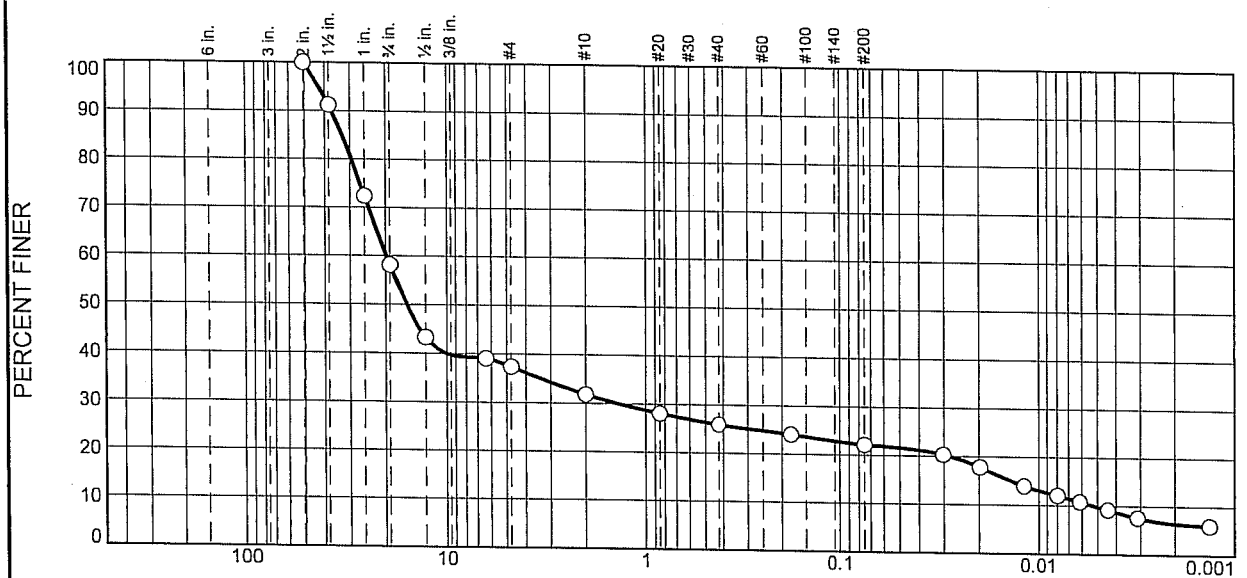
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-08-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-03 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.66'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 42 | 21 | 5 | 6 | 4 | 12 | 10 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 2" | 100 | | |
| 1-1/2" | 91 | | |
| 1" | 72 | | |
| 3/4" | 58 | | |
| 1/2" | 43 | | |
| 1/4" | 39 | | |
| #4 | 37 | | |
| #10 | 32 | | |
| #20 | 28 | | |
| #40 | 26 | | |
| #80 | 24 | | |
| #200 | 22 | | |

* (no specification provided)

**Soil Description**

Brown cmf GRAVEL; little cmf SAND; little SILT; little CLAY

**Atterberg Limits**

PL= 13 LL= 17 PI= 4

**Coefficients**

$D_{85}$= 32.7961 $D_{60}$= 19.8078 $D_{50}$= 15.7485
$D_{30}$= 1.3732 $D_{15}$= 0.0139 $D_{10}$= 0.0052
$C_u$= 3788.13 $C_c$= 18.21

**Classification**

USCS= GC-GM AASHTO= A-1-b

**Remarks**

Moisture content 14.0%

Figure

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# ATLANTIC TESTING LABORATORIES

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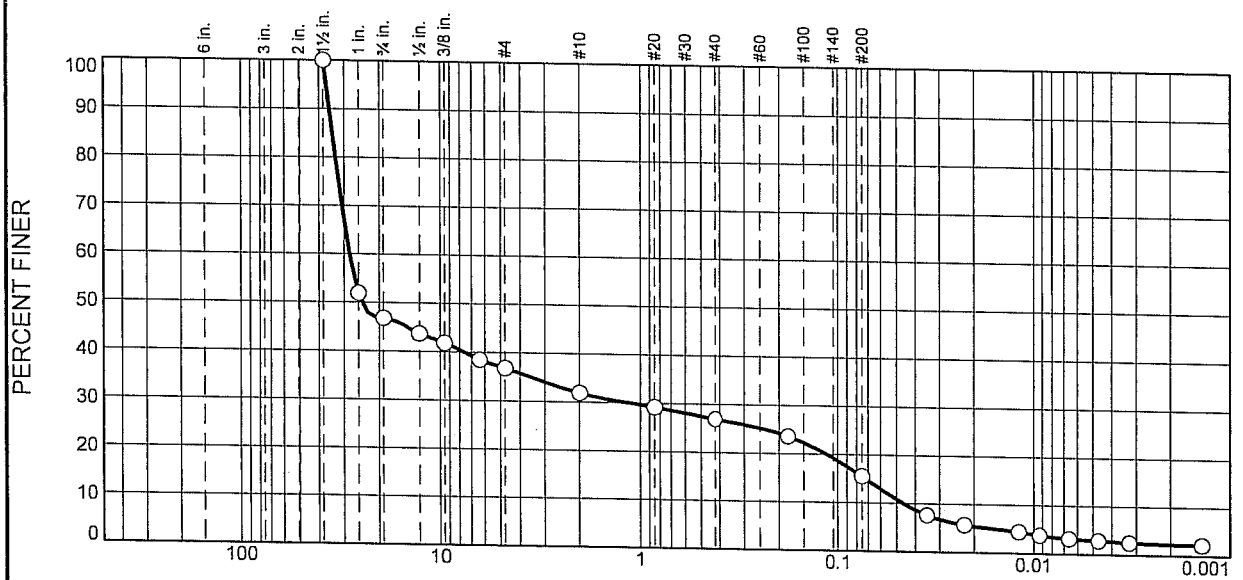
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-09-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-04 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.6'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 53 | 10 | 5 | 5 | 12 | 12 | 3 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1-1/2" | 100 | | |
| 1" | 52 | | |
| 3/4" | 47 | | |
| 1/2" | 44 | | |
| 3/8" | 42 | | |
| 1/4" | 38 | | |
| #4 | 37 | | |
| #10 | 32 | | |
| #20 | 29 | | |
| #40 | 27 | | |
| #80 | 24 | | |
| #200 | 15 | | |

* (no specification provided)

**Soil Description**

Brown/Black cmf GRAVEL; some cmf SAND; little SILT; trace CLAY

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 34.4001 $D_{60}$= 28.1274 $D_{50}$= 24.4205
$D_{30}$= 1.1385 $D_{15}$= 0.0718 $D_{10}$= 0.0459
$C_u$= 612.98 $C_c$= 1.00

**Classification**

USCS= GM AASHTO=

**Remarks**

Moisture content 10.8%

**Figure**

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# ATLANTIC TESTING LABORATORIES

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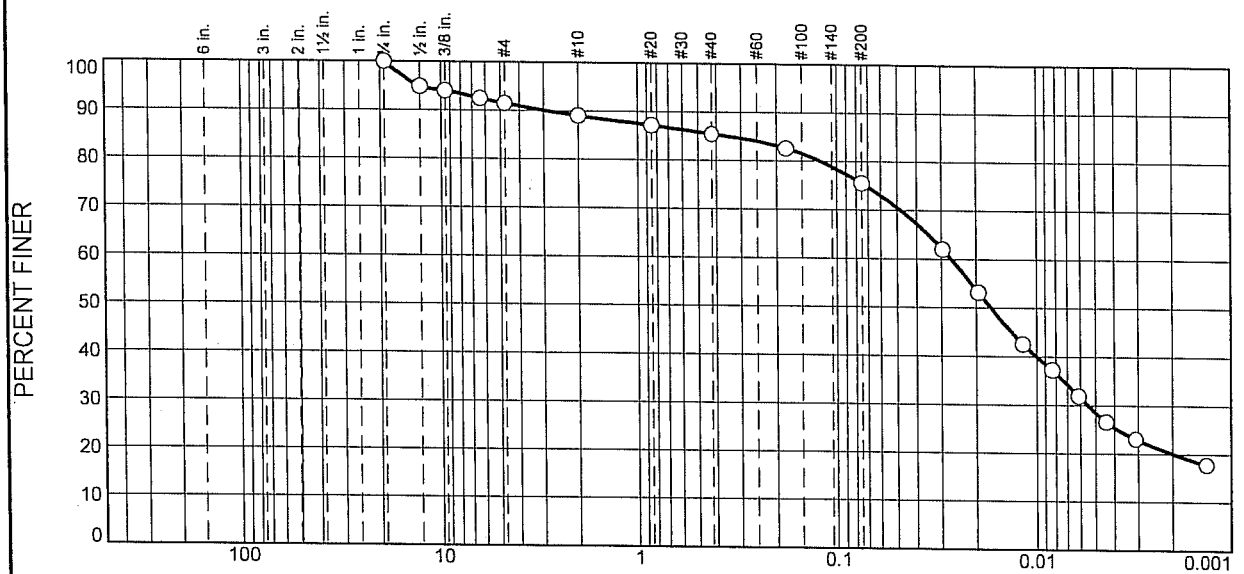
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-10-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-04 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.6-2.0'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 9 | 2 | 4 | 9 | 48 | 28 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3/4" | 100 | | |
| 1/2" | 95 | | |
| 3/8" | 94 | | |
| 1/4" | 92 | | |
| #4 | 91 | | |
| #10 | 89 | | |
| #20 | 87 | | |
| #40 | 85 | | |
| #80 | 83 | | |
| #200 | 76 | | |

* (no specification provided)

**Soil Description**

Brown SILT; some CLAY; little cmf SAND; trace mf GRAVEL

**Atterberg Limits**

PL= 13 LL= 17 PI= 4

**Coefficients**

$D_{85}$= 0.3469 $D_{60}$= 0.0266 $D_{50}$= 0.0169
$D_{30}$= 0.0055 $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL-ML AASHTO=

**Remarks**

Moisture content 12.5%

**Figure**

**ATLANTIC TESTING LABORATORIES, LIMITED**

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# ATLANTIC TESTING LABORATORIES

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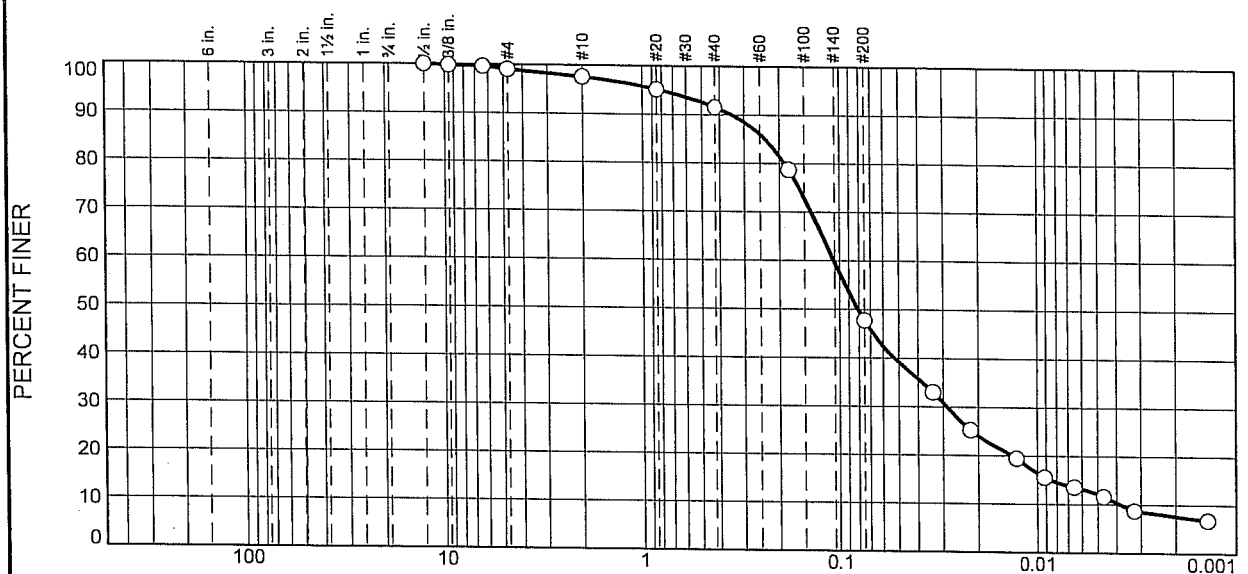
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-11-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-05 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-1.0'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 1 | 1 | 6 | 44 | 36 | 12 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1/2" | 100 | | |
| 3/8" | 100 | | |
| 1/4" | 100 | | |
| #4 | 99 | | |
| #10 | 98 | | |
| #20 | 95 | | |
| #40 | 92 | | |
| #80 | 79 | | |
| #200 | 48 | | |

* (no specification provided)

**Soil Description**

Black/Brown cmf SAND; and SILT; little CLAY; trace f GRAVEL

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 0.2353 $D_{60}$= 0.1070 $D_{50}$= 0.0808
$D_{30}$= 0.0286 $D_{15}$= 0.0086 $D_{10}$= 0.0038
$C_u$= 28.16 $C_c$= 2.01

**Classification**

USCS= SM AASHTO=

**Remarks**

Moisture content 56.9%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

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# ATLANTIC TESTING LABORATORIES

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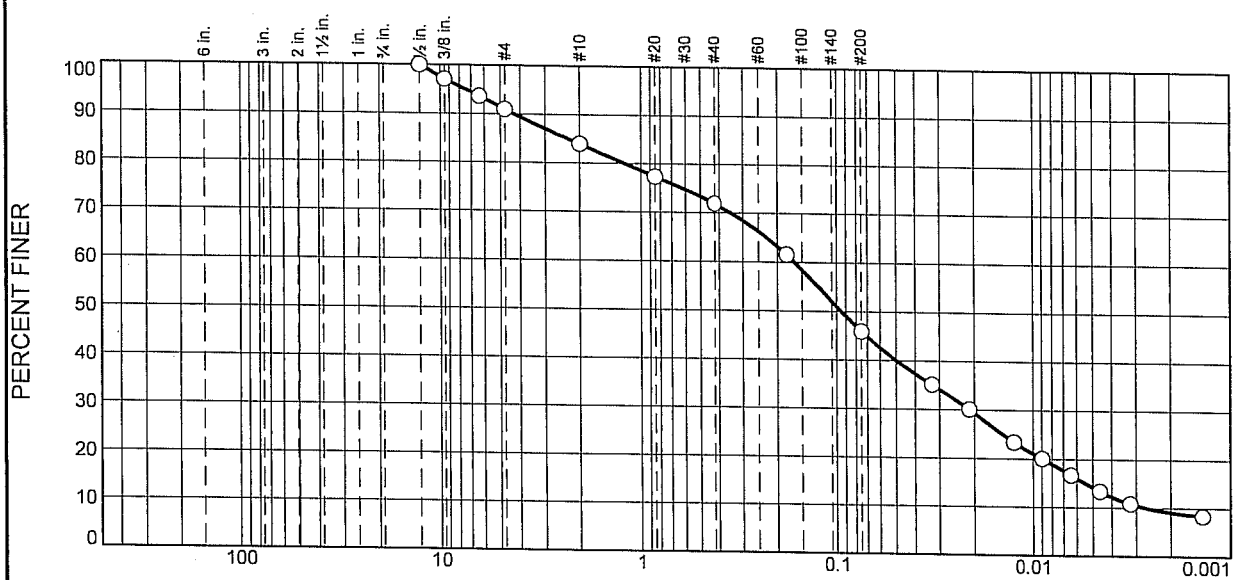
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-12-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-05 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 1.0-1.3'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 9 | 7 | 12 | 26 | 32 | 14 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1/2" | 100 | | |
| 3/8" | 97 | | |
| 1/4" | 94 | | |
| #4 | 91 | | |
| #10 | 84 | | |
| #20 | 77 | | |
| #40 | 72 | | |
| #80 | 62 | | |
| #200 | 46 | | |

* (no specification provided)

**Soil Description**

Black/Brown cmf SAND; some SILT; little CLAY; trace f GRAVEL

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 2.2849 $D_{60}$= 0.1636 $D_{50}$= 0.0946
$D_{30}$= 0.0210 $D_{15}$= 0.0054 $D_{10}$= 0.0026
$C_u$= 61.87 $C_c$= 1.02

**Classification**

USCS= SM AASHTO=

**Remarks**

Moisture content 15.6%

Figure

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# ATLANTIC TESTING LABORATORIES

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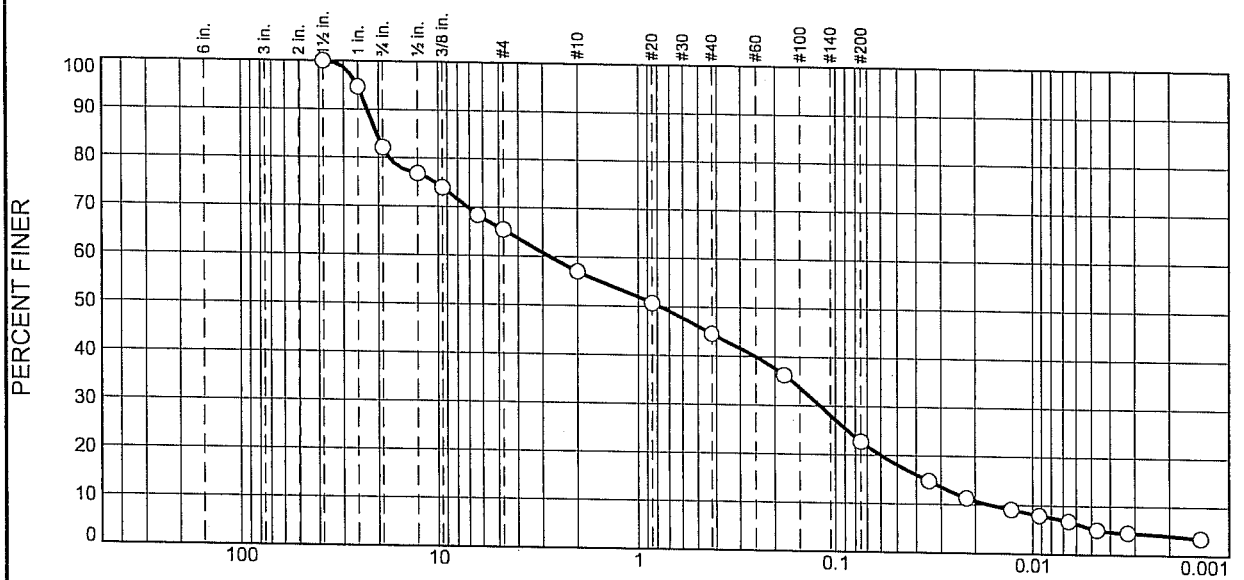
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-13-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-06 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-1.66'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 18 | 17 | 8 | 12 | 22 | 18 | 5 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1-1/2" | 100 | | |
| 1" | 95 | | |
| 3/4" | 82 | | |
| 1/2" | 77 | | |
| 3/8" | 74 | | |
| 1/4" | 68 | | |
| #4 | 65 | | |
| #10 | 57 | | |
| #20 | 51 | | |
| #40 | 45 | | |
| #80 | 36 | | |
| #200 | 23 | | |

* (no specification provided)

**Soil Description**

Black/Brown cmf SAND; some cmf GRAVEL; little SILT; trace CLAY

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 20.4581 $D_{60}$= 2.7563 $D_{50}$= 0.7763
$D_{30}$= 0.1193 $D_{15}$= 0.0355 $D_{10}$= 0.0168
$C_u$= 164.46 $C_c$= 0.31

**Classification**

USCS= SM AASHTO=

**Remarks**

Moisture content 19.3%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

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# ATLANTIC TESTING LABORATORIES

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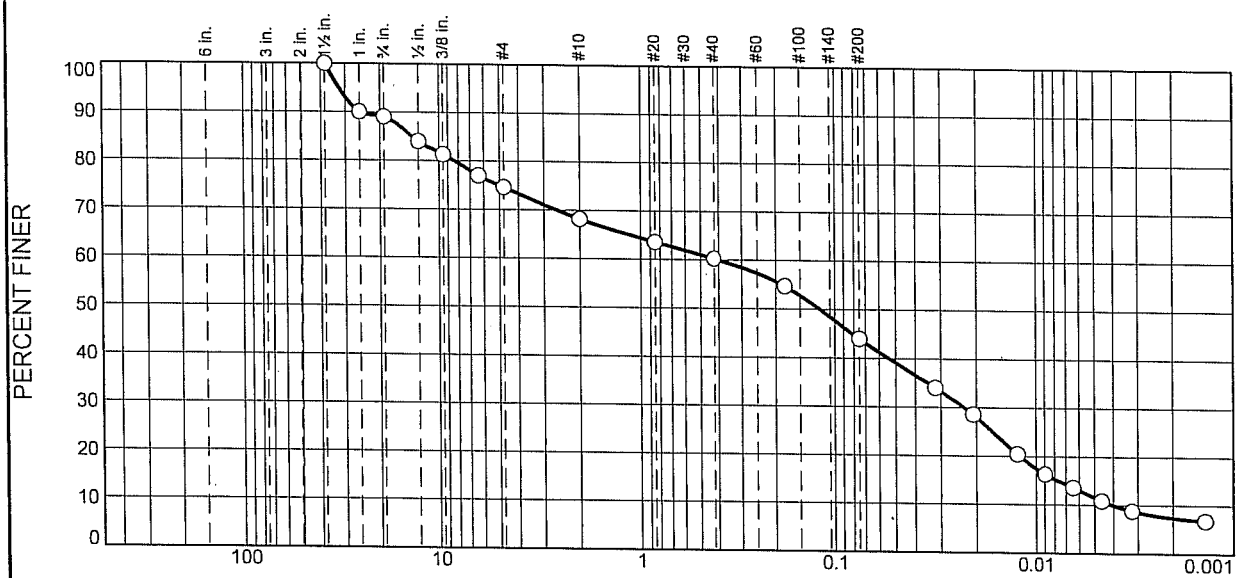
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-14-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-06 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 1.66-3.1'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 11 | 14 | 7 | 8 | 16 | 32 | 12 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1-1/2" | 100 | | |
| 1" | 90 | | |
| 3/4" | 89 | | |
| 1/2" | 84 | | |
| 3/8" | 81 | | |
| 1/4" | 77 | | |
| #4 | 75 | | |
| #10 | 68 | | |
| #20 | 64 | | |
| #40 | 60 | | |
| #80 | 55 | | |
| #200 | 44 | | |

* (no specification provided)

**Soil Description**

Brown SILT; some cmf SAND; some cmf GRAVEL; little CLAY

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 13.7152 $D_{60}$= 0.4032 $D_{50}$= 0.1191
$D_{30}$= 0.0230 $D_{15}$= 0.0077 $D_{10}$= 0.0040
$C_u$= 100.24 $C_c$= 0.33

**Classification**

USCS= SM AASHTO=

**Remarks**

Moisture content 8.9%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

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# ATLANTIC TESTING LABORATORIES

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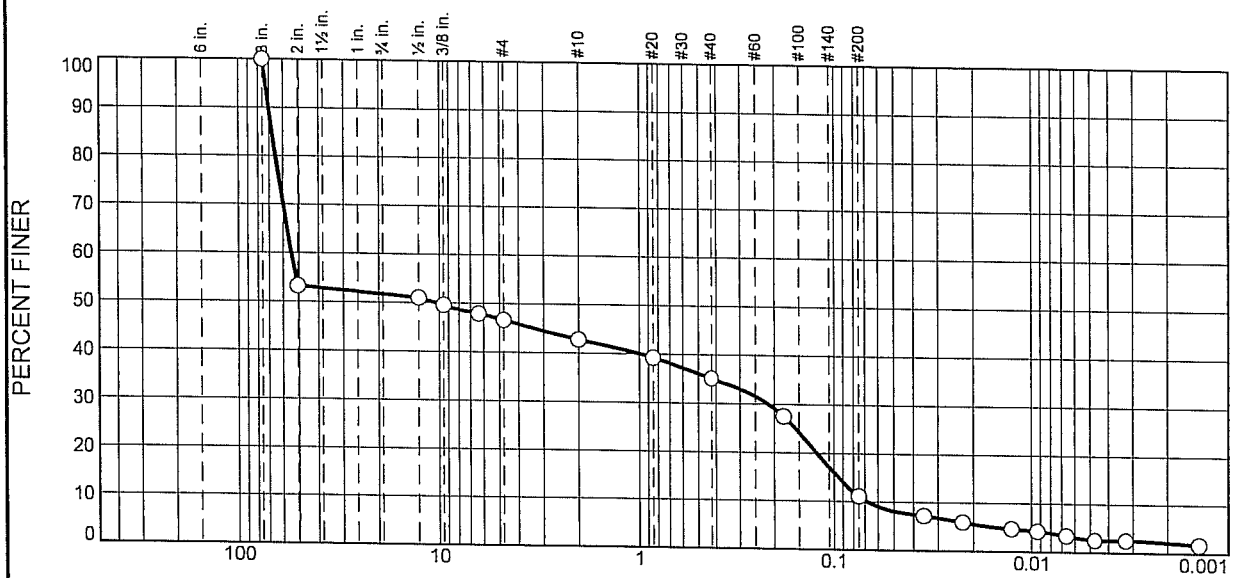
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-15-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-07 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.85'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 48 | 5 | 4 | 8 | 24 | 8 | 3 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3" | 100 | | |
| 2" | 53 | | |
| 1/2" | 51 | | |
| 3/8" | 50 | | |
| 1/4" | 48 | | |
| #4 | 47 | | |
| #10 | 43 | | |
| #20 | 39 | | |
| #40 | 35 | | |
| #80 | 28 | | |
| #200 | 11 | | |

* (no specification provided)

**Soil Description**

Black/Brown cmf GRAVEL; and cmf SAND; trace SILT; trace CLAY

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 67.8682 $D_{60}$= 54.6522 $D_{50}$= 10.2910
$D_{30}$= 0.2151 $D_{15}$= 0.0951 $D_{10}$= 0.0676
$C_u$= 808.25 $C_c$= 0.01

**Classification**

USCS= GP-GM AASHTO=

**Remarks**

Moisture content 21.3%

**Figure**

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# ATLANTIC TESTING LABORATORIES

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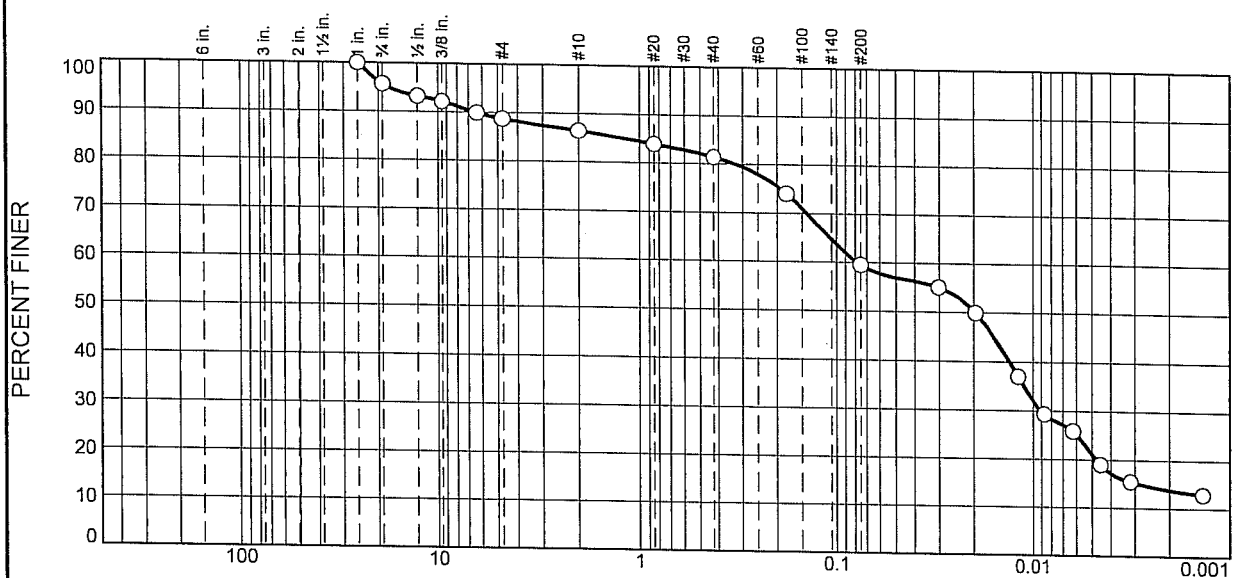
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-16-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-08 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-1.0'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 4 | 7 | 3 | 5 | 21 | 39 | 21 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1" | 100 | | |
| 3/4" | 96 | | |
| 1/2" | 93 | | |
| 3/8" | 92 | | |
| 1/4" | 90 | | |
| #4 | 89 | | |
| #10 | 86 | | |
| #20 | 84 | | |
| #40 | 81 | | |
| #80 | 74 | | |
| #200 | 60 | | |

* (no specification provided)

**Soil Description**

Brown SILT; some cmf SAND; some CLAY; little mf GRAVEL

**Atterberg Limits**

PL= 13 LL= 21 PI= 8

**Coefficients**

$D_{85}$= 1.1955 $D_{60}$= 0.0779 $D_{50}$= 0.0197
$D_{30}$= 0.0091 $D_{15}$= 0.0028 $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL AASHTO=

**Remarks**

Moisture content 17.7%

Figure

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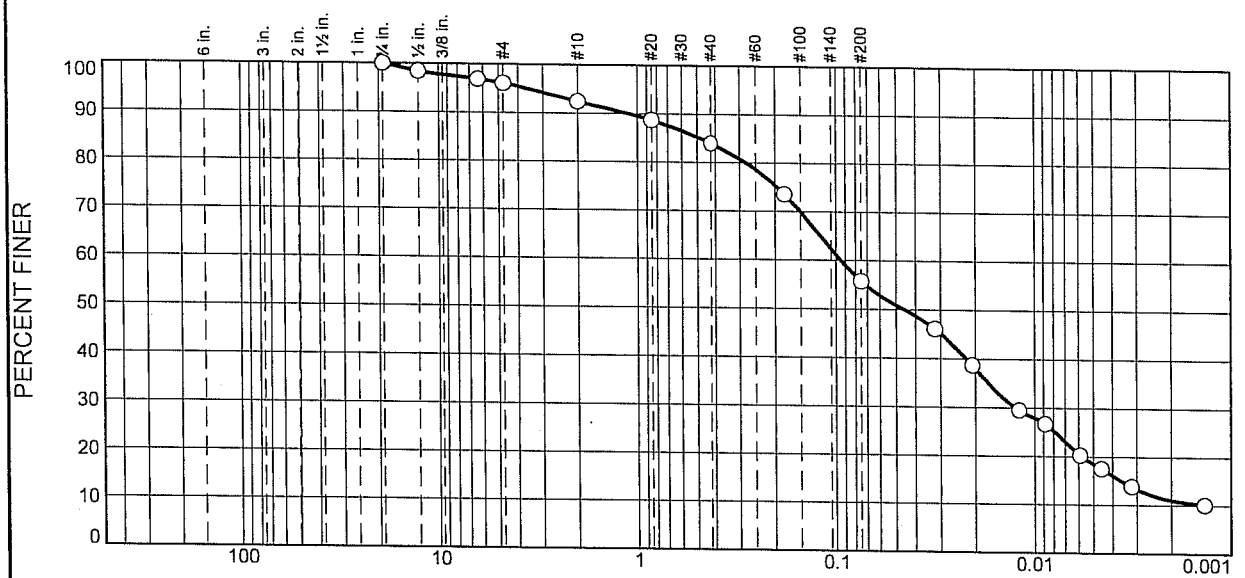
## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-17-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-09 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.0-0.5'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 4 | 4 | 8 | 28 | 38 | 18 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3/4" | 100 | | |
| 1/2" | 98 | | |
| 1/4" | 97 | | |
| #4 | 96 | | |
| #10 | 92 | | |
| #20 | 89 | | |
| #40 | 84 | | |
| #80 | 74 | | |
| #200 | 56 | | |

* (no specification provided)

**Soil Description**

Brown cmf SAND; and SILT; little CLAY; trace mf GRAVEL

**Atterberg Limits**

PL= 27 LL= 31 PI= 4

**Coefficients**

$D_{85}$= 0.4819 $D_{60}$= 0.0945 $D_{50}$= 0.0454
$D_{30}$= 0.0126 $D_{15}$= 0.0036 $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= ML AASHTO=

**Remarks**

Moisture content 58.9%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 4/17/15

# ATLANTIC TESTING LABORATORIES

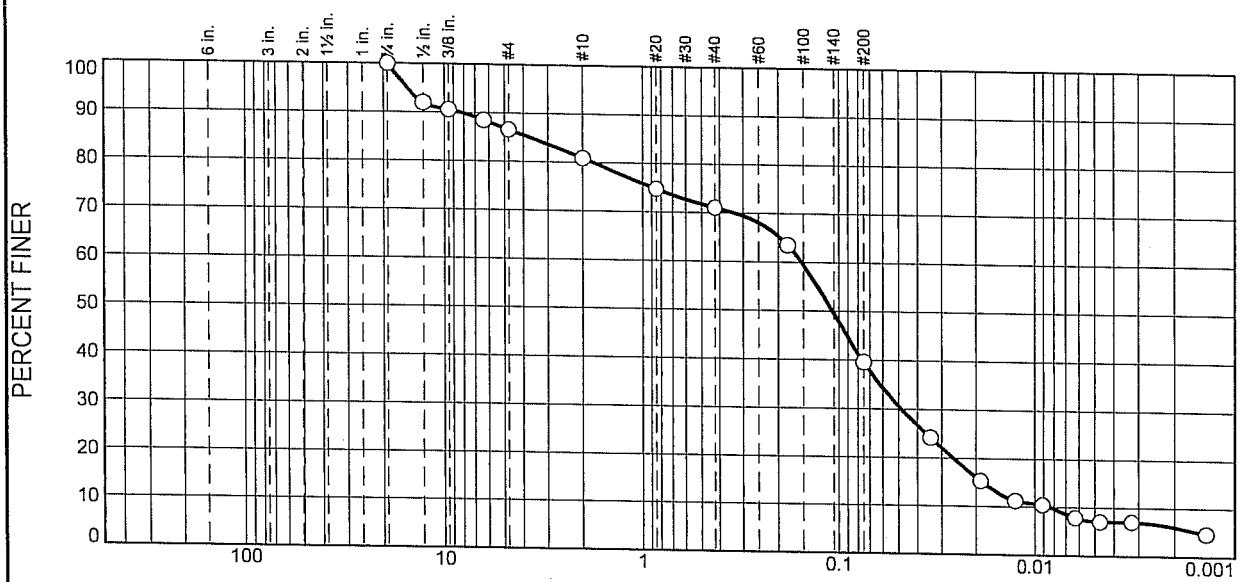
*WBE certified company*

## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-18-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-09 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.5-0.85'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 13 | 6 | 10 | 31 | 33 | 7 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 3/4" | 100 | | |
| 1/2" | 92 | | |
| 3/8" | 91 | | |
| 1/4" | 88 | | |
| #4 | 87 | | |
| #10 | 81 | | |
| #20 | 75 | | |
| #40 | 71 | | |
| #80 | 64 | | |
| #200 | 40 | | |

* (no specification provided)

**Soil Description**

Brown cmf SAND; some SILT; little mf GRAVEL; trace CLAY

**Atterberg Limits**

PL= NP LL= NP PI= NP

**Coefficients**

$D_{85}$= 3.6883 $D_{60}$= 0.1536 $D_{50}$= 0.1076
$D_{30}$= 0.0482 $D_{15}$= 0.0184 $D_{10}$= 0.0083
$C_u$= 18.40 $C_c$= 1.81

**Classification**

USCS= SM AASHTO=

**Remarks**

Moisture content 12.7%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 4/17/15

# ATLANTIC TESTING LABORATORIES

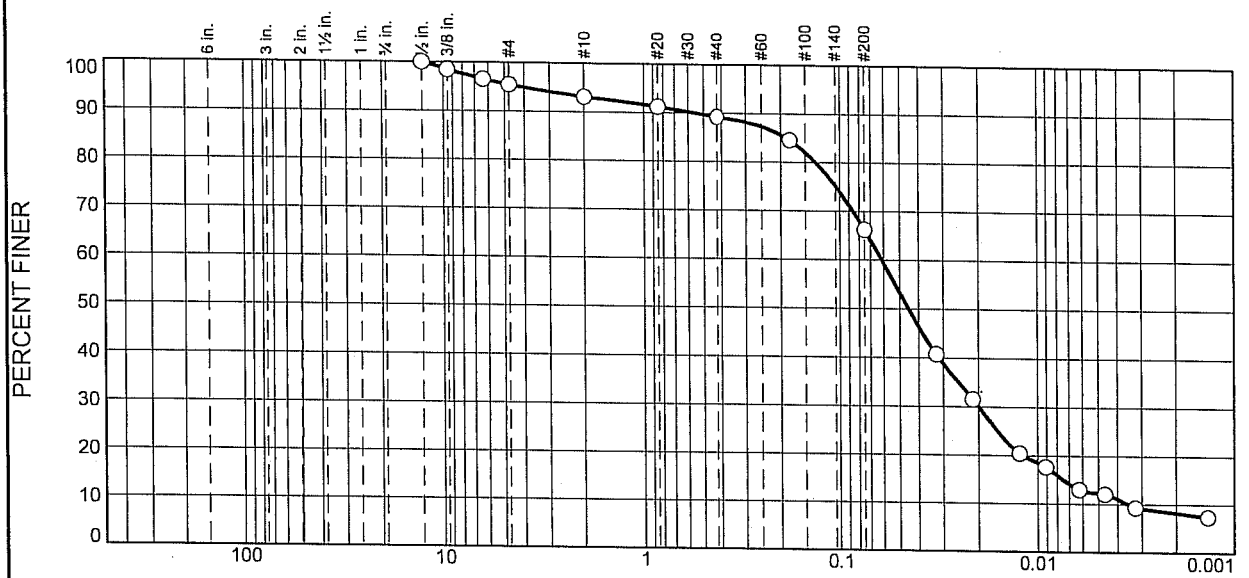
*WBE certified company*

## Particle Size Distribution Report

**Project:** Post-dredge Investigation, Waterloo, Cayuga County, NY **Report No.:** CD3831SL-19-04-15

**Client:** CH2M Hill **Date:** 4/17/15

**Sample No:** CSC-SED-09 **Source of Sample:** Sediment Sample
**Location:** In-Situ **Elev./Depth:** 0.85-2.0'




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0 | 0 | 5 | 2 | 4 | 23 | 54 | 12 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | OUT OF SPEC. (X) |
|---|---|---|---|
| 1/2" | 100 | | |
| 3/8" | 98 | | |
| 1/4" | 97 | | |
| #4 | 95 | | |
| #10 | 93 | | |
| #20 | 91 | | |
| #40 | 89 | | |
| #80 | 85 | | |
| #200 | 66 | | |

* (no specification provided)

**Soil Description**

Brown SILT; some cmf SAND; little CLAY; trace f GRAVEL

**Atterberg Limits**

PL= 15 LL= 17 PI= 2

**Coefficients**

$D_{85}$= 0.1867 $D_{60}$= 0.0613 $D_{50}$= 0.0450
$D_{30}$= 0.0199 $D_{15}$= 0.0075 $D_{10}$= 0.0035
$C_u$= 17.40 $C_c$= 1.84

**Classification**

USCS= ML AASHTO=

**Remarks**

Moisture content 16.4%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 4/17/15

# Attachment 3
# Photographic Log

# Former HCC RA – Post Dredge Verification Sampling

## *Attachment 3 - Sediment Core Photos*

Typical Cat Head Split Spoon Sampler – Safety Method

Typical Soft Sediment found in the Finger Area of Gorham Street Deposit (GSD-1)

# Former HCC RA – Post Dredge Verification Sampling

## *Attachment 3 - Sediment Core Photos*

Brownish black Soft Sediment found in the Finger Area of Gorham Street Deposit (GSD-1)

Typical Black, Very Soft Sediment observed in the Finger Area of the Gorham Street Deposit (GSD-1)

Soft Sediment / Compacted fine sand layer above the till material observed in Gorham Street Deposit (GSD-2

# Former HCC RA – Post Dredge Verification Sampling

## *Attachment 3 - Sediment Core Photos*

Dry – Typical Pale reddish brown Till material observed in Gorham Street and Downstream Deposit

Typical Till material – with sub-angular clast ingrained throughout the interval

# Former HCC RA – Post Dredge Verification Sampling

## *Attachment 3 - Sediment Core Photos*

Typical Till material – with rounded and sub-angular clast ingrained throughout the interval

Typical Pale Reddish Brown Till material with Clast (Angular / Sub-angular) observed in the Gorham Street and Downstream Deposits

# Former HCC RA – Post Dredge Verification Sampling

## *Attachment 3 - Sediment Core Photos*

Typical Pale Reddish Brown Till material with large Clast / gravel (Rounded / Sub-angular) observed in the Gorham Street and Downstream Deposits.

Highly Plastic / stiff fat clay at Gorham Street Deposit GSD-2

# Former HCC RA – Post Dredge Verification Sampling

## *Attachment 3 - Sediment Core Photos*

Undisturbed core sample from Gorham Street Finger area – GSD-2 DMU – Note Clast/gravel at bottom

Fat Clay observed in Gorham Street Deposit (GSD-2) at CSC-03 with Red Brick in between