Geotechnical Services Report

Roadway Soils Survey

Project Description:

SR-847/NW 47th Avenue PD&E Study

From SR-860/NW 183rd Street to Premier Parkway

Miami-Dade County, Florida

FM No.: 430637-1-22-01

Prepared for:

District VI

1000 NW 111 Avenue
Miami, FL 33172

December 13, 2013

Date: December 13, 2013

Prepared by: **GCME, Inc.**

TO: Stanley Consultants Inc.
1641 Worthington Road, Suite 400
West Palm Beach, FL 33409

Attention: **Mr. William Evans, P.E.**
Senior Project Manager

SUBJECT: **Geotechnical Report**
Roadway Soils Survey
SR-847/NW 47th Avenue PD&E Study
From SR-860/NW 183rd Street to Premier Parkway
Miami-Dade County, Florida
FM No.: 430637-1-22-01
GCME Project No.: 2000-01-12009

Dear Mr. Evans:

GCME, Inc. has completed the Geotechnical Report – Roadway Soils Survey in connection with the subject project. The purpose of this report is to provide geotechnical information to the roadway engineers and for preparation of the plans for the proposed improvements. The following report includes the methods of study, evaluations and recommendations concerning geotechnical aspects of the proposed roadway improvements and also incorporate the comments made by FDOT in reference to our Report dated August 10, 2013.

The work was completed following our contract with your firm and followed the basic guidelines of the Florida Department of Transportation (FDOT) Soils and Foundations Handbook, 2013. This report is written using English units.

We are pleased to be of continued service to Stanley Consultants Inc. and the Florida Department of Transportation (FDOT). If you have any questions or comments regarding the contents of the following report, please call.

Very truly yours,

GCME, INC.

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1.0 PROJECT DESCRIPTION

This entire project corridor runs along NW 47th Avenue (SR-847) with limits beginning at Station 110+00, NW 183rd Street (SR-860), in Miami-Dade County, proceeding north to Station 235+00, Premier Parkway, in Broward County, Florida, a distance of about 2.4 miles. The project includes widening SR-847 from two (2) to four (4) lanes, where one 12 feet travel lane will be added in each direction by widening to outside of SR-847. All improvements will be within the existing right of way. The existing bridge over C-9/Snake Creek Canal will be replaced/widened to accommodate the proposed improvements. We believe the existing box culvert over A-2/Carol City Canal will also be replaced/widened to accommodate the proposed improvements.

The majority of the project site is located in Miami-Dade County along NW 47th Avenue (SR-847). Land in the project vicinity is urban. Terrain in the area is relatively flat. The subject project corridor consists of generally one (1) lane of through traffic in each direction, northbound and southbound.

The Site Vicinity Map, Plate 1, presents the project limits.

2.0 PURPOSE AND SCOPE OF STUDY

The purpose of this PD&E Study was to explore the subsurface conditions within the general vicinity of the project corridor in order to catalog the general subsurface stratigraphy and provide geotechnical engineering information for the proposed improvements in each of the following areas.

1. General assessment of the area geology based on our past experience and study of available geological literature.

2. Soil stratigraphy at the boring locations. Development of soil profiles along the proposed roadway alignment.

3. Assessment of the existing soil and groundwater conditions along the subject alignment for suitability for roadway pavement support.

4. General location and description of potential deleterious materials encountered in the borings, which may interfere with construction progress or pavement performance, including existing fills or surficial organics.

5. Site preparation requirements. Engineering criteria for placement and compaction of approved fill materials. Recommended treatment methods for buried organics (if any).

6. Identification of construction considerations based on the soil and groundwater conditions developed from the borings.

7. General recommendations for roadway embankment.

The scope of work for this project included the following:

1. Conducted a general visual reconnaissance of the project alignment.

2. Reviewed readily available published geologic and topographic information. This published information was obtained from the "Opa-Locka, Florida" Quadrangle Maps published by the USGS and the "Soil Survey of Miami-Dade County and Broward County, Florida" published by the USDA Soil Conservation Service (SCS).

3. Executed a program of subsurface exploration consisting of subsurface sampling. The subsurface sampling was accomplished by performing Standard Penetration Test (SPT) and auger profile borings along the roadway corridor.

4. Visually classified the samples obtained from the auger borings in the laboratory using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System in general accordance with the American Society of Testing and Materials (ASTM) test designation D-3282, titled "Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes." The laboratory testing program included grain-size analyses, organic and moisture content determination and FDOT corrosion series (pH, sulfates, chlorides, and resistivity).

5. Measured groundwater levels in the borings.

6. Prepared an engineering report summarizing our field and laboratory testing, the subsurface soil and groundwater conditions encountered and general evaluation and design recommendations for roadway embankments.

3.0 FIELD INVESTIGATION

To evaluate the subsurface condition along the proposed roadway alignment, auger borings were performed along or proximate to the proposed improvements (widening) of the roadway alignment. Subsoil along the proposed roadway alignments was explored by drilling auger profile and SPT borings to nominal depths of 5 and 10 feet below the existing ground surface respectively. The borings were drilled at an average nominal horizontal spacing of about 100 feet along both sides of SR-847, staggered along the centerline. At approximately every 500 feet interval, the boring was extended to a nominal depth of 10 feet below grade. The project surveyors provided the horizontal controls (control points/stations) for performing the borings along the project corridor. We explored the subsurface conditions along the project corridor, along SR-847 between stations 110+00 and 235+00.

A total of one hundred and twenty-two (122) borings were drilled. The numbering schedule and location of the borings drilled for the proposed improvements of the roadway corridor and the crossing streets are as follows:

- Along SR-847:
  (Station 110+00 to 235+00)

  One hundred and twenty-two (122) borings, numbered RD-101 through RD-226.
  Borings RD-102 and RD-106: skipped due to utility conflicts.
  Borings RD-215 and RD-223: skipped due to Turnpike utility conflict and existing construction.

Five (5) cores of the existing pavements were cut along the project corridor for this study. Approximate locations of the pavement cores are presented in Plates 2 through 9.

Boring location plans showing the approximate location of the borings drilled for the project roadway corridor are presented on the plates titled “Boring Location Plan”, Plates 2 through 9. The station, offset, elevation and coordinates information at the boring and pavement core locations were provided to us by FDOT.

Bulk samples of the upper 2 to 3 feet of soils were collected at five (5) different locations along the project corridor roadway and delivered to the FDOT Gainesville Laboratory for Resilient Modulus Testing. The bulk samples locations are presented in Table – A1. The results provided by FDOT are presented in Appendix – A.

4.0 LABORATORY TESTS

4.1 Soil Classification Testing

Representative samples recovered from the borings were visually reviewed in the laboratory by a geotechnical engineer to confirm the field classification. The recovered samples for the borings were classified in general accordance with the American Association of State Highway and Transportation Officials (ASSHTO) Soil Classification System. The visual classification of the soil was confirmed with the use of the laboratory test results. Laboratory index tests consisting of sieve analyses, natural moisture content and organic content determination were performed on selected samples. Corrosion tests were also performed on selected soil samples.

4.2 Grain-Size Analysis

The grain-size analyses were conducted in general accordance with the FDOT test designation Florida Manual (FM) 1-T088 (ASTM test designation D-422). The grain-size analysis test measures the percentage by weight of a dry soil sample passing a series of U.S. standard sieves, including the percentage passing the No. 200 Sieve. In this manner, the grain-size distribution of a soil is measured. The percentage by weight passing the No. 200 Sieve is the amount of silt and clay sized particles. The gradation of a soil, including the amount of silt and clay in a soil, affects its engineering properties, including permeability, consolidation rate, suitability as roadway subgrade, and suitability as general fill material.

4.3 Moisture and Organic Content Tests

Laboratory moisture content and organic content tests consist of the determination of the percentage of moisture and organic content in selected samples in general accordance with FM 1-T265 and 1-T267 (ASTM D-2216 and AASHTO T267-86). Briefly, natural moisture content was determined by weighing a sample of the selected material and then drying it in a warm oven. Care was taken to use a gentle heat so as not to burn off any organics. The sample was removed from the oven and reweighed. The difference of the two weights was the amount of moisture removed from the sample. The weight of the moisture divided by the weight of the dry soil sample is the percentage by weight of the moisture in the sample.

The dried soil samples were then heated in a small muffle furnace to 455±10 degrees Centigrade for six hours, thereby burning off all organic-type material, leaving only the soil minerals. The difference in weight prior to and after the burning is the weight of organics. The weight of the organics divided by the weight of the dried soil is the percentage of organics within a sample. Organic contents in excess of five (5) percent are generally considered unsuitable.

4.4 Corrosion Testing

Corrosion tests were conducted in accordance with FDOT test designations FM 5-550, FM 5-551, FM 5-552 and FM 5-553. These tests are performed on recovered soil samples obtained from samples retrieved from the auger boring location. Corrosion tests measure parameters such as pH, resistivity, sulfate content, and chloride content.

4.5 Summary of Laboratory Test Results

The laboratory index property test results of samples recovered from the borings are presented in Table 1. Corrosion series test results are presented in Table 2. Resilient Modulus Test results provided by FDOT Gainesville laboratory are provided in Appendix A.

5.0 USDA, SCS SOIL SURVEY

Research of the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) Soil Survey of the Miami-Dade County area indicates the presence of different soil map units along the roadway sections. The soil map units present along the project corridor are described in details in Appendix – B.

A segment of the USDA Soils Map showing the proposed roadway section and the surrounding areas is presented in Appendix – B.

6.0 SUBSURFACE CONDITIONS

6.1 Stratigraphy

Soils and soil profiles encountered in borings drilled for the project roadway corridor study generally consisted of six (6) general types:

Stratum 1*:* Dark brown Sand with silt, with trace to few organic, trace roots, trace to few limerock fragments (Topsoil; A-8).

Stratum 2: Brown to dark brown Sand with silt, sometimes with trace to few limerock fragments (A-3).

Stratum 2A: Brown to light brown Sand and some limerock fragments, with silt (A-3).

Stratum 3: Dark brown to light brown silty Sand, with trace to few limerock fragments (A-2-4).

Stratum 4: Dark brown organic Sand with silt to silty (A-8).

Stratum 5: Brown to light brown sandy to silty Limestone.

Figure 1, Cross Section Soil Survey for the Design of Roads, describes the various strata that were encountered during the study of the project corridor and presents test results for each stratum. The majority of the project corridor is underlain with interlayering of Strata 1, 2, 2A and 5. Stratum 3 soil was encountered in several isolated borings. Stratum 4 soil was only encountered in eight (8) isolated borings.

Stratum 1 is topsoil and shall be removed during clearing and grubbing in accordance with section 110 of the FDOT Standard Specifications.

Stratum 2 consists of select material and is adequate for subgrade and embankment support, and should be utilized according to Standard Index 505.

Stratum 2A consists of select material and is adequate for subgrade and embankment support, and should be utilized according to Standard Index 505. However, portions may retain excess moisture due to slightly high fines content (ranging between 9 to 10 percent) and could be more difficult to handle, place and compact than ordinary A-3 material.

Stratum 3 soils have fine content ranging between 11 to 24 percent. Stratum 3 soils classified as A-2-4, consist mainly of soils with high fines content and are likely to retain some excess moisture and could be difficult to handle, place and compact compared to ordinary A-3 materials. Hence, these soils may be used in the subgrade with extra caution, and proper supervision and quality control.

Stratum 4 consists of organic soils classified as A-8 materials. As per FDOT Standard Index 500 these soils need to be removed and replaced with select embankment fill. These soils are only encountered in a few (8) boring locations drilled along the project corridor and at discrete depths.

Stratum 5 consists of sandy to silty limestone.
The details of the subsurface soil profiles along the project alignment can be gleaned from the soil

profile sheets. Figures 2 through 8 show the soil profiles of borings drilled along project corridor. Groundwater levels and the dates they were recorded are shown adjacent to the borings.

6.2 Groundwater

The depths to the groundwater table measured in each of the borings are indicated in the soil profiles on Figures 2 through 8. Depths to groundwater table measured in the borings drilled along the roadway section ranged between 2.5 and 8.0 feet below ground surface.

Groundwater levels were reported in each of the borings. Based on our experience, water levels encountered in the test borings may not have sufficient time to achieve equilibrium prior to reading measurements. Therefore, groundwater levels encountered in the field during construction may be higher (or lower) than that indicated on the test boring logs. Fluctuation should be anticipated due to environmental variation and seasonal condition, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing canals, swales, drainage ponds, and under drains. We recommend that the contractors determine the actual groundwater levels prior to the time of the construction to evaluate groundwater impact on their construction procedure.

We have prepared a table showing the groundwater table levels measured in all the borings applicable to the project corridor. The information is presented in Appendix – C, Table – C1. The U.S. Geological Survey (USGS) Water Resources were reviewed and there are two (2) existing wells close the project corridor. The South Florida Water Management (SFWM) Water Resources were reviewed and there are two (2) stations on C-9 Canal, close the project corridor. The location and available data in reference to these two (2) USGS wells and two (2) SFWM stations were also present in Appendix – C for information purposes only. Based on information above, we estimate that the seasonal high groundwater table will be +4.00’ NGVD, 1929.

7.0 ROADWAY EMBANKMENT EVALUATION

After reviewing the findings of field and laboratory analytical data for this study indicate that the roadway alignment is generally suitable for the planned construction when viewed from a geotechnical engineering perspective. The subsurface conditions of the roadway alignment are not expected to impose any significant constraints or limitations on the design or construction of the planned project from a soil mechanics, foundation engineering or engineering geology standpoint. However, organic soils are present along the existing roadway corridor and need to be taken into consideration. The position of the groundwater table must also be generally considered during final design phase and construction.

The existing soils along the majority of the project alignments should have modest subgrade strength for pavement support. Subgrade preparation in these areas should consist of normal clearing, stripping, and compacting. The majority of the project corridor is underlain with interlayering of Strata 1, 2, 2A and 5. Stratum 3 soil was encountered in several borings. Stratum 4 soil was only encountered in eight (8) borings.

Stratum 2 and 2A consist of select materials and are adequate for subgrade and embankment support. However, Stratum 2A soils have fine content ranging between 9 to 20 percent and are likely to retain some excess moisture and could be difficult to handle, place and compact compared to ordinary A-3 materials. The high fine content is generally attributed to the silty limerock fragments found within the layer.

The soil profiles indicate that silty sands (Stratum 3, mostly A-2-4) were encountered in several (15) borings the project corridor. Stratum 3 soils are silty soils with average fines content at 17 percent. These soils (Stratum 3) due to high fines content are likely to retain excess moisture and could be difficult to handle, place and compact. These soils may be used in the roadway subgrade with extra caution, and proper supervision and quality control. However, the District Materials Engineer (along with the CEI team) has the authority to approve or disapprove the use of these soils based on existing site conditions during construction and efficiency of the contractor's means and methods for handling these soils.

Stratum 4 consists of organic soils classified as A-8 materials. As per FDOT standard Index 500 these soils need to be removed and replaced with select embankment fill. These organic soils are only encountered at eight (8) isolated boring locations at depths of about 1 to 10 feet below grade with average organic content 19.7%.

We believe that based on the project corridor proposed improvement; and the location, extent, depth, and organic content of these soils; removal and replacement of the organic soils with select fill materials may not always be a feasible option applicable to all locations where these soils were encountered. Therefore, we would recommend removal and replacement at locations where organic soils were encountered at shallow depths, and use of a geogrid layer placed directly below the bottom of the new roadway base materials along locations where these soils were encountered below 4 feet from the existing grade. We would recommend using a geogrid layer, as per FDOT index 501, having an ultimate tensile strength of at least 280 lb/ft in the machine direction at 2% strain, placed directly below the bottom of the new base materials along the proposed roadway widening and/or shoulder construction. Adjacent geogrid layer should be overlapped by at least 3 feet in all directions. The details including limits are presented in Figure 1.

Embankment fill will be required for construction of the new roadway shoulder. New embankment fill should meet the gradation requirements of the FDOT Standard Index No. 505 "Embankment Utilization." Embankment construction for the proposed roadway should follow FDOT Standard Specifications for Road and Bridge Construction, 2013.

We expect some ground settlement at the base of raised and/or widened portions of the existing fills, and for new fills, as an elastic response as the sand strata deform under the increase in embankment weight. The largest deformations should occur within the shallow subsoils, particularly those that are relatively loose. We believe the settlement will be concurrent with embankment fill construction for the subsoils and new fill which are granular in nature.

We understand that project corridor is located in an urban neighborhood. Vibrations resulting from use of construction equipment (e.g., vibratory roller, temporary sheet pile installation, etc.) at the project location should be carefully monitored to limit the impact of ground motion on existing structures. A precondition survey is often prudent to evaluate existing conditions (if any) before any construction operations. Also, during construction operation, vibration resulting from the operation should be monitored constantly in order to limit/avoid any impact of ground motion on the existing structures.

8.0 PAVEMENT CONDITIONS SURVEY

We have cut five (5) pavement cores along the project roadway corridor. The approximate core locations are presented in Plates 2 through 9.

In order to accurately evaluate the existing pavements in these areas, we have cut cores of the asphalt and base course materials and deepened the holes utilizing power augers to a depth of at least 6 inches below the base course materials in order to check the depth and consistency of the base course and subgrade soils. The depth drilled at each location varied approximately between 1.1 and 1.2 feet, measured from the top of asphalt. Rut depths and cross slopes were measured at the corresponding lanes where the cores were cut. A general pavement condition survey including evaluation of class, type and extent of cracking (if any) was also completed during our field study. The results of our field study are shown on the Pavement Evaluation and Condition Data (Table – 3). The pictures of the core samples are presented in Appendix – D.

The survey indicates that the overall existing pavement condition is “Poor” to “Good” based on guidelines established in FDOT’s Flexible Pavement Distress Identification Section.

The five (5) cores had asphalt thicknesses ranging between 3.7 to 7.8 inches. The results of the pavement cores are presented in Table – 3. Base course material found below the asphalt layers mainly consists of crushed limerock with some sand and silt, and was between 5 and 9 inches thick. In addition, we have measured a maximum depression about 0.722 inches at the left wheel path of the north bound lane, the location of PC-4, approximate station 194+00. The subgrade soils found below the base course generally consisted of sands. Subgrade soils generally extend to termination depths of exploration at each core location. The details of materials found at each location are shown in Table – 4.

9.0 LIMITATIONS OF STUDY

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been presented after being prepared following generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics and engineering geology. This company is not responsible for the conclusion, opinion, or recommendations made by others based on this data. No other warranties are expressed or implied.

The scope of the investigation was intended to evaluate soil conditions within the influence of foundations and does not include an evaluation of potential deep soil problems such as sinkholes. The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated. If any subsoil variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should also be reviewed in the event significant changes occur in the design, nature, or location of the proposed roadway and structures.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in the report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

TABLE - 1

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-103	2.0	-	3.0	2	A-3	0.5					95.8	93.4	92.5	91.8	91.2	85.2	58.8	12.6	2.5
RD-105	3.0	-	4.0	2	A-3	3.5					100.0	99.0	95.5	94.5	94.0	89.0	64.0	17.7	7.2
RD-105	4.0	-	5.0	2	A-3	1.4					100.0	100.0	100.0	100.0	99.9	93.9	67.7	14.8	3.3
RD-107	6.0	-	8.0	2	A-3	19.7					100.0	100.0	98.9	98.8	98.5	92.6	67.6	15.1	1.8
RD-111	8.0	-	10.0	4	A-8	42.8	33.1												
RD-113	3.0	-	4.0	3	A-2-4	10.4					100.0	100.0	99.4	99.2	99.1	97.2	84.0	41.6	17.0
RD-115	2.0	-	4.0	3	A-2-4	4.3					100.0	88.0	79.4	73.3	69.5	65.4	54.5	29.5	14.6
RD-117	1.0	-	2.0	2	A-3	1.3					100.0	100.0	100.0	100.0	99.8	94.4	72.0	20.9	1.3
RD-118	4.0	-	5.0	3	A-2-4	0.3					100.0	100.0	98.5	97.3	96.2	89.9	71.8	34.9	18.7
RD-119	3.0	-	4.0	2A	A-3	8.8					81.3	72.1	67.6	66.8	66.1	61.9	45.5	17.6	10.3
RD-120	4.0	-	6.0	3	A-2-4	13.0					100.0	78.6	68.1	62.8	60.0	55.6	42.8	26.1	19.6
RD-121	2.0	-	3.0	2	A-3	1.1					100.0	100.0	100.0	100.0	99.8	92.6	62.9	11.9	0.8
RD-122	2.0	-	3.0	2	A-3	1.6					100.0	97.3	90.4	83.7	80.1	73.8	51.4	14.0	4.4
RD-123	2.0	-	3.0	2	A-3	0.1					100.0	100.0	100.0	100.0	99.8	92.8	65.1	13.2	0.7
RD-126	2.0	-	3.0	3	A-2-4	3.7					100.0	94.6	93.2	92.0	91.3	84.4	62.8	35.9	23.5
RD-129	2.0	-	3.0	2	A-3	1.6					100.0	100.0	100.0	100.0	99.8	92.5	62.5	13.2	0.9
RD-130	8.0	-	10.0	2	A-3	23.9					100.0	100.0	100.0	99.9	99.7	94.7	71.5	22.3	8.9
RD-131	2.0	-	3.0	2	A-3	0.4					100.0	100.0	100.0	100.0	99.8	93.6	61.0	14.8	0.9
RD-133	3.0	-	4.0	3	A-2-4	8.0					100.0	98.9	97.3	96.1	95.2	89.4	68.2	30.8	20.6
RD-139	4.0	-	6.0	4	A-8	33.4	13.0												
RD-140	4.0	-	6.0	4	A-8	29.2	16.5												
RD-143	4.0	-	5.0	4	A-8	43.6	33.3												
RD-145	3.0	-	4.0	2	A-3	0.4					100.0	95.2	91.9	89.8	88.6	83.3	57.1	15.7	3.7
RD146	1.0	-	2.0	3	A-2-4	2.3					100.0	95.1	89.8	84.8	82.1	76.9	59.9	28.9	18.6
RD-146	3.0	-	4.0	2	A-3	1.1					96.3	84.0	79.5	76.2	74.7	69.8	47.3	15.3	3.7
RD-151	4.0	-	6.0	2	A-3	21.5					100.0	100.0	100.0	100.0	99.8	92.9	65.7	18.5	3.4
RD-152	4.0	-	6.0	2	A-3	19.4					100.0	100.0	100.0	100.0	99.7	91.5	59.7	14.2	2.3
RD-155	8.0	-	10.0	2	A-3	19.8					100.0	100.0	100.0	100.0	99.8	93.4	64.9	17.6	3.7
RD-160	1.0	-	2.0	4	A-8	19.3	12.7												
RD-161	4.0	-	5.0	2	A-3	23.2					100.0	100.0	100.0	100.0	99.8	92.9	66.8	16.2	1.7

TABLE - 1

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-163	2.0	-	4.0	2	A-3	10.0	2.6												
RD-169	1.0	-	2.0	2	A-3	19.4	4.96												
RD-172	4.0	-	6.0	4	A-8	23.9	29.2												
RD-176	1.0	-	2.0	4	A-8	13.9	11.2												
RD-184	4.0	-	5.0	2	A-3	22.5					100.0	100.0	100.0	100.0	99.8	93.3	63.1	13.6	0.9
RD-188	2.0	-	3.0	2	A-3	1.0					100.0	99.4	98.2	97.7	97.1	86.4	59.0	16.7	2.6
RD-189	4.0	-	6.0	2	A-3	7.7					100.0	96.0	88.8	83.3	80.7	75.7	53.0	21.7	8.6
RD-192	4.0	-	6.0	2	A-3	2.7					100.0	91.7	90.0	89.2	88.7	83.0	60.2	17.8	3.0
RD-197	4.0	-	6.0	2	A-3	20.6					100.0	100.0	100.0	100.0	99.9	94.1	68.5	17.1	1.6
RD-198	2.0	-	4.0	2	A-3	3.7					100.0	98.7	98.7	98.5	98.2	91.9	67.1	19.5	2.2
RD-199	4.0	-	5.0	3	A-2-4	24.5					100.0	97.6	95.0	92.1	87.9	79.2	59.1	28.5	14.3
RD-201	4.0	-	5.0	3	A-2-4	25.8					100.0	97.1	96.0	94.4	91.5	83.3	61.2	28.4	12.6
RD-206	2.0		4.0	4	A-8	18.0	8.5												
RD-206	6.0	-	8.0	5	-	19.5					68.6	63.4	57.6	50.8	46.6	42.1	33.6	17.7	10.1
RD-207	3.0	-	4.0	3	A-2-4	8.1					100.0	99.1	97.4	96.2	95.4	90.9	72.2	30.1	11.1
RD-209	4.0	-	5.0	2	A-3	11.1					100.0	95.9	93.8	92.7	92.1	87.4	67.7	25.6	9.0
RD-211	3.0	-	4.0	2	A-3	4.5					100.0	96.3	94.9	94.2	93.6	88.9	70.8	24.5	6.0
RD-217	8.0	-	10.0	2A	A-3	13.3					100.0	87.3	74.8	67.8	65.2	60.9	45.3	16.7	9.2
RD-219	4.0	-	5.0	3	A-2-4	18.4					100.0	85.7	81.7	80.4	79.6	75.6	60.5	28.2	15.4
RD-222	6.0	-	8.0	2	A-3	18.8					100.0	100.0	99.5	99.5	99.2	93.8	69.4	19.1	7.6

TABLE - 1A

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-103	2.0	-	3.0	2	A-3	0.5					95.8	93.4	92.5	91.8	91.2	85.2	58.8	12.6	2.5
RD-105	3.0	-	4.0	2	A-3	3.5					100.0	99.0	95.5	94.5	94.0	89.0	64.0	17.7	7.2
RD-105	4.0	-	5.0	2	A-3	1.4					100.0	100.0	100.0	100.0	99.9	93.9	67.7	14.8	3.3
RD-107	6.0	-	8.0	2	A-3	19.7					100.0	100.0	98.9	98.8	98.5	92.6	67.6	15.1	1.8
RD-117	1.0	-	2.0	2	A-3	1.3					100.0	100.0	100.0	100.0	99.8	94.4	72.0	20.9	1.3
RD-121	2.0	-	3.0	2	A-3	1.1					100.0	100.0	100.0	100.0	99.8	92.6	62.9	11.9	0.8
RD-122	2.0	-	3.0	2	A-3	1.6					100.0	97.3	90.4	83.7	80.1	73.8	51.4	14.0	4.4
RD-123	2.0	-	3.0	2	A-3	0.1					100.0	100.0	100.0	100.0	99.8	92.8	65.1	13.2	0.7
RD-129	2.0	-	3.0	2	A-3	1.6					100.0	100.0	100.0	100.0	99.8	92.5	62.5	13.2	0.9
RD-130	8.0	-	10.0	2	A-3	23.9					100.0	100.0	100.0	99.9	99.7	94.7	71.5	22.3	8.9
RD-131	2.0	-	3.0	2	A-3	0.4					100.0	100.0	100.0	100.0	99.8	93.6	61.0	14.8	0.9
RD-145	3.0	-	4.0	2	A-3	0.4					100.0	95.2	91.9	89.8	88.6	83.3	57.1	15.7	3.7
RD-146	3.0	-	4.0	2	A-3	1.1					96.3	84.0	79.5	76.2	74.7	69.8	47.3	15.3	3.7
RD-151	4.0	-	6.0	2	A-3	21.5					100.0	100.0	100.0	100.0	99.8	92.9	65.7	18.5	3.4
RD-152	4.0	-	6.0	2	A-3	19.4					100.0	100.0	100.0	100.0	99.7	91.5	59.7	14.2	2.3
RD-155	8.0	-	10.0	2	A-3	19.8					100.0	100.0	100.0	100.0	99.8	93.4	64.9	17.6	3.7
RD-161	4.0	-	5.0	2	A-3	23.2					100.0	100.0	100.0	100.0	99.8	92.9	66.8	16.2	1.7
RD-163	2.0	-	4.0	2	A-3	10.0	2.6												
RD-169	1.0	-	2.0	2	A-3	19.4	4.96												
RD-184	4.0	-	5.0	2	A-3	22.5					100.0	100.0	100.0	100.0	99.8	93.3	63.1	13.6	0.9
RD-188	2.0	-	3.0	2	A-3	1.0					100.0	99.4	98.2	97.7	97.1	86.4	59.0	16.7	2.6
RD-189	4.0	-	6.0	2	A-3	7.7					100.0	96.0	88.8	83.3	80.7	75.7	53.0	21.7	8.6
RD-192	4.0	-	6.0	2	A-3	2.7					100.0	91.7	90.0	89.2	88.7	83.0	60.2	17.8	3.0
RD-197	4.0	-	6.0	2	A-3	20.6					100.0	100.0	100.0	100.0	99.9	94.1	68.5	17.1	1.6
RD-198	2.0	-	4.0	2	A-3	3.7					100.0	98.7	98.7	98.5	98.2	91.9	67.1	19.5	2.2
RD-209	4.0	-	5.0	2	A-3	11.1					100.0	95.9	93.8	92.7	92.1	87.4	67.7	25.6	9.0
RD-211	3.0	-	4.0	2	A-3	4.5					100.0	96.3	94.9	94.2	93.6	88.9	70.8	24.5	6.0
RD-222	6.0	-	8.0	2	A-3	18.8					100.0	100.0	99.5	99.5	99.2	93.8	69.4	19.1	7.6

TABLE - 1B

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-119	3.0	-	4.0	2A	A-3	8.8					81.3	72.1	67.6	66.8	66.1	61.9	45.5	17.6	10.3
RD-217	8.0	-	10.0	2A	A-3	13.3					100.0	87.3	74.8	67.8	65.2	60.9	45.3	16.7	9.2

TABLE - 1C

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-113	3.0	-	4.0	3	A-2-4	10.4					100.0	100.0	99.4	99.2	99.1	97.2	84.0	41.6	17.0
RD-115	2.0	-	4.0	3	A-2-4	4.3					100.0	88.0	79.4	73.3	69.5	65.4	54.5	29.5	14.6
RD-118	4.0	-	5.0	3	A-2-4	0.3					100.0	100.0	98.5	97.3	96.2	89.9	71.8	34.9	18.7
RD-120	4.0	-	6.0	3	A-2-4	13.0					100.0	78.6	68.1	62.8	60.0	55.6	42.8	26.1	19.6
RD-126	2.0	-	3.0	3	A-2-4	3.7					100.0	94.6	93.2	92.0	91.3	84.4	62.8	35.9	23.5
RD-133	3.0	-	4.0	3	A-2-4	8.0					100.0	98.9	97.3	96.1	95.2	89.4	68.2	30.8	20.6
RD146	1.0	-	2.0	3	A-2-4	2.3					100.0	95.1	89.8	84.8	82.1	76.9	59.9	28.9	18.6
RD-199	4.0	-	5.0	3	A-2-4	24.5					100.0	97.6	95.0	92.1	87.9	79.2	59.1	28.5	14.3
RD-201	4.0	-	5.0	3	A-2-4	25.8					100.0	97.1	96.0	94.4	91.5	83.3	61.2	28.4	12.6
RD-207	3.0	-	4.0	3	A-2-4	8.1					100.0	99.1	97.4	96.2	95.4	90.9	72.2	30.1	11.1
RD-219	4.0	-	5.0	3	A-2-4	18.4					100.0	85.7	81.7	80.4	79.6	75.6	60.5	28.2	15.4

TABLE - 1D

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-111	8.0	-	10.0	4	A-8	42.8	33.1												
RD-139	4.0	-	6.0	4	A-8	33.4	13.0												
RD-140	4.0	-	6.0	4	A-8	29.2	16.5												
RD-143	4.0	-	5.0	4	A-8	43.6	33.3												
RD-160	1.0	-	2.0	4	A-8	19.3	12.7												
RD-172	4.0	-	6.0	4	A-8	23.9	29.2												
RD-176	1.0	-	2.0	4	A-8	13.9	11.2												
RD-206	2.0		4.0	4	A-8	18.0	8.5												

TABLE - 1E

SUMMARY OF LABORATORY TESTING RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Sample Depth (ft)			Stratum No.	AASHTO Symbol	Natural Moisture Content (%)	Organic Content (%)	Atterberg Limits			Sieve Analysis								
								LL (%)	PL (%)	PI (%)	3/4"	3/8"	#4	#10	#20	#40	#60	#100	#200
RD-206	6.0	-	8.0	5	-	19.5					68.6	63.4	57.6	50.8	46.6	42.1	33.6	17.7	10.1

GCME

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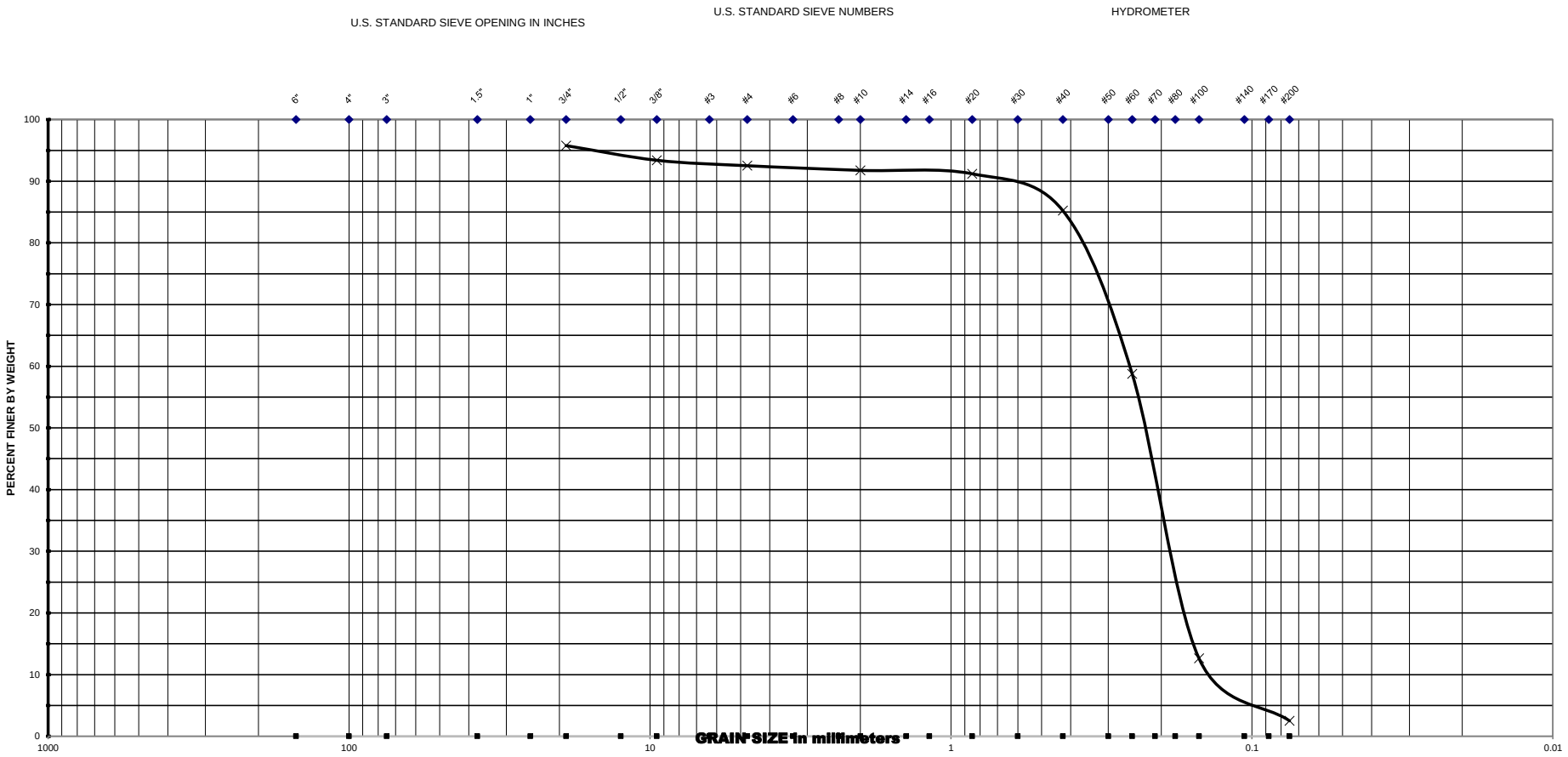


Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

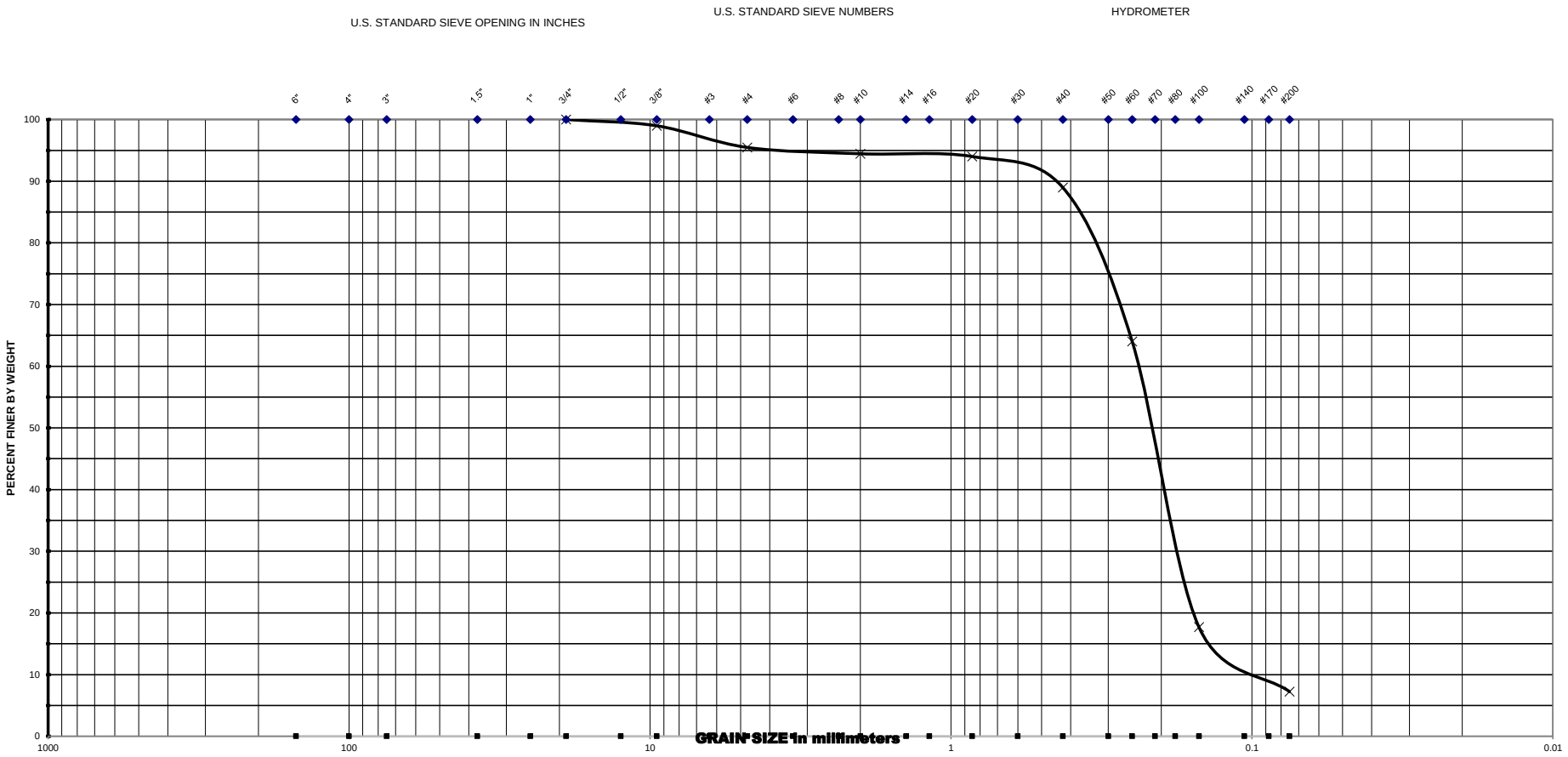
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-103	2.0 - 3.0	A-3	0.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	95.8
3/8"	93.4
#4	92.5
#10	91.8
#20	91.2
#40	85.2
#60	58.8
#100	12.6
#200	2.5

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

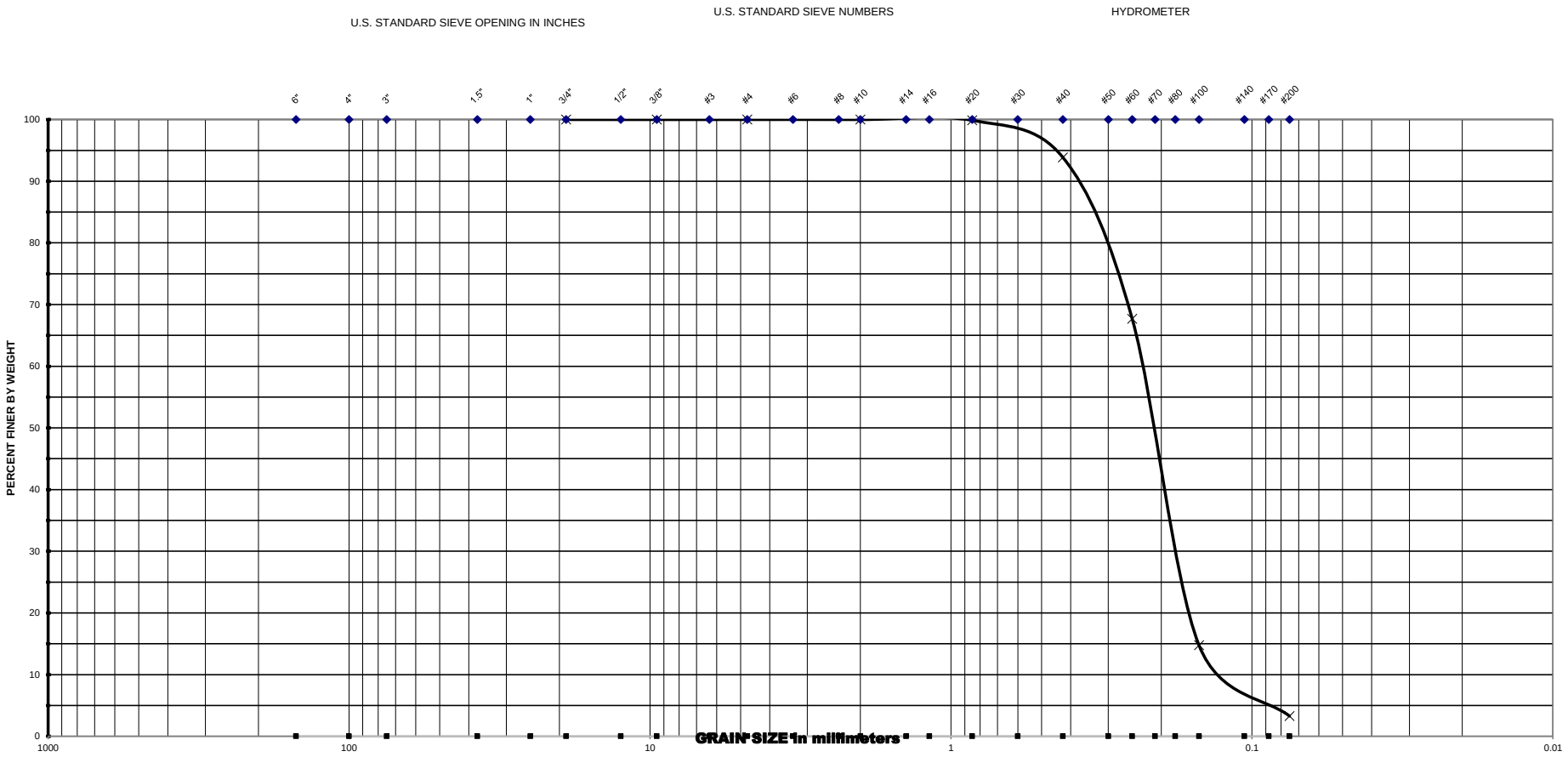
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-105	3.0 - 4.0	A-3	3.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	99.0
#4	95.5
#10	94.5
#20	94.0
#40	89.0
#60	64.0
#100	17.7
#200	7.2

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

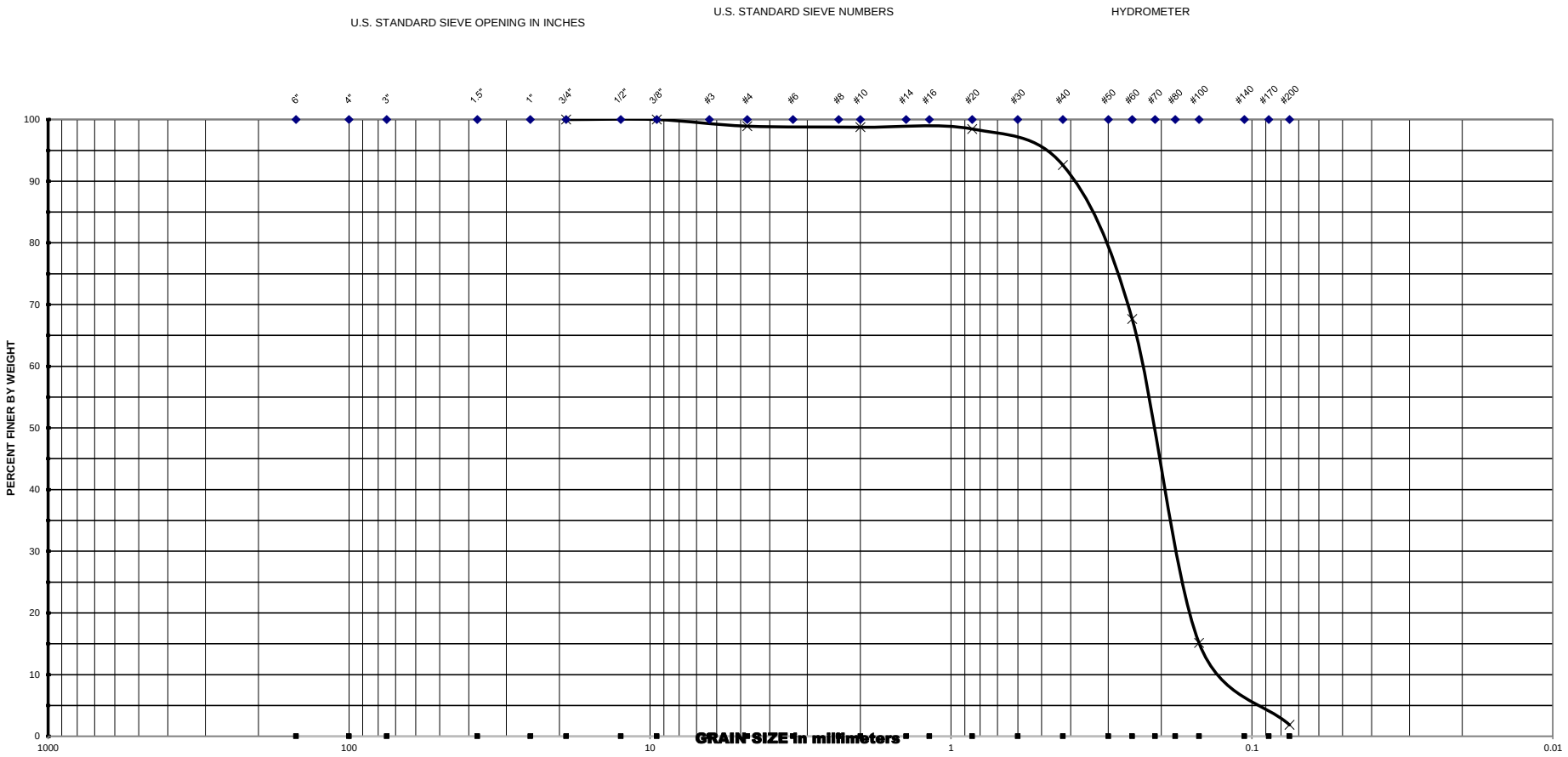
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-105	4.0 - 5.0	A-3	1.4	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.9
#40	93.9
#60	67.7
#100	14.8
#200	3.3

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

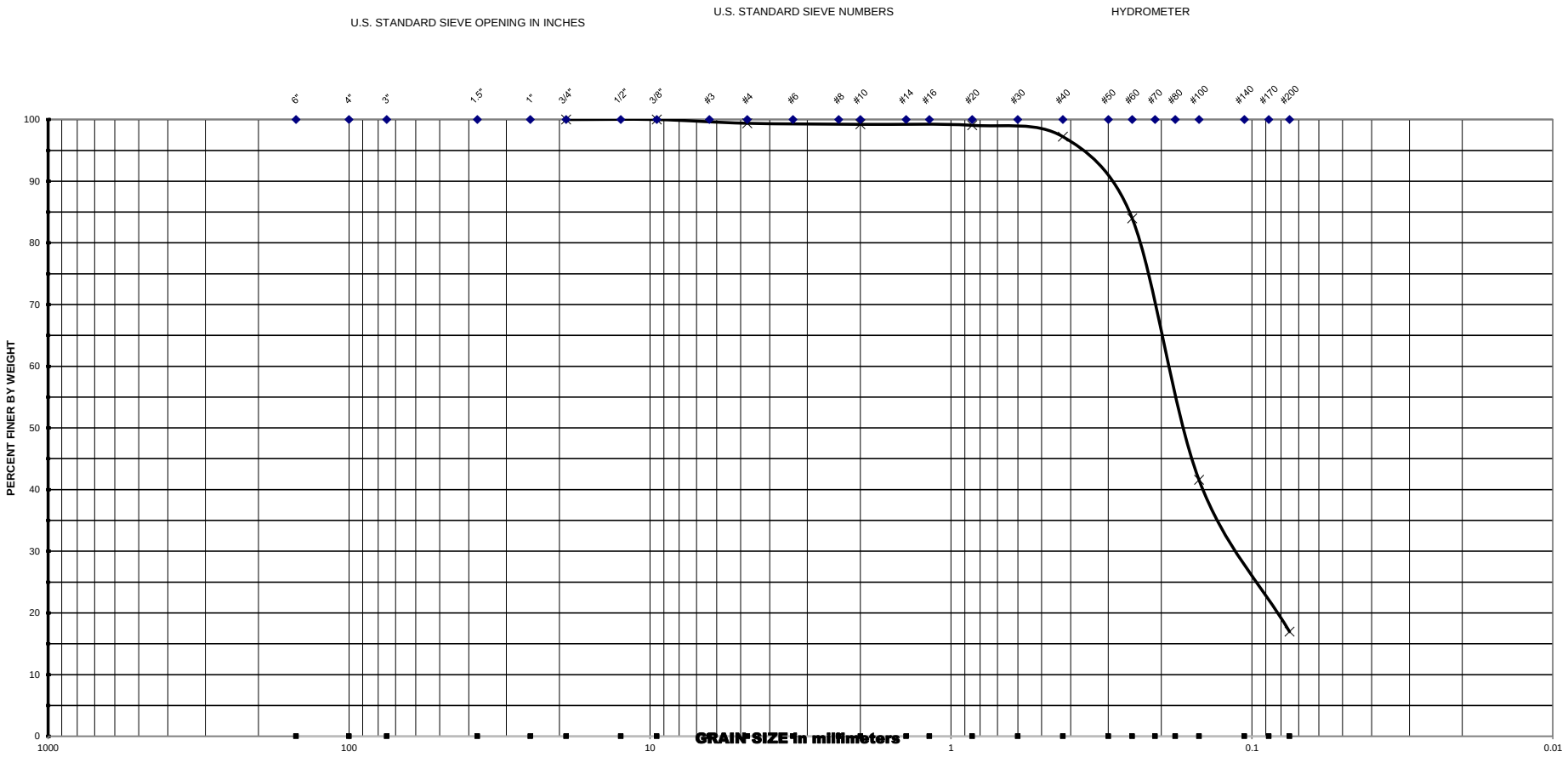
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-107	6.0 - 8.0	A-3	19.7	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	98.9
#10	98.8
#20	98.5
#40	92.6
#60	67.6
#100	15.1
#200	1.8

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

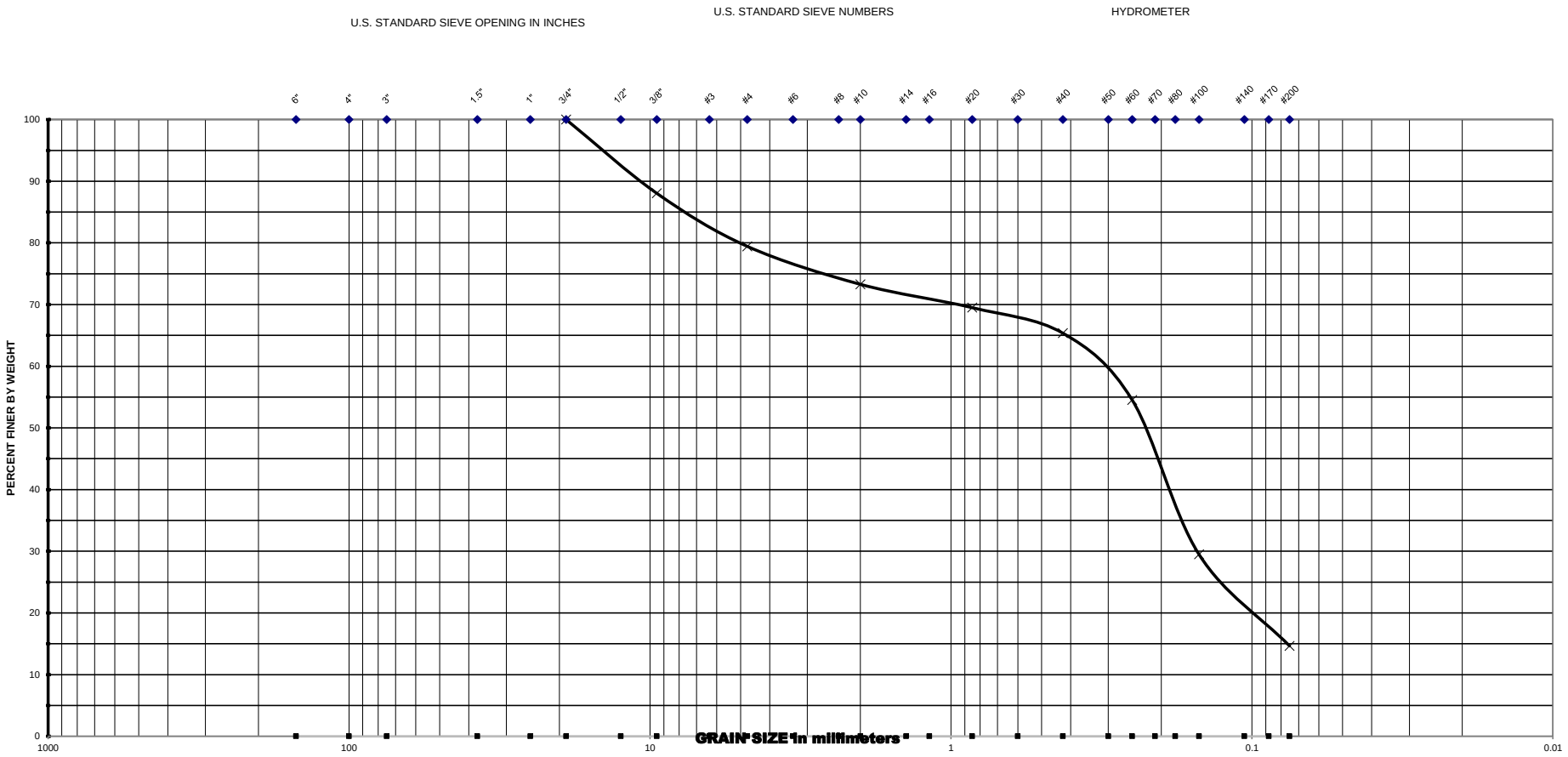
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-113	3.0 - 4.0	A-2-4	10.4	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	99.4
#10	99.2
#20	99.1
#40	97.2
#60	84.0
#100	41.6
#200	17.0

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

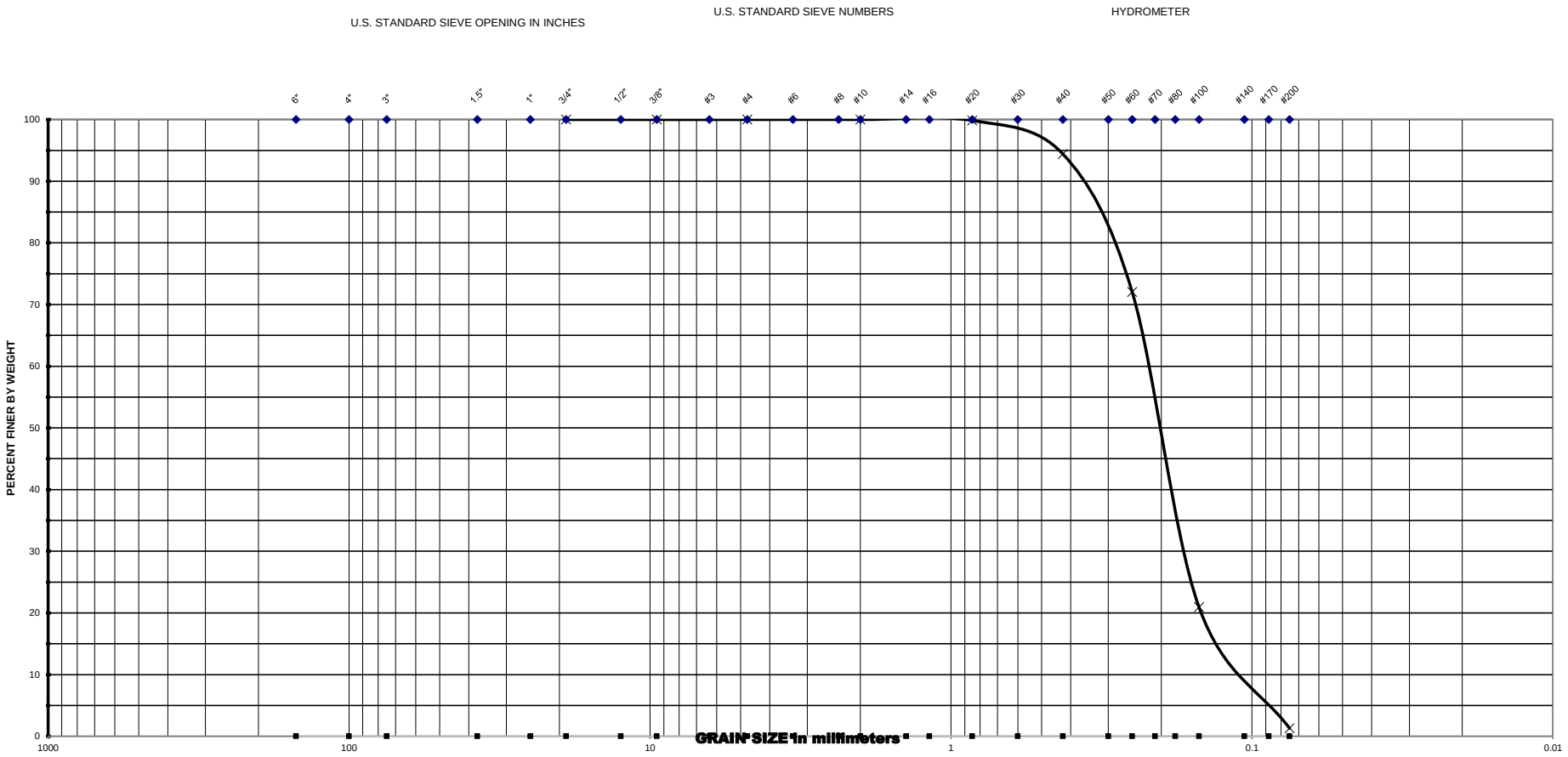
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-115	2.0 - 4.0	A-2-4	4.3	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	88.0
#4	79.4
#10	73.3
#20	69.5
#40	65.4
#60	54.5
#100	29.5
#200	14.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

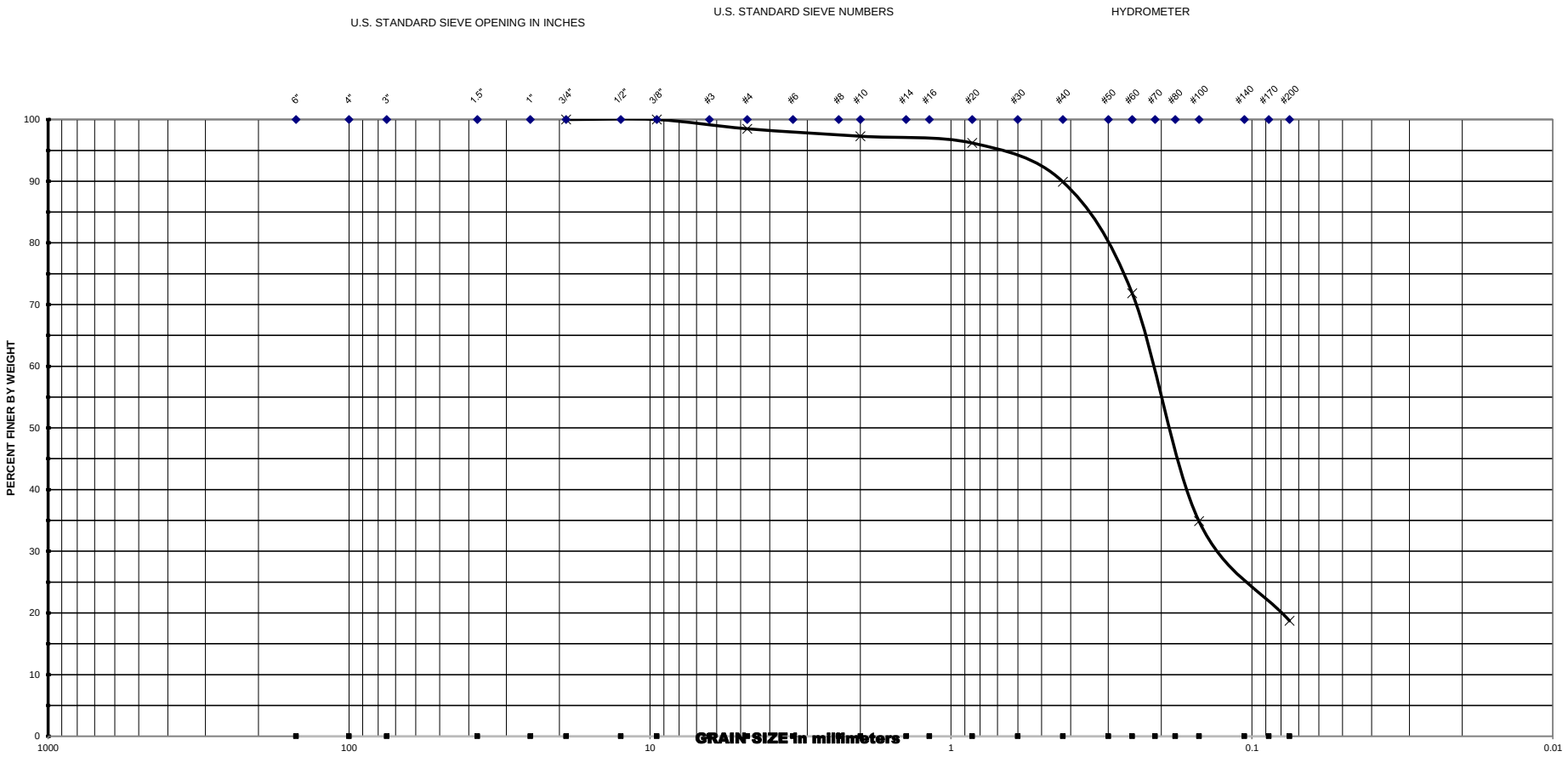
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-117	1.0 - 2.0	A-3	1.3	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	94.4
#60	72.0
#100	20.9
#200	1.3

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

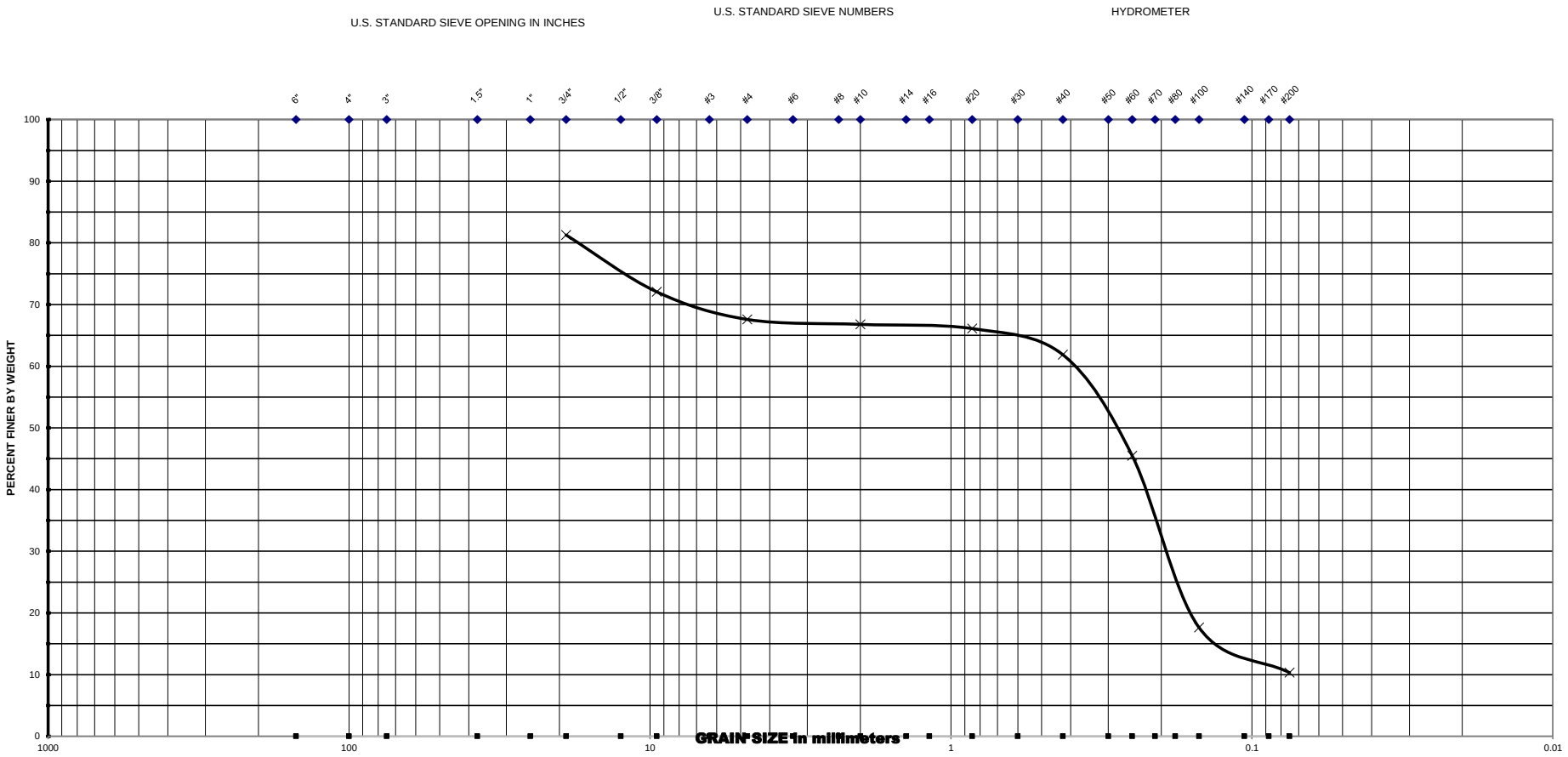
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-118	4.0 - 5.0	A-2-4	0.3	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	98.5
#10	97.3
#20	96.2
#40	89.9
#60	71.8
#100	34.9
#200	18.7

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

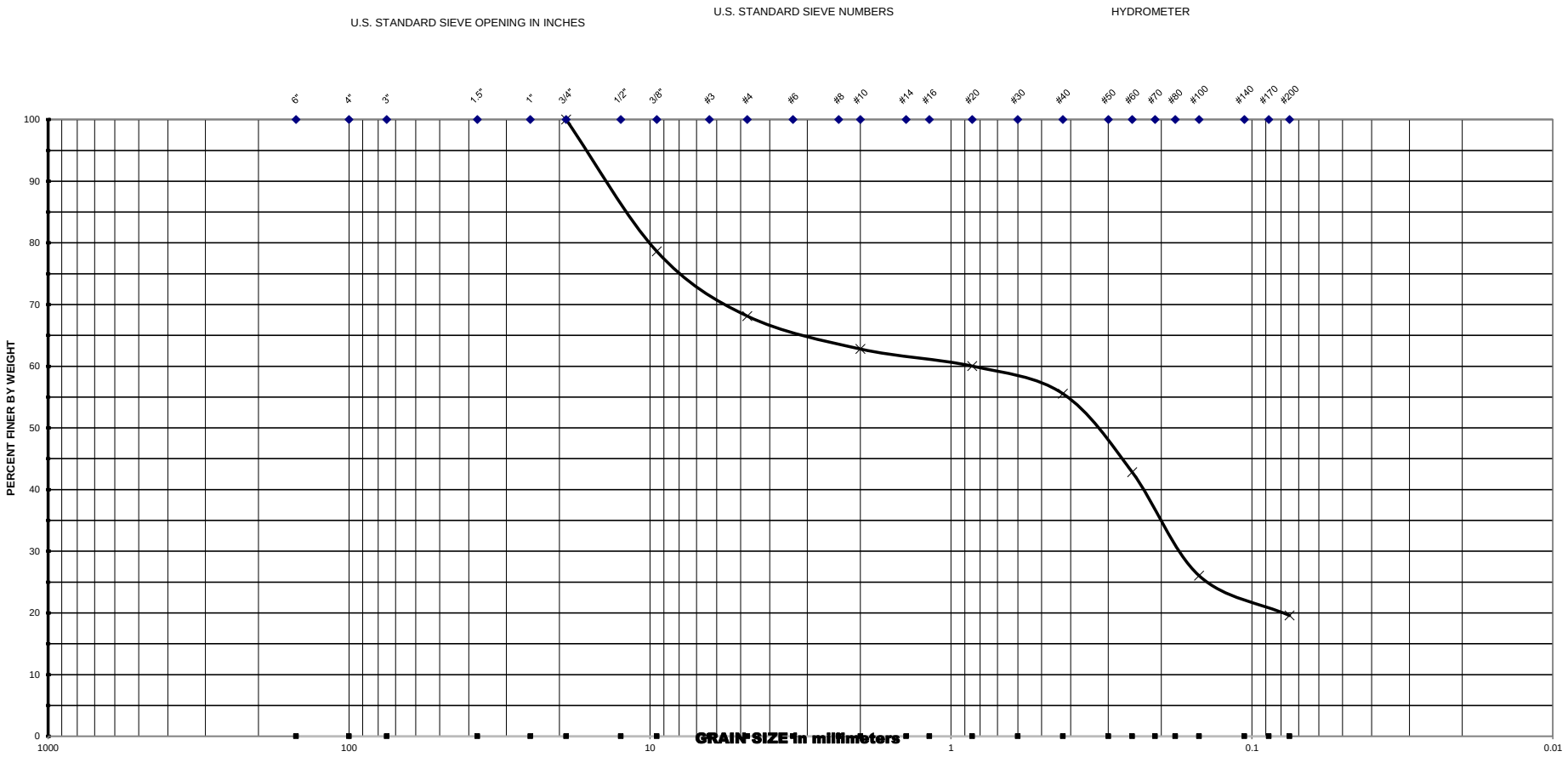
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-119	3.0 - 4.0	A-3	8.8	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	81.3
3/8"	72.1
#4	67.6
#10	66.8
#20	66.1
#40	61.9
#60	45.5
#100	17.6
#200	10.3

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

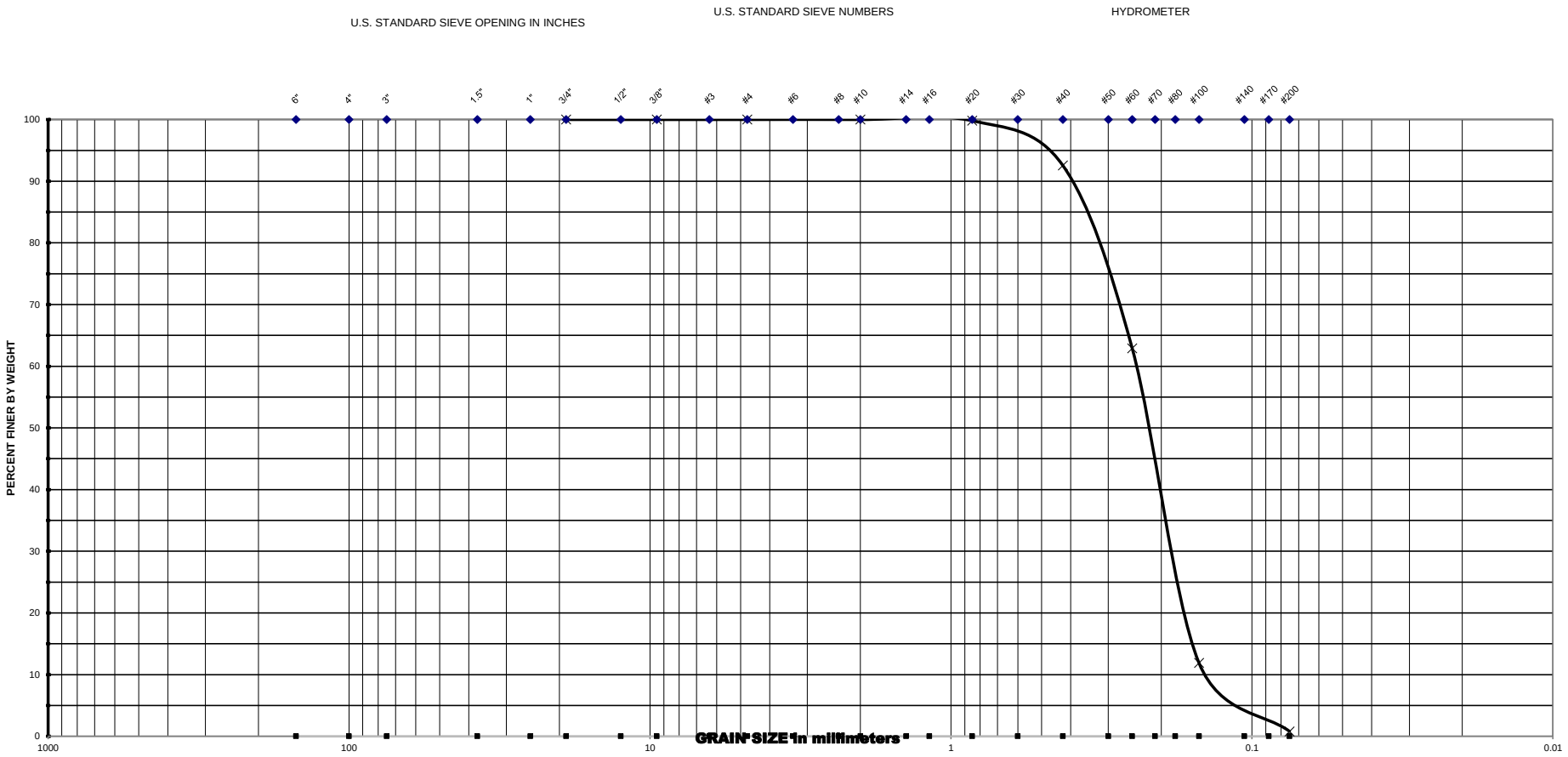
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-120	4.0 - 6.0	A-2-4	13.0	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	78.6
#4	68.1
#10	62.8
#20	60.0
#40	55.6
#60	42.8
#100	26.1
#200	19.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

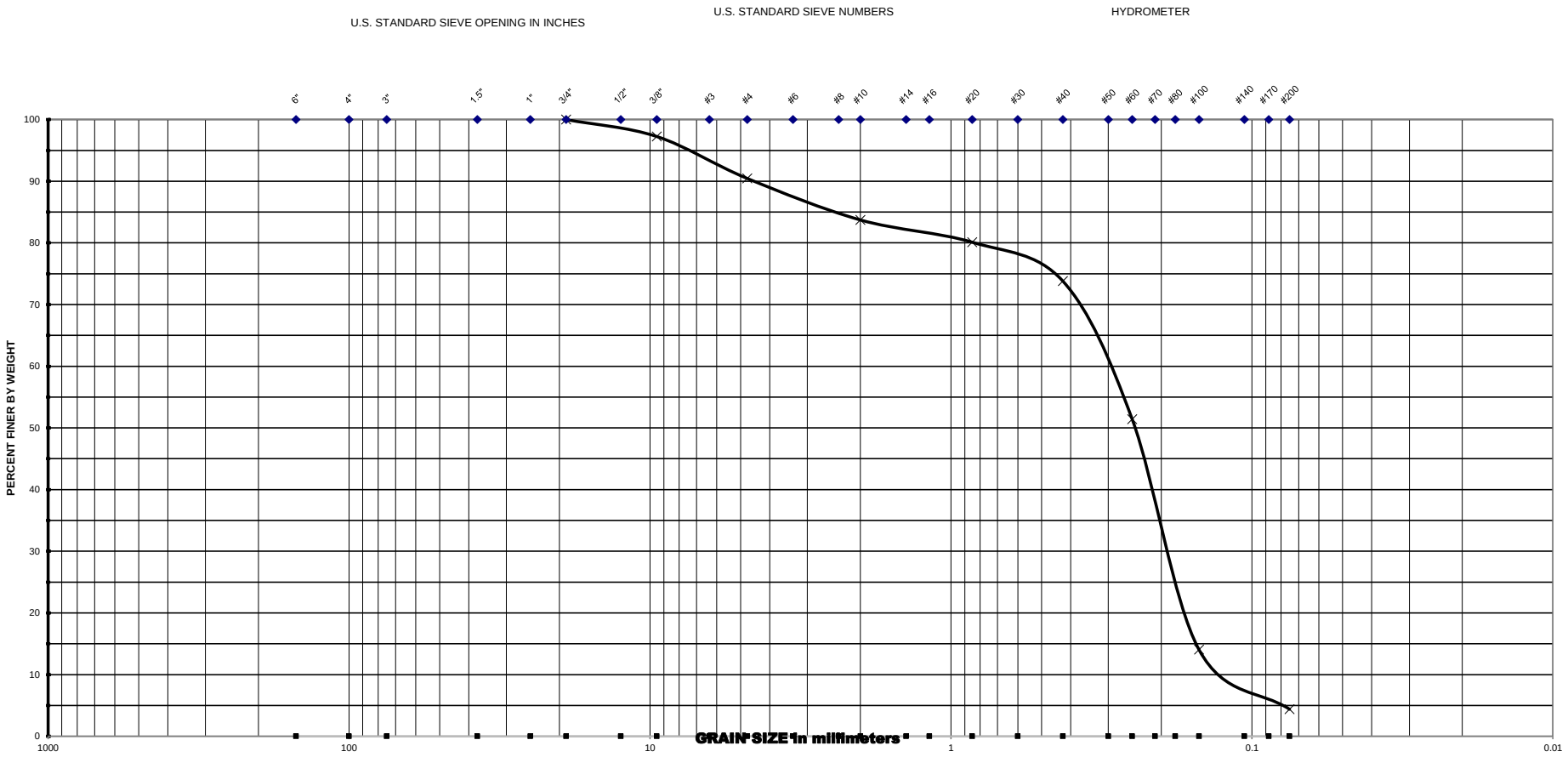
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-121	2.0 - 3.0	A-3	1.1	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	92.6
#60	62.9
#100	11.9
#200	0.8

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

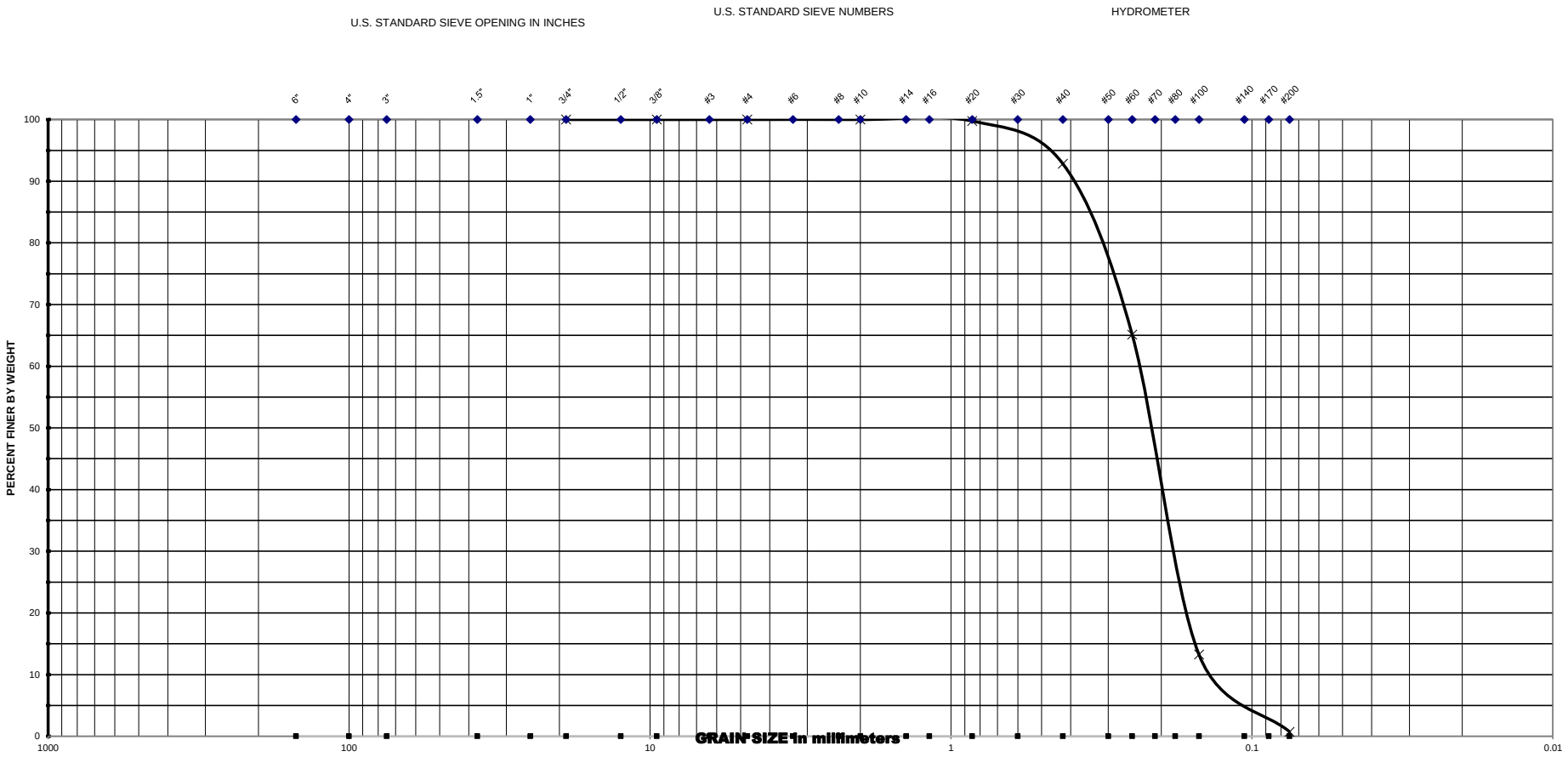
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-122	2.0 - 3.0	A-3	1.6	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	97.3
#4	90.4
#10	83.7
#20	80.1
#40	73.8
#60	51.4
#100	14.0
#200	4.4

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

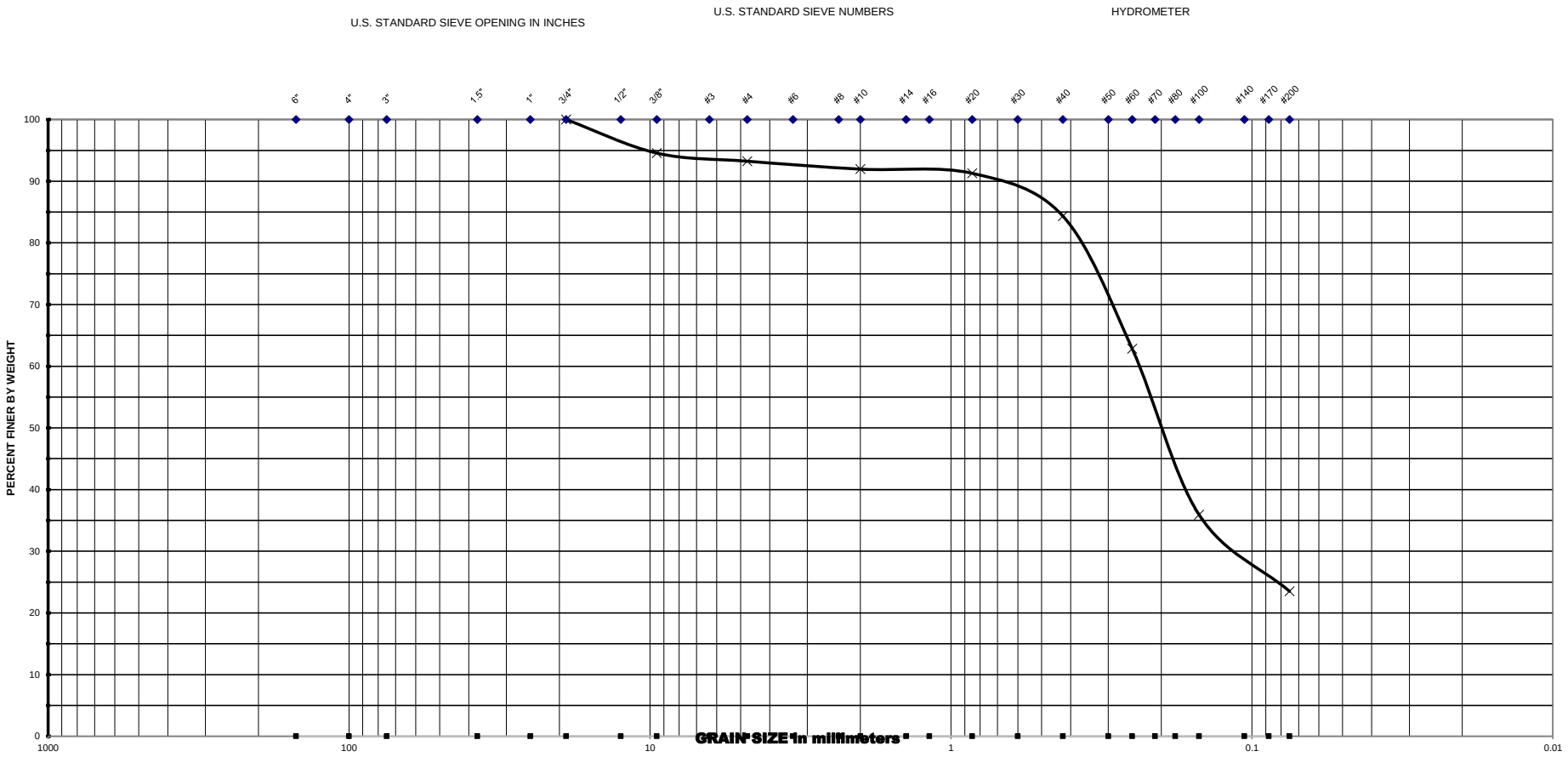
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-123	2.0 - 3.0	A-3	0.1	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	92.8
#60	65.1
#100	13.2
#200	0.7

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

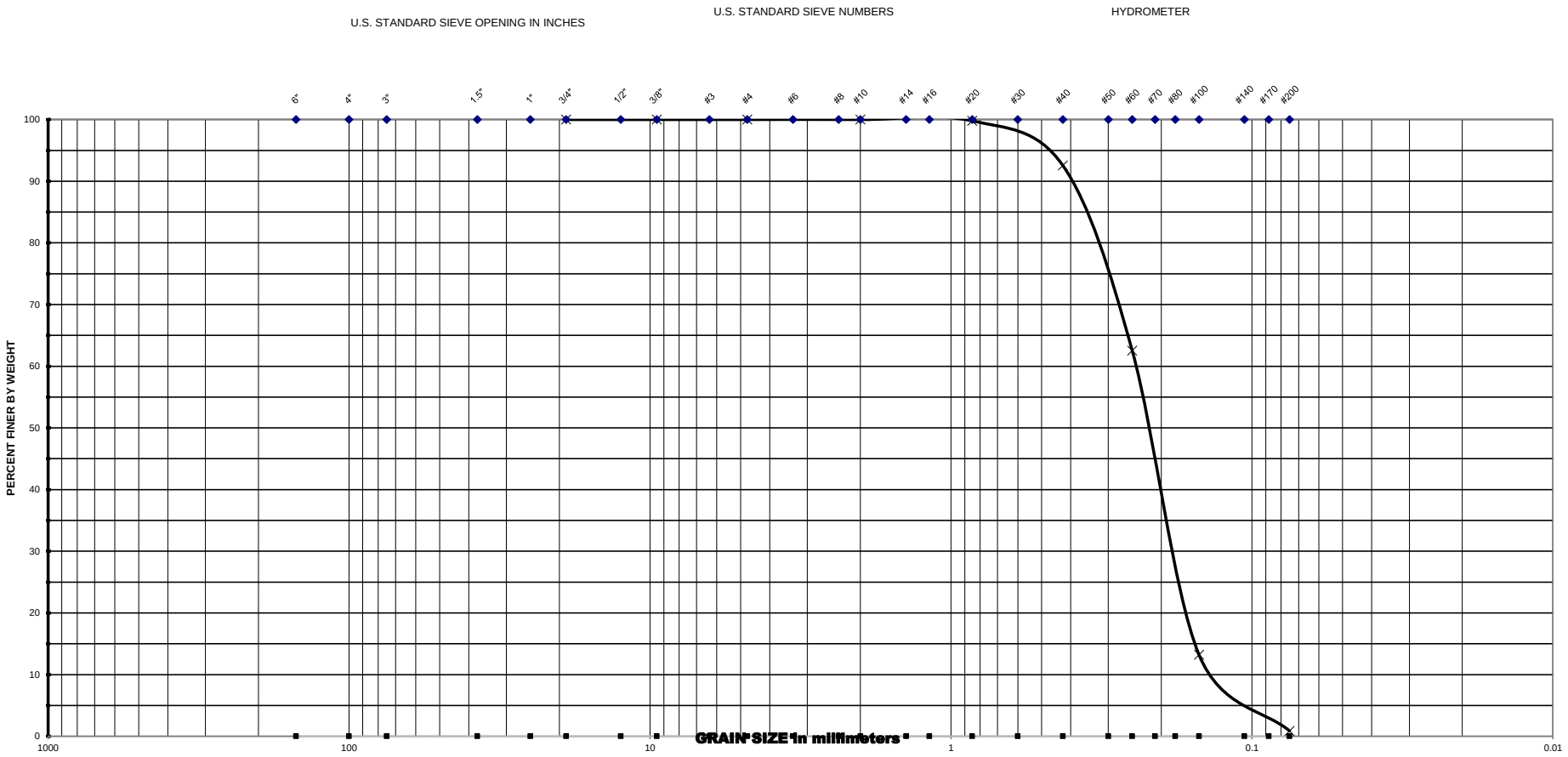
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-126	2.0 - 3.0	A-2-4	3.7	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	94.6
#4	93.2
#10	92.0
#20	91.3
#40	84.4
#60	62.8
#100	35.9
#200	23.5

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

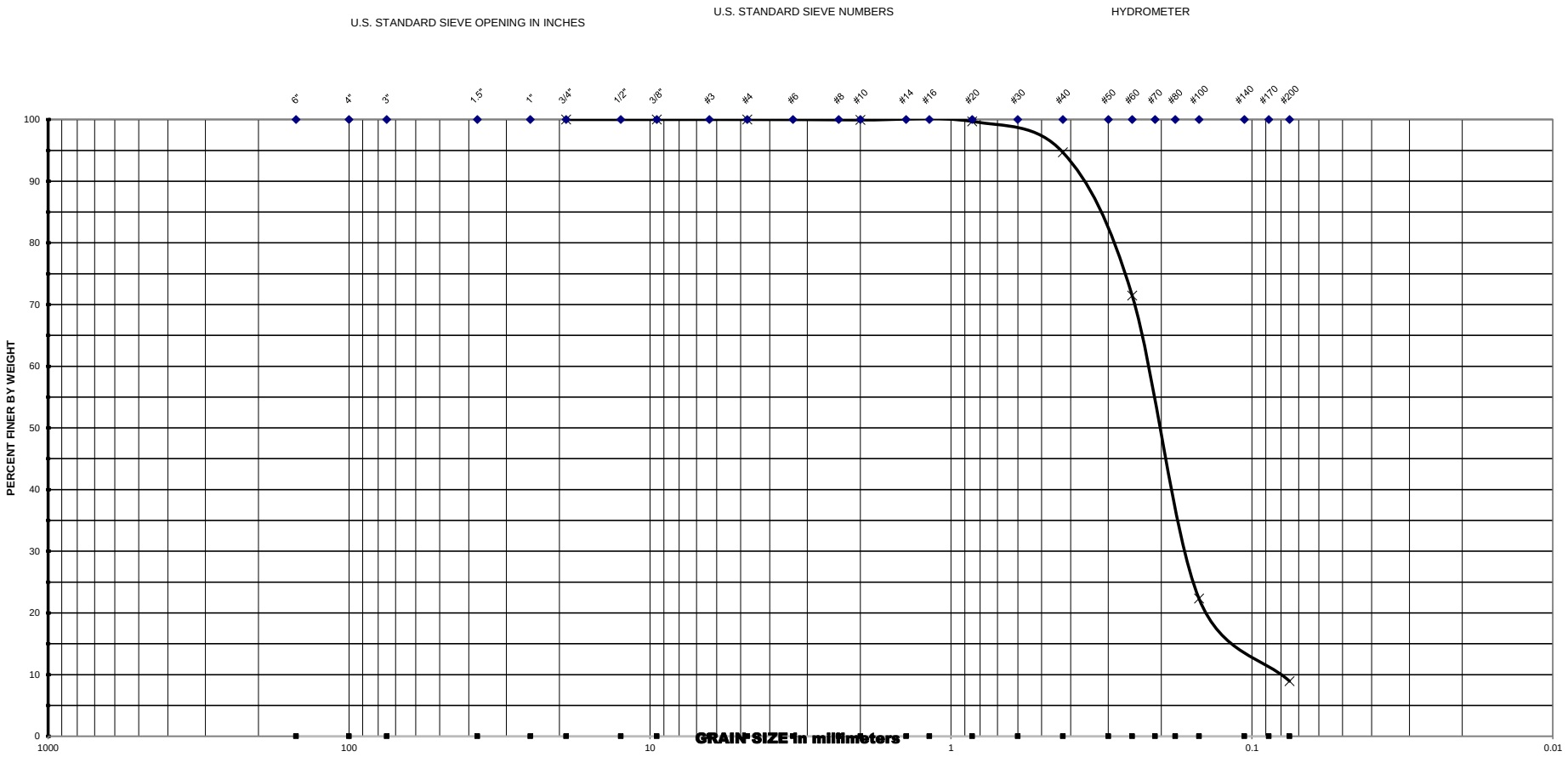
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-129	2.0 - 3.0	A-3	1.6	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	92.5
#60	62.5
#100	13.2
#200	0.9

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

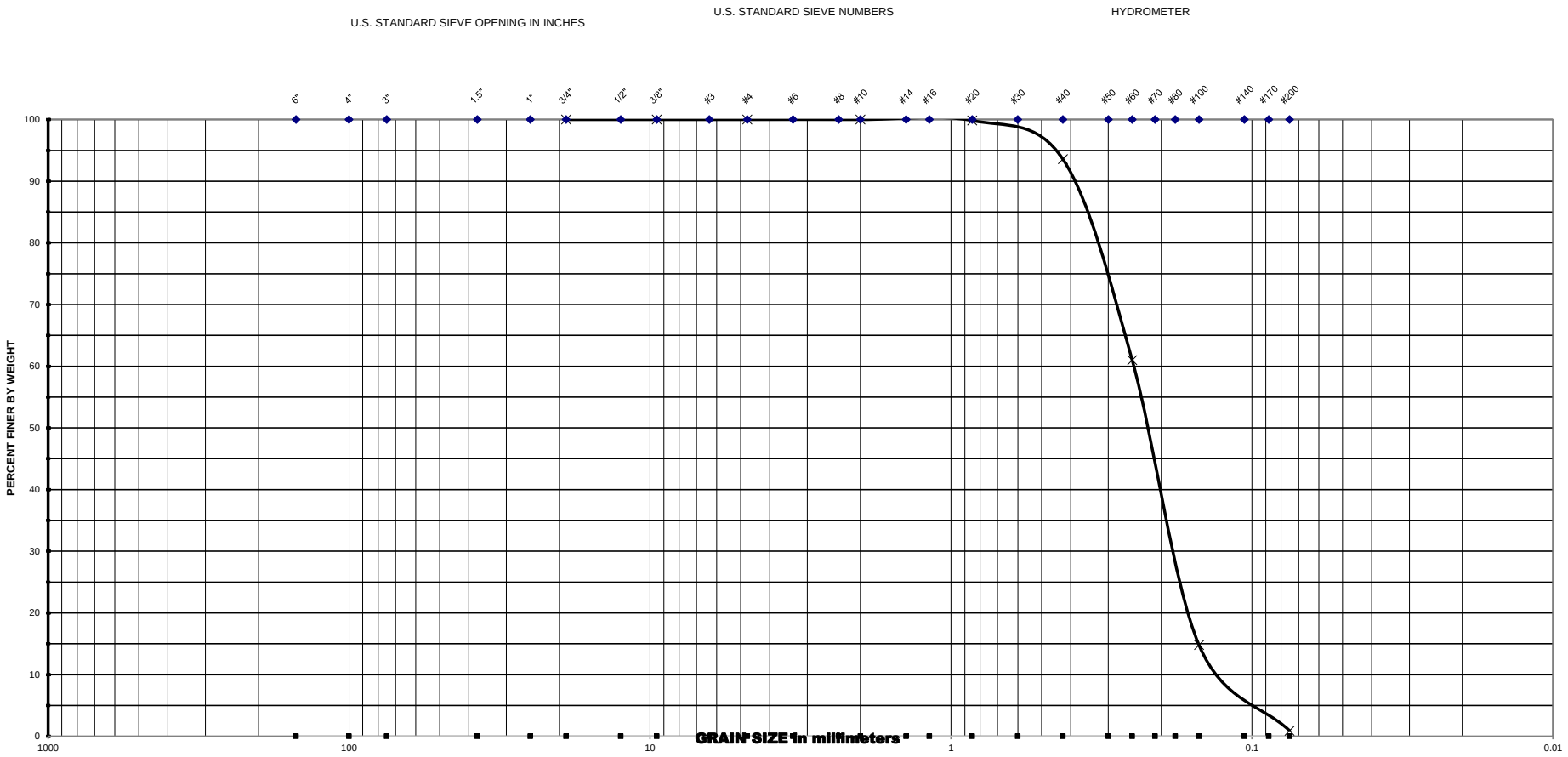
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-130	8.0 - 10.0	A-3	23.9	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	99.9
#20	99.7
#40	94.7
#60	71.5
#100	22.3
#200	8.9

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

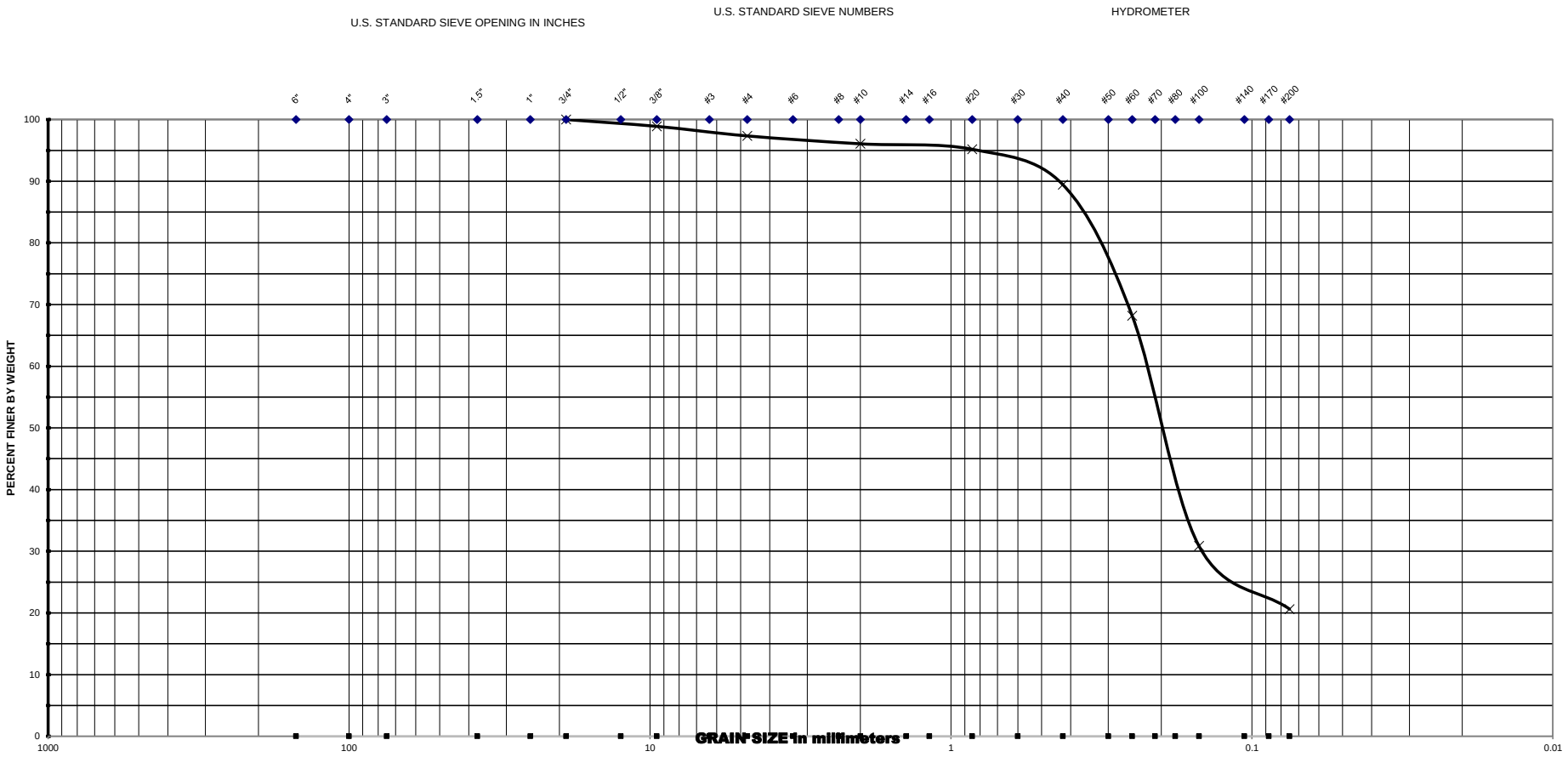
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-131	2.0 - 3.0	A-3	0.4	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	93.6
#60	61.0
#100	14.8
#200	0.9

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

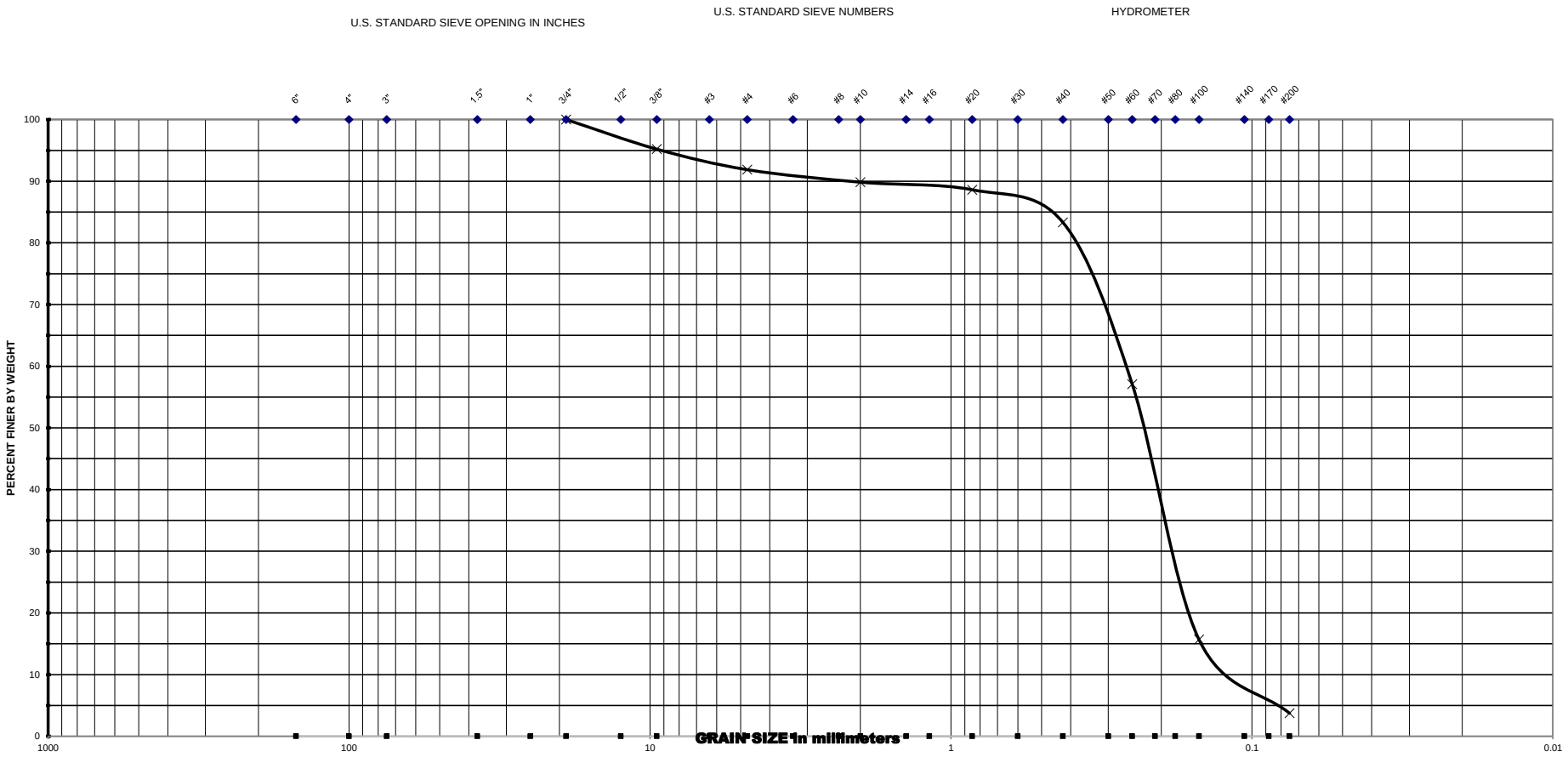
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-133	3.0 - 4.0	A-2-4	8.0	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	98.9
#4	97.3
#10	96.1
#20	95.2
#40	89.4
#60	68.2
#100	30.8
#200	20.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

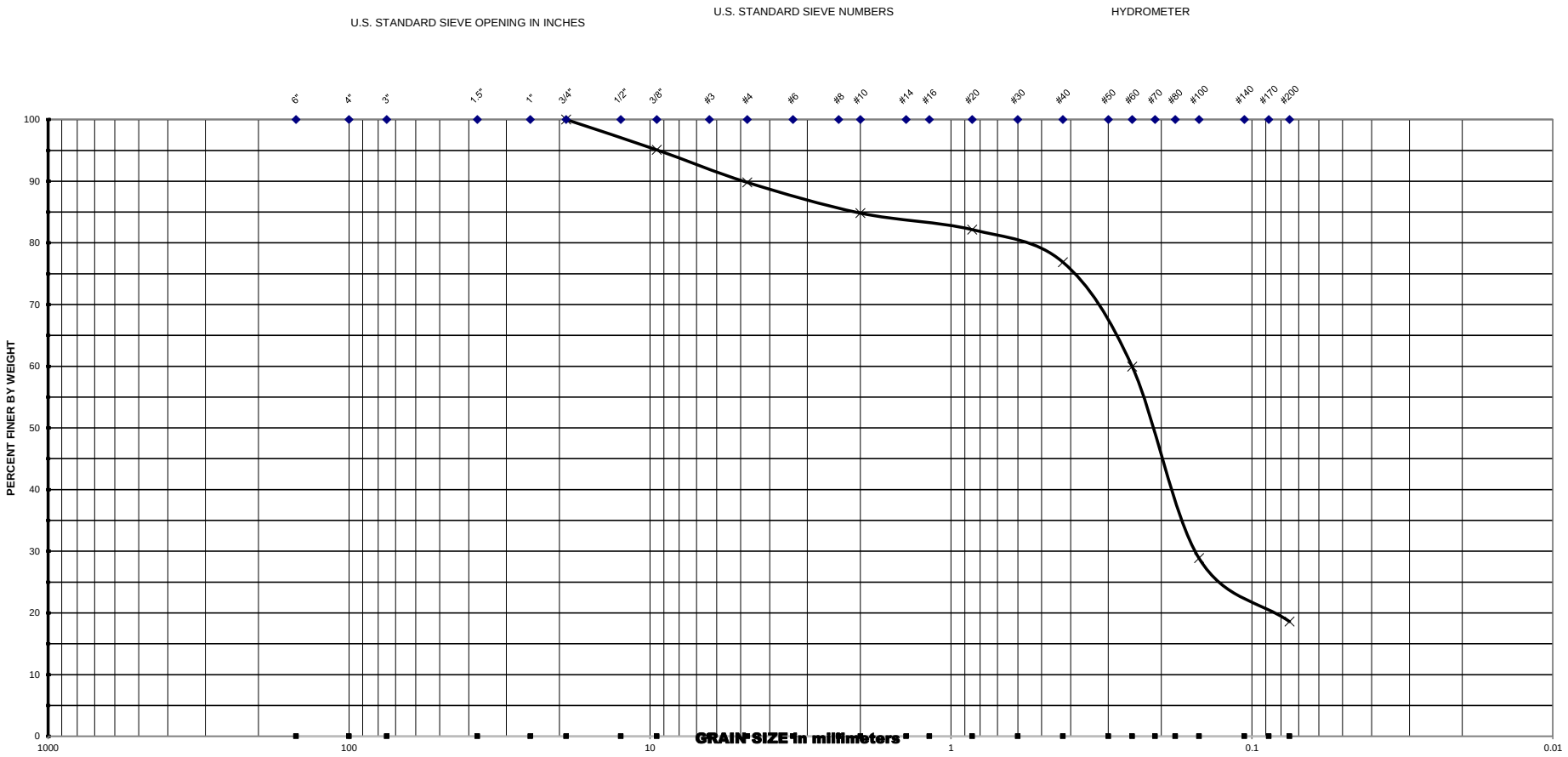
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-145	3.0 - 4.0	A-3	0.4	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	95.2
#4	91.9
#10	89.8
#20	88.6
#40	83.3
#60	57.1
#100	15.7
#200	3.7

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

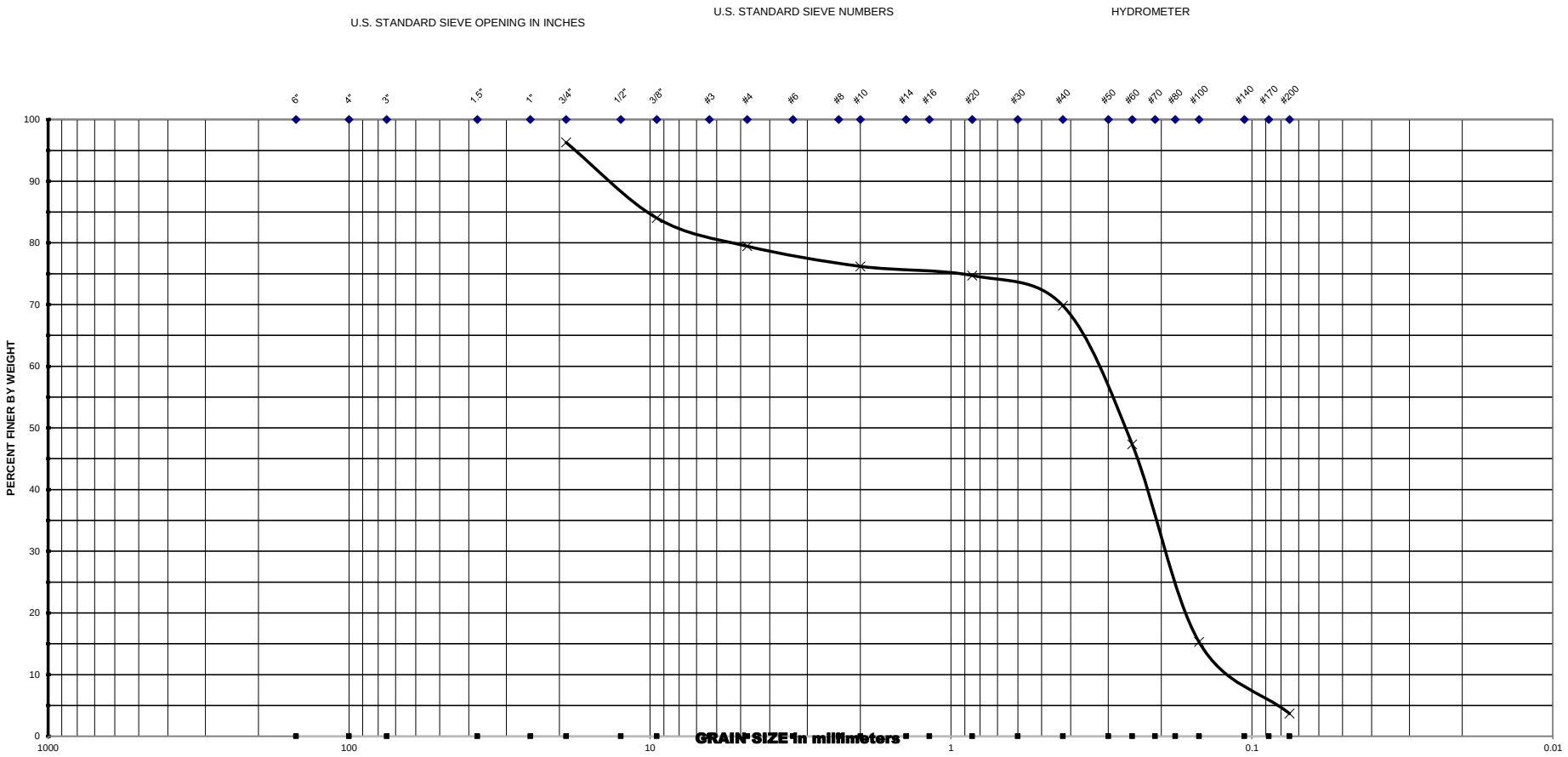
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD146	1.0 - 2.0	A-2-4	2.3	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	95.1
#4	89.8
#10	84.8
#20	82.1
#40	76.9
#60	59.9
#100	28.9
#200	18.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

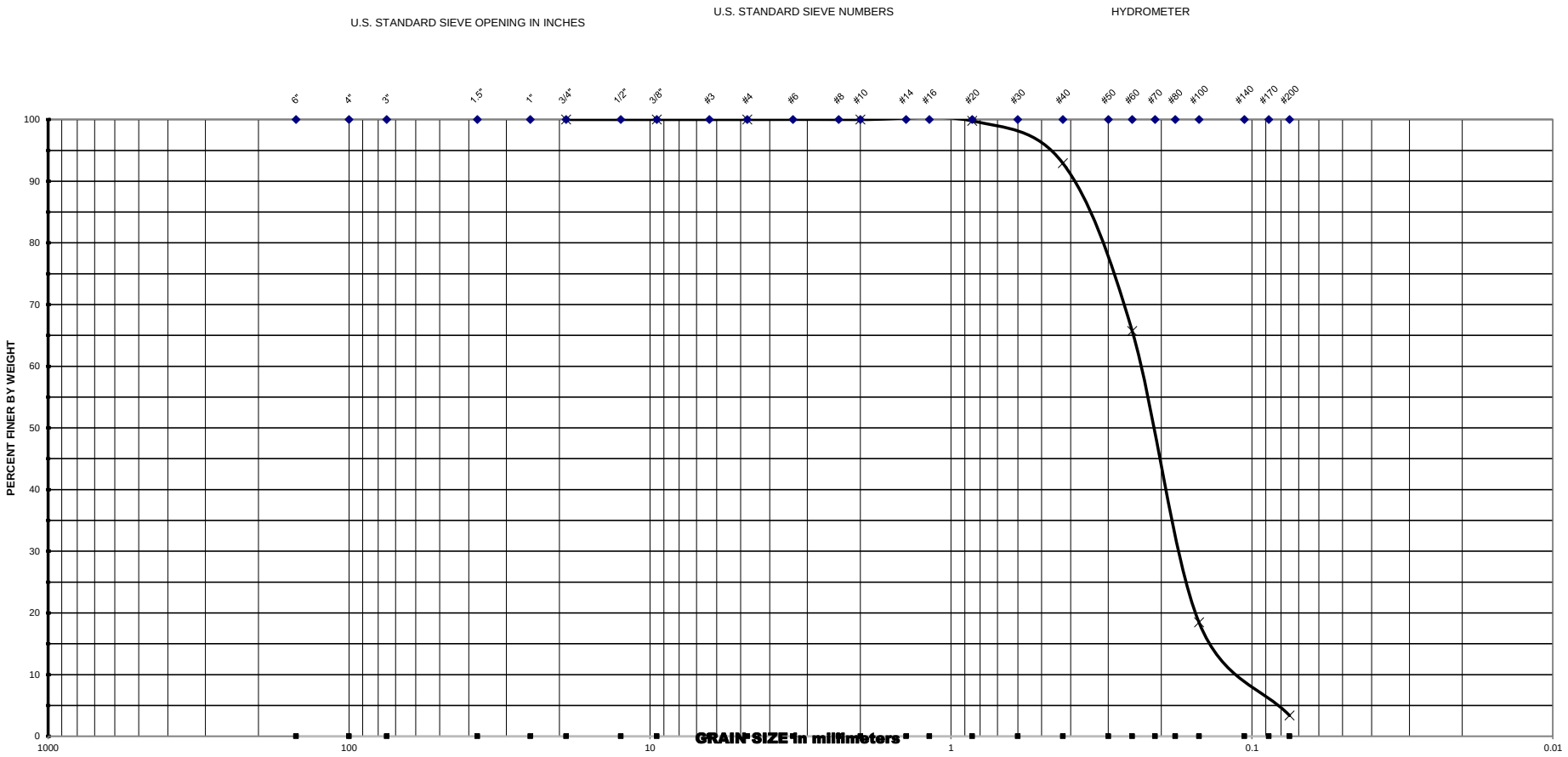
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-146	3.0 - 4.0	A-3	1.1	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	96.3
3/8"	84.0
#4	79.5
#10	76.2
#20	74.7
#40	69.8
#60	47.3
#100	15.3
#200	3.7

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

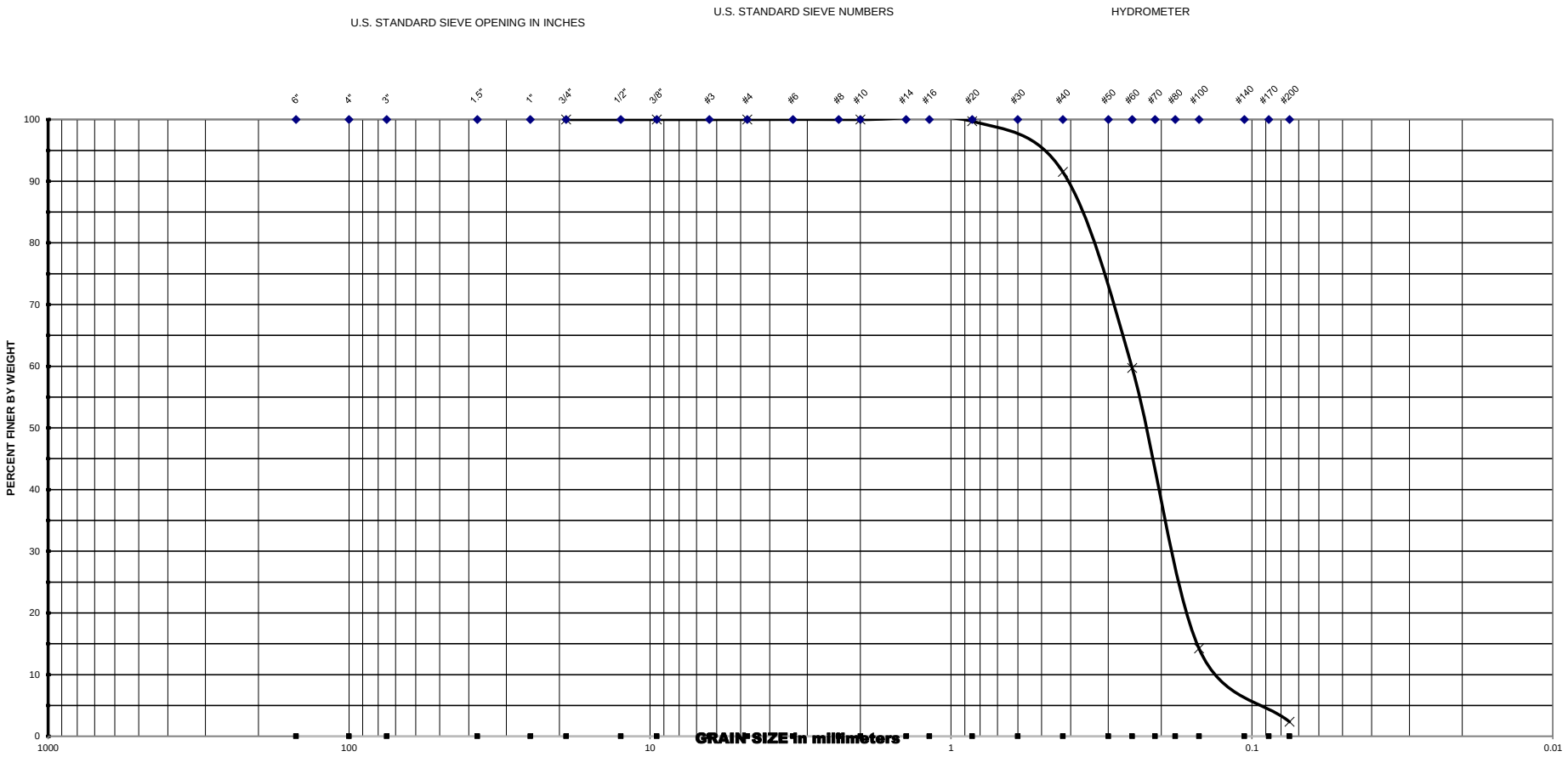
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-151	4.0 - 6.0	A-3	21.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	92.9
#60	65.7
#100	18.5
#200	3.4

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

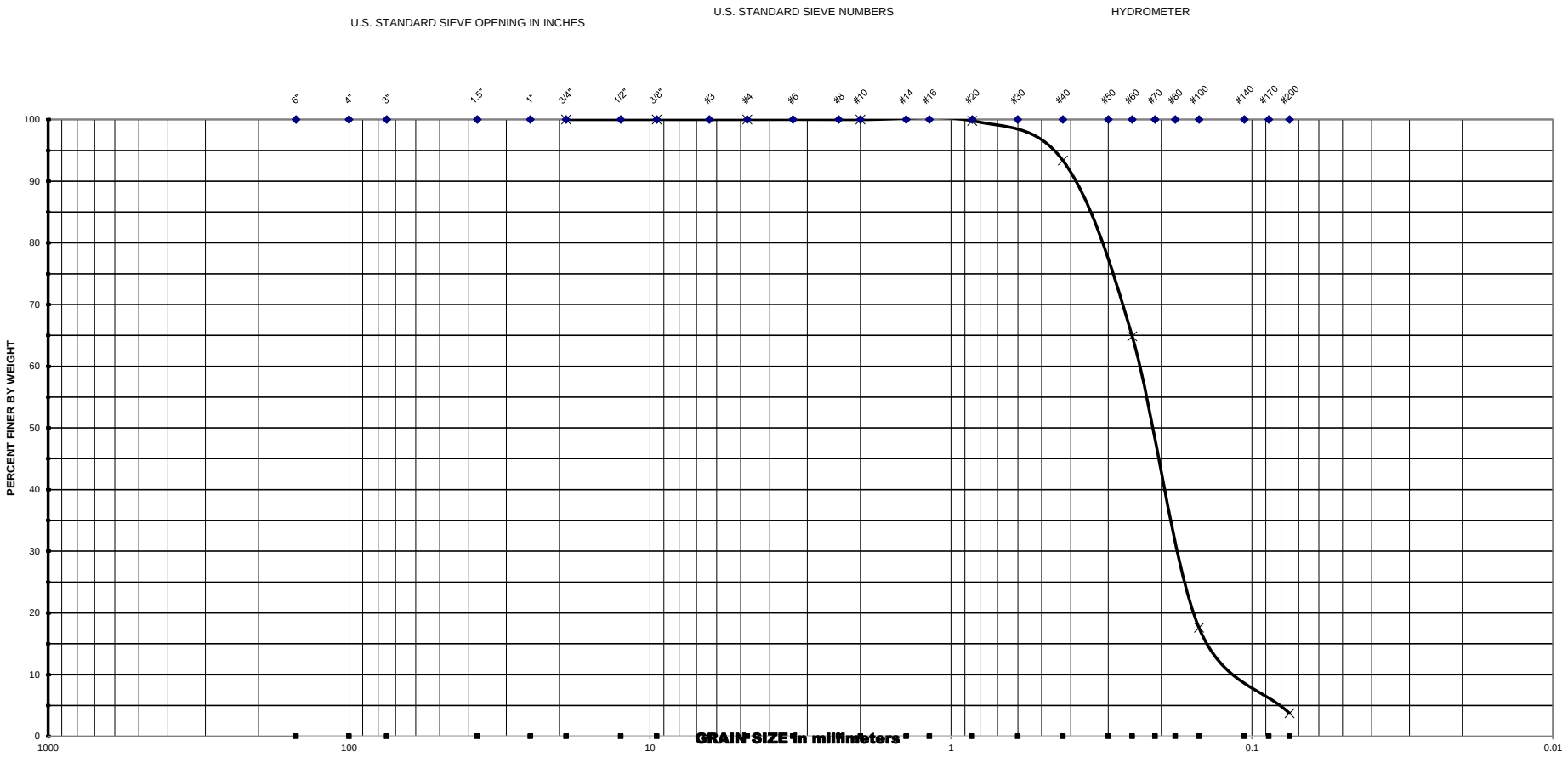
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-152	4.0 - 6.0	A-3	19.4	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.7
#40	91.5
#60	59.7
#100	14.2
#200	2.3

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

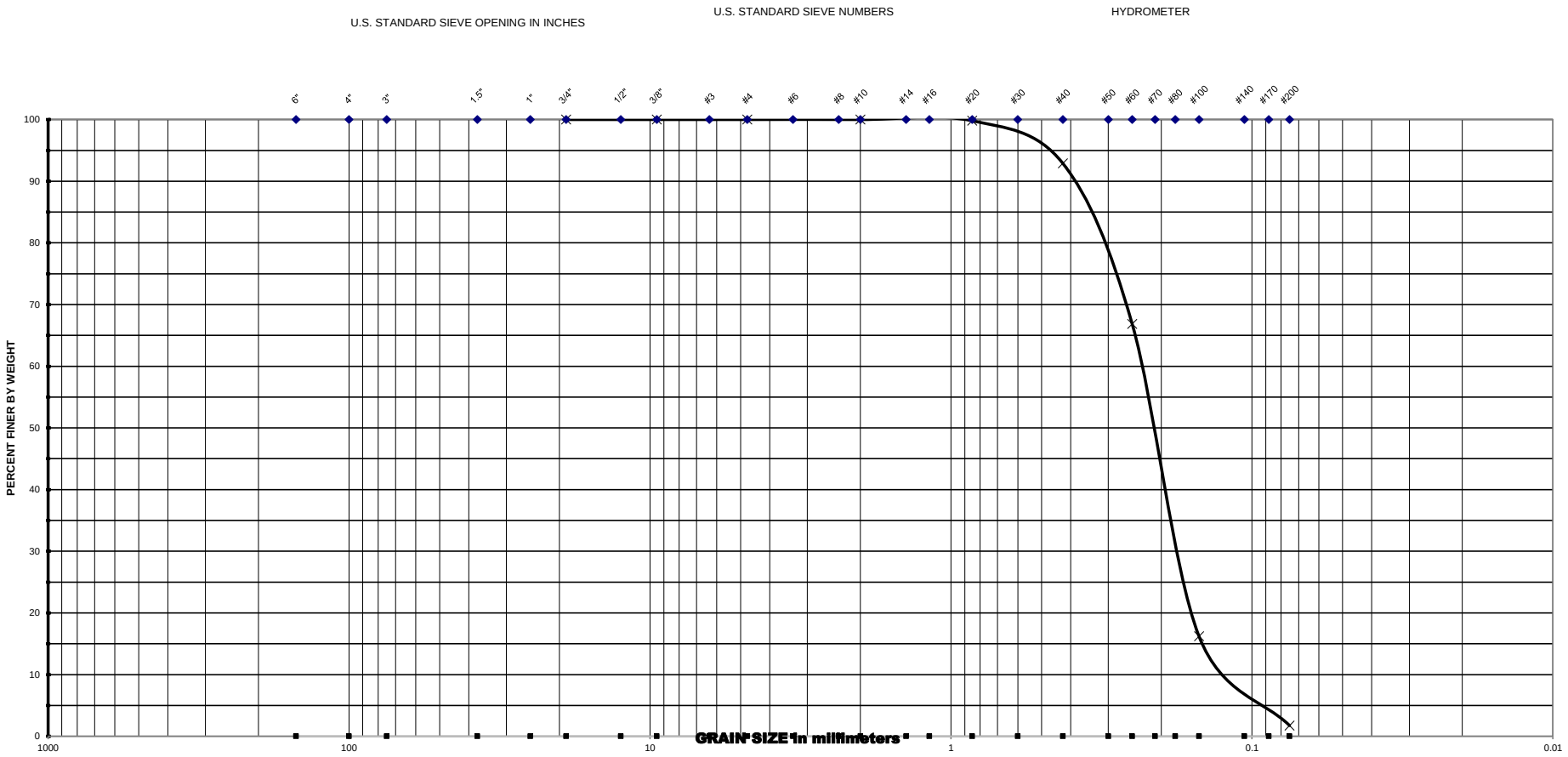
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-155	8.0 - 10.0	A-3	19.8	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	93.4
#60	64.9
#100	17.6
#200	3.7

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

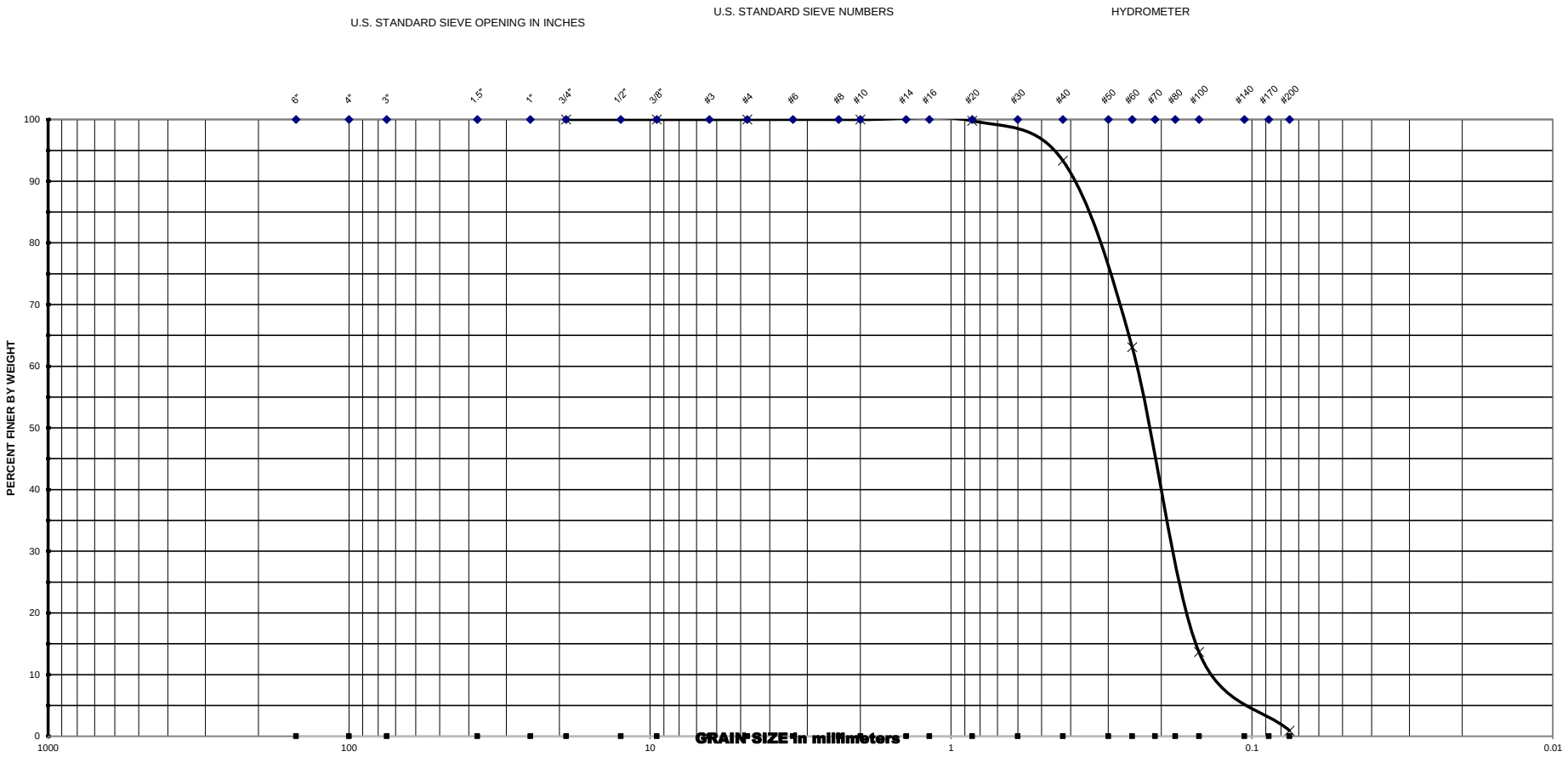
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-161	4.0 - 5.0	A-3	23.2	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	92.9
#60	66.8
#100	16.2
#200	1.7

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

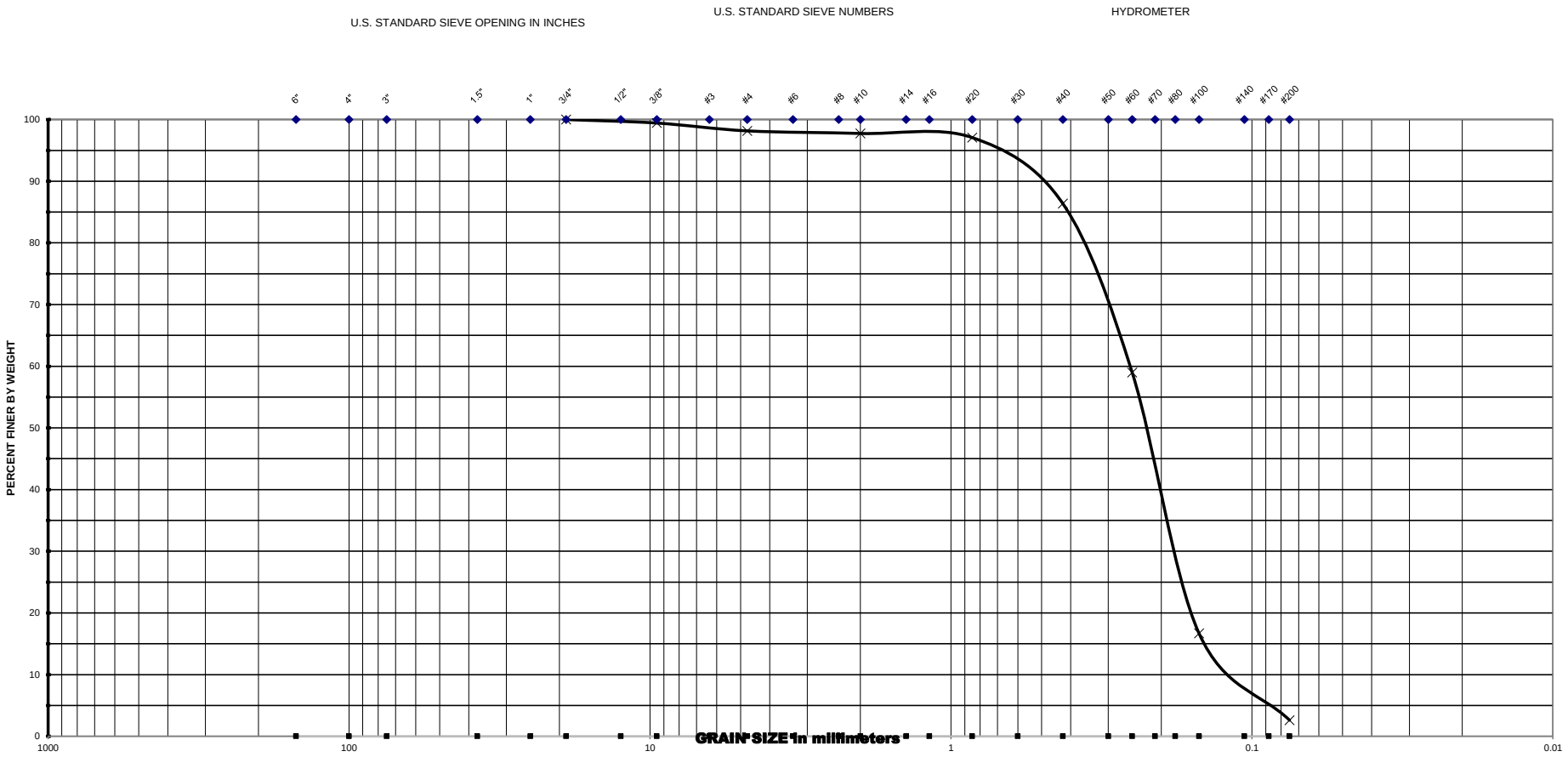
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-184	4.0 - 5.0	A-3	22.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.8
#40	93.3
#60	63.1
#100	13.6
#200	0.9

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

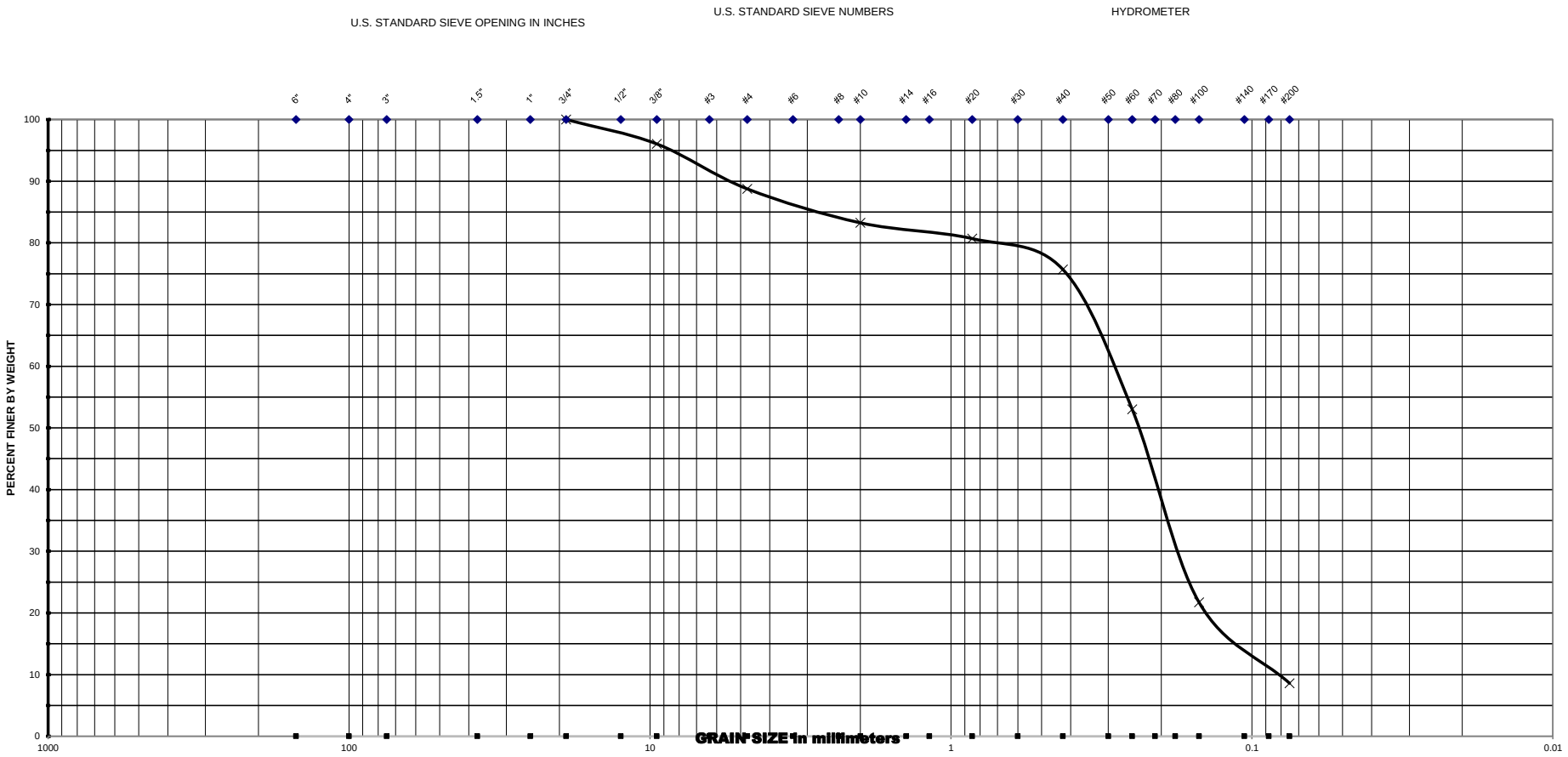
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-188	2.0 - 3.0	A-3	1.0	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	99.4
#4	98.2
#10	97.7
#20	97.1
#40	86.4
#60	59.0
#100	16.7
#200	2.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

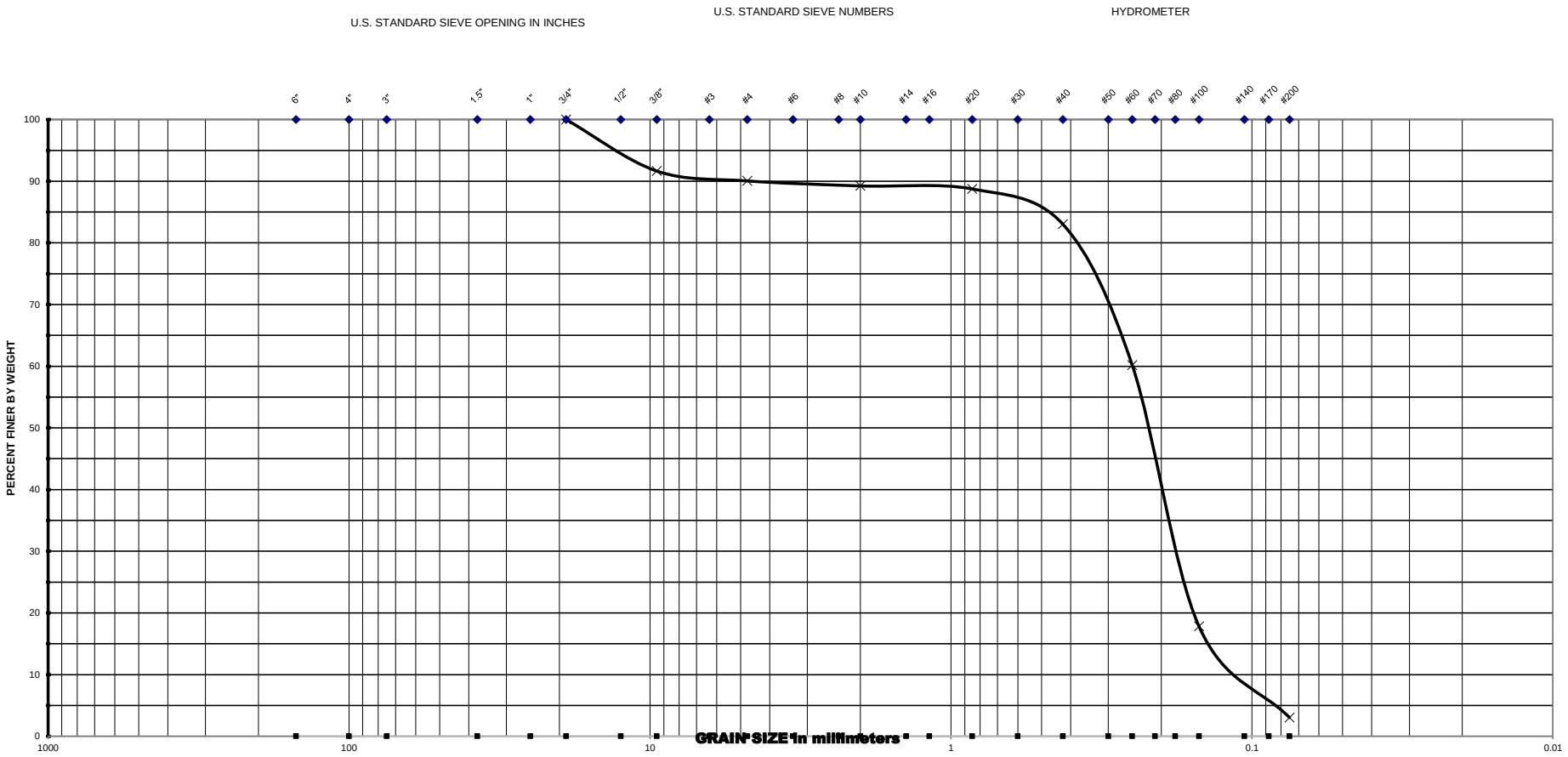
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-189	4.0 - 6.0	A-3	7.7	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	96.0
#4	88.8
#10	83.3
#20	80.7
#40	75.7
#60	53.0
#100	21.7
#200	8.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

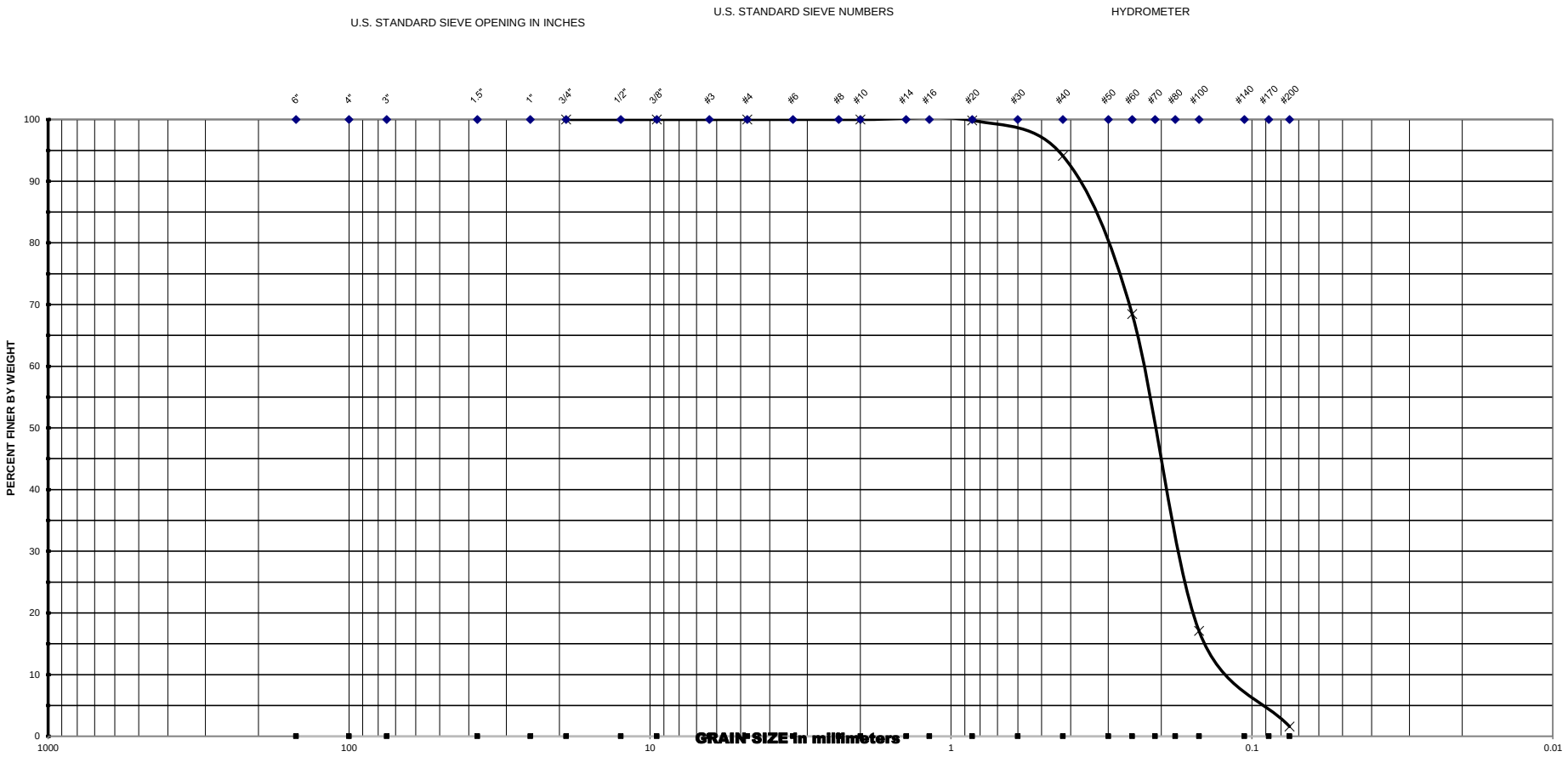
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-192	4.0 - 6.0	A-3	2.7	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	91.7
#4	90.0
#10	89.2
#20	88.7
#40	83.0
#60	60.2
#100	17.8
#200	3.0

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

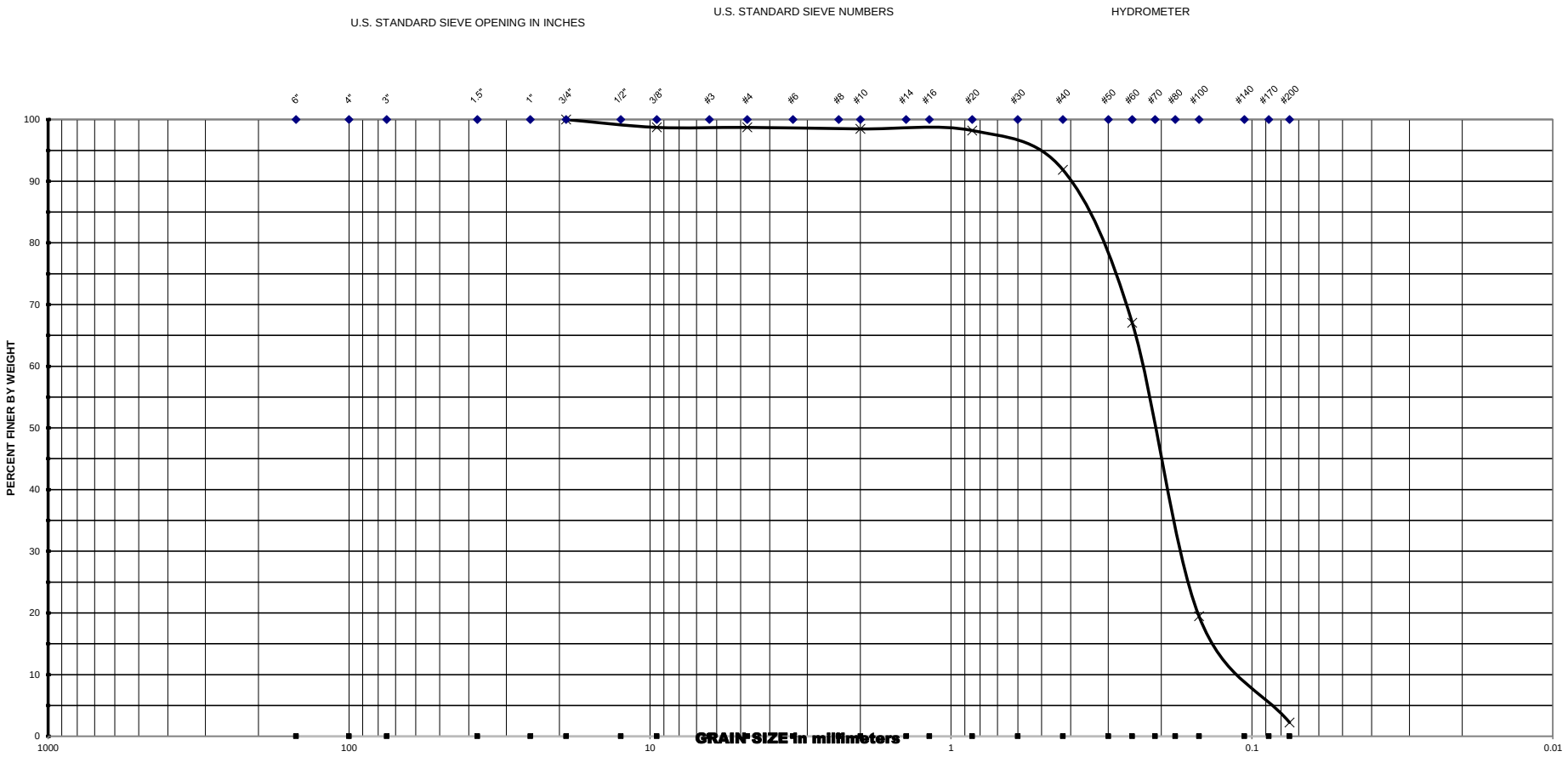
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-197	4.0 - 6.0	A-3	20.6	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	100.0
#10	100.0
#20	99.9
#40	94.1
#60	68.5
#100	17.1
#200	1.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

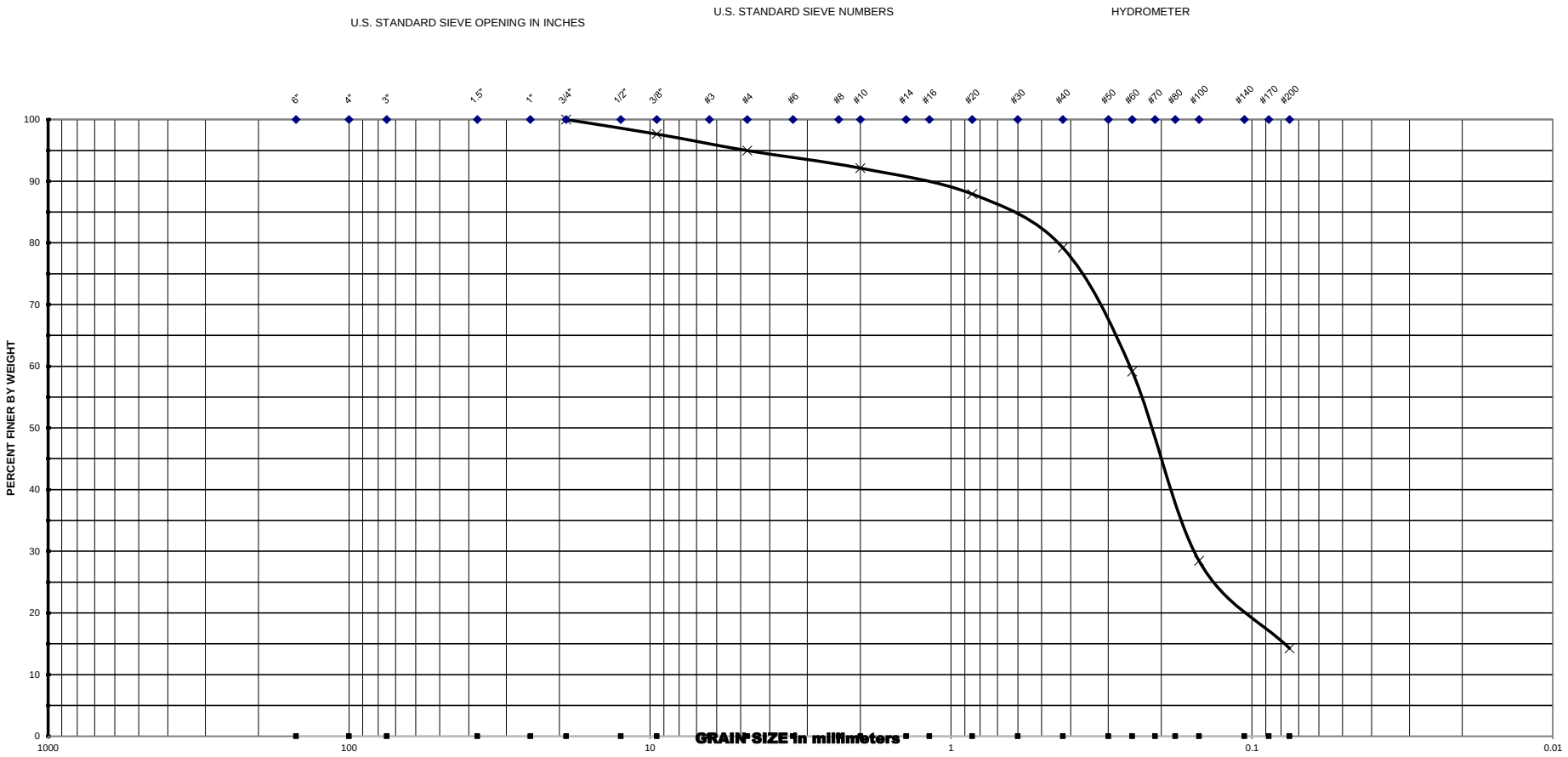
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-198	2.0 - 4.0	A-3	3.7	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	98.7
#4	98.7
#10	98.5
#20	98.2
#40	91.9
#60	67.1
#100	19.5
#200	2.2

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

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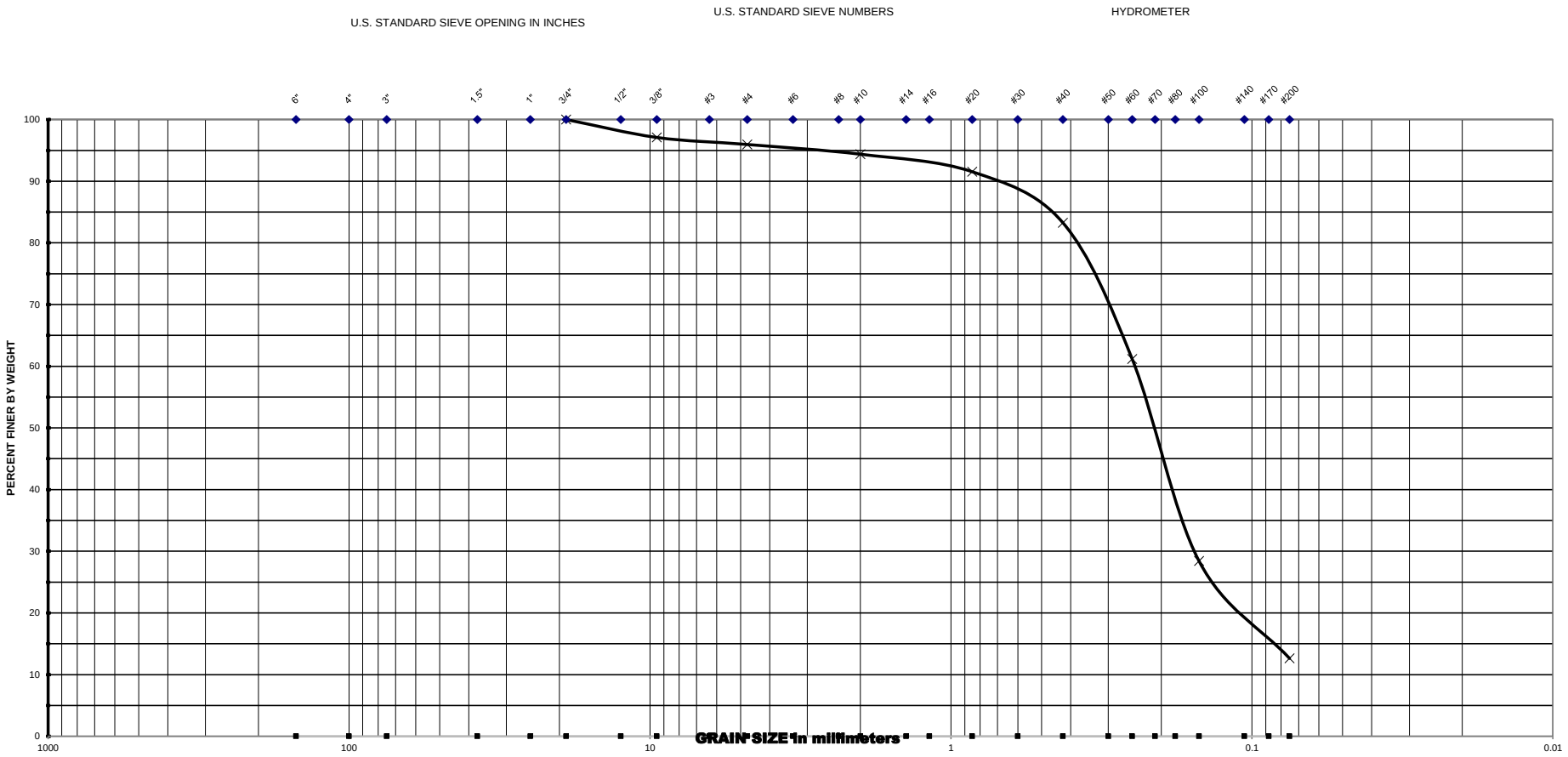
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-199	4.0 - 5.0	A-2-4	24.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	97.6
#4	95.0
#10	92.1
#20	87.9
#40	79.2
#60	59.1
#100	28.5
#200	14.3

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

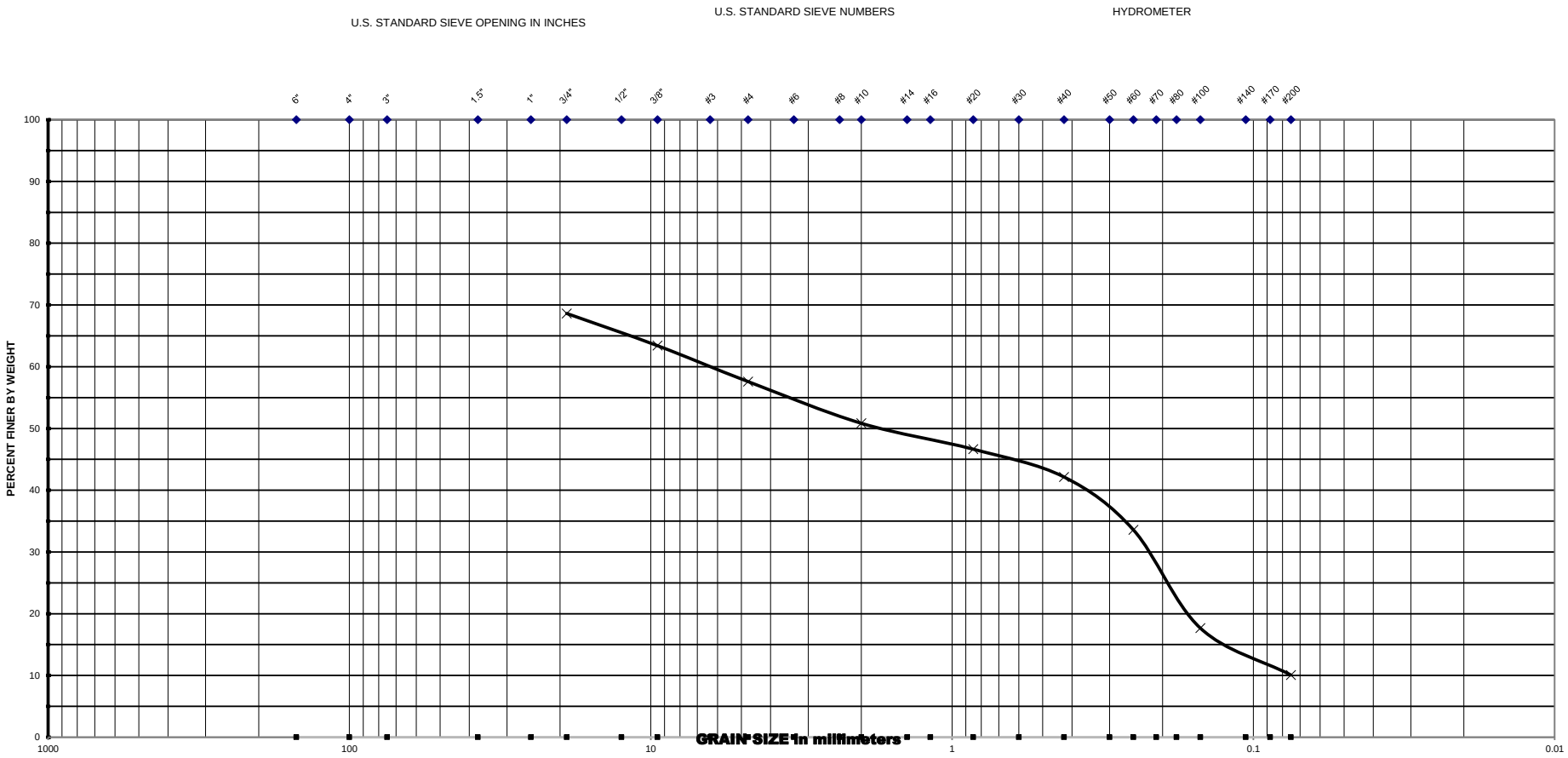
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-201	4.0 - 5.0	A-2-4	25.8	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	97.1
#4	96.0
#10	94.4
#20	91.5
#40	83.3
#60	61.2
#100	28.4
#200	12.6

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

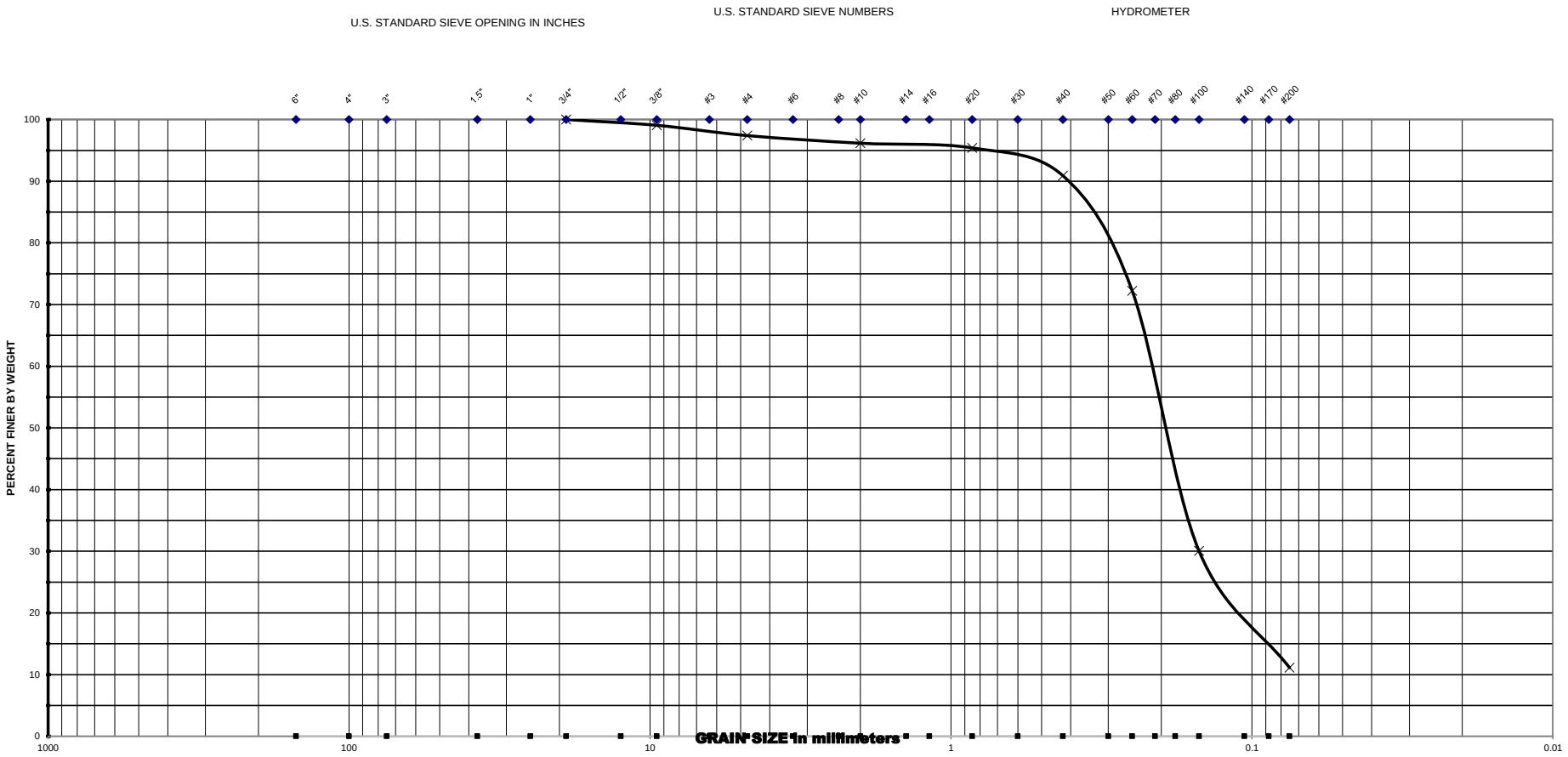
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-206	6.0 - 8.0	-	19.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	68.6
3/8"	63.4
#4	57.6
#10	50.8
#20	46.6
#40	42.1
#60	33.6
#100	17.7
#200	10.1

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

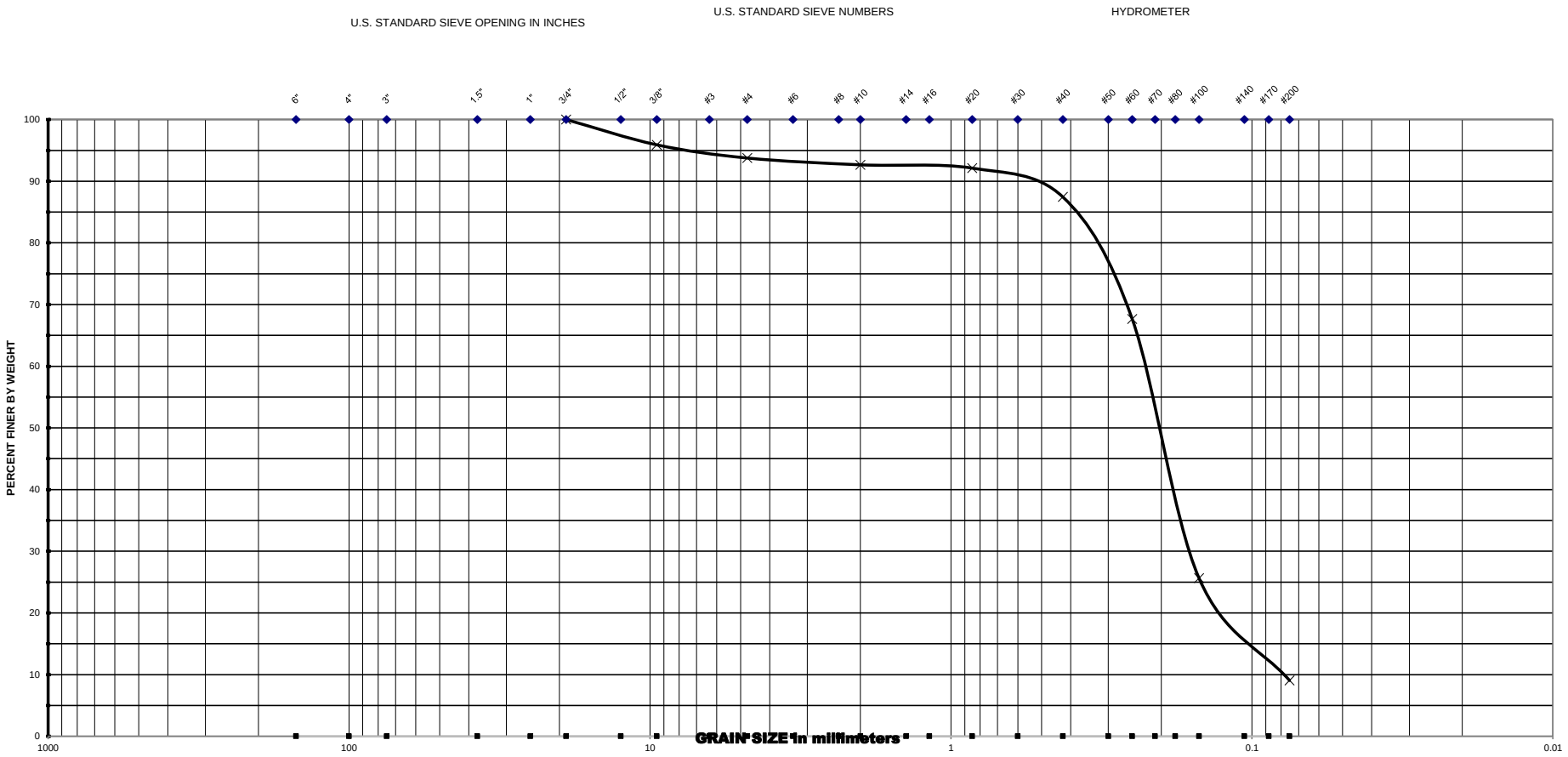
BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-207	3.0 - 4.0	A-2-4	8.1	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	99.1
#4	97.4
#10	96.2
#20	95.4
#40	90.9
#60	72.2
#100	30.1
#200	11.1

GCME

Geotechnical - Consulting - Engineering - Testing



Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-209	4.0 - 5.0	A-3	11.1	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	95.9
#4	93.8
#10	92.7
#20	92.1
#40	87.4
#60	67.7
#100	25.6
#200	9.0

GCME

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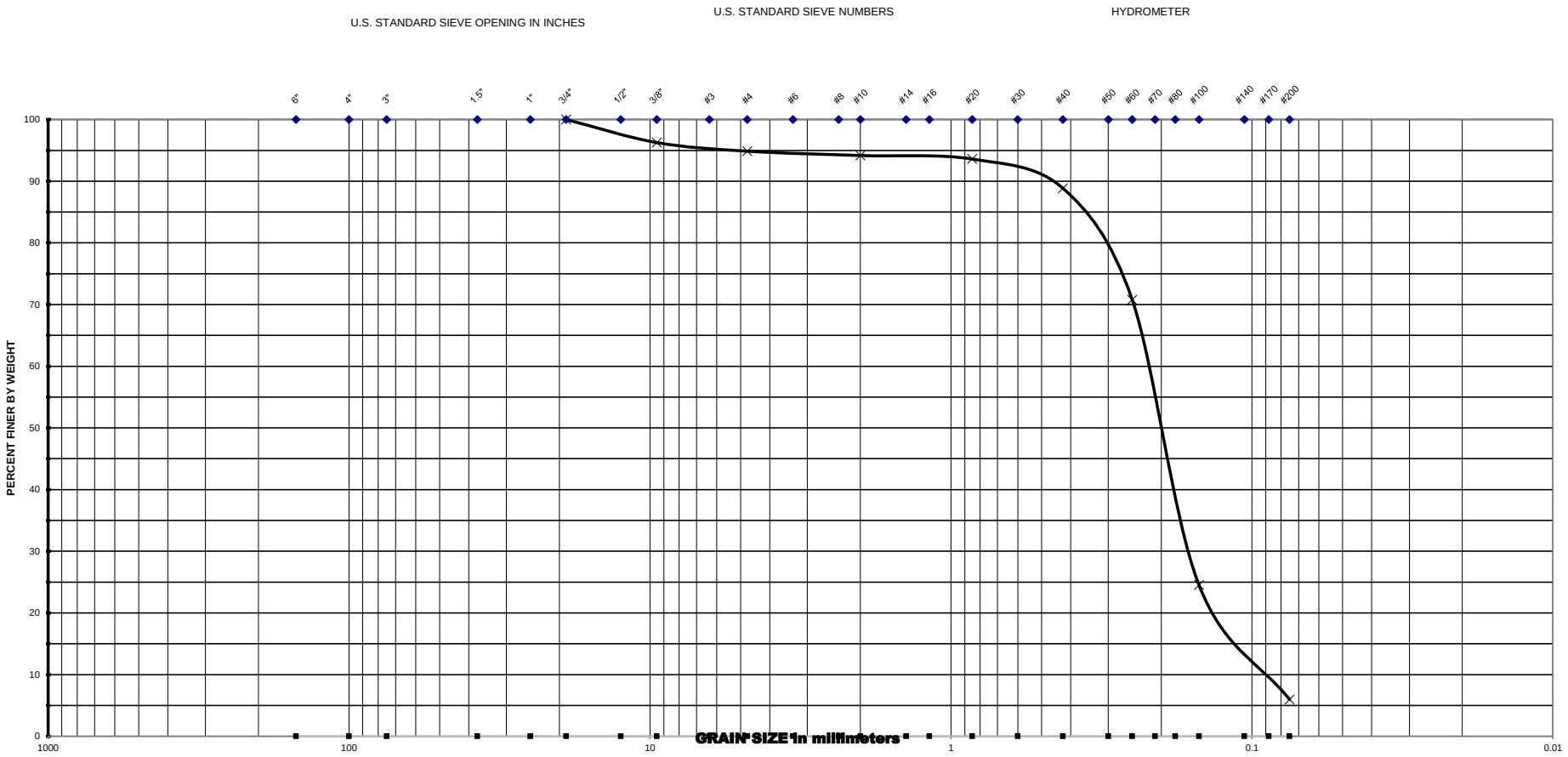

Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-211	3.0 - 4.0	A-3	4.5	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	96.3
#4	94.9
#10	94.2
#20	93.6
#40	88.9
#60	70.8
#100	24.5
#200	6.0

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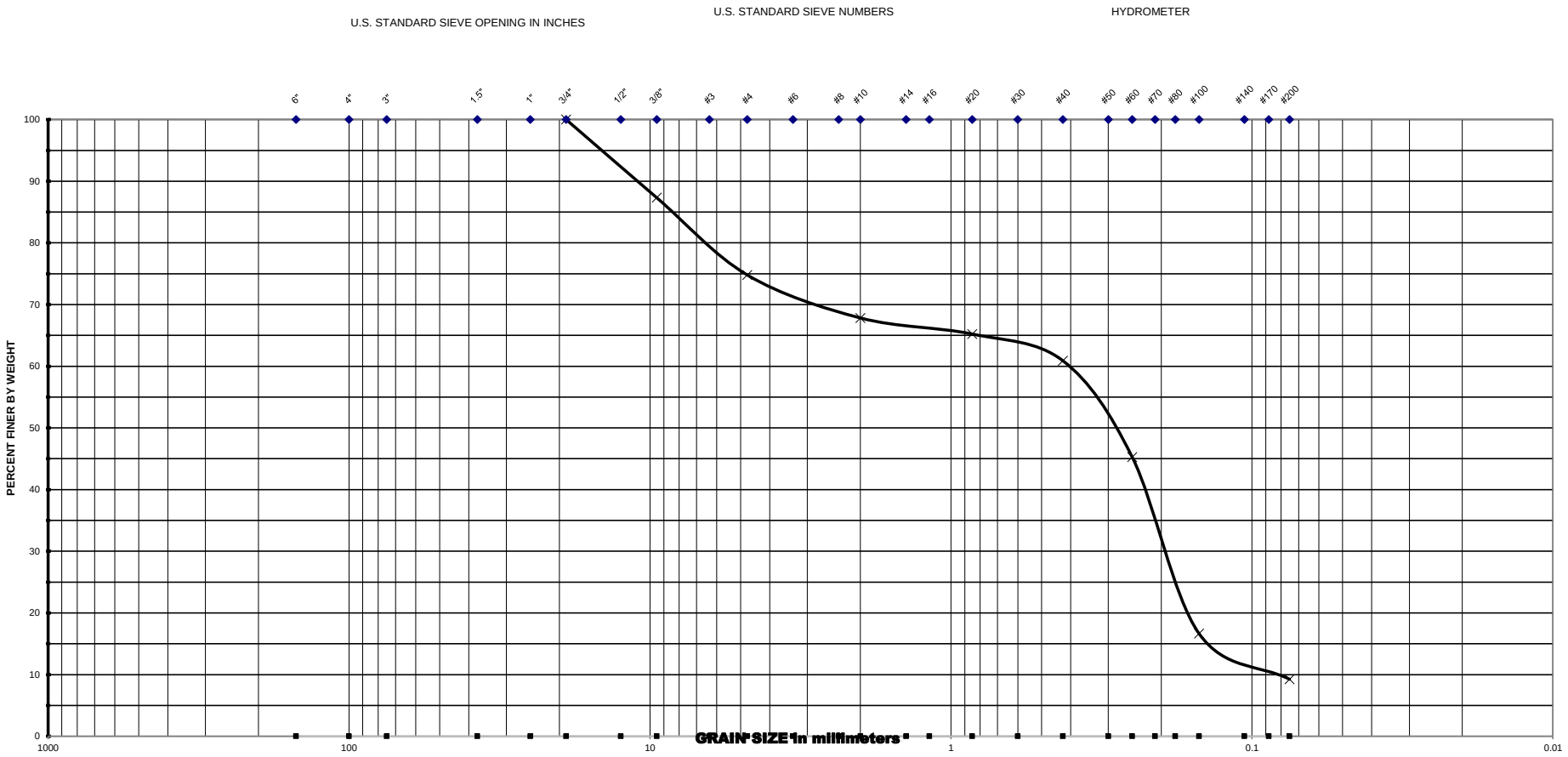

Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 6/26/2013

BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-217	8.0 - 10.0	A-3	13.3	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	87.3
#4	74.8
#10	67.8
#20	65.2
#40	60.9
#60	45.3
#100	16.7
#200	9.2

GCME

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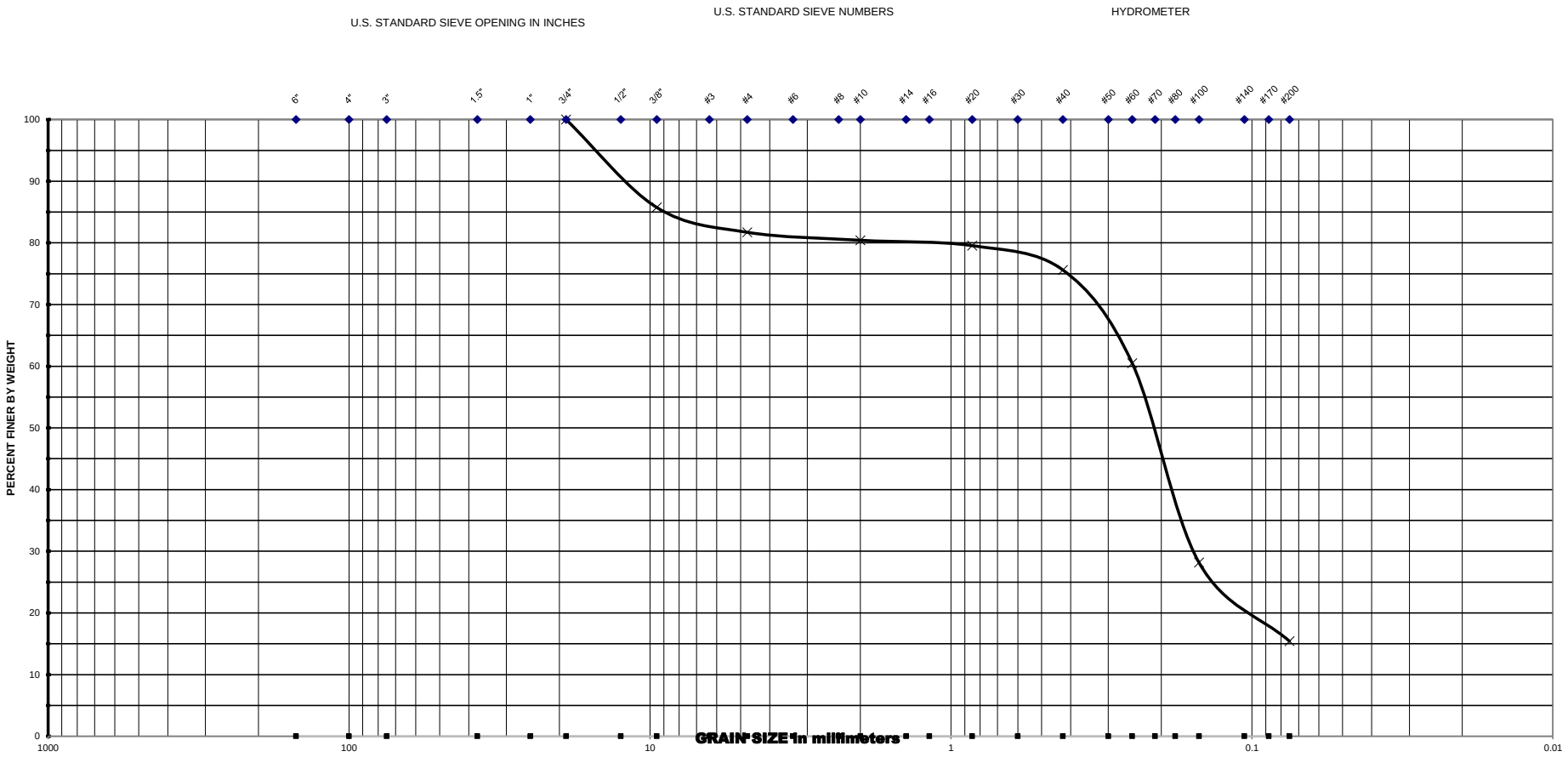

Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/2/2013

BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-219	4.0 - 5.0	A-2-4	18.4	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	85.7
#4	81.7
#10	80.4
#20	79.6
#40	75.6
#60	60.5
#100	28.2
#200	15.4

GCME

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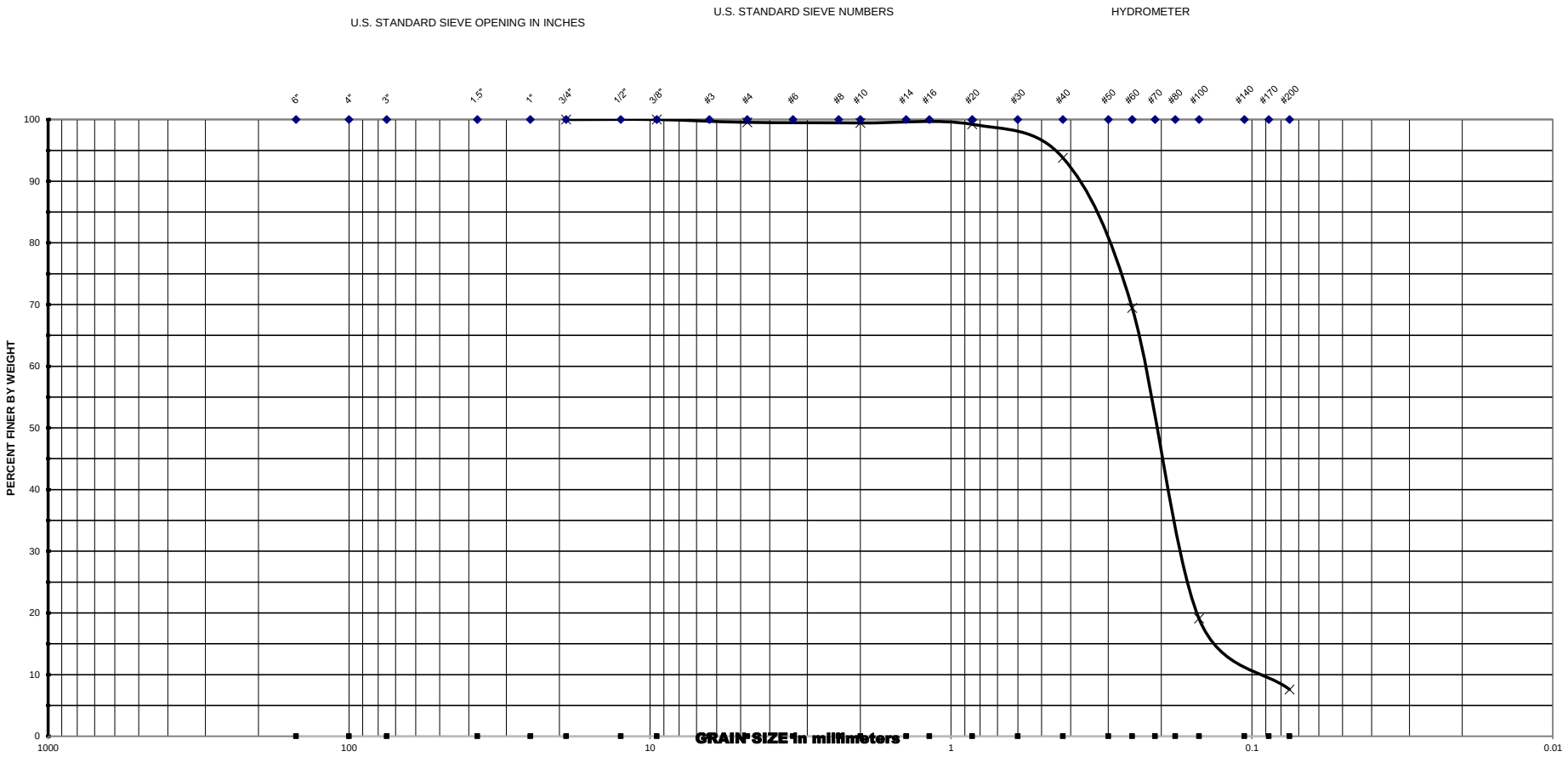

Project Name : SR-847 / 47th Ave

Project No. : 2000-01-12009 **Date :** 7/5/2013

BORING NO.	DEPTH INTERVAL [FT]	SOIL DESCRIPTION	MC	OC
RD-222	6.0 - 8.0	A-3	18.8	

Note : MC - Moisture Content (%)
OC - Organic Content (%)

U.S SIEVE NO.	CUMM. % PASSING
3/4"	100.0
3/8"	100.0
#4	99.5
#10	99.5
#20	99.2
#40	93.8
#60	69.4
#100	19.1
#200	7.6

TABLE - 2

SUMMARY OF CORROSION TEST RESULTS

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Boring No.	Location		Startum	Sample	Depth	pH	Resistivity	Chloride	Sulfate	Environmental Classification (Substructure)	
	Station	Offset (ft)					(ohm-cm)	(ppm)	(ppm)	Steel	Concrete
RD-111	121+00	27	5	Soil	4.0 - 6.0	7.8	10400	5.0	36.7	Slightly Aggressive	Slightly Aggressive
RD-130	140+00	-31	3	Soil	6.0 - 8.0	7.7	9350	5.0	67.1	Slightly Aggressive	Slightly Aggressive
RD-164	174+00	45	2	Soil	8.0 - 10.0	8.0	26200	5.0	8.4	Slightly Aggressive	Slightly Aggressive
RD-176	186+00	52	2	Soil	2.0 - 3.0	7.6	25800	6.0	17.6	Slightly Aggressive	Slightly Aggressive
RD-189	199+00	-27	2A	Soil	6.0 - 8.0	8.1	10700	5.0	79.2	Slightly Aggressive	Slightly Aggressive
RD-214	223+50	41	2	Soil	2.0 - 4.0	8.3	17700	5.0	10.9	Slightly Aggressive	Slightly Aggressive
B-102	202+00	50	2	Soil	6.0 - 8.0	8.0	26100	5.6	14.5	Slightly Aggressive	Slightly Aggressive
B-201	150+80	39	2	Soil	8.0 - 10.0	8.0	10500	11.0	120.0	Slightly Aggressive	Slightly Aggressive

Reference: Structures Design Guidelines Jan-2012, Page 1-4.

Table 1.3.2-1 Criteria for Substructure Environmental Classifications

Classification	Environmental Condition	Units	Steel		Concrete	
			Water	Soil	Water	Soil
Extremely Aggressive (If any of these conditions exist)	pH		< 6.0		< 5.0	
	Cl	ppm	> 2000		> 2000	
	SO_4	ppm	N.A.		> 1500	> 2000
	Resistivity	Ohm-cm	< 1000		< 500	
Slightly Aggressive (If all of these conditions exist)	pH		> 7.0		> 6.0	
	Cl	ppm	<500		< 500	
	SO_4	ppm	N.A.		< 150	< 1000
	Resistivity	Ohm-cm	> 5000		> 3000	
Moderately Aggressive	This classification must be used at all sites not meeting requirements for either slightly aggressive or extremely aggressive environments.					

pH = acidity ($-\log_{10}H^{+}$; potential of Hydrogen), Cl = chloride content, SO_4 = Sulfate content.

Palm Beach Environmental
Laboratories Inc.

Partha Ghosh
GCME
West Palm Beach, FL 33411
(561) 640-0085
LOG #: 0011529

July 05, 2013

Enclosed is the laboratory report for your project. All results meet the requirements of the NELAC standards.

Please note the following:

(1) The samples were received as stated on the chain of custody, correctly labeled and at the proper temperature unless otherwise noted. The results contained in this report relate only to the items tested or to the samples as received by the laboratory.

(2) This report may not be reproduced except in full, without the written approval of the laboratory. Any anomalies are noted in the case narrative.

(3) Results for all solid matrices are reported in dry weight unless otherwise noted.

(4) Results for all liquid matrices are analyzed as received in the laboratory unless otherwise noted.

(5) Samples are disposed of within 30 days of their receipt by the laboratory.

(6) A statement of Qualifiers is available upon request.

(7) Certain analyses are subcontracted to outside NELAC certified laboratories and are designated on your report.

(8) Precision & Accuracy will be provided when clients require a measure of estimated uncertainty.

(9) The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report Preliminary Data should not be used for regular purposes. Authorized signature(s) is provided on final report only

Please contact me if you have any questions or concerns regarding this report.

Sincerely,

Pamela Shore
QA Officer

Palm Beach Environmental Laboratories Inc.

CERTIFICATE OF ANALYSIS

GCME
6903 Vista Parkway N, Suite 8
West Palm Beach, FL 33411
ATTN: Partha Ghosh
PHONE: (561) 640-0085 **FAX:** (561) 640-0409

LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: RD-111-3 **Lab ID:** 0011529-01 **Sampled:** 04/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	pH	7.8	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	Resistivity	10400	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	5.0	JEE, I	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-79 8	Sulfate as SO4	36.7	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

CERTIFICATE OF ANALYSIS

GCME
6903 Vista Parkway N, Suite 8
West Palm Beach, FL 33411
ATTN: Partha Ghosh
PHONE: (561) 640-0085 **FAX:** (561) 640-0409

LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: RD-130-4 **Lab ID:** 0011529-02 **Sampled:** 04/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**pH**	**7.7**	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**Resistivity**	**9350**	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	5.0	JEE, U	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-798	**Sulfate as SO4**	**67.1**	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

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LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: RD-164-5 **Lab ID:** 0011529-03 **Sampled:** 04/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**pH**	**8.0**	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**Resistivity**	**26200**	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	5.0	JEE, U	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-798	**Sulfate as SO4**	**8.4**	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

CERTIFICATE OF ANALYSIS

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LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: RD-189-4 **Lab ID:** 0011529-04 **Sampled:** 04/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**pH**	**8.1**	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**Resistivity**	**10700**	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	5.0	JEE, U	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-798	**Sulfate as SO4**	**79.2**	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

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LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: RD-214-2 **Lab ID:** 0011529-05 **Sampled:** 04/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**pH**	**8.3**	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	**Resistivity**	**17700**	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	5.0	JEE, U	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-798	**Sulfate as SO4**	**10.9**	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

CERTIFICATE OF ANALYSIS

GCME
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PHONE: (561) 640-0085 **FAX:** (561) 640-0409

LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: B-102-4 **Lab ID:** 0011529-06 **Sampled:** 03/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	pH	8.0	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	Resistivity	26100	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	5.6	JEE, I	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-79 8	Sulfate as SO4	14.5	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

CERTIFICATE OF ANALYSIS

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LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: B-201-5 **Lab ID:** 0011529-07 **Sampled:** 03/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	pH	8.0	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	Resistivity	10500	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	11	JEE, I	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-79 8	Sulfate as SO4	120	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Palm Beach Environmental Laboratories Inc.

CERTIFICATE OF ANALYSIS

GCME
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West Palm Beach, FL 33411
ATTN: Partha Ghosh
PHONE: (561) 640-0085 **FAX:** (561) 640-0409

LOG #: 0011529
COC#: 18647
REPORTED: 7/5/2013 1:32:15PM
PROJECT #: [none]
PROJECT: Miami 47th Ave

Description: RD-176-3 **Lab ID:** 0011529-08 **Sampled:** 04/13/13 00:00
Matrix: Soil **Sampled By:** client **Received:** 06/28/13 11:15

pH

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	pH	7.6	JEE	S.U.	EPA 9045C	1	0.01	0.03	06/29/13	06/29/13	SL

Resistivity

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
NA	Resistivity	25800	JEE	ohms*cm	ASTM-D1125	1	1.0	3.0	06/29/13	06/29/13	SL

SM4500CL-B

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
16887-00-6	Chloride	6.0	JEE, I	mg/kg	EPA 300.0	1	5.0	15	06/29/13	06/29/13	SL

Sulfate

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction Date	Analysis Date	Analyst
148-08-798	Sulfate as SO4	17.6	JEE	mg/kg	EPA 9056	1	2.8	8.4	06/29/13	06/29/13	SL

Notes and Definitions

U	Analyte included in the analysis, but not detected
I	The reported value is between the laboratory Method Detection Limit & the laboratory Practical Quantitation Limit
JEE	Analysis performed by Florida Environmental Cert#E86006

TABLE 3
PAVEMENT EVALUATIONS AND CONDITION DATA
GCME PROJECT NO. 2000-01-12009

Cored by: GCME

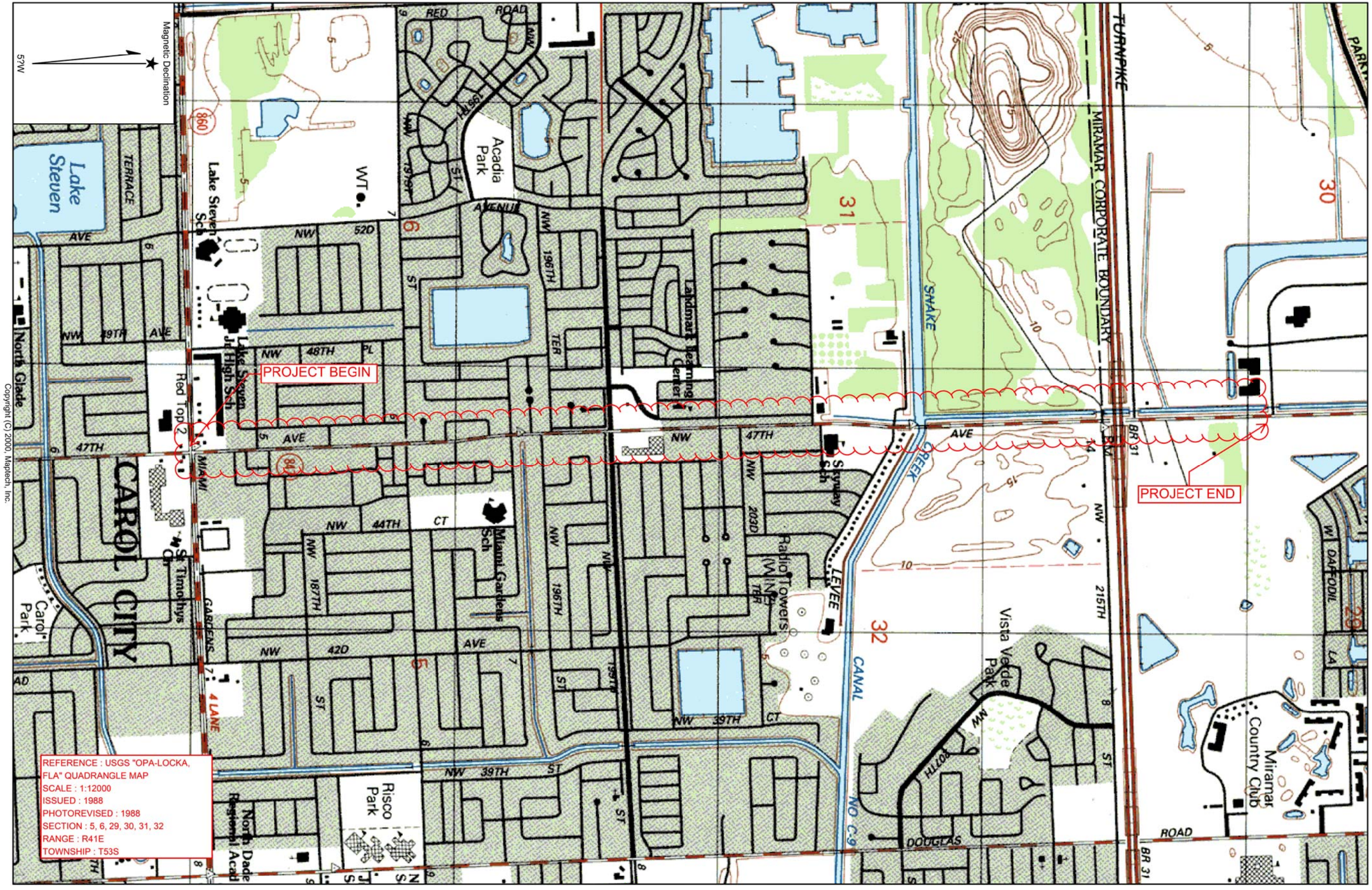
W.P.A. No.:	N/A	Name:	NW 47th Ave. (SR-847)	Lanes:	1
State Proj. No.:	N/A	From:	Miami Garden Drive		
F.A. Proj. No.:	430637-1-22-01	To:	Premier Parkway	Inside:	1
County:	Miami-Dae	Beg. Sta.:	110+00 End Sta.: 235+00	Outside:	0
Median Curbed (Y) (N) ( ) Lawn ( ) Other:				Curb & Gutter (Y) (N)	

Core No.	Mile Post Or Sta. No. [Approx]	Lane	Wheel Path	Pavement Layer (inch)			Base (inch)	Sub-grade (inch)	Cracks				Cond. Of PVT	Rut Depth (inch)	Cross Slope and Direct. c/s (ft/6ft)	Comments
				FC-2	Type S-I	Core Length			Depth (inch)	Type*	Class	Extent				
PC-1	121+00	L1	X	1.4	3.5	4.9	7.5		-	-	-	-	Good	0.406	0.273	Left Wheel Path
PC-2	145+00	R1	X	2.0	3.1	5.1	8		0.158	S	I	L	Fair	0.218	-0.075	Right Wheel Path
PC-3	168+00	L1	X	0.9	3.2	4.1	8		0.720	S	I	L	Poor	0.589	0.166	Right Wheel Path
PC-4	194+00	R1	X	0.9	6.9	7.8	5		0.587	S	I	L	Poor	0.722	0.264	Left Wheel Path
PC-5	216+00	L2	X	0.9	2.8	3.7	9		0.128	S	I	L	Fair	0.449	0.206, 0.289	Right Wheel Path

'*' S – Single; B – Branch; A – Alligator/Fatigue

TABLE –4
DETAILS OF PAVEMENT SECTION DATA
GCME PROJECT NO. 2000-01-12009

CORE #	PAVEMENT SECTION	THICKNESS (inch)	TYPE / MATERIAL DESCRIPTION	REMARKS
CORE PC -1	ASPHALT	1.4 +3.5	TYPE FC-2 + TYPE S-I	Station 121+00 (South Bound)
	BASE COURSE	7.5	Light Brown Sand & Some Limerock Fragments	
	SUBGRADE		Brown Sand	
CORE PC -2	ASPHALT	2.0+3.1	TYPE FC-2 + TYPE S-I	Station 145+00 (North Bound)
	BASE COURSE	8	Light Brown Sand & Some Limerock Fragments	
	SUBGRADE		Brown Sand	
CORE PC -3	ASPHALT	0.9+3.2	TYPE FC-2 + TYPE S-I	Station 178+00 (South Bound)
	BASE COURSE	8	Light Brown Sand & Some Limerock Fragments	
	SUBGRADE		Brown Sand	
CORE PC -4	ASPHALT	0.9+6.9	TYPE FC-2 + TYPE S-I	Station 194+00 (North Bound)
	BASE COURSE	5	Light Brown Sand & Some Limerock Fragments	
	SUBGRADE		Dark Brown Sand	
CORE PC -5	ASPHALT	0.9+2.8	TYPE FC-2 + TYPE S-I	Station 216+00 (South Bound) (Right Turn Lane)
	BASE COURSE	9	Light Brown Sand & Some Limerock Fragments	
	SUBGRADE		Brown Sand	



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

$USER$ $DATE$ $TIME$ $FILE$

SITE VICINITY MAP
PLATE - 1

SHEET NO.

GCME PROJECT NO. 2000-01-12009

PLATE-1 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 2

SHEET NO.

fpler 11/25/2013 10:28:45 AM X:\CADD\MicroStation Drawing\2012\2000-01-12009\PLATE-2.dgn

GCME PROJECT NO. 2000-01-12009

PLATE-2 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
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GCME, INC.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

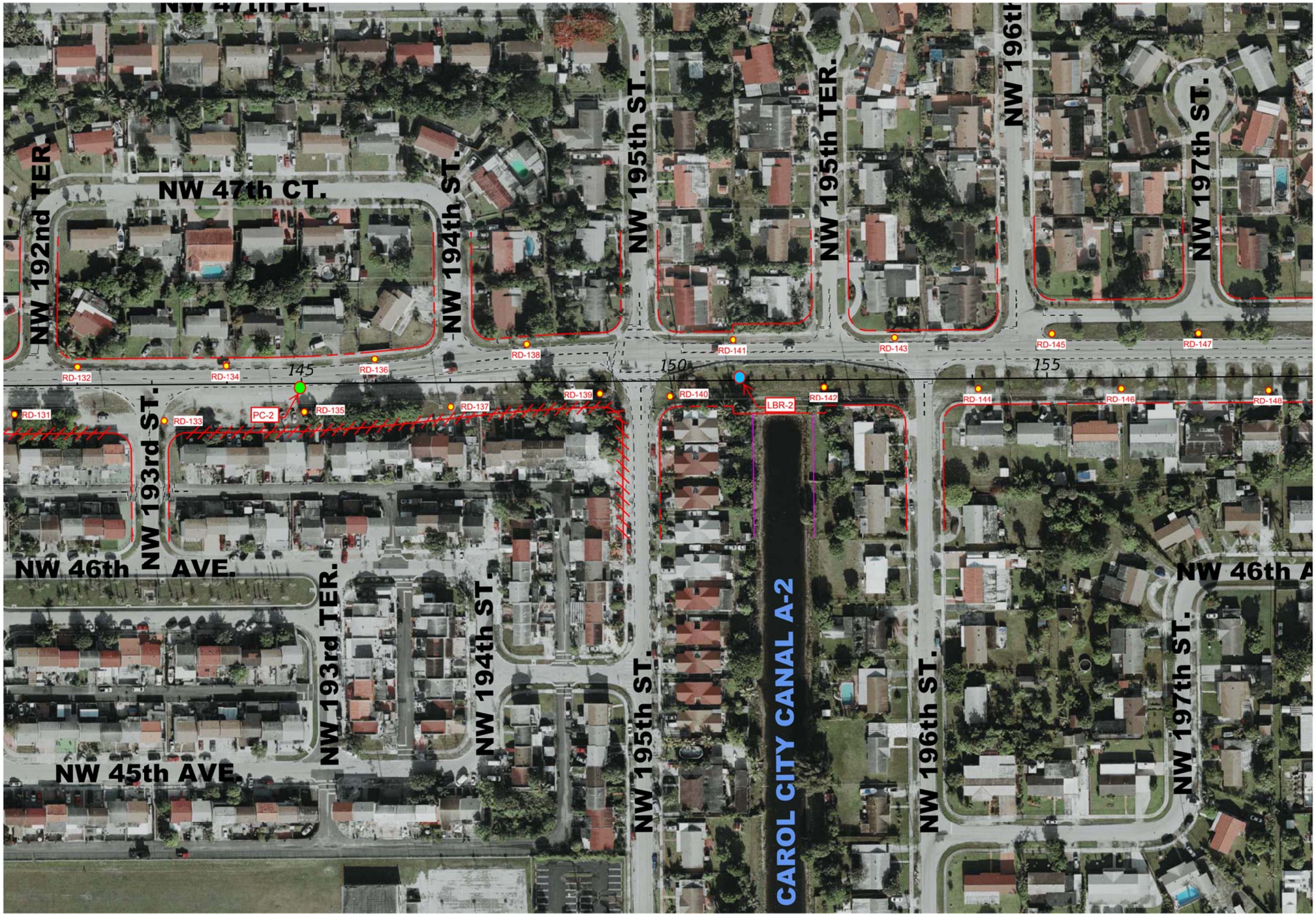
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 3

SHEET NO.

fpler 11/25/2013 10:36:21 AM X:\CADD\MicroStation Drawing\2012\2000-01-12009\PLATE-3.dgn

PLATE-3 NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C



GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 4

SHEET NO.

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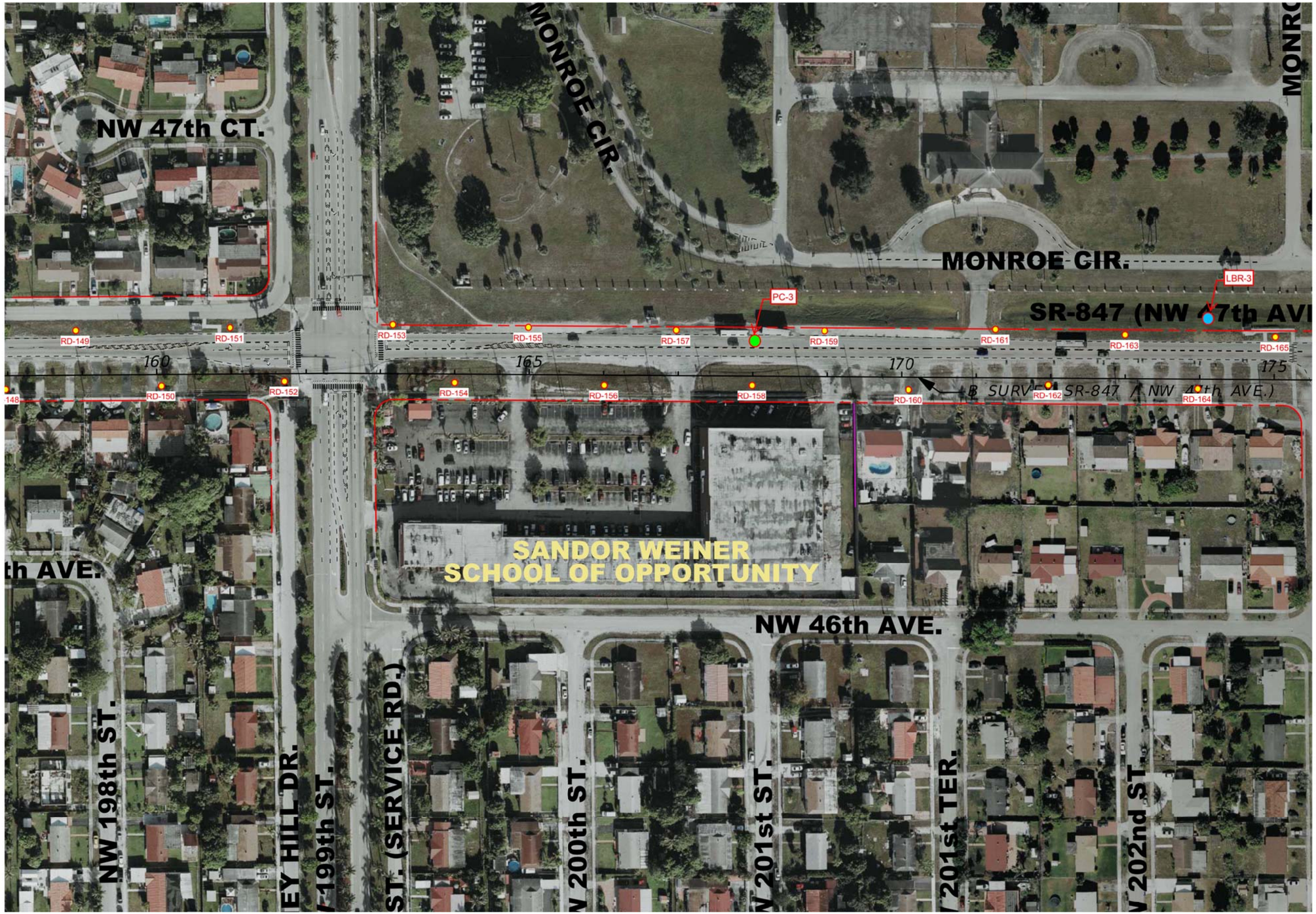
PLATE-4 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C



GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
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CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

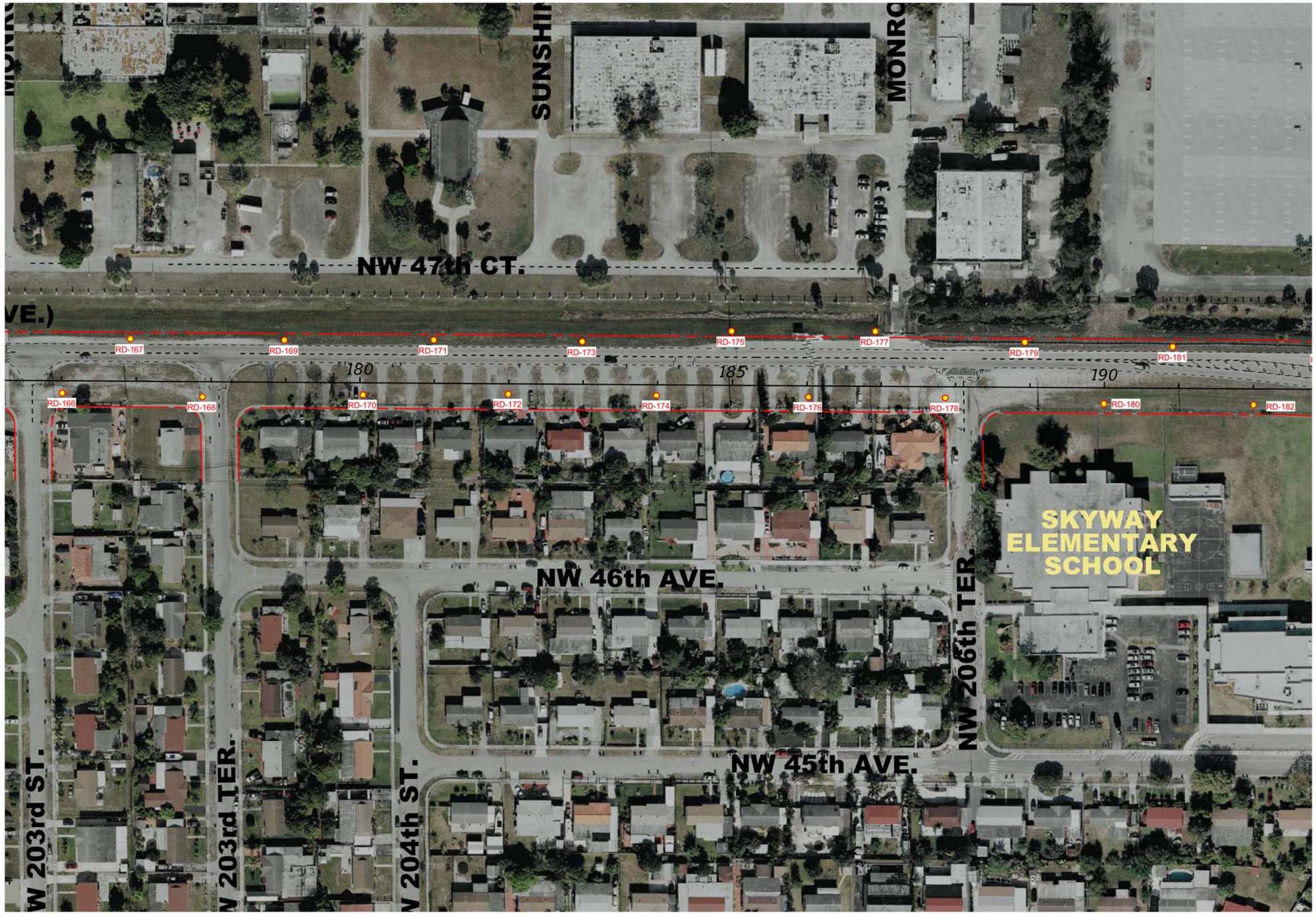
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 5

SHEET NO.

fpler 11/25/2013 10:51:33 AM X:\CADD\MicroStation Drawing\2012\2000-01-12009\PLATE-5.dgn

PLATE-5 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C



GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

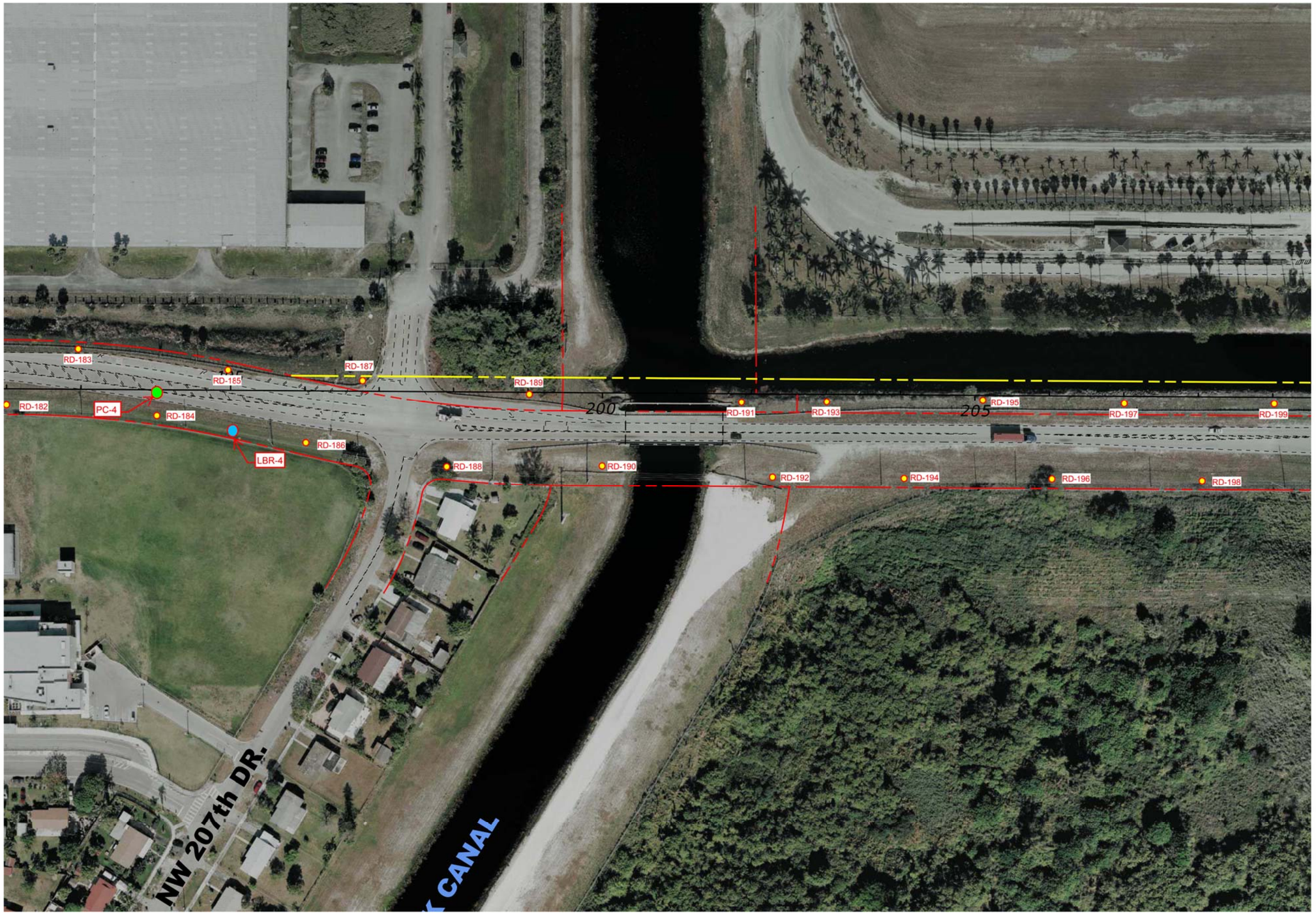
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 6

SHEET NO.

fpler 11/25/2013 11:02:32 AM X:\CADD\MicroStation Drawing\2012\2000-01-12009\PLATE-6.dgn

PLATE-6 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER 6G15-23.003, F.A.C



GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

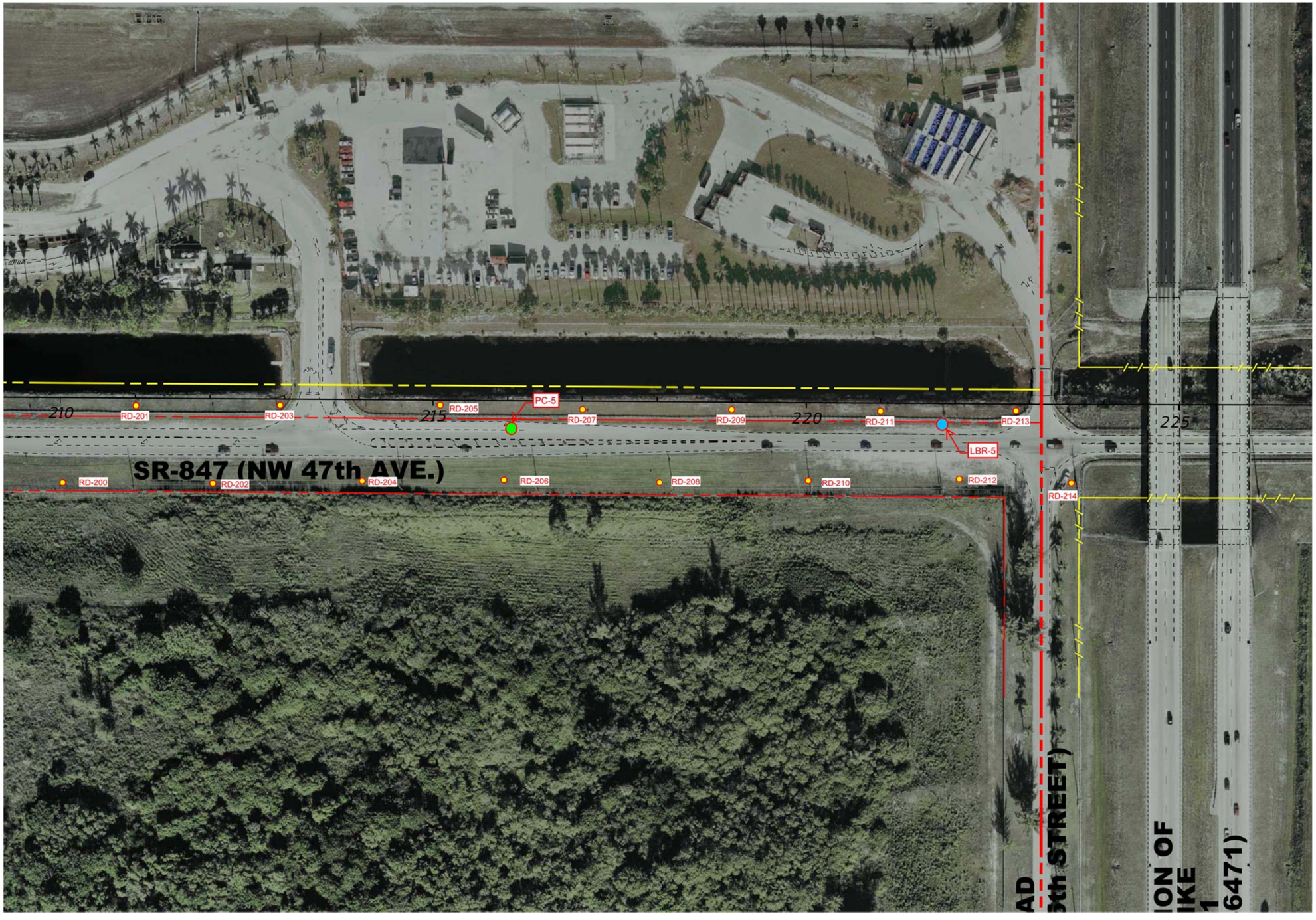
BORING LOCATION PLAN
PLATE - 7

SHEET NO.

fpler 11/25/2013 11:11:25 AM X:\CADD\MicroStation Drawing\2012\2000-01-12009\PLATE-7.dgn

NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

PLATE-7



GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 8

SHEET NO.

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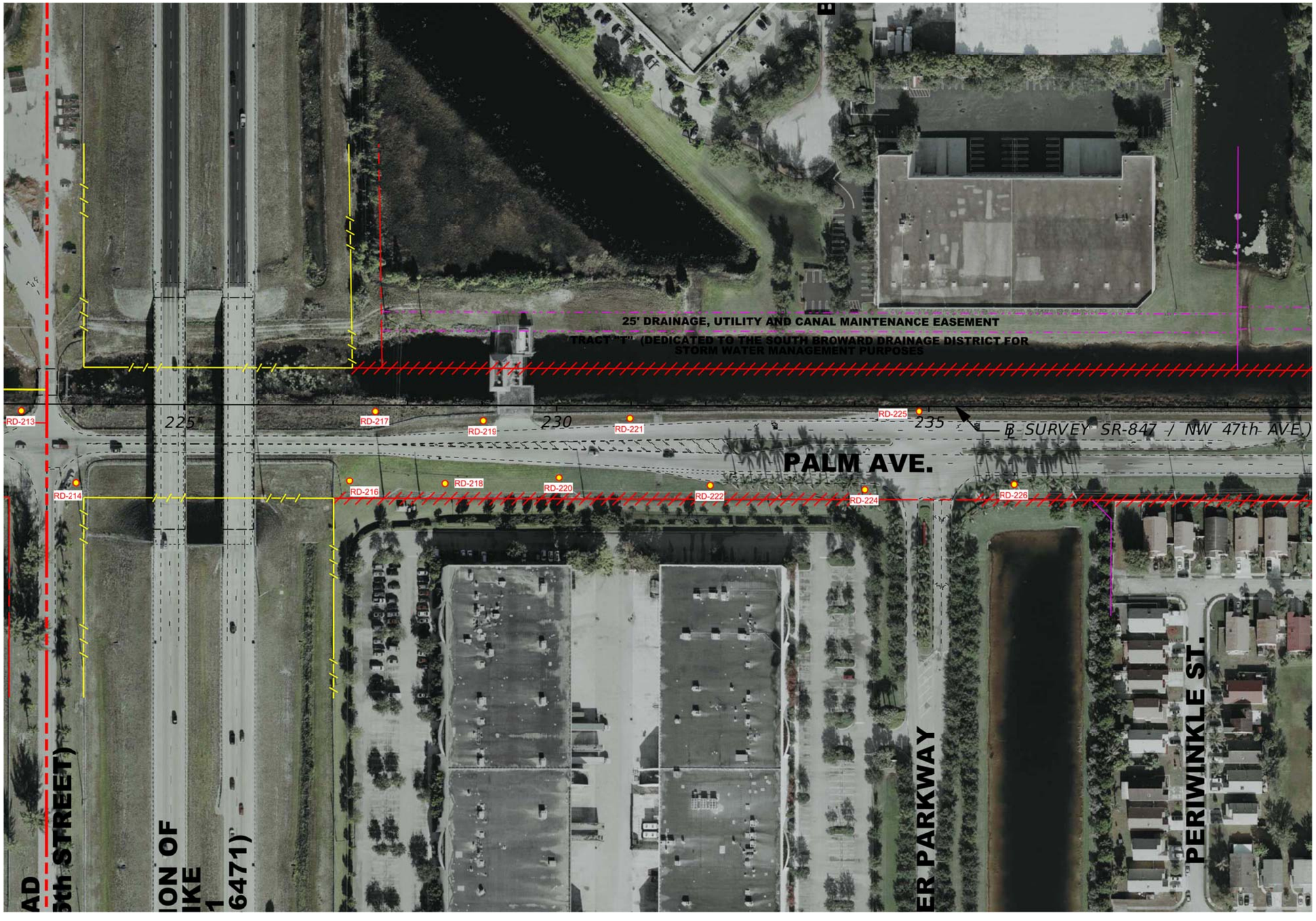
PLATE-8 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C



GCME PROJECT NO. 2000-01-12009

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

BORING LOCATION PLAN
PLATE - 9

SHEET NO.

fpler 11/25/2013 11:36:59 AM X:\CADD\MicroStation Drawing\2012\2000-01-12009\PLATE-9.dgn

PLATE-9 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

DATE OF SURVEY: 2/20/2013 - 4/12/2013
SURVEY MADE BY: GCME, INC.
SUBMITTED BY: PARTHA GHOSH, P.E.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DISTRICT: 6
ROAD NO.: 847
COUNTY: MIAMI-DADE / BROWARD

FINANCIAL PROJECT ID : 430637-1-22-01
PROJECT NAME: SR-847 WIDENING

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. : 110+00 SURVEY ENDS STA. : 235+00

REFERENCE: SR-847

	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS PERCENT PASS (%)						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	-	-	-	-	-	-	-	-	-	-	-	-	-	A-8	DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)	-	-	-	-	-
2	2	3-5	28	0-24	26	76-100	70-95	47-72	12-26	1-9	-	-	-	A-3	BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS	5	10500-26200	5-11	8-120	7.6-8.3
2A	-	-	2	9-13	2	67	61-62	45-46	17-18	9-10	-	-	-	A-3	BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT	1	10700	5	79	8.1
3	-	-	11	0-26	11	63-99	56-97	43-84	26-42	11-24	-	-	-	A-2-4	DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS	1	9350	5	67	7.7
4	8	9-33	8	14-44	-	-	-	-	-	-	-	-	-	A-8	DARK BROWN ORGANIC SAND WITH SILT TO SILTY	-	-	-	-	-
5	-	-	1	20	1	51	42	34	18	10	-	-	-	-	BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE	1	10400	5	37	7.8

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.

▽ - WATER TABLE ENCOUNTERED

GNE - GROUNDWATER NOT ENCOUNTERED

NOTES:

(1) THE MATERIAL FROM STRATUM 1 IS TOPSOIL (A-8) AND CONSIDERED TO BE UNSUITABLE (MUCK). IT SHALL BE REMOVED DURING CLEARING AND GRUBBING IN ACCORDANCE WITH SECTION 110 OF THE FDOT STANDARD SPECIFICATIONS.

(2) STRATUM 2 AND 2A CONSIST OF SELECT MATERIALS AND ARE ADEQUATE FOR SUBGRADE AND EMBANKMENT SUPPORT, AND SHOULD BE UTILIZED ACCORDING TO STANDARD INDEX 505. HOWEVER, PORTIONS MAY RETAIN EXCESS MOISTURE DUE TO SLIGHTLY HIGH FINES CONTENT AND COULD BE MORE DIFFICULT TO HANDLE, PLACE AND COMPACT THAN ORDINARY A-3 MATERIAL.

(3) STRATUM 3 CONSISTS OF SELECT MATERIALS AND ARE GENERALLY ADEQUATE FOR SUBGRADE AND EMBANKMENT SUPPORT, AND SHOULD BE UTILIZED ACCORDING TO STANDARD INDEX 505. HOWEVER, SOME PORTIONS OF THESE SOILS HAVE HIGH FINES CONTENT, AND HENCE WILL RETAIN EXCESS MOISTURE, AND WILL BE DIFFICULT TO HANDLE, PLACE AND COMPACT. THESE MATERIALS MAY BE USED IN THE ROADWAY SUBGRADE WITH EXTRA CAUTION AND PROPER SUPERVISION AND QUALITY CONTROL.

(4) STRATUM 4 (A-8) CONSISTS OF ORGANIC MATERIALS.
THE MATERIALS FROM STRATUM 4 ENCOUNTERED BELOW EXISTING GRADES SHALL BE REMOVED AND REPLACED WITH SELECT FILL IN ACCORDANCE WITH FDOT STANDARD INDICES 500 AND 505. THE LIMITS OF REMOVAL WITH RESPECT TO THE CENTERLINE OF CONSTRUCTION ARE AS FOLLOWS:

(a) FROM STATION 169+00 TO STATION 171+00 (RT - ABOVE 2 FEET)
(b) FROM STATION 185+00 TO STATION 187+00 (RT - ABOVE 2 FEET)
(c) FROM STATION 215+00 TO STATION 217+00 (RT - ABOVE 4 FEET)

FOR AREAS WHICH ENCOUNTERED STRATUM 4 MATERIALS AT DEPTHS GREATER THAN 4 FEET, WE RECOMMEND THAT THE ORGANIC MATERIALS ENCOUNTERED AT THESE LOCATIONS AND DEPTHS REMAIN IN PLACE. A GEOGRID LAYER SHALL BE PLACED BELOW THE BOTTOM OF THE PAVEMENT BASE MATERIALS DURING CONSTRUCTION OF THE ROADWAY WIDENING ALONG THE FOLLOWING LIMITS WITH RESPECT TO THE CENTERLINE OF CONSTRUCTION:

(a) FROM STATION 120+00 TO STATION 122+00 (RT)
(b) FROM STATION 148+00 TO STATION 151+00 (RT)
(c) FROM STATION 152+00 TO STATION 154+00 (LT)
(d) FROM STATION 181+00 TO STATION 183+00 (RT)

(5) STRATUM 5 IS LIMESTONE. SPECIALIZED TOOLS AND EQUIPMENT WILL BE REQUIRED TO EXCAVATE / PENETRATE THIS LIMESTONE LAYER.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

ROADWAY SOILS SURVEY

SHEET NO.

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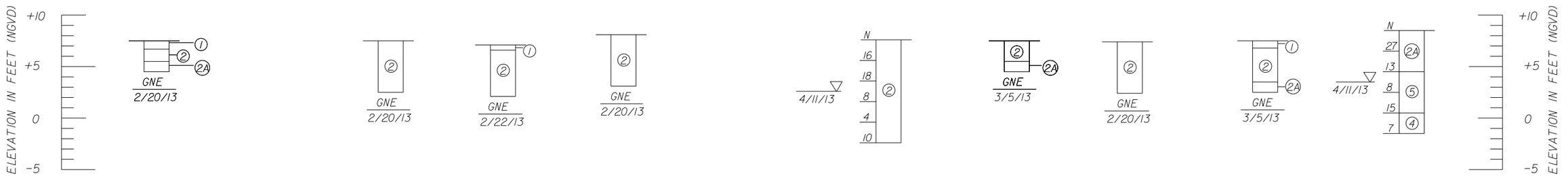
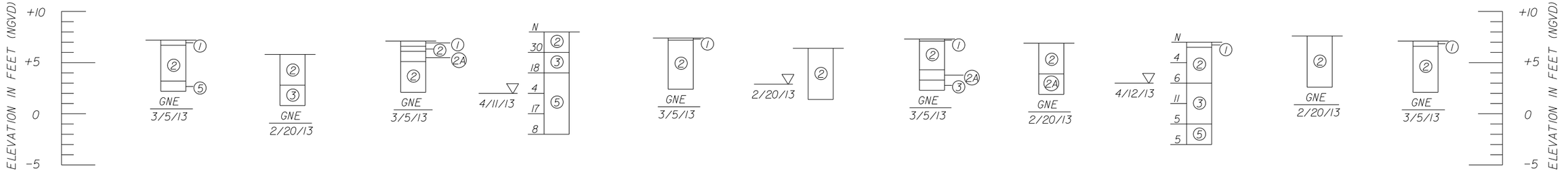
GCME PROJECT NO. 2000-01-12009

FIGURE: 1 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

BORING NO.	RD-101*	RD-102*	RD-103	RD-104	RD-105	RD-106*	RD-107	RD-108*	RD-109	RD-110	RD-111
STATION	111+00	[SKIPPED]	113+00	114+00	115+00	[SKIPPED]	117+00	118+00	119+00	120+00	121+00
OFFSET	45.0' RT	-	32.8' RT	31.9' LT	16.3'	-	27.4' RT	40.0' LT	23.6' RT	26.1' LT	12.3' RT
ELEVATION	+7.5'	-	+7.5'	+7.1'	+8.1'	-	+7.6'	+7.5'	+7.4'	+7.5'	+8.5'
COORDINATES	N584526.4'	-	N584732.5'	N584829.4'	N584931.5'	-	N585131.9'	N585221.4'	N585331.4'	N585429.0'	N585530.7'
	E893657.5'	-	E893634.7'	E893565.4'	E893608.8'	-	E893610.6'	E893535.0'	E893597.4'	E893543.0'	E893576.7'
HAMMER	-	-	-	-	-	-	AUTOMATIC	-	-	-	AUTOMATIC
DATE	2/20/13	-	2/20/13	2/22/13	2/20/13	-	4/11/13	3/5/13	2/20/13	3/5/13	4/11/13



BORING NO.	RD-112	RD-113	RD-114	RD-115	RD-116	RD-117	RD-118	RD-119	RD-120	RD-121	RD-122
STATION	122+00	123+00	124+00	125+00	126+00	127+00	128+00	129+00	130+00	131+00	132+00
OFFSET	24.2' LT	33.9' RT	24.6' LT	12.0' RT	25.0' LT	39.1' RT	26.8' LT	37.0' RT	27.1' LT	26.7' RT	26.3' LT
ELEVATION	+7.2'	+5.8'	+7.1'	+8.0'	+7.4'	+6.4'	+7.3'	+6.9'	+7.0'	+7.6'	+7.1'
COORDINATES	N585628.9'	N587731.5'	N585828.6'	N585930.2'	N586028.4'	N586131.3'	N586228.1'	N586331.0'	N586427.9'	N586530.3'	N586627.7'
	E893535.6'	E893589.0'	E893525.9'	E893557.6'	E893516.1'	E893575.3'	E893504.9'	E893563.8'	E893495.1'	E893544.2'	E893486.6'
HAMMER	-	-	-	AUTOMATIC	-	-	-	-	AUTOMATIC	-	-
DATE	3/5/13	2/20/13	3/5/13	4/11/13	3/5/13	2/20/13	3/5/13	2/20/13	4/12/13	2/20/13	3/5/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)
2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)
3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
- STATION / OFFSET / ELEVATION / COORDINATE INFORMATION ARE PROVIDED BY SURVEYORS.
- (A-3) - AASHTO SOIL SYMBOL
- * - BORING SKIPPED OR TERMINATED AT SHALLOW DEPTHS DUE TO CONFLICT WITH EXISTING UTILITIES.

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
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GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

GCME PROJECT NO. 2000-01-12009

FIGURE: 2 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

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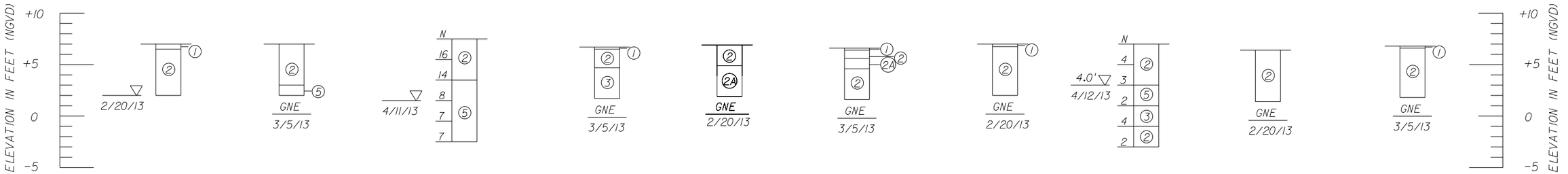
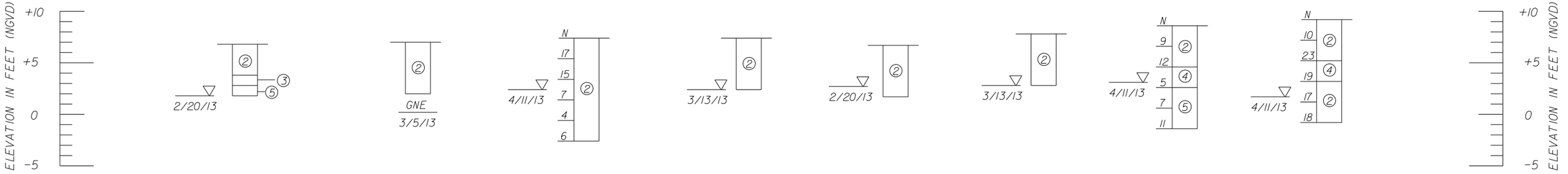
BORING NO.	RD-123	RD-124	RD-125	RD-126	RD-127	RD-128	RD-129	RD-130	RD-131	RD-132
STATION	133+00	134+00	135+00	136+00	137+00	138+00	139+00	140+00	141+00	142+00
OFFSET	33.7' RT	24.7' LT	11.7' RT	31.3' LT	34.7' RT	25.9' LT	34.1' RT	27.5' LT	33.8' RT	26.2' LT
ELEVATION	+7.0'	+7.0'	+7.5'	+6.7'	+6.9'	+6.6'	+7.0'	+7.0'	+6.4'	+6.8'
COORDINATES	N586730.4' E893541.9'	N586827.5' E893478.9'	N586929.1' E893510.5'	N587027.0' E893462.8'	N587130.0' E893524.0'	N587227.0' E893458.8'	N587329.7' E893514.1'	N587426.7' E893447.9'	N587529.5' E893504.4'	N587626.6' E893439.8'
HAMMER	-	-	AUTOMATIC	-	-	-	-	AUTOMATIC	-	-
DATE	2/20/13	3/5/13	4/11/13	3/5/13	2/20/13	3/5/13	2/20/13	4/12/13	2/20/13	3/5/13



BORING NO.	RD-133	RD-134	RD-135	RD-136	RD-137	RD-138	RD-139	RD-140
STATION	143+40	144+00	145+00	146+00	147+00	148+00	149+00	150+00
OFFSET	26.0' RT	26.9' LT	15.2' RT	31.0' LT	13.7' RT	50.2' LT	15.6' LT	15.4' LT
ELEVATION	+6.8'	+7.0'	+7.4'	+7.4'	+6.7'	+7.8'	+8.6'	+9.2'
COORDINATES	N587768.9' E893485.3'	N587826.3' E893429.7'	N587928.2' E893467.1'	N588025.9' E893416.2'	N588127.9' E893456.2'	N588224.8' E893387.6'	N588326.3' E893417.5'	N588426.2' E893413.0'
HAMMER	-	-	AUTOMATIC	-	-	-	AUTOMATIC	AUTOMATIC
DATE	2/20/13	3/5/13	4/11/13	3/13/13	2/20/13	3/13/13	4/11/13	4/11/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)

2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)

3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
- STATION / OFFSET / ELEVATION / COORDINATE INFORMATION ARE PROVIDED BY SURVEYORS.

(A-3) - AASHTO SOIL SYMBOL

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

GCME PROJECT NO. 2000-01-12009

FIGURE: 3 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

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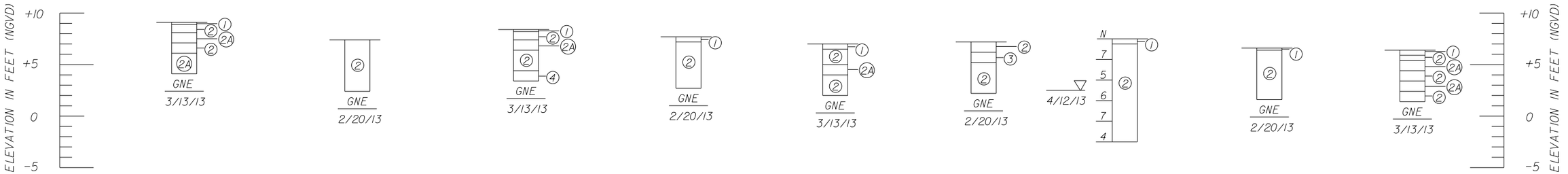
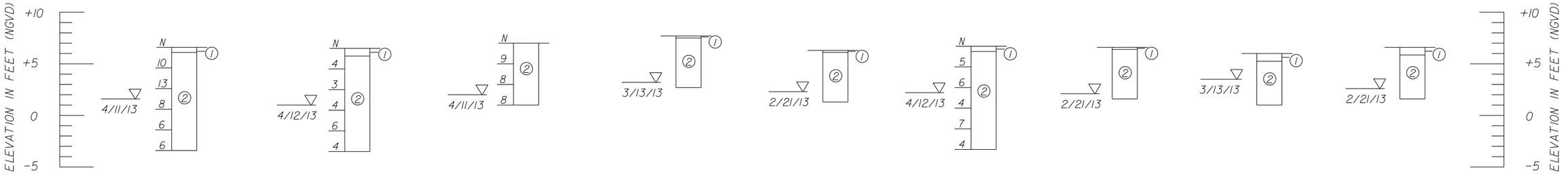
	RD-141	RD-142	RD-143	RD-144	RD-145	RD-146	RD-147	RD-148	RD-149
BORING NO.	RD-141	RD-142	RD-143	RD-144	RD-145	RD-146	RD-147	RD-148	RD-149
STATION	150+80	152+00	153+00	154+00	155+00	156+00	157+00	158+00	159+00
OFFSET	52.4' LT	0.1' RT	56.4' LT	+6.1' LT	67.2' LT	2.2' RT	57.2' LT	2.3' LT	67.2' LT
ELEVATION	+9.1'	+7.4'	+8.4'	+7.7'	+7.0'	+7.2'	+7.5'	+6.6'	+6.4'
COORDINATES	N588504.4' E893372.4'	N588626.7' E893419.2'	N588724.0' E893358.0'	N588826.2' E893403.6'	N588923.2' E893337.9'	N589026.4' E893402.5'	N589123.5' E893338.4'	N589225.9' E893388.6'	N589322.8' E893319.1'
HAMMER	-	-	-	-	-	-	AUTOMATIC	-	-
DATE	3/13/13	2/20/13	3/13/13	2/20/13	3/13/13	2/20/13	4/12/13	2/20/13	3/13/13



	RD-150	RD-151	RD-152	RD-153	RD-154	RD-155	RD-156	RD-157	RD-158
BORING NO.	RD-150	RD-151	RD-152	RD-153	RD-154	RD-155	RD-156	RD-157	RD-158
STATION	160+00	161+00	161+70	163+20	164+00	165+00	166+00	167+00	168+00
OFFSET	10.2' LT	66.6' LT	3.7' LT	110.4' LT	1.4' LT	60.5' LT	3.3' RT	79.4' LT	+4.7' RT
ELEVATION	+6.6'	+6.5'	+7.0'	+5.7'	+6.3'	+6.7'	+6.6	+6.0'	+6.6'
COORDINATES	N589425.4' E893371.4'	N589522.6' E893310.3'	N589595.5' E893369.8'	N589741.9' E893257.3'	N589825.4' E893363.6'	N589923.4' E893301.2'	N590025.5' E893361.7'	N590122.7' E893275.8'	N590225.4' E893356.5'
HAMMER	AUTOMATIC	AUTOMATIC	AUTOMATIC	-	-	AUTOMATIC	-	-	-
DATE	4/11/13	4/12/13	4/11/13	3/13/13	2/21/13	4/12/13	2/21/13	3/13/13	2/21/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)
2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)
3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
- STATION / OFFSET / ELEVATION / COORDINATE INFORMATION ARE PROVIDED BY SURVEYORS.

(A-3) - AASHTO SOIL SYMBOL

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

GCME PROJECT NO. 2000-01-12009

FIGURE: 4 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

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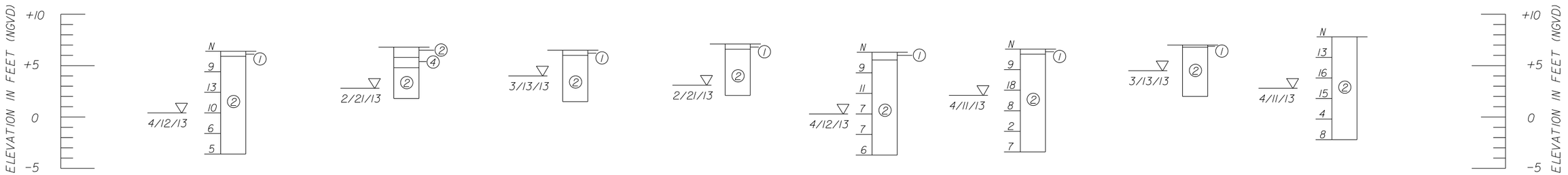
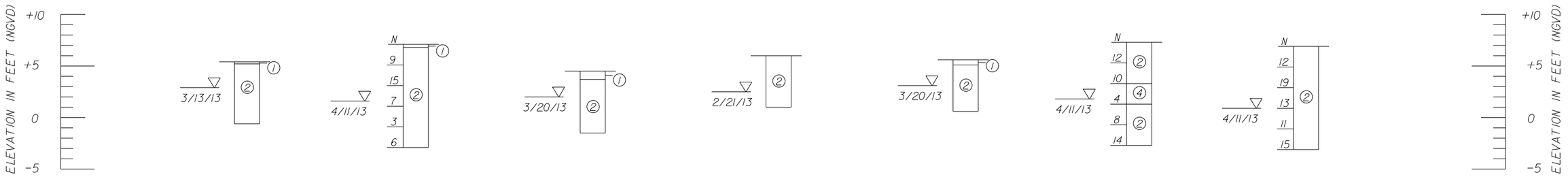
BORING NO.	RD-159	RD-160	RD-161	RD-162	RD-163	RD-164	RD-165	RD-166
STATION	169+00	170+00	171+00	172+00	173+00	174+00	175+00	176+00
OFFSET	59.7' LT	2.6' LT	70.6' LT	2.1' RT	53.7' LT	5.3' LT	69.4' LT	5.8' LT
ELEVATION	+6.4'	+6.8'	+6.5'	+7.1'	+6.3'	+6.6'	+7.0'	+7.8'
COORDINATES	N590323.3' E893288.9'	N590425.1' E893342.7'	N590522.8' E893271.5'	N590625.1' E893340.8'	N590723.2' E893281.8'	N590824.8' E893326.9'	N590922.6' E893259.5'	N591024.6' E893319.8'
HAMMER	AUTOMATIC	-	-	-	AUTOMATIC	AUTOMATIC	-	AUTOMATIC
DATE	4/12/13	2/21/13	3/13/13	2/21/13	4/12/13	4/11/13	3/13/13	4/11/13



BORING NO.	RD-167	RD-168	RD-169	RD-170	RD-171	RD-172	RD-173
STATION	177+00	177+85	179+00	180+00	181+00	182+00	183+00
OFFSET	69.4' LT	6.1' RT	69.6' LT	2.4 LT	67.5' LT	18.4' LT	52.3' LT
ELEVATION	+5.4'	+7.1'	+4.5'	+6.0'	+5.6'	+7.3'	+6.9'
COORDINATES	N591122.5' E893253.0'	N591209.9' E893325.6'	N591322.4' E893246.2'	N591424.5' E893310.1'	N591522.3' E893241.7'	N591623.9' E893287.6'	N591722.7' E893250.4'
HAMMER	-	AUTOMATIC	-	-	-	AUTOMATIC	AUTOMATIC
DATE	3/13/13	4/11/13	3/20/13	2/21/13	3/20/13	4/11/13	4/11/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)
2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)
3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
- STATION / OFFSET / ELEVATION / COORDINATE INFORMATION ARE PROVIDED BY SURVEYORS.

(A-3) - AASHTO SOIL SYMBOL

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

FIGURE: 5

NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

GCME PROJECT NO. 2000-01-12009

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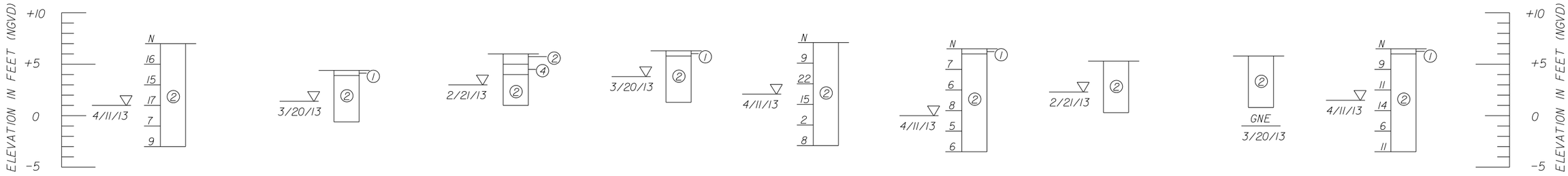
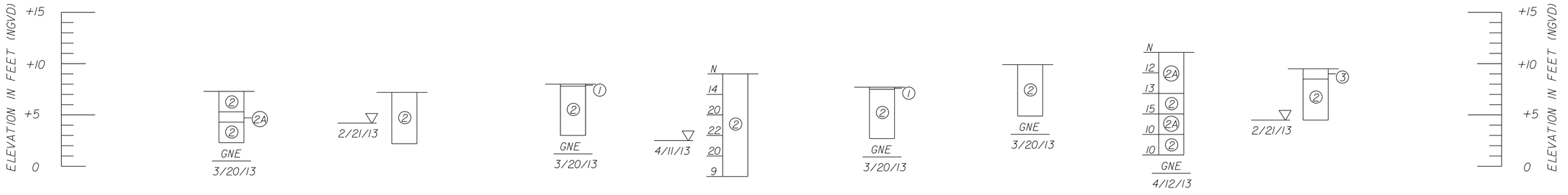
BORING NO.	RD-174	RD-175	RD-176	RD-177	RD-178	RD-179	RD-180	RD-181	RD-182
STATION	184+00	185+00	186+00	187+00	187+85	189+00	190+00	191+00	192+00
OFFSET	20.9' LT	75.2' LT	1.8' RT	74.7' LT	7.8' LT	60.5' LT	15.1' RT	66.7' LT	5.8' LT
ELEVATION	+7.0'	+4.4	+6.0'	+6.3'	+7.1'	+6.5'	+5.3'	+5.8'	+6.5'
COORDINATES	N591823.7' E893278.5'	N591921.9' E893221.0'	N592024.4' E893294.6'	N592121.8' E893214.9'	N592208.9' E893279.0'	N592322.1' E893222.5'	N592424.6' E893294.8'	N592521.8' E893209.7'	N592623.8' E893267.3'
HAMMER	AUTOMATIC	-	-	-	AUTOMATIC	AUTOMATIC	-	-	AUTOMATIC
DATE	4/11/13	3/20/13	2/21/13	3/20/13	4/11/13	4/11/13	2/21/13	3/20/13	4/11/13



BORING NO.	RD-183	RD-184	RD-185	RD-186	RD-187	RD-188	RD-189	RD-190
STATION	193+00	194+00	195+00	196+00	197+00	198+00	199+00	200+00
OFFSET	62.0' LT	32.5' RT	36.7' LT	50.2' RT	45.8' LT	91.1' RT	12.9' RT	91.6' RT
ELEVATION	+7.3'	+5.2'	+8.0'	+9.0'	+7.7'	+9.9'	+11.1'	+9.5'
COORDINATES	N592721.9' E893207.9'	N592824.9' E893299.1'	N592922.6' E893226.6'	N593025.4' E893310.2'	N593122.2' E893211.0'	N593226.6' E893344.5'	N593324.0' E893263.1'	N593426.5' E893338.5'
HAMMER	-	-	-	AUTOMATIC	-	-	AUTOMATIC	-
DATE	3/20/13	2/21/13	3/20/13	4/11/13	3/20/13	3/20/13	4/12/13	2/21/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)

2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)

3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
- STATION / OFFSET / ELEVATION / COORDINATE INFORMATION ARE PROVIDED BY SURVEYORS.

(A-3) - AASHTO SOIL SYMBOL

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

GCME PROJECT NO. 2000-01-12009

FIGURE: 6 NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

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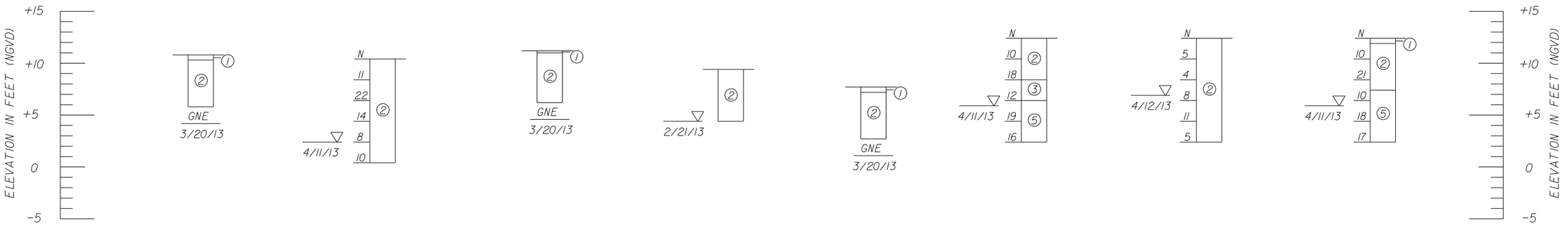
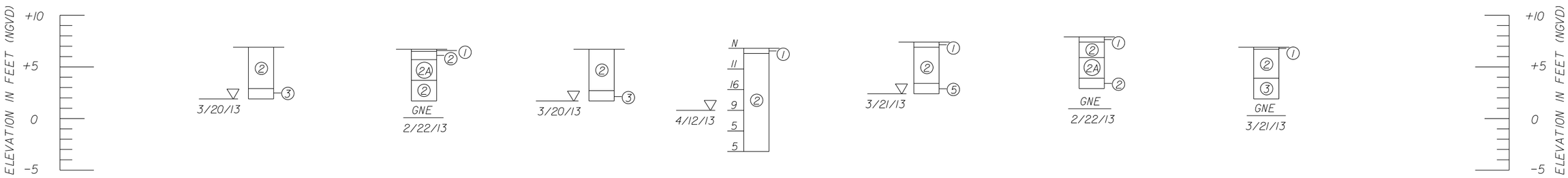
BORING NO.	RD-191	RD-192	RD-193	RD-194	RD-195	RD-196	RD-197	RD-198
STATION	201+80	202+30	203+00	204+00	205+00	206+00	207+00	208+00
OFFSET	16.8' RT	85.4' RT	23.4' RT	104.8' RT	14.8' RT	80.0' RT	35.3' RT	74.9' RT
ELEVATION	+10.8'	+10.4'	+11.2'	+9.4'	+7.7'	+8.4'	+8.4'	+8.4'
COORDINATES	N593604.0' E893257.8'	N593656.2' E893324.7'	N593724.1' E893260.5'	N593826.8' E893338.5'	N593923.8' E893245.2'	N594025.8' E893307.1'	N594124.3' E893259.2'	N594225.6' E893295.5'
HAMMER	-	AUTOMATIC	-	-	-	AUTOMATIC	AUTOMATIC	AUTOMATIC
DATE	3/20/13	4/11/13	3/20/13	2/21/13	3/20/13	4/11/13	4/12/13	4/11/13



BORING NO.	RD-199	RD-200	RD-201	RD-202	RD-203	RD-204	RD-205
STATION	209+00	210+00	211+00	212+00	213+00	214+00	215+00
OFFSET	7.6' RT	113.8' RT	6.6' RT	111.2' RT	9.0' RT	103.3' RT	8.8' RT
ELEVATION	+6.9'	+7.0'	+6.7'	+6.8'	+7.4'	+7.9'	+6.9'
COORDINATES	N594323.3' E893225.0'	N594426.7' E893327.8'	N594523.2' E893217.4'	N594626.5' E893318.7'	N594723.1' E893213.3'	N594826.2' E893304.2'	N594923.0' E893206.5'
HAMMER	-	-	-	AUTOMATIC	-	-	-
DATE	3/20/13	2/22/13	3/20/13	4/12/13	3/21/13	2/22/13	3/21/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)

2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)

3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
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(A-3) - AASHTO SOIL SYMBOL

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

GCME PROJECT NO. 2000-01-12009

FIGURE: 7

NOTICE: THE OFFICAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C

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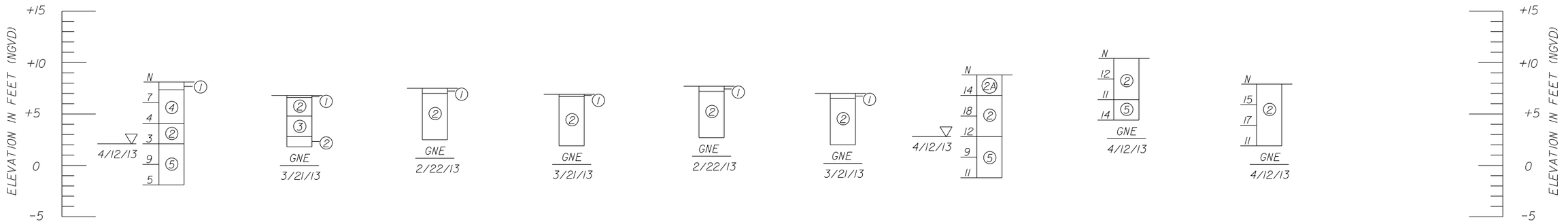
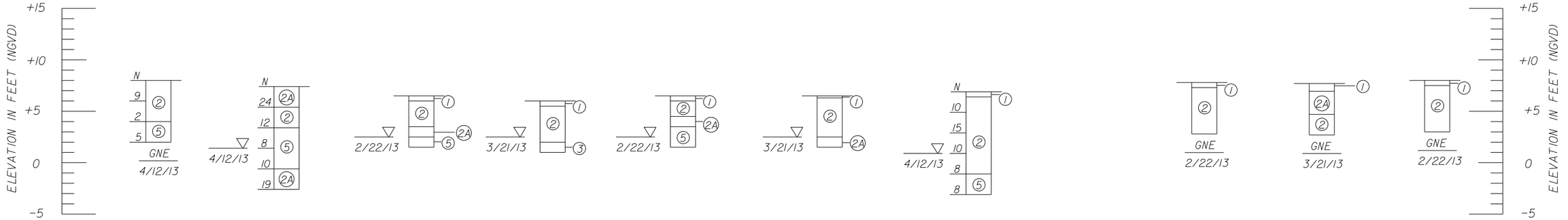
BORING NO.	RD-206	RD-207	RD-208	RD-209	RD-210	RD-211	RD-212	RD-213	RD-214	RD-215*
STATION	216+00	217+00	218+00	219+00	220+00	221+00	222+00	222+80	223+50	[SKIPPED]
OFFSET	77.9' RT	6.7' RT	103.1' RT	14.9' RT	116.0' RT	18.3' RT	69.3' RT	23.6' RT	104.1' RT	-
ELEVATION	+8.1'	+6.8'	+7.5'	+6.9'	+7.7'	+7.0'	+8.8'	+10.4'	+7.9'	-
COORDINATES	N595025.2'	N595122.8'	N595226.0'	N595323.0'	N595426.3'	N595523.0'	N595624.6'	N595703.1'	N595776.1'	-
	E893272.2'	E893197.8'	E893290.9'	E893199.5'	E893297.2'	E893196.3'	E893244.0'	E893195.7'	E893273.7'	-
HAMMER	AUTOMATIC	-	-	-	-	-	AUTOMATIC	AUTOMATIC	AUTOMATIC	-
DATE	4/12/13	3/21/13	2/22/13	3/21/13	2/22/13	3/21/13	4/12/13	4/12/13	4/12/13	-



BORING NO.	RD-216	RD-217	RD-218	RD-219	RD-220	RD-221	RD-222	RD-223*	RD-224	RD-225	RD-226
STATION	227+30	227+00	228+50	229+00	230+00	231+00	232+00	[SKIPPED]	234+00	235+00	236+00
OFFSET	70.4' RT	36.7' RT	105.8' RT	18.8' RT	105.2' RT	19.5' RT	102.5' RT	-	106.0' RT	11.8' RT	108.3' RT
ELEVATION	+8.0'	+7.4'	+6.5'	+6.0'	+6.5'	+6.5'	+6.9'	-	+7.8'	+7.7'	+8.0'
COORDINATES	N596154.6'	N596123.4'	N596275.8'	N596322.6'	N596425.7'	N596522.5'	N596625.5'	-	N596825.5'	N596921.9'	N597025.4'
	E893225.9'	E893193.4'	E893256.8'	E893168.1'	E893250.7'	E893161.3'	E893240.6'	-	E893236.7'	E893138.9'	E893231.6'
HAMMER	AUTOMATIC	AUTOMATIC	-	-	-	-	AUTOMATIC	-	-	-	-
DATE	4/12/13	4/12/13	2/22/13	3/21/13	2/22/13	3/21/13	4/12/13	-	2/22/13	3/21/13	2/22/13



LEGEND

1. DARK BROWN SAND WITH SILT, WITH TRACE TO FEW ORGANIC, TRACE ROOTS, TRACE TO FEW LIMEROCK FRAGMENTS (TOPSOIL)
2. BROWN TO DARK BROWN SAND WITH SILT, SOMETIMES WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-3)

2A. BROWN TO LIGHT BROWN SAND AND SOME LIMEROCK FRAGMENTS, WITH SILT (A-3)

3. DARK BROWN TO LIGHT BROWN SILTY SAND, WITH TRACE TO FEW LIMEROCK FRAGMENTS (A-2-4)
4. DARK BROWN ORGANIC SAND WITH SILT TO SILTY (A-8)
5. BROWN TO LIGHT BROWN SANDY TO SILTY LIMESTONE

NOTES

- ▽ GROUNDWATER LEVEL RECORDED, ON THE DATE OF DRILLING.
- GNE: WATER TABLE NOT ENCOUNTERED WITHIN THE DEPTH OF EXPLORATION.
- DRILLED BY: JIMMY
- N: STANDARD PENETRATION RESISTANCE IN BLOWS PER 12 INCHES.
- STATION / OFFSET / ELEVATION / COORDINATE INFORMATION ARE PROVIDED BY SURVEYORS.
- (A-3) - AASHTO SOIL SYMBOL
- * - BORING SKIPPED OR TERMINATED AT SHALLOW DEPTHS DUE TO CONFLICT WITH EXISTING UTILITIES.

SCALE: 1"=10'V

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
PARTHA GHOSH, P.E. LICENSE NO. 51377
GCME, INC.
6903 VISTA PARKWAY NORTH, SUITE 8
WEST PALM BEACH, FLORIDA 33411
CERTIFICATE OF AUTHORIZATION NO. 9076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
847	MIAMI-DADE	430637-1-22-01

SOIL PROFILES

SHEET NO.

GCME PROJECT NO. 2000-01-12009
fpler 12/12/2013 4:39:57 PM X:\CADD\MicroStation Drawing\2012\2000-01-12009\rdgeo07.dgn

APPENDIX – A

Resilient Modulus Test Results – Provided By FDOT

TABLE - A1

Mr & LBR SAMPLE LIST

DISTRICT: Ⅵ

PROJECT NAME: SR-847/NW 47 Ave. from SR-860/NW 183 St. to Premier Pkwy.

FPID NO.: 430637-1-22-01

COUNTY: Miami-Dade

LBR Sample No.	Road	Approximate Station	RT/LT of Base Line	DEPTH INTERVAL
LBR # 1	SR-847/NW 47 Ave.	125+50	45' RT	1' - 3' BELOW GRADE
LBR # 2	SR-847/NW 47 Ave.	151+00	5' RT	1' - 3' BELOW GRADE
LBR # 3	SR-847/NW 47 Ave.	174+20	80' LT	1' - 3' BELOW GRADE
LBR # 4	SR-847/NW 47 Ave.	194+90	55' RT	1' - 3' BELOW GRADE
LBR # 5	SR-847/NW 47 Ave.	221+80	20' RT	1' - 3' BELOW GRADE

Florida Department of Transportation

RICK SCOTT
GOVERNOR

STATE MATERIALS OFFICE
5007 Northeast 39th Avenue, Gainesville, Florida 32609
Telephone: (352) 955-6600, Fax: (352) 955-6613

ANANTH PRASAD, P.E.
SECRETARY

MEMORANDUM

DATE: April 17, 2013

TO: Michael Kim

FROM: David Horhota

SUBJECT: Embankment Resilient Modulus Pavement Design
District 6, Miami-Dade County
FPN 430637-1: SR-847/NW 47th Avenue from SR-860/NW 183rd Street to Premier Parkway

Five (5), 2-bag samples were received by the State Materials Office (SMO) for determination of an embankment (roadbed) resilient modulus for pavement design. After visual observation of the 5 samples, it was determined that the material from each sample looked visually similar and the material from each of the bags were combined to form one sample from each location. After combining materials from the bags, samples from each location were obtained for classification tests (Atterberg limits, sieve analysis and organic content), Proctor density, and resilient modulus. The classification test results are reported in Table 1. Information provided with the samples from GCME, Inc. indicated all material was collected from depth of 1 to 3 feet.

Table 1. Summary of Initial Classification Results

Sample ID	Station No.	Passing No. 4, %	Passing No. 10, %	Passing No. 40, %	Passing No. 60, %	Passing No. 100, %	Passing No. 200, %	Class.	Organic Content, %	LL/PI
LBR-1	125+50	79.4	76.3	71.2	58.6	29.1	5.9	A-3	1.5	N.P.
LBR-2	151+00	97.1	93.0	86.3	64.7	19.7	3.1	A-3	1.1	N.P.
LBR-3	174+20	99.7	99.2	92.9	71.8	22.7	2.2	A-3	1.1	N.P.
LBR-4	194+90	100.0	99.0	91.9	65.8	19.1	2.3	A-3	1.8	N.P.
LBR-5	221+80	92.1	89.1	84.0	68.7	32.1	6.2	A-3	0.7	N.P.

In addition to the classification testing, the following test program was conducted:

(1) Standard Proctor, AASHTO T 99
(2) Resilient Modulus (M_R), AASHTO T 307.

A summary of laboratory test results is included in Table 2. The resilient modulus values listed in this table were obtained using the relationship developed from each individual test (resilient modulus versus bulk stress - with bulk stress, **Θ,** defined as $\Theta = \sigma_1 + \sigma_2 + \sigma_3$), and using a bulk stress of 11 psi, which is the recommendation from Dr. Ping's research work in modeling the embankment in-situ stresses for Florida pavement conditions. Two results are listed for each location because two samples were prepared for each location and they represent the individual test result from each sample tested. The resilient modulus samples were compacted to within 1 pound per cubic foot (pcf) of the maximum density and 0.5 percent of the optimum moisture content as determined by AASHTO T99.

Table 2. Summary of T-99 and M_R Test Results

Sample ID	Passing No. 200, %	Standard Proctor Density, pcf	Optimum Moisture Content, %	Resilient Modulus @ Θ=11psi (psi)
LBR-1	6	109.8	10.3	14,949
				14,293
LBR-2	3	104.7	12.5	14,092
				12,779
LBR-3	2	102.1	13.6	11,311
				11,945
LBR-4	2	102.8	14.6	11,605
				11,718
LBR-5	6	108.7	12.2	13,398
				13,876

To obtain a design embankment resilient modulus, a 90 percent method was used as outlined in both the Flexible Pavement Design Manual and Soils and Foundations Handbook. The resilient modulus values were ranked in ascending order and the percentage of values which were greater than or equal to the individual value were determined. The results of this analysis are recorded in Table 3 and the corresponding graph of these results is included as Figure 1. The numbers in parentheses (after the sample identification information) represent the test number (either 1 or 2) for the corresponding resilient modulus value due to the fact that two individual tests were performed on material from the same location (as shown in Table 2).

Table 3. Ranked M_R Test Results for 90 Percent Method

Rank	Sample ID	% ≥	M_R (psi)
1	LBR-3 (1)	100	11,311
2	LBR-4 (1)	90	11,605
3	LBR-4 (2)	80	11,718
4	LBR-3 (2)	70	11,945
5	LBR-2 (2)	60	12,779
6	LBR-5 (1)	50	13,398
7	LBR-5 (2)	40	13,876
8	LBR-2 (1)	30	14,092
9	LBR-1 (2)	20	14,293
10	LBR-1 (1)	10	14,949

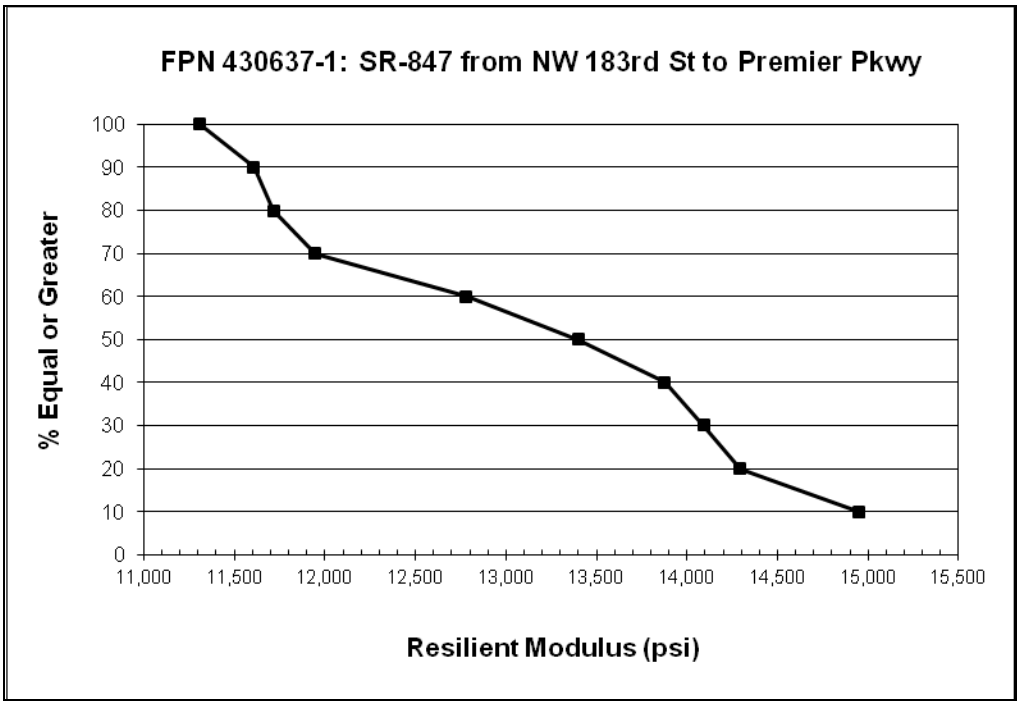


Figure 1. Ranked M_R Test Results for 90 Percent Method

Based on the results shown in Table 3 and Figure 1, the resilient modulus corresponding to a 90th percentile is 11,600 psi, which would represent the design embankment M_R value.

APPENDIX – B

USDA, SCS Soil Information

United States Department of Agriculture

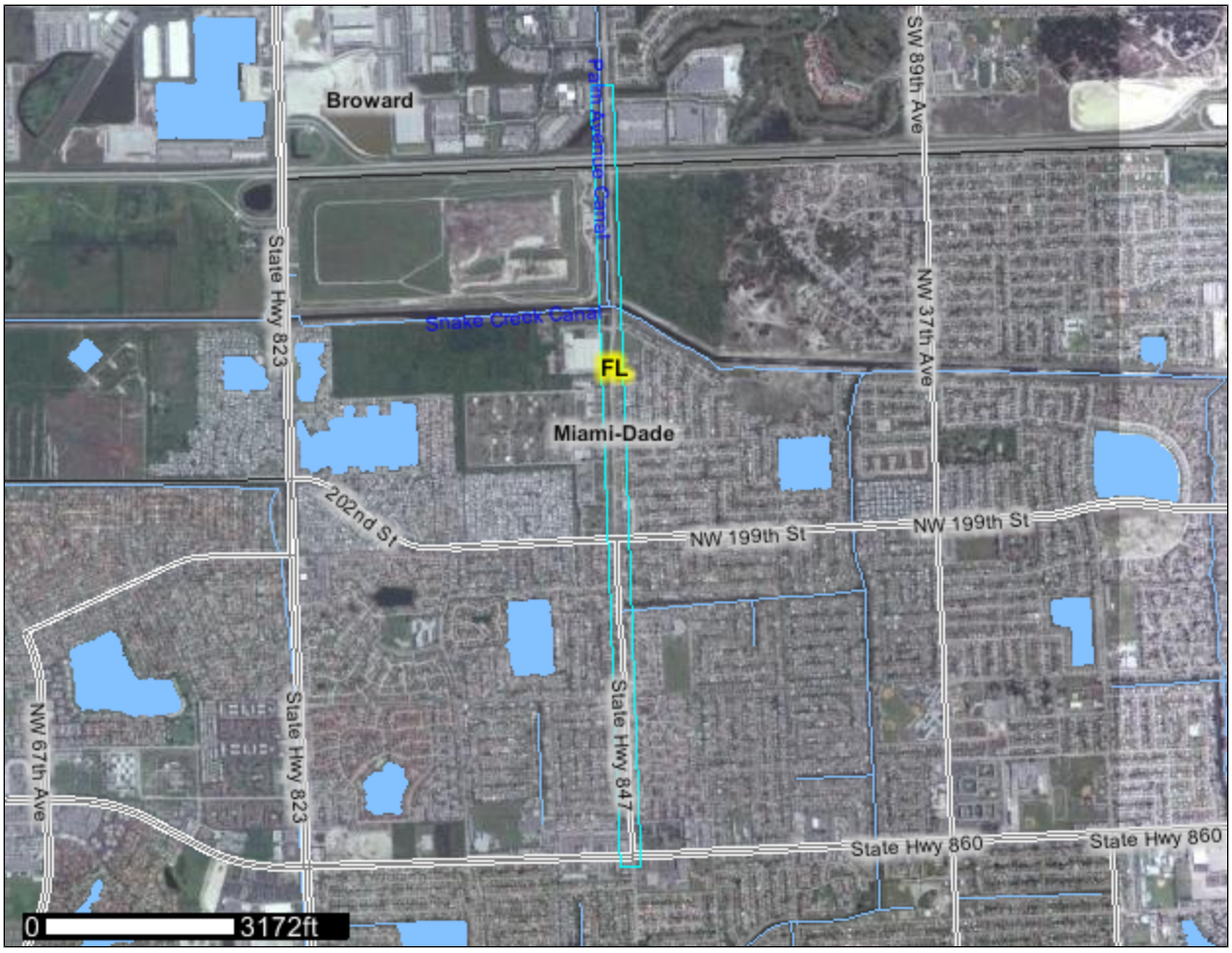
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Broward County, Florida, East Part; and Miami-Dade County Area, Florida

SR-847/NW-47 Ave From NW-183 St. To Premier Parkway



May 29, 2012

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

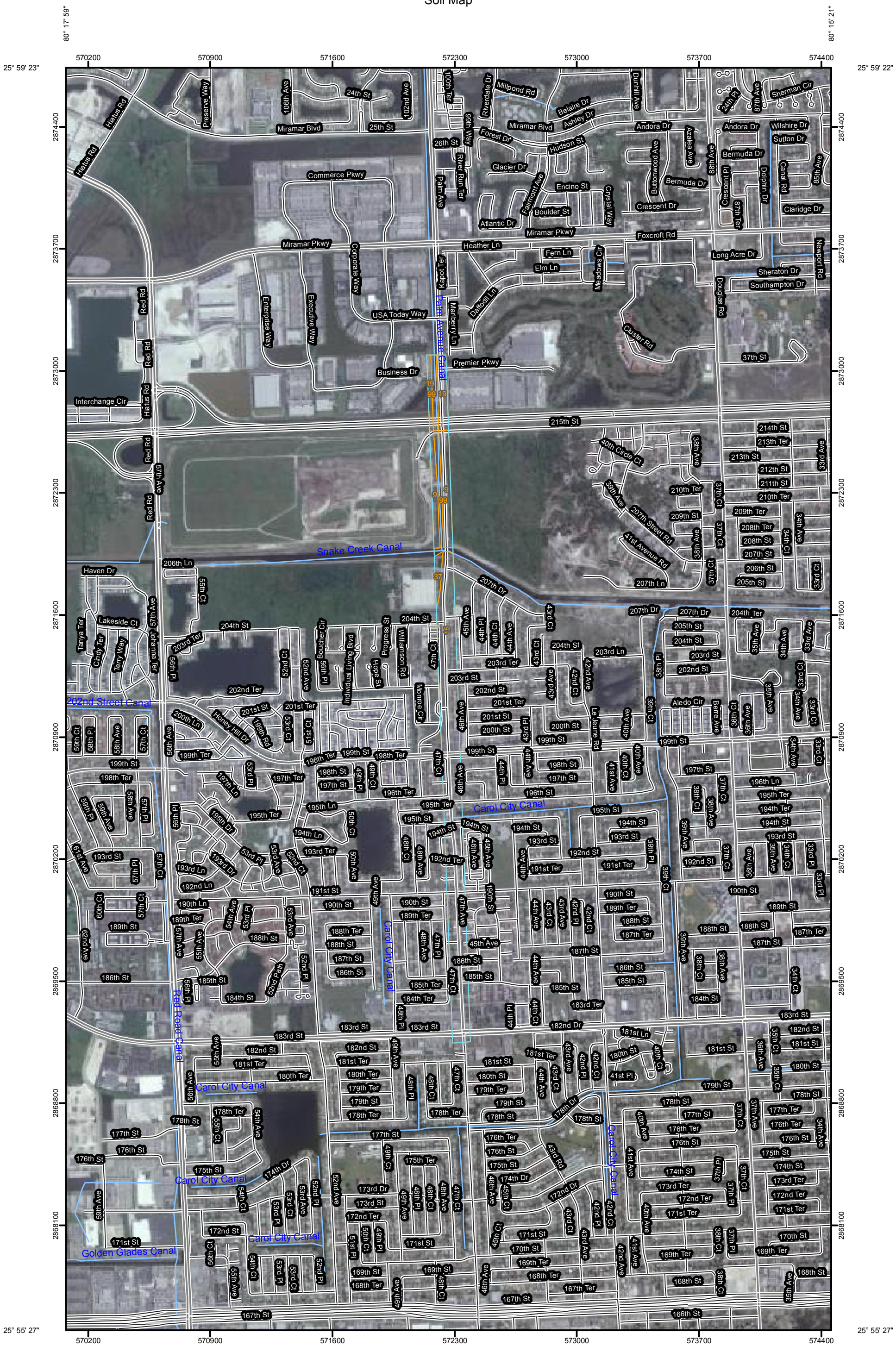
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:20,000 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Broward County, Florida, East Part
Survey Area Data: Version 7, Jan 27, 2010

Soil Survey Area: Miami-Dade County Area, Florida
Survey Area Data: Version 3, Jan 13, 2010

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 5/8/2007; 6/4/2007

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Broward County, Florida, East Part (FL606)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
19	Margate fine sand	8.6	8.2%
99	Water	3.2	3.1%
Subtotals for Soil Survey Area		**11.9**	**11.3%**
Totals for Area of Interest		**104.9**	**100.0%**

Miami-Dade County Area, Florida (FL686)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
9	Udorthents-Water complex	14.1	13.5%
15	Urban land	71.6	68.3%
37	Basinger fine sand	2.4	2.2%
99	Water	4.9	4.7%
Subtotals for Soil Survey Area		**93.0**	**88.7%**
Totals for Area of Interest		**104.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the

contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Broward County, Florida, East Part

19—Margate fine sand

Map Unit Setting

Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days

Map Unit Composition

Margate and similar soils: 90 percent
Minor components: 10 percent

Description of Margate

Setting

Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy marine deposits over limestone

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 8 inches: Fine sand
8 to 16 inches: Fine sand
16 to 28 inches: Fine sand
28 to 32 inches: Gravelly fine sand
32 to 36 inches: Unweathered bedrock

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave

Plantation, undrained
Percent of map unit: 5 percent
Landform: Marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

99—Water

Map Unit Composition
Water: 100 percent

Miami-Dade County Area, Florida

9—Udorthents-Water complex

Map Unit Setting

Mean annual precipitation: 62 to 70 inches
Mean annual air temperature: 73 to 81 degrees F
Frost-free period: 358 to 365 days

Map Unit Composition

Udorthents and similar soils: 75 percent
Water: 20 percent
Minor components: 5 percent

Description of Udorthents

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 80 inches: Gravelly loam

Minor Components

Urban land

Percent of map unit: 5 percent
Landform: Marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear

15—Urban land

Map Unit Setting

Mean annual precipitation: 62 to 70 inches
Mean annual air temperature: 73 to 81 degrees F
Frost-free period: 358 to 365 days

Map Unit Composition

Urban land: 98 percent
Minor components: 2 percent

Description of Urban Land

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: No parent material

Minor Components

Udorthents

Percent of map unit: 2 percent
Landform: Marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

37—Basinger fine sand

Map Unit Setting

Mean annual precipitation: 62 to 70 inches
Mean annual air temperature: 73 to 81 degrees F
Frost-free period: 358 to 365 days

Map Unit Composition

Basinger and similar soils: 95 percent
Minor components: 5 percent

Description of Basinger

Setting

Landform: Drainageways on marine terraces

Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 6 inches: Fine sand
6 to 30 inches: Fine sand
30 to 50 inches: Fine sand
50 to 80 inches: Fine sand

Minor Components

Dade

Percent of map unit: 2 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear

Udorthents

Percent of map unit: 1 percent
Landform: Marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Plantation

Percent of map unit: 1 percent
Landform: Marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Pomello

Percent of map unit: 1 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

99—Water

Map Unit Composition

Water: 100 percent

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APPENDIX – C

Ground Water Information

TABLE - C1

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Soil Boring Information With GWT

Boring #	Information			Station (PROVIDED TO SURVEYORS & HELD BY SURVEYORS)	Offset by Surveyors (FROM SURVEY BASELINE)	Offset Direction from Surveyors (FROM SURVEY BASELINE)	Elevation by Surveyors (NGVD-29 using GPS RTK)
	Boring Depth (ft)	GWT Depth (ft)	GWT_Ele (ft, NGVD, 1929)				
RD-107	10	5.0	2.6	117+00	27.4	RT	7.6
RD-111	10	5.0	3.5	121+00	12.3	RT	8.5
RD-115	10	6.0	2.0	125+00	12.0	RT	8.0
RD-117	5	3.5	2.9	127+00	39.1	RT	6.4
RD-120	10	4.0	3.0	130+00	27.1	LT	7.0
RD-123	5	5.0	2.0	133+00	33.7	RT	7.0
RD-125	10	6.0	1.5	135+00	11.7	RT	7.5
RD-130	10	4.0	3.0	140+00	27.5	LT	7.0
RD-133	5	5.0	1.8	143+40	26.0	RT	6.8
RD-135	10	5.0	2.4	145+00	15.2	RT	7.4
RD-136	5	5.0	2.4	146+00	31.0	LT	7.4
RD-138	5	5.0	2.8	148+00	50.2	LT	7.8
RD-139	10	5.5	3.1	149+00	15.6	LT	8.6
RD-140	10	7.5	1.7	150+00	15.4	LT	9.2
RD-147	10	5.0	2.5	157+00	57.2	LT	7.5
RD-150	10	5.0	1.6	160+00	10.2	LT	6.6
RD-151	10	5.5	1.0	161+00	66.6	LT	6.5
RD-152	6	5.0	2.0	161+70	3.7	LT	7.0
RD-153	5	4.5	1.2	163+20	110.4	LT	5.7
RD-154	5	4.0	2.3	164+00	1.4	LT	6.3
RD-155	10	4.5	2.2	165+00	60.5	LT	6.7
RD-156	5	4.5	2.1	166+00	3.3	RT	6.6
RD-157	5	2.5	3.5	167+00	79.4	LT	6.0
RD-158	5	4.0	2.6	168+00	4.7	RT	6.6
RD-159	10	6.0	0.4	169+00	59.7	LT	6.4
RD-160	5	4.0	2.8	170+00	2.6	LT	6.8
RD-161	5	2.5	4.0	171+00	70.6	LT	6.5
RD-162	5	4.0	3.1	172+00	2.1	RT	7.1
RD-163	10	6.0	0.3	173+00	53.7	LT	6.3
RD-164	10	4.5	2.1	174+00	5.3	LT	6.6
RD-165	5	2.5	4.5	175+00	69.4	LT	7.0

TABLE - C1

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Soil Boring Information With GWT

Boring #	Information			Station (PROVIDED TO SURVEYORS & HELD BY SURVEYORS)	Offset by Surveyors (FROM SURVEY BASELINE)	Offset Direction from Surveyors (FROM SURVEY BASELINE)	Elevation by Surveyors (NGVD-29 using GPS RTK)
	Boring Depth (ft)	GWT Depth (ft)	GWT_Ele (ft, NGVD, 1929)				
RD-166	10	5.0	2.8	176+00	5.8	LT	7.8
RD-167	5	2.5	2.9	177+00	69.4	LT	5.4
RD-168	10	5.5	1.6	177+85	6.1	RT	7.1
RD-169	5	2.5	2.0	179+00	69.6	LT	4.5
RD-170	5	3.5	2.5	180+00	2.4	LT	6.0
RD-171	5	2.5	3.1	181+00	67.5	LT	5.6
RD-172	10	5.5	1.8	182+00	18.4	LT	7.3
RD-173	10	6.0	0.9	183+00	52.3	LT	6.9
RD-174	10	6.0	1.0	184+00	20.9	LT	7.0
RD-175	5	3.0	1.4	185+00	75.2	LT	4.4
RD-176	5	3.0	3.0	186+00	1.8	RT	6.0
RD-177	5	2.5	3.8	187+00	74.7	LT	6.3
RD-178	10	5.0	2.1	187+85	7.8	LT	7.1
RD-179	10	6.5	0.0	189+00	60.5	LT	6.5
RD-180	5	3.0	2.3	190+00	15.1	RT	5.3
RD-182	10	5.0	1.5	192+00	5.8	LT	6.5
RD-184	5	3.0	2.2	194+00	32.5	RT	5.2
RD-186	10	6.5	2.5	196+00	50.2	RT	9.0
RD-190	5	5.0	4.5	200+00	91.6	RT	9.5
RD-192	10	8.0	2.4	202+30	85.4	RT	10.4
RD-194	5	5.0	4.4	204+00	104.8	RT	9.4
RD-196	10	6.5	1.9	206+00	80.0	RT	8.4
RD-197	10	5.5	2.9	207+00	35.3	RT	8.4
RD-198	10	6.5	1.9	208+00	74.9	RT	8.4
RD-199	5	5.0	1.9	209+00	7.6	RT	6.9
RD-201	5	5.0	1.7	211+00	6.6	RT	6.7
RD-202	10	6.0	0.8	212+00	111.2	RT	6.8
RD-203	5	5.0	2.4	213+00	9.0	RT	7.4
RD-206	10	6.0	2.1	216+00	77.9	RT	8.1
RD-212	10	6.0	2.8	222+00	69.3	RT	8.8
RD-217	10	6.0	1.4	227+00	36.7	RT	7.4

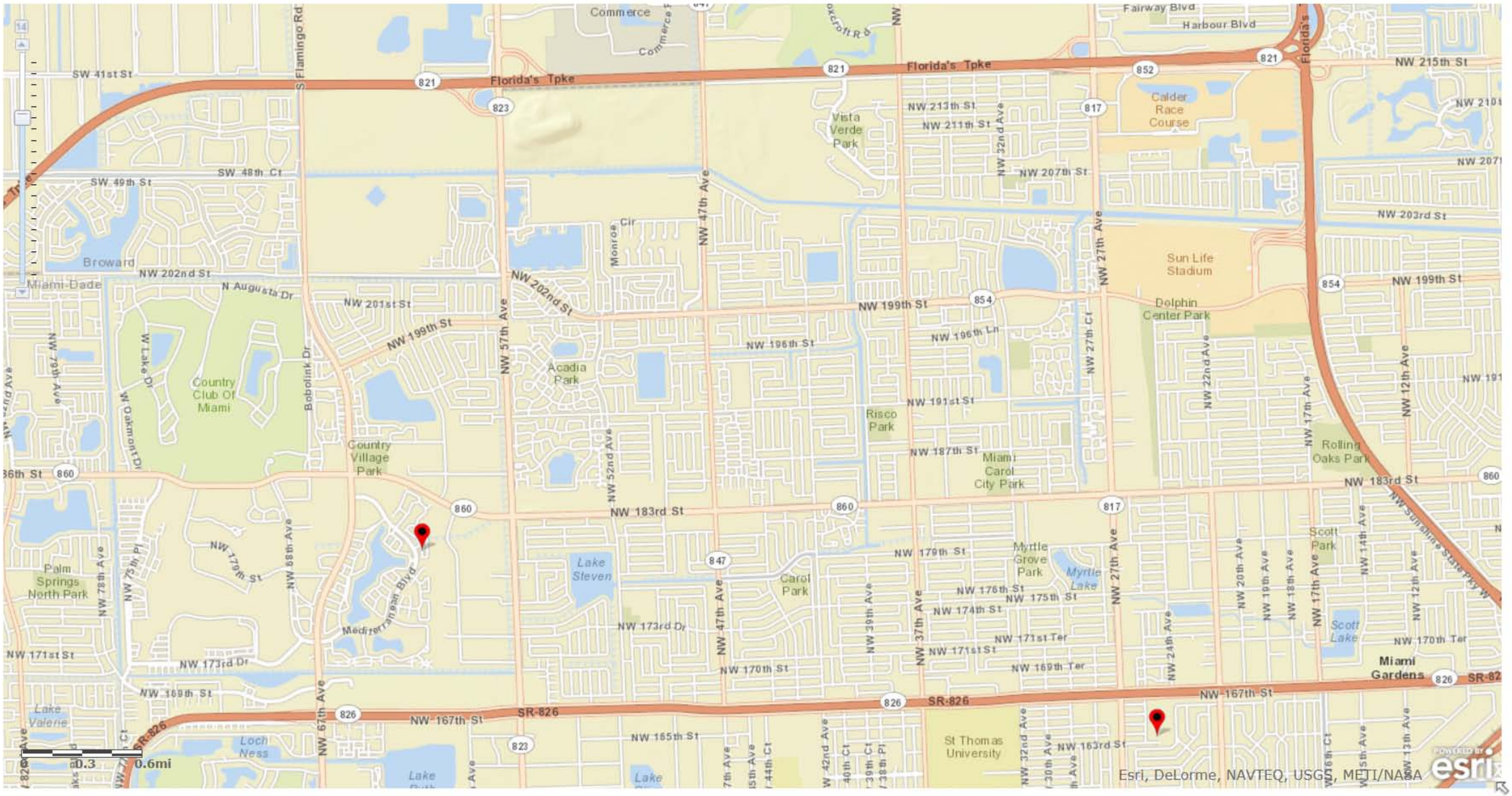
TABLE - C1

Project: SR-847 / 47 Ave. (From NW 183 St. to Premier Pkwy)

Soil Boring Information With GWT

Boring #	Information			Station (PROVIDED TO SURVEYORS & HELD BY SURVEYORS)	Offset by Surveyors (FROM SURVEY BASELINE)	Offset Direction from Surveyors (FROM SURVEY BASELINE)	Elevation by Surveyors (NGVD-29 using GPS RTK)
	Boring Depth (ft)	GWT Depth (ft)	GWT_Ele (ft, NGVD, 1929)				
RD-218	5	4.0	2.5	228+50	105.8	RT	6.5
RD-219	5	3.5	2.5	229+00	18.8	RT	6.0
RD-220	5	4.0	2.5	230+00	105.2	RT	6.5
RD-221	5	4.0	2.5	231+00	19.5	RT	6.5
RD-222	10	6.0	0.9	232+00	102.5	RT	6.9

National Water Information System: Mapper



Help

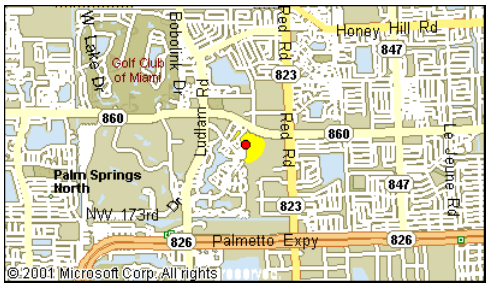
Page Info

125%

USGS
science for a changing world

Groundwater Watch

Site Number: 255616080180301 - G -3571



Groundwater Watch Help Page

DESCRIPTION:

Latitude 25°56'15.8", Longitude 80°18'03.3" NAD83
Miami-Dade County, Florida, Hydrologic Unit 03090202
Well depth: 18.5 feet
Land surface altitude: 7.4feet above NGVD29.
Well completed in "Biscayne aquifer" (N400BISCYN) national aquifer.
Well completed in "Biscayne Limestone Aquifer" (112BSCNN) local aquifer

AVAILABLE DATA FROM NWISWeb:

Daily Data

Elevation above NGVD 1929, feet	1994-11-29	2013-06-06	6578

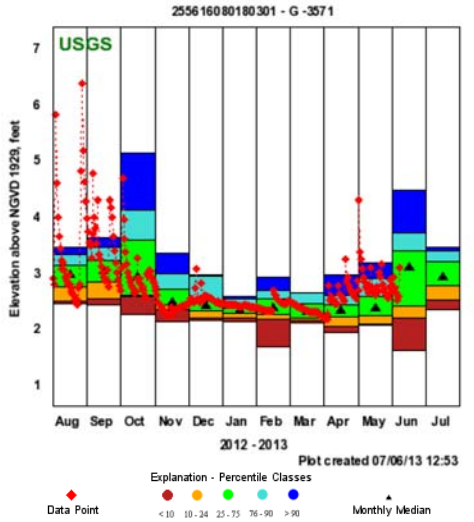
Field groundwater-level measurements
Field/Lab water-quality samples

Additional Data Sources		Begin Date	End Date	Count
Annual Water-Data Report (pdf)	**offsite**	2006	2012	7
Groundwater Watch	**offsite**	1994	2013	6438

OPERATION:

Record for this site is maintained by the USGS Florida Water Science Center - Ft. Lauderdale
Email questions about this site to Florida Water-Data Inquiries

Site Statistics



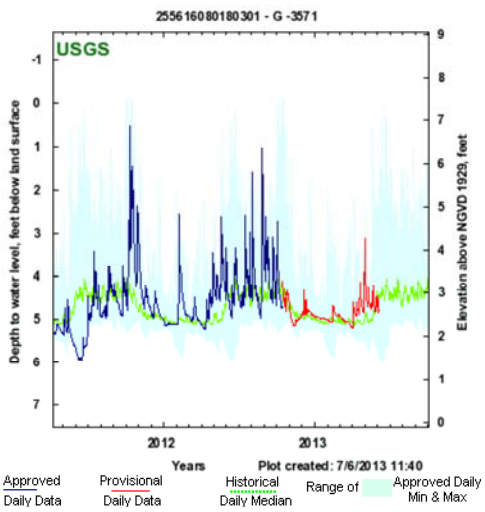
Most recent data value: 3.10 on 6/7/2013
Period of Record Monthly Statistics for 255616080180301
Elevation above NGVD 1929, feet
All Approved Continuous & Periodic Data Used In Analysis
Note: Highlighted values in the table indicate closest statistic to the most recent data value.

Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	2.13	2.20	2.28	2.33	2.38	2.55	2.59	18
Feb	1.69	2.19	2.26	2.38	2.54	2.70	2.94	19
Mar	2.11	2.16	2.21	2.31	2.45	2.65	2.65	18
Apr	1.95	2.06	2.22	2.33	2.44	2.60	2.97	19
May	2.07	2.10	2.25	2.37	2.59	2.90	3.19	18
Jun	1.62	2.21	2.42	3.10	3.41	3.72	4.48	19
Jul	2.35	2.52	2.78	2.92	3.20	3.40	3.46	18
Aug	2.46	2.50	2.75	2.97	3.15	3.33	3.46	18
Sep	2.44	2.54	2.84	3.04	3.22	3.46	3.64	17
Oct	2.27	2.58	2.62	2.93	3.60	4.13	5.13	19
Nov	2.14	2.35	2.43	2.49	2.72	3.00	3.36	18
Dec	2.17	2.20	2.33	2.41	2.51	2.95	2.97	19

As of 7/5/2013 18:01-2

Statistics Options

View month/year statistics



Daily Groundwater Data

Most recent Provisional daily data value: 2.58 on 06/06/13
Summary for Period of Continuous Record
Elevation above NGVD 1929, feet
Approved Daily Maximum Values Data Used in Analysis

Begin Date	End Date	Days	% Complete
11/29/94	10/14/12	6,343	97

Lowest Level	5th %ile	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	95th %ile	Highest Level
1.41	2.10	2.19	2.33	2.54	2.99	3.61	4.10	7.52

Daily Data Options

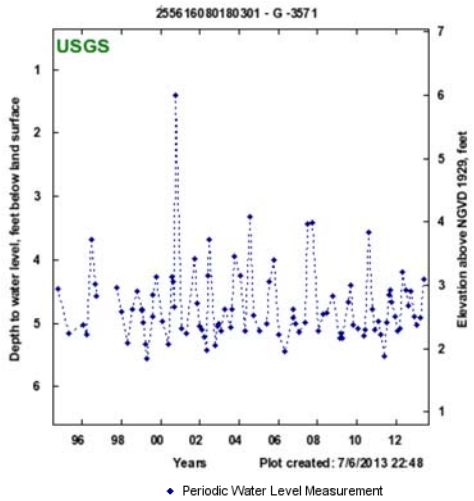
View latest data on NWISWeb

View data in calendar format

Download data in text format

View daily medians

Periodic Groundwater Data

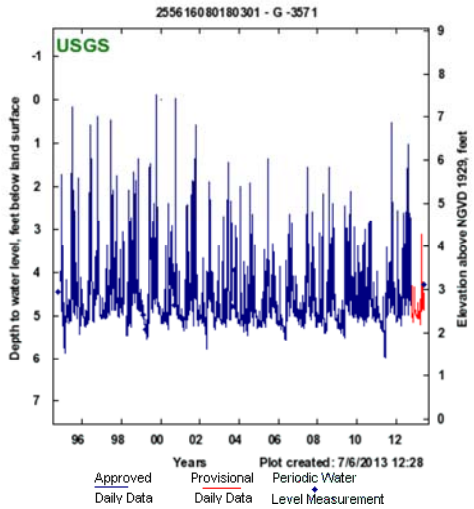


Summary for Period of Record Periodic Water Levels
Elevation above NGVD 1929, feet
Approved Periodic Water Level Values

Begin Date	End Date	Number of Values
10/07/94	06/07/13	95

Lowest WL	Date of Lowest WL	Highest WL	Date of Highest WL
1.84	04/28/99	6	10/06/00

Period of Record - All Data Types



Summary for Period of Record - All Data Types
Elevation above NGVD 1929, feet

Begin Date	End Date	Number of Values
10/07/94	06/07/13	6,674

Lowest WL	Date of Lowest WL	Highest WL	Date of Highest WL
1.41	06/18/11	7.52	10/15/99

Period of Record Options

View latest data on NWISWeb for all data types

View annual monthly statistics for all data types

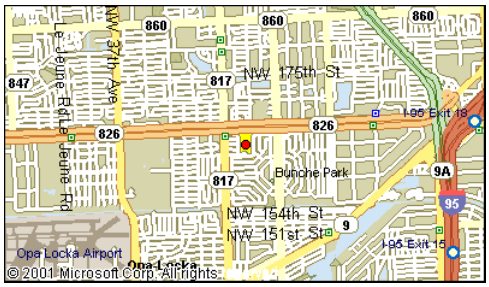
Download Groundwater levels in text format of all data types

Return to Groundwater Watch | Return to County Page | Return to State Page

USGS science for a changing world

Groundwater Watch

Site Number: 255526080143001 - S - 18



Groundwater Watch Help Page

DESCRIPTION:

Latitude 25°55'26", Longitude 80°14'30" NAD27
Miami-Dade County, Florida, Hydrologic Unit 03090202
Well depth: 52 feet
Land surface altitude: 9.1feet above NGVD29.
Well completed in "Biscayne aquifer" (N400BISCYN) national aquifer.
Well completed in "Biscayne Limestone Aquifer" (112BSCNN) local aquifer

AVAILABLE DATA FROM NWISWeb:

Daily Data

Elevation above NGVD 1929, feet	1955-01-01	2013-06-06	15283

Field groundwater-level measurements

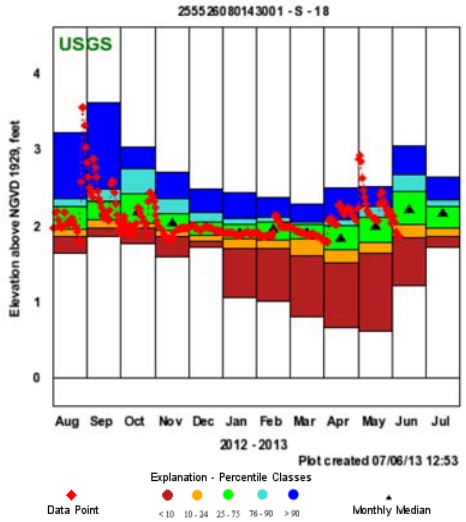
Field/Lab water-quality samples

Additional Data Sources		Begin Date	End Date	Count
Annual Water-Data Report (pdf)	**offsite**	2006	2012	7
Groundwater Watch	**offsite**	1955	2013	15280

OPERATION:

Record for this site is maintained by the USGS Florida Water Science Center - Ft. Lauderdale
Email questions about this site to Florida Water-Data Inquiries

Site Statistics



Most recent data value: 1.87 on 6/7/2013
Period of Record Monthly Statistics for 255526080143001
Elevation above NGVD 1929, feet
All Approved Continuous & Periodic Data Used In Analysis
Note: Highlighted values in the table indicate closest statistic to the most recent data value.

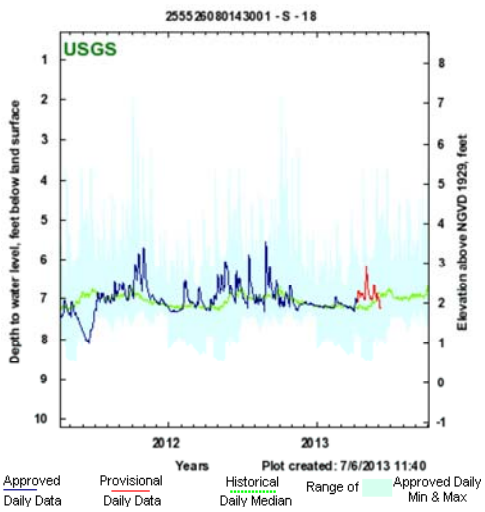
Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	1.06	1.71	1.83	1.91	2.03	2.11	2.44	57
Feb	1.02	1.71	1.82	1.96	2.05	2.12	2.37	57
Mar	0.80	1.61	1.83	1.91	2.02	2.05	2.29	56
Apr	0.66	1.52	1.69	1.84	2.01	2.09	2.50	57
May	0.62	1.65	1.78	1.99	2.12	2.27	2.51	57
Jun	1.22	1.85	2.02	2.21	2.45	2.67	3.06	58
Jul	1.73	1.86	1.98	2.16	2.27	2.34	2.65	57
Aug	1.65	1.87	1.96	2.08	2.26	2.36	3.23	55
Sep	1.87	1.97	2.09	2.17	2.33	2.48	3.62	54
Oct	1.77	1.97	2.04	2.19	2.42	2.76	3.04	58
Nov	1.60	1.86	1.95	2.04	2.16	2.35	2.71	56
Dec	1.73	1.81	1.88	1.97	2.05	2.18	2.48	57

As of 7/5/2013 18:00-2

Statistics Options

View month/year statistics

Daily Groundwater Data



Most recent Provisional daily data value: 1.88 on 06/06/13

Summary for Period of Continuous Record

Elevation above NGVD 1929, feet

Approved Daily Maximum Values Data Used in Analysis

Begin Date	End Date	Days	% Complete
01/01/55	04/10/13	15,226	71

Lowest Level	5th %ile	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	95th %ile	Highest Level
0.54	1.63	1.74	1.87	2.02	2.23	2.54	2.83	7.14

Daily Data Options

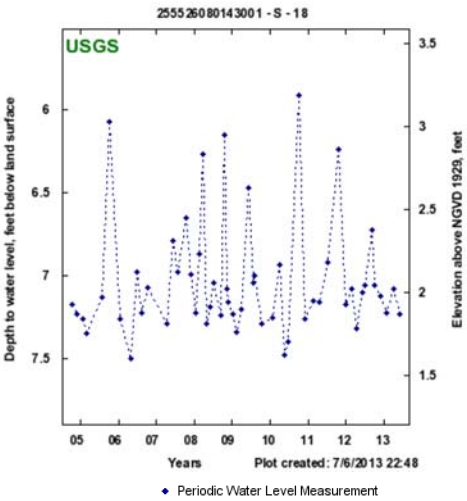
View latest data on NWISWeb

View data in calendar format

Download data in text format

View daily medians

Periodic Groundwater Data

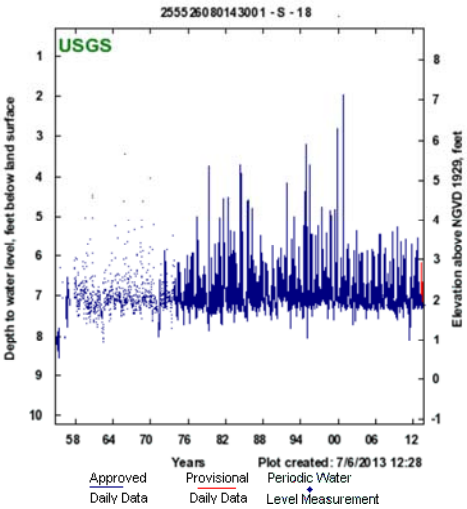


Summary for Period of Record Periodic Water Levels
Elevation above NGVD 1929, feet
Approved Periodic Water Level Values

Begin Date	End Date	Number of Values
10/06/04	06/07/13	54

Lowest WL	Date of Lowest WL	Highest WL	Date of Highest WL
1.6	05/03/06	3.19	10/01/10

Period of Record - All Data Types



Summary for Period of Record - All Data Types
Elevation above NGVD 1929, feet

Begin Date	End Date	Number of Values
01/01/55	06/07/13	15,338

Lowest WL	Date of Lowest WL	Highest WL	Date of Highest WL
0.54	05/15/55	7.14	10/03/00

Period of Record Options

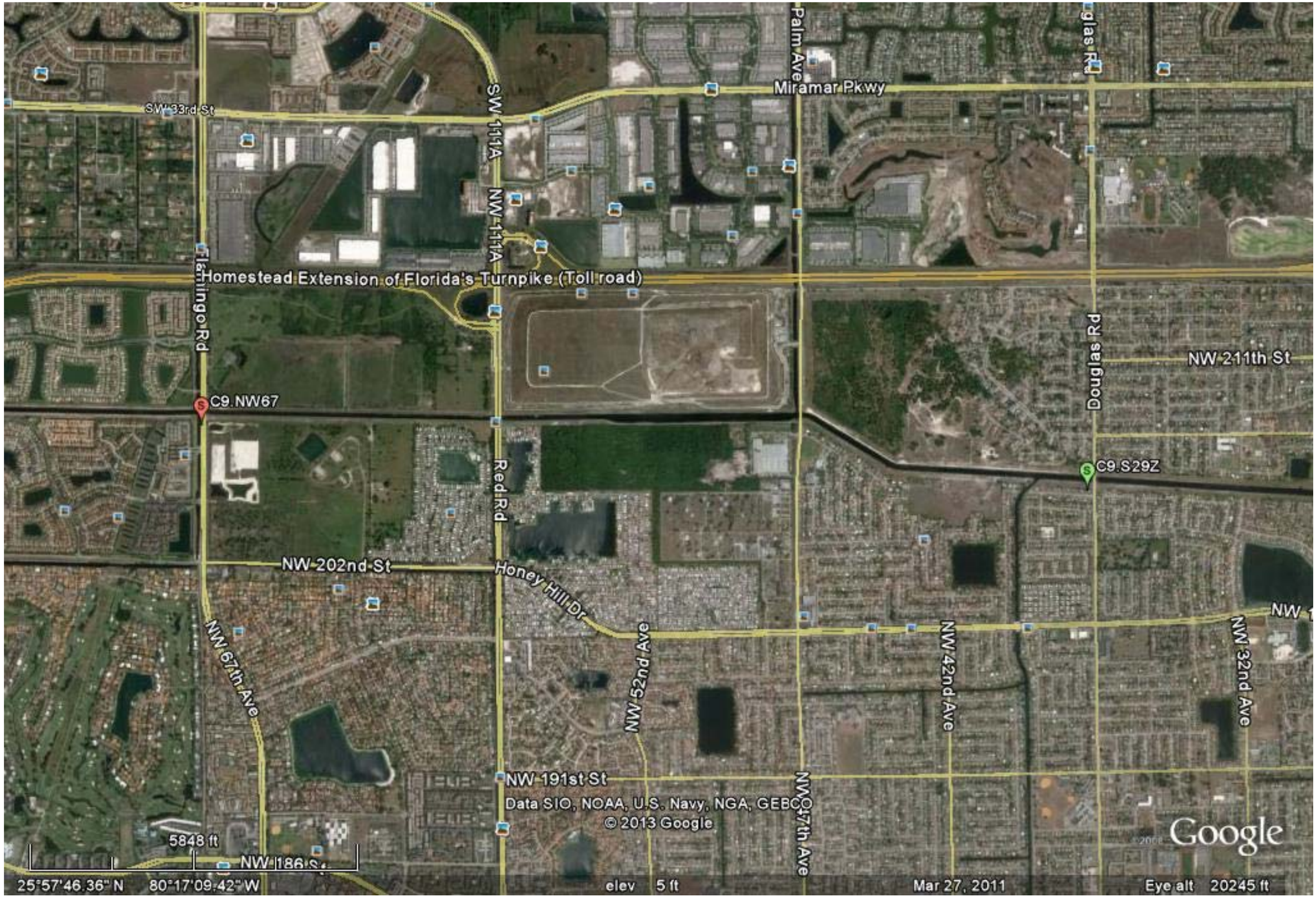
View latest data on NWISWeb for all data types

View annual monthly statistics for all data types

Download Groundwater levels in text format of all data types

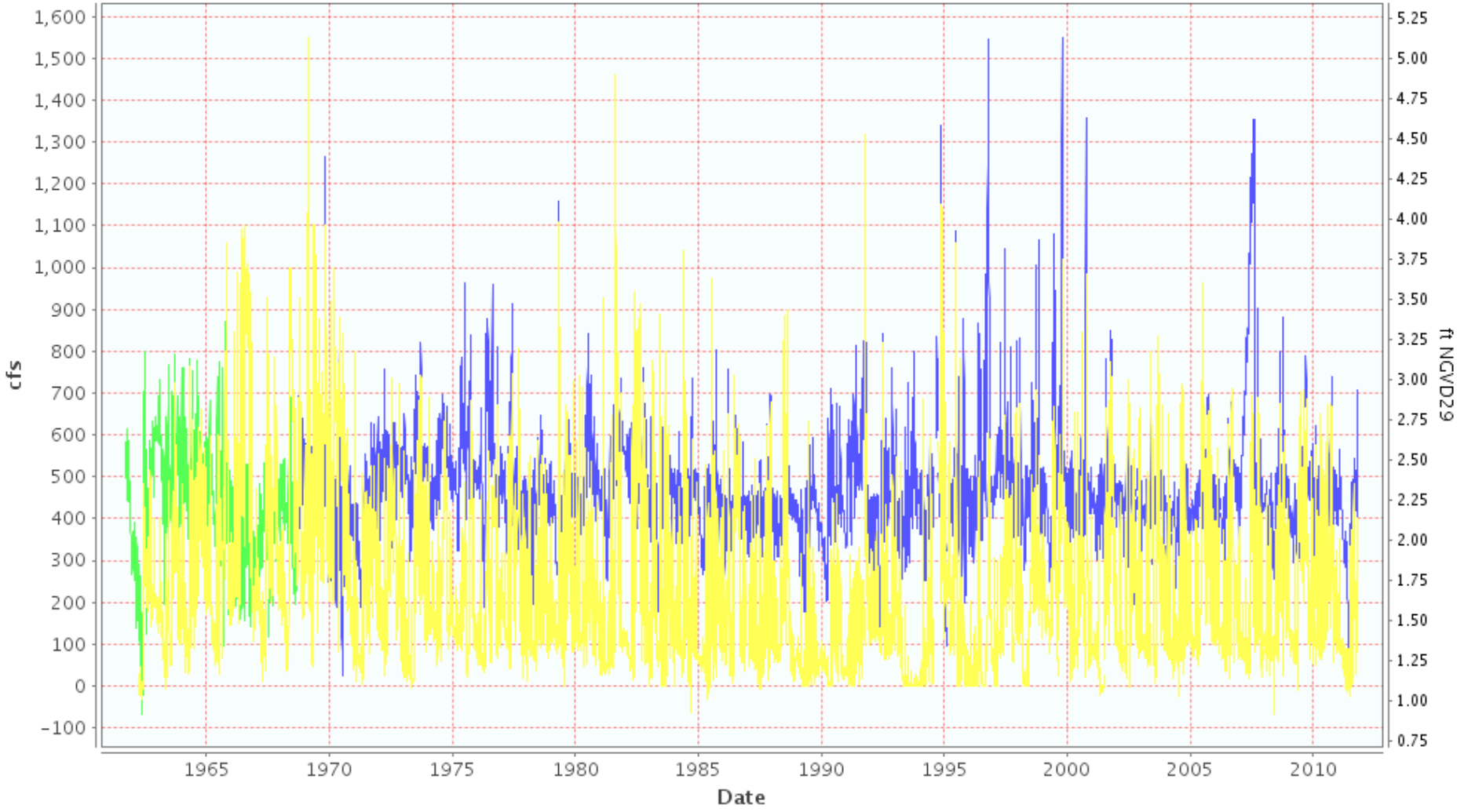
Return to Groundwater Watch | Return to County Page | Return to State Page

*References to non-Department of the Interior (DOI) products do not constitute an endorsement by the DOI.
By viewing the Google Maps API on this web site the user agrees to these TERMS.


SW 33rd St
SW 111A
NW 111A
Miramar Pkwy
Palm Ave
Douglas Rd
Homestead Extension of Florida's Turnpike (Toll road)
Flamingo Rd
NW 211th St
C9.NW67
C9.S29Z
Red Rd
NW 202nd St
Honey Hill Dr
NW 67th Ave
NW 52nd Ave
NW 42nd Ave
NW 32nd Ave
NW 191st St
NW 17th Ave
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2013 Google
Google
5848 ft
NW 186 St
25°57'46.36" N 80°17'09.42" W
elev 5 ft
Mar 27, 2011
Eye alt 20245 ft

DBHYDRO Chart

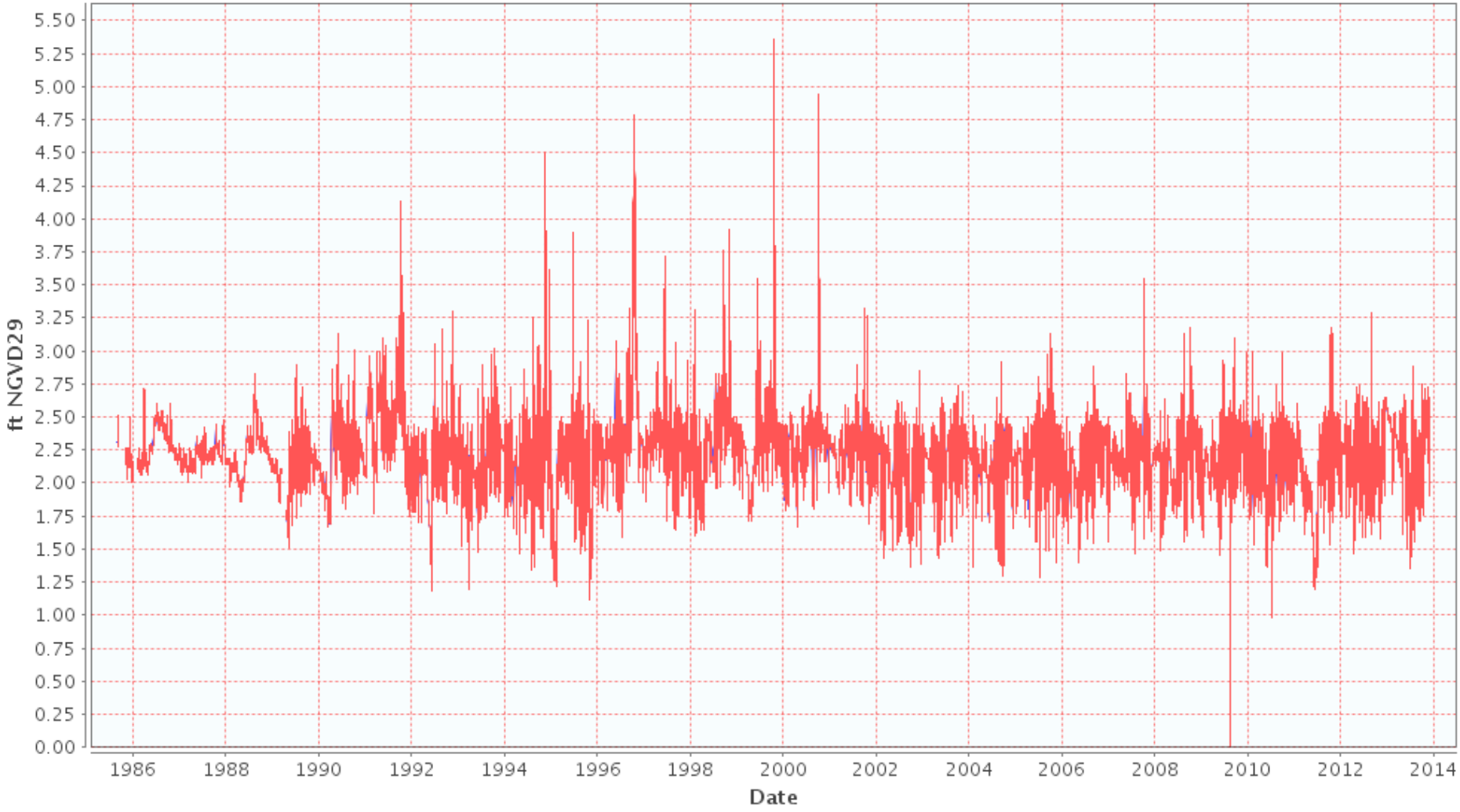
01-OCT-1961 to 16-OCT-2011



DBKey	Station	Agency	Data Type	Unit	Statistic	Frequency	Strata	Gate/Pump#
06484	C9.NW67	USGS	FLOW	cfs	INST	DA	0	N/A
00506	C9.NW67	USGS	FLOW	cfs	MEAN	DA	0	N/A
00505	C9.NW67	USGS	STG	ft NGVD29	FWM	DA	0	N/A
00504	C9.NW67	USGS	STG	ft NGVD29	MEAN	DA	0	N/A

DBHYDRO Chart

31-AUG-1985 to 26-NOV-2013



	DBKey	Station	Agency	Data Type	Unit	Statistic	Frequency	Strata	Gate/Pump#
	04145	C9.S29Z	WMD	STG	ft NGVD29	INST	BK	0	N/A
	04146	C9.S29Z	WMD	STG	ft NGVD29	MEAN	DA	0	N/A

APPENDIX – D

Pavement Core Pictures

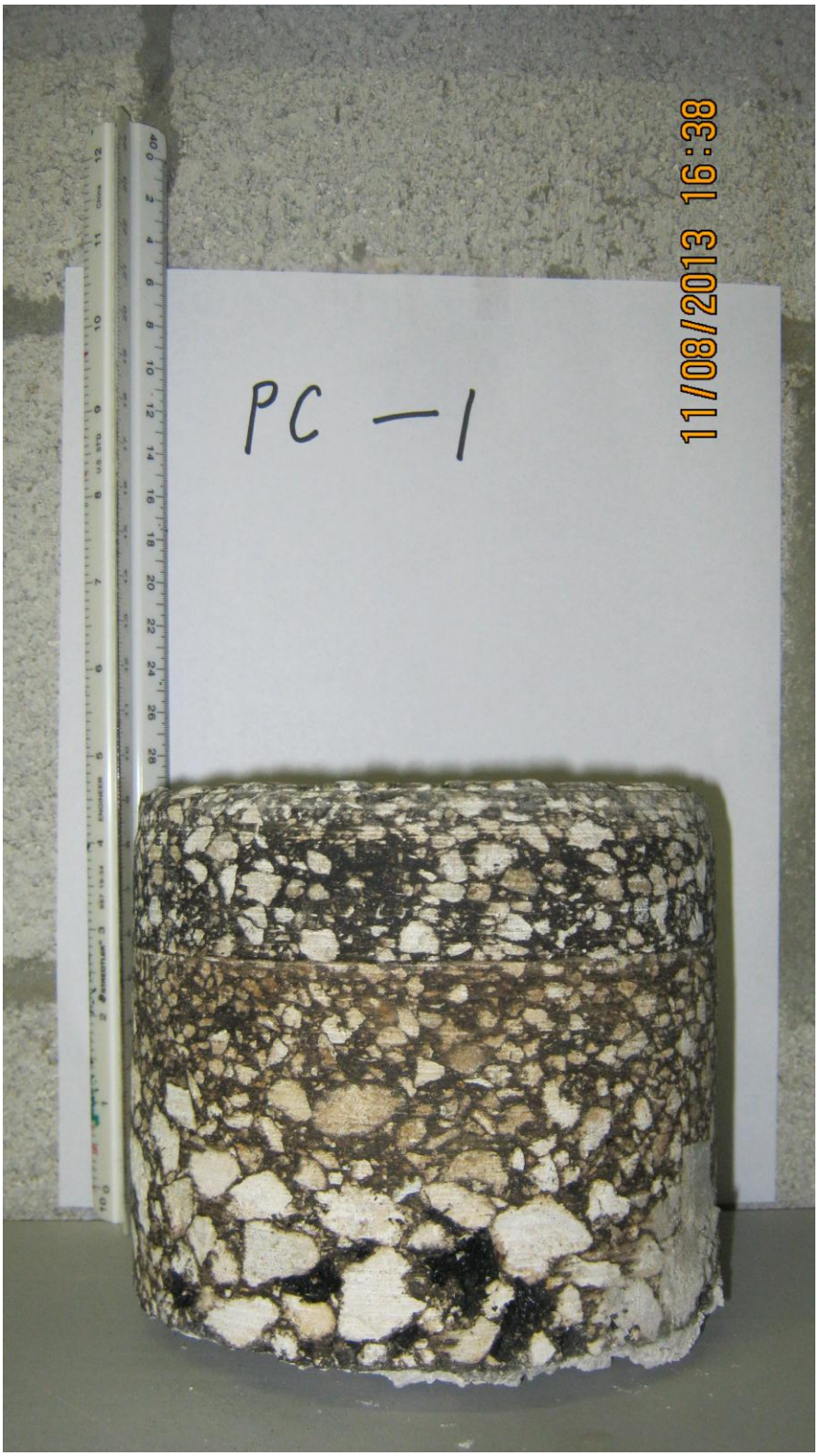


Photo – 1: Core PC-1; NW 47th Ave., Southbound

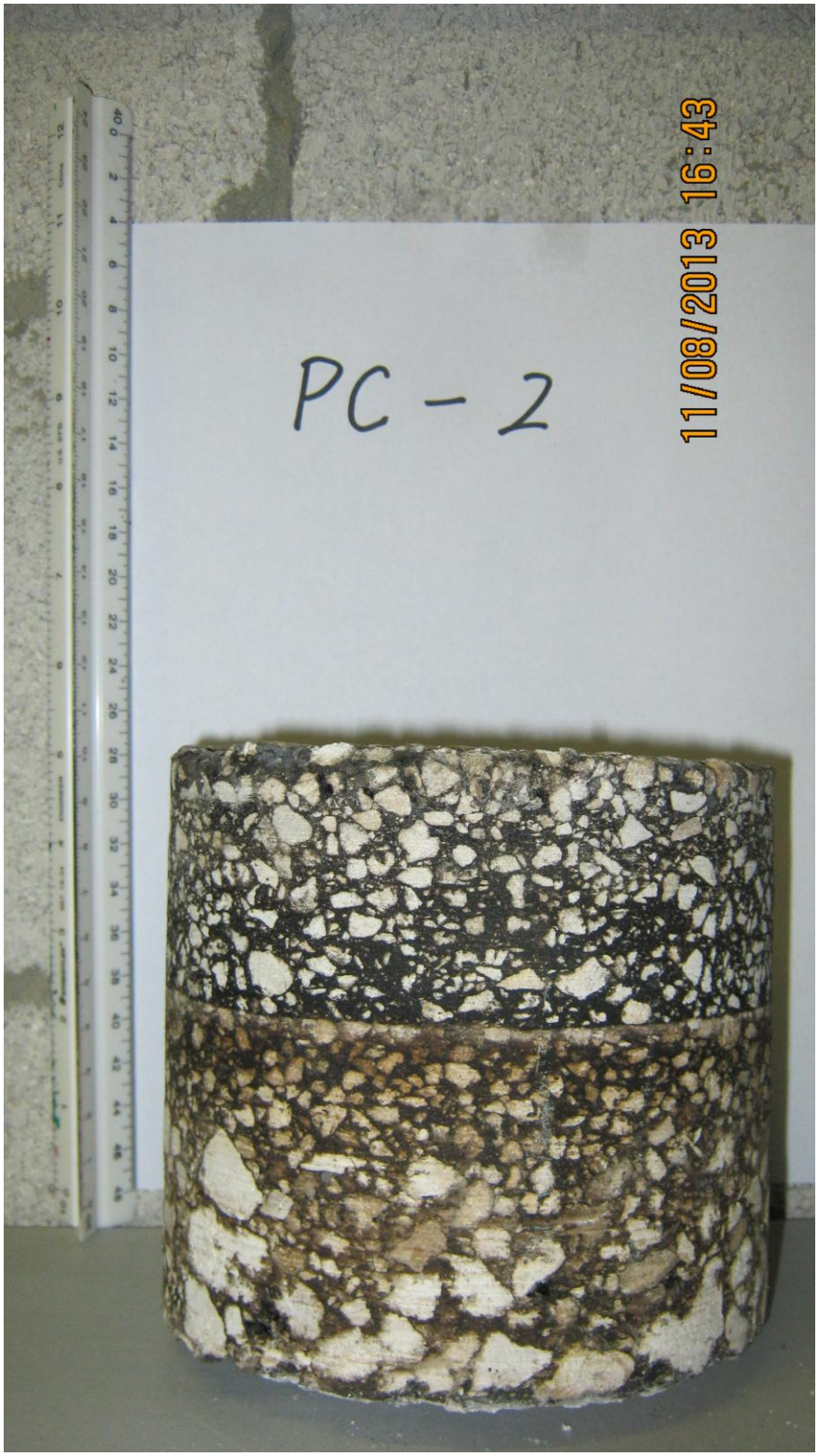


Photo – 2: Core PC-2; NW 47th Ave., Northbound

Photo – 3: Core PC-3; NW 47th Ave., Southbound

Photo – 4: Core PC-4; NW 47th Ave., Northbound

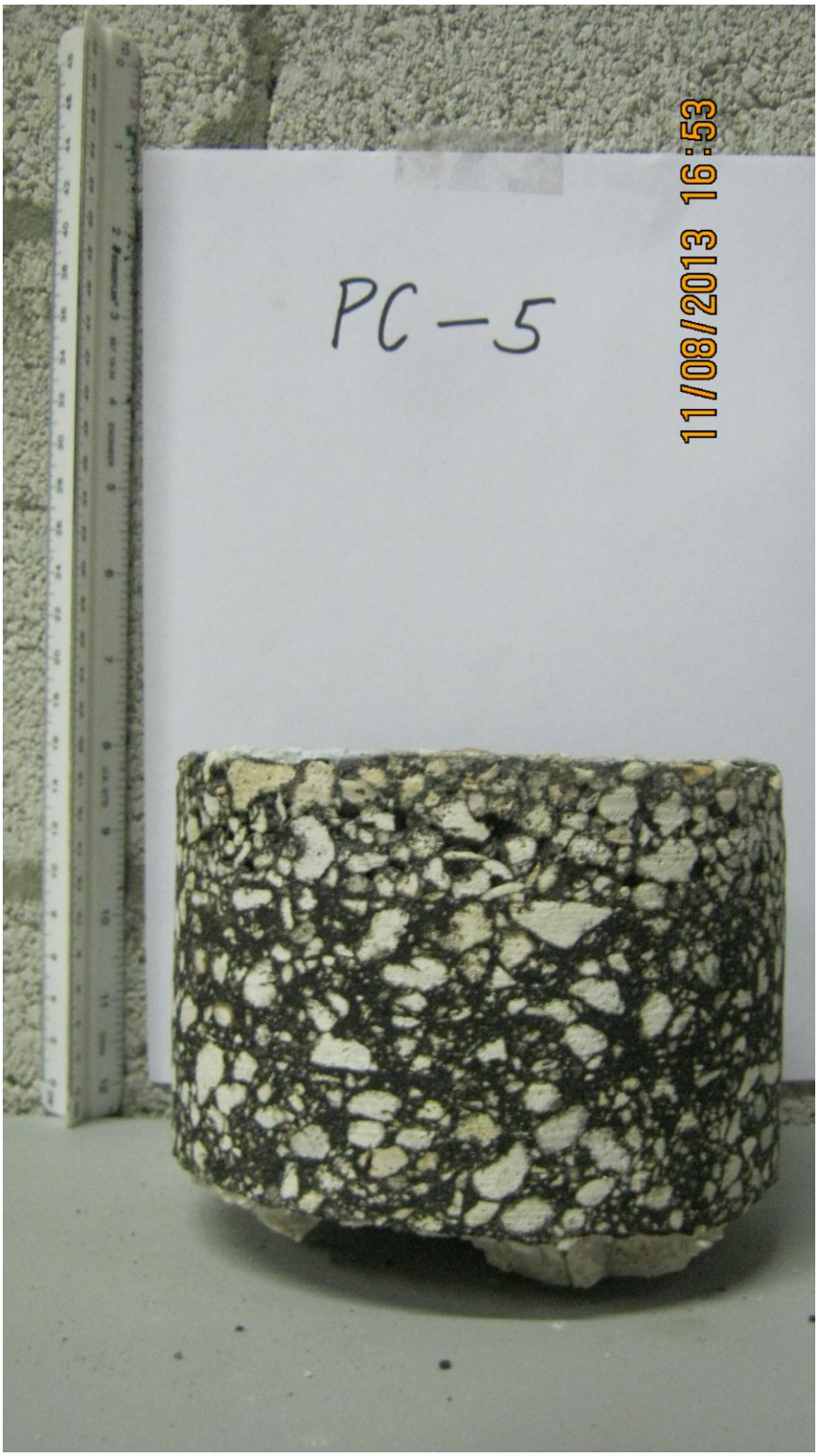


Photo – 5: Core PC-5; NW 47th Ave., Souththbound

GEOTECHNICAL REPORT REVIEW CHECKLISTS

The following checklists cover the major information and recommendations that should be addressed in project geotechnical reports.

Section A covers site investigation information that will be common to all geotechnical reports for any type of geotechnical feature.

Sections B through I cover the basic information and recommendations that should be presented in geotechnical reports for specific geotechnical features: centerline cuts and embankments, embankments over soft ground, landslides, retaining structures, structure foundations and material sites.

Subject Page

SECTION A, Site Investigation Information 12
SECTION B, Centerline Cuts and Embankments 14
SECTION C, Embankments Over Soft Ground 16
SECTION D, Landslide Corrections 18
SECTION E, Retaining Structures 20
SECTION F, Structure Foundations – Spread Footings 21
SECTION G, Structure Foundations – Driven Piles 22
SECTION H, Structure Foundations – Drilled Shafts 25
SECTION I, Ground Improvement Techniques 27
SECTION J, Material Sites 28

In most sections and subsections the user has been provided supplemental page references to the "Soils and Foundations Workshop Manual" FHWA NHI-00-045. These page numbers appear in parentheses ( ) immediately adjacent to the section or subsection topic. Generalist engineers are particularly encouraged to read these references. Additional reference information on these topics is available in the Geotechnical Engineering Notebook, a copy of which is kept in all FHWA Division offices by either the Bridge Engineer or the engineer with the geotechnical collateral duty.

Certain checklist items are of vital importance to have been included in the geotechnical report. These checklist items have been marked with an asterisk (*). A negative response to any of these asterisked items is cause to contact the geotechnical engineer for clarification of this omission.

GTR REVIEW CHECKLIST FOR SITE INVESTIGATION

A. Site Investigation Information

Since the most important step in the geotechnical design process is to conduct an adequate site investigation, presentation of the subsurface information in the geotechnical report and on the plans deserves careful attention.

Geotechnical Report Text (Introduction) (Pgs. 10-1 to 10-4)	Yes	No	Unknown or N/A
1. Is the general location of the investigation described and/or a vicinity map included?	X		
2. Is scope and purpose of the investigation summarized?	X		
3. Is concise description given of geologic setting and topography of area?	X		
4. Are the field explorations and laboratory tests on which the report is based listed?	X		
5. Is the general description of subsurface soil, rock, and groundwater conditions given?	X		
*6. Is the following information included with the geotechnical report (typically included in the report appendices):			
a. Test hole logs? (Pgs. 2-24 to 2-32)	X		
b. Field test data?	X		
c. Laboratory test data? (Pgs. 4-22 to 4-23)	X		
d. Photographs (if pertinent)?	X		
Plan and Subsurface Profile (Pgs. 2-19, 3-9 to 3-12, 10-13)			
*7. Is a plan and subsurface profile of the investigation site provided?	X		
8. Are the field explorations located on the plan view?	X		

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

A. Site Investigation Information (Cont.)		Yes	No	Unknown or N/A
*9.	Does the conducted site investigation meet minimum criteria outlined in Table 2?	X		
10.	Are the explorations plotted and correctly numbered on the profile at their true elevation and location?	X		
11.	Does the subsurface profile contain a word description and/or graphic depiction of soil and rock types?	X		
12.	Are groundwater levels and date measured shown on the subsurface profile?	X		
	Subsurface Profile or Field Boring Log (Pgs. 2-14, 2-15, 2-24 to 2-31)			
13.	Are sample types and depths recorded?	X		
*14.	Are SPT blow count, percent core recovery, and RQD values shown?	X		
15.	If cone penetration tests were made, are plots of cone resistance and friction ratio shown with depth?			X
	Laboratory Test Data (Pgs. 4-6, 4-22, 4-23)			
*16.	Were lab soil classification tests such as natural moisture content, gradation, Atterberg limits, performed on selected representative samples to verify field visual soil identification?	X		
17.	Are laboratory test results such as shear strength (Pg. 4-14), consolidation (Pg. 4-9), etc., included and/or summarized?			X

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR CENTERLINE CUTS AND EMBANKMENTS

B. Centerline Cuts and Embankments (Pgs. 2-2 to 2-6)

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report.

Are station-to-station descriptions included for:	Yes	No	Unknown or N/A
1. Existing surface and subsurface drainage?			X
2. Evidence of springs and excessively wet areas?			X
3. Slides, slumps, and faults noted along the alignment?			X

Are station-to-station recommendations included for the following?

General Soil Cut or Fill

4. Specific surface/subsurface drainage recommendations?			X
5. Excavation limits of unsuitable materials?	X		
*6. Erosion protection measures for back slopes, side slopes, and ditches, including riprap recommendations or special slope treatment.			X

Soil Cuts (Pgs. 5-23, 5-24)

*7. Recommended cut slope design?			X
8. Are clay cut slopes designed for minimum F.S. = 1.50?			X
9. Special usage of excavated soils?			X
10. Estimated shrink-swell factors for excavated materials?			X
11. If answer to 3 is yes, are recommendations provided for design treatment?			X

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

B. Centerline Cuts and Embankments (Cont.)	Yes	No	Unknown or N/A
Fills (Pgs. 5-1 to 5-3)			
12. Recommended fill slope design?	___	___	X
13. Will fill slope design provide minimum F.S. = 1.25?	___	___	X
Rock Slopes			
*14. Are recommended slope designs and blasting specifications provided?	___	___	X
*15. Is the need for special rock slope stabilization measures, e.g., rockfall catch ditch, wire mesh slope protection, shotcrete, rock bolts, addressed?	___	___	X
16. Has the use of "template" designs been avoided (such as designing all rock slopes on 0.25:1 rather than designing based on orientation of major rock jointing)?	___	___	X
*17. Have effects of blast induced vibrations on adjacent structures been evaluated?	___	___	X

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

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