PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT

VAN BUREN WEST

MICHIGAN AVENUE & ECORSE ROAD
VAN BUREN TOWNSHIP, MICHIGAN
MSG PROJECT NUMBER: 401.2401193.000

JANUARY 2025

PREPARED FOR:

DETROIT REGIONAL PARTNERSHIP

1001 WOODWARD AVENUE, SUITE 800
DETROIT, MICHIGAN 48226

PREPARED BY:

THE MANNIK & SMITH GROUP, INC.

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January 31, 2024

Ms. Shannon Selby
Detroit Regional Partnership
1001 Woodward Avenue, Suite 800
Detroit, Michigan 48226

RE: Preliminary Geotechnical Investigation Report
Van Buren West
Michigan Avenue & Ecorse Road
Van Buren Township, Michigan 48111
MSG Project Number: 401.2401193.000

Dear Ms. Shelby:

This report presents the results of our preliminary geotechnical investigation for the proposed Development Support of RACER Van Buren West located on a parcel of land between Michigan Avenue and Ecorse Road, Van Buren Township, Michigan 48111. We completed this investigation in accordance with our proposal No. OP230026 dated September 23, 2024, and revised September 25, 2024.

We trust that this report addresses your project needs. We appreciate the opportunity to work with you on this very important project. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
The Mannik & Smith Group, Inc.

Cathal Taylor
Geotechnical Engineer

Kevin D. Brown, PE
Geotechnical Engineer

EXECUTIVE SUMMARY

The Mannik & Smith Group, Inc., (MSG) was retained by Detroit Regional Partnership (DRP) through the Verified Industrial Properties (VIP) program to complete a preliminary geotechnical investigation to support the physical site studies for the proposed site development and at the property owned by RACER Trust located between Michigan Avenue and Ecorse Road in Van Buren Township, Michigan.

The subsurface investigation consisted of performing fourteen (14) soil borings, designated as SB-01 to SB-14 and extending to depths ranging from 30 to 50 feet below existing grades. The field exploration also included fourteen (14) Cone Penetration Test (CPT) soundings designated as CPT-SB-01 to CPT-SB-14 and paired with the corresponding soil boring of the same ID number; the soundings extended to termination depth or refusal.

Topsoil was encountered at all the soil boring locations with a thickness of about 8 to 11 inches below the surface. Stratum 1 consisting of very stiff silty clay and lean clay was encountered below the topsoil in three borings to a depth of 3.5 feet below grade. Stratum 2 consisting of very loose to dense sand was encountered below the topsoil and Stratum 1 and extended to depths of 8.5 to 23.5 feet below grade. Stratum 3 consisting of soft to hard silty clay and lean clay was encountered below Stratum 2 and extended to the maximum boring depth of 50 feet below grade.

Based upon our review of the existing soil conditions situated at a minimum foundation depth of 3.5 feet, the bearing soils consist of very loose to medium dense sand. The existing loose sand soil encountered below the foundation bearing elevation should be reworked in place. Provided the subgrade of the footings are properly prepared, it is recommended that conventional shallow foundations bearing on the compacted-in-place native sand material be designed for a net allowable bearing capacity of 2,000 psf. The total settlement underneath the proposed shallow foundations in the native cohesive soil and/or engineered fill is anticipated to be less than 1 inch and the differential settlement is expected to be ¾ of the total settlement.

Based upon our review of the existing soil conditions in the planned foundation areas, an estimated modulus for subgrade reaction on top of the existing subgrade of 180 pounds per cubic inch (pci) may be used for slab-on-grade design. For a subgrade composed of well-compacted engineered fill, a modulus of subgrade reaction of 200 pci may be used.

Based on the soil characteristics from the preliminary geotechnical investigation, a design CBR value of 8 and resilient modulus of 9,600 pci was estimated. Recommendations for both flexible and rigid pavement sections are presented in Section 4.3.

According to ASCE 7-22 Table 20.2-1, the proposed Site is designated as “Site Class D” based on the average soil shear strength for the upper 50 feet of soil.

For standard shallow excavations, significant problems associated with groundwater seepage into the excavation are not anticipated; however, the Contractor should be prepared to address localized groundwater accumulation, perched groundwater, or surface run off (i.e., pumping water from prepared sumps).

This summary briefly discusses major findings covered within the body of the report. The intent of this executive summary is to provide a general summary. The report must be read carefully in its entirety before using any recommendations described herein.

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Appendices

1.0 INTRODUCTION

1.1 General

The Mannik & Smith Group, Inc., (MSG) was retained by Detroit Regional Partnership (DRP) through the Verified Industrial Properties (VIP) program to complete a preliminary geotechnical investigation to support the physical site studies for the proposed site development and at the property owned by RACER Trust located between Michigan Avenue and Ecorse Road in Van Buren Township, Michigan. The site location is depicted as Figure 1 in Appendix A. This preliminary geotechnical investigation was performed in general accordance with MSG Proposal No. OP230026 dated September 23, 2024, and revised September 25, 2024.

This preliminary geotechnical investigation report addresses feasible options for foundation design and pavement support. Once additional design details become available, including the depth and configurations of proposed structures, a supplemental geotechnical investigation should be completed to confirm encountered conditions and verify the preliminary recommendations contained herein.

1.2 Project Information and Site Conditions

As we understand, the scope of the preliminary geotechnical investigation is to provide a basic understanding of the geologic conditions within the selected area of the site. The site for the proposed development pad is located in the southeast corner of the site near the GM property in Van Buren Township. The existing site is approximately 68-acres, and the topography is relatively flat with a gradual increase in elevation toward the north end of the site; the site elevations ranged from 713 to 733 feet based on GPS survey data. At the time of the investigation, detailed site grading plans and structural loading information for the proposed buildings and infrastructure were not available; however, we assume no significant grading (greater than 3 feet cut/fill) is anticipated at the site associated with this project.

2.0 SUBSURFACE INVESTIGATION

2.1 Field Exploration

The subsurface investigation consisted of performing fourteen (14) soil borings, designated as SB-01 to SB-14 and extending to depths ranging from 30 to 50 feet below existing grades. The field exploration also included fourteen (14) Cone Penetration Test (CPT) soundings designated as CPT-SB-01 to CPT-SB-14 and paired with the corresponding soil boring of the same ID number; the soundings extended to termination depth or refusal. Table 2.1-1 provides a summary of the geotechnical borings completed for this project.

Table 2.1-1 Summary of Geotechnical Borings & Soundings

Proposed Purpose	Soil Boring ID	Soil Boring Depth (ft.)	CPT Sounding ID
Building Footprints	SB-01 to SB-06 & SB-10	50	CPT-SB-01 to CPT-SB-06 & CPT-SB-10
Associated Pavement Infrastructure	SB-07 to SB-09 & SB-11 to SB-14	30	CPT-SB-07 to CPT-SB-09 & CPT-SB-11 to CPT-SB-14

The approximate soil boring locations were field marked by MSG personnel by measuring from existing site features. The soil boring locations were obtained by survey using a handheld GPS, and elevations and coordinates are provided on the boring logs. A Soil Boring Location Plan is presented as Figure 2 of Appendix A.

The drilling operation for the geotechnical investigation were conducted between October 14 and November 4, 2024. All borings were advanced using a track-mounted Geoprobe 3230DT drill rig and advanced with 2.25-inch diameter

hollow stem augers in general accordance with ASTM D6151. Upon completion, the boreholes were backfilled to the surface with bentonite mixed with auger cuttings.

The Standard Penetration Test (SPT) was conducted in general accordance with ASTM D1586 procedures and was completed at 2.5-foot intervals for the first 10 feet, and at 5-foot intervals thereafter until termination depth. Soil samples were recovered using a split-spoon sampling procedure in general accordance with ASTM D1586. All collected samples were labeled with the soil boring designation and a unique sample number. The samples were sealed in glass jars in the field to protect the soil and maintain the soil's natural moisture content. All samples were transferred to MSG's laboratory for further analysis and testing. The soil samples collected from this investigation will be retained in our laboratory for a period of 30 days after the date of submission of the final report, after which they will be discarded unless we are notified otherwise.

CPT was performed in general accordance with ASTM D5778. CPT soundings consist of a conical-pointed penetrometer being hydraulically pushed into the soil at a constant rate around ¾ inch per second with a friction sleeve above the penetrometer. The instrument records tip resistance, side friction, and pore water pressure. The CPT data is interpreted to determine soil parameters and stratigraphy based on Robertson's (2016) soil behavior type (SBT) classification system. Soil classification derived from the SBT index is an accurate representation of soil behavior when compared with traditional soil classification based on grain size or plasticity.

Whenever possible, groundwater level observations were made during the drilling operations and are shown in the Soil Boring Logs. Prior to backfilling, each open borehole was observed again for groundwater. During drilling, the depth at which free water was observed, where drill cuttings became saturated or where saturated samples were collected, was indicated as the groundwater level during drilling. In particular, in pervious soils (granular soils), water levels are considered relatively reliable when solid or hollow-stem augers are used for drilling. However, in cohesive soils, groundwater observations are not necessarily indicative of the static water table due to low permeability rates of the soils and due to the sealing off of natural paths of groundwater during drilling operations. It should be noted that seasonal variations and recent rainfall conditions may influence the groundwater table significantly.

Soil boring logs are included in Appendix B. Also included in Appendix B are General Soil Sample Notes, and a Boring/Well Log Key that illustrates the soil classification criteria and terminology used on the Soil Boring Logs.

2.2 Laboratory Testing

Each sample recovered from the borings was examined and visually classified. This examination was performed to verify conditions identified within field boring logs, to select samples for further laboratory evaluation, and to perform visual-manual classification of samples not subject to further laboratory testing. During the examination process, the geotechnical engineer finalized the soil boring logs.

Representative soil samples were subjected to laboratory tests consisting of the pocket penetrometer, natural moisture content (ASTM D2216), Atterberg Limits (ASTM D4318), sieve and hydrometer analysis (ASTM D422), resistivity of soil (ASTM G57), sulfate content (ASTM D8459), organic content (ASTM D2974), and swell pressure (ASTM D4546). A brief description of each test is provided in Laboratory Test Procedures in Appendix C.

All soil samples were classified in general accordance with the Unified Soil Classification System (USCS). The USCS group symbol determined from the visual-manual classification is shown in parentheses at the end of the sample description for each layer shown on the Soil Boring Logs.

3.0 SUBSURFACE CONDITIONS

3.1 Subsurface Classification

The following sections describe the subsurface conditions in terms of major soil strata for the purposes of geotechnical exploration. The soil boundaries indicated are inferred from non-continuous sampling and observations of the drilling operations and/or sampling resistance. The subsurface conditions discussed in the following sections and those shown on the boring logs represent an evaluation of the subsurface conditions based on interpretation of the field and laboratory data using normally accepted geotechnical engineering judgement and common engineering practice standards. The subsurface conditions described herein may vary beyond the boring locations and at different times of the year. A generalized soil profile of the subsurface conditions encountered across the site, beginning at the ground surface, and extended downward is as follows:

Surficial Materials
Approximately 8 to 11 inches of topsoil was encountered in each of the soil boring locations.

Stratum 1 – Silty Clay / Lean Clay (CL / CL-ML)
Very stiff silty clay and lean clay with variable amounts of sand and gravel was encountered in three (3) soil borings (SB-01, SB-02, and SB-08) below the topsoil and extended to the depths of about 3.5 feet below ground surface. The standard penetration number ranged from 16 to 26 and averaged 22.

Stratum 2 – Sand/Silt (SC / SP / SP-SC / SW / SW-SC / SM / ML)
Sand with variable amounts of silt, clay, and gravel was encountered in all of the soil boring locations either below the topsoil or Stratum 1 and extended to depths ranging from 8.5 to 23.5 feet below ground surface. The sand stratum was typically encountered as follows:

- Very loose to loose up to depths of 6 feet below grade in borings SB-06, SB-07, SB-10, and SB-11; the standard penetration number ranged from 3 to 9 and averaged 7.
- Medium dense to dense up to depths ranging from 8.5 to 23.5 feet below grade in all borings; the standard penetration number ranged from 11 to 37 and averaged 21.
- Loose between depths of 13.5 and 18.5 feet below grade in borings SB-03 and SB-08; the standard penetration number was 10.
- Medium dense silt was encountered within Stratum 3 between 18.5 and 23.5 feet; the standard penetration number was 24.

Stratum 3 – Silty Clay / Lean Clay (CL / CL-ML)
Silty clay and lean clay with variable amounts of sand and gravel was encountered in all of the soil borings below Stratum 2 and extended to the depths ranging from 30 to 50 feet below ground surface at the termination depth of the borings. The clay stratum was typically encountered as follows:

- Soft to medium stiff up to depths ranging from 18.5 to 23.5 feet below grade in borings SB-06, SB-07, SB-10, and SB-11; the standard penetration number ranged from 4 to 8 and averaged 7.
- Stiff to hard up to the maximum termination of the borings at 50 feet below grade in all borings; the standard penetration number ranged from 9 to 34 and averaged 17.

3.2 Groundwater Observations

During drilling operations, groundwater was encountered in all of the soil borings at depths between 5 to 10 feet below ground surface.

Table 3.2-1 Summary of Encountered Groundwater Conditions

Boring No.	Boring Depth (ft.)	Depth (ft.) During Drilling
SB-01	50.0	10.0
SB-02	50.0	9.0
SB-03	50.0	6.0
SB-04	50.0	7.0
SB-05	50.0	7.5
SB-06	50.0	5.0
SB-07	30.0	6.0
SB-08	30.0	6.0
SB-09	30.0	6.0
SB-10	50.0	5.0
SB-11	30.0	6.0
SB-12	30.0	8.5
SB-13	30.0	9.0
SB-14	30.0	6.0

Water levels reported are accurate only for the time and date the borings were drilled. The borings were backfilled and sealed the same day that they were completed. Long-term monitoring of the boreholes was not included as part of the scope of our subsurface investigation.

It should be noted that the elevation of the natural groundwater table is likely to vary throughout the year depending on the amount of precipitation, runoff, evaporation, and percolation in the area, as well as the water level in any surface water bodies in the vicinity. Long-term monitoring with monitoring wells or piezometers is necessary to accurately assess the groundwater levels and fluctuation patterns at the site.

3.3 CPT Results

The results of the CPT soundings are provided graphically and are available in Appendix E. In these results, an approximate soil profile was determined from charts correlating various friction and tip resistance ratios. The interpretation of soil type is based on the correlations developed by Robertson (1990) using the normalized soil behavior type (SBTn). Using the data obtained from the CPT soundings, the soil types interpreted from the correlations were found to be fairly consistent with classifying the soil types when compared with the soil borings. In most cases, the CPT results interpreted the encountered clay soils as clayey silt or silty clay with pockets of sandy silt.

4.0 ANALYSES AND RECOMMENDATIONS

4.1 Preliminary Design Soil Profile

Based on our review of the subsurface soil conditions encountered during this preliminary geotechnical investigation, we have developed the following soil profile:

Table 4.1-1 Soil Profile

Stratum No	Soil Description	Depth (ft)	Total Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)
1	V. Stiff Clay	1.0-3.5	128.0	2,000	0
2a	Loose Sand	3.5-6.0	120.0	0	28
2b	M. Dense to Dense Sand	3.5-23.5	125.0	0	34
3a	Soft to M. Stiff Clay	18.5-23.5	120.0	750	0
3b	Stiff to Hard Clay	18.5-50.0	130.0	2,000	0

4.2 Preliminary Structure Recommendations

4.2.1 Structural Information

Structural loading information was not available at the time this report was prepared. MSG has developed the preliminary foundation recommendations presented herein based on the above project's background information, the subsurface conditions encountered during our field investigation, the results of our laboratory testing, and the results of our geotechnical analyses.

4.2.2 Shallow Foundations

Based upon our review of the existing soil conditions situated at a minimum foundation depth of 3.5 feet, the bearing soils consist of very loose to medium dense sand. The existing loose sand soil encountered below the foundation bearing elevation should be reworked in place. Provided the subgrade of the footings are properly prepared, it is recommended that conventional shallow foundations bearing on the compacted-in-place native sand material be designed for a net allowable bearing capacity of 2,000 psf.

By utilizing proper construction techniques, the total settlement underneath the proposed shallow foundations is anticipated to be less than 1 inch and the differential settlement is expected to be ¾ of the total settlement. Additionally, for foundations bearing on granular soils, most of the settlement, if any, occurs during the construction activities.

The aforementioned recommended soil bearing capacity and the associated settlement estimation are based on footing elevations with regards to existing and proposed preliminary site elevations. The required footing sizes are dependent on the column and wall loads in comparison to the above recommended allowable bearing capacity of the bearing soil. However, wall footings should at least be a minimum of 18 inches wide and column footings should have a minimum dimension of 30 inches. Exterior footing bottoms and footings in unheated areas should be no less than 42 inches (typical frost depth for southern Michigan) below final exterior grade for protection against possible frost damage. Interior footings in heated buildings, which should not be subject to frost action, may bear at shallower depths, provided they are supported on native compact soil or engineered fill capable of supporting the design load.

Prior to the placement of reinforcing steel and concrete, an MSG geotechnical engineer or their designated representative should evaluate foundation excavations to verify that an adequate bearing material is present and that all debris, mud, loose, frozen, or water-softened soils, and unsuitable soils are removed. In addition, MSG recommends that a DCP test or Housel Penetrometer Test, or similar field testing, be performed by the geotechnical engineer representative to assure a suitable bearing capacity for all foundations prior to concrete placement.

If any unsuitable materials are suspected at the subgrade elevation during construction, the project Geotechnical Engineer or their designated on-site representative should be contacted, and additional soils laboratory testing may be required. Where foundation subgrade undercutting and replacement with engineered fill is required, the undercuts should extend laterally at a slope of 1(Horizontal):2(Vertical) from the edge of the footing as shown in the typical undercutting diagram below:

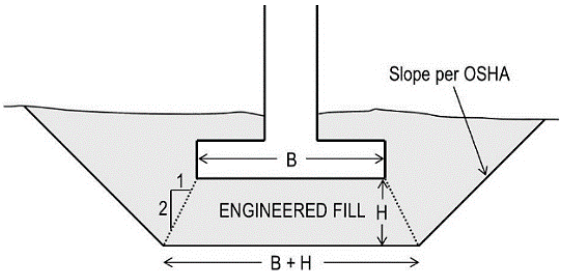


Figure 4.2.2-1 - Undercutting Diagram

Foundations should be constructed as soon as practical after foundation excavation activities. If the foundation excavations will be left open for an extended period of time, a thin mat of lean concrete should be placed over the bottom to minimize damage to the bearing surface from weather or construction activities. Water should not be allowed to pond in any excavation. Foundation concrete should not be placed on frozen or flooded subgrade.

The final grade adjacent to the building exterior should be sloped at a minimum 2 percent grade away from the building foundations, and roof drains should be routed away from the foundation soils. Foundation drains will assist in ensuring the foundation subgrade soils are not adversely impacted by moisture changes that could result in differential settlement of the foundations. To prevent moisture against the exterior footings, a perforated matted edge drain may be used around the perimeter of the footings and placed at the base of the footings. The underdrain should be backfilled with free draining material. A waterproofing membrane with a protection layer should extend from the top to the base of the footings along the exterior edge where the concrete is in direct contact with the natural or backfilled material.

If a two-pour system is used for the footings and slab, the cold joint at the interface of the exterior footings and slab on grade should be located at least 4 inches above the adjacent finish exterior grade. As an alternative, the use of a water-stop between the two pours will minimize the moisture penetration through the cold joint and migration of water under the slab. A monolithic pour will eliminate the use of the water-stop.

4.2.3 Slab-on-Grade

Based upon our review of the existing soil conditions in the planned foundation areas, an estimated modulus for subgrade reaction on top of the existing subgrade of 180 pounds per cubic inch (pci) may be used for slab-on-grade design. For a subgrade composed of well-compacted engineered fill, a modulus of subgrade reaction of 200 pci may be used. The final design thickness of the floor slabs, the joint spacing and slab reinforcement should be determined by the structural engineer based on the above recommended subgrade modulus, the floor loading conditions and local building code requirements.

The subgrade of the slab-on-grade areas should be inspected and tested to assure proper preparation. The subgrade soils should be protected against frost action if construction takes places during the winter. Frozen soils should be thawed, moisture conditioned and recompacted or undercut and replaced prior to

commencement of slab-on-grade construction. We recommend that the floor slabs-on-grade bear directly on a minimum of 6 inches of capillary resistant granular engineered fill (well graded granular material or engineer approved equivalent) compacted to 98 percent of Standard Proctor or 95 percent of Modified Proctor Maximum Dry Density (MDD) within 2 percent of the Optimum Moisture Content (OMC).

A waterproof membrane (vapor retarder) should be placed directly beneath the concrete to minimize infiltration of water and delamination of the concrete floor slab. The moisture condition of the floor slab should be tested prior to placement of floor coverings to verify they are within tolerable limits for the floor coverings.

In order to minimize the potential impacts caused by differential settlement, the slab-on-grade should be kept structurally separate from walls and columns and saw cut control joints should be provided at suitable intervals. A minimum of 6 inches of engineered fill should be placed between the slab bottom and the top of the footings below.

4.3 Preliminary Pavement Recommendation

California Bearing Ratio (CBR) testing was not performed. Based on the soil characteristics from the preliminary geotechnical investigation and anticipated proposed elevations, a design CBR value of 8 and resilient modulus of 9,600 pci was estimated using parameters obtained from field and laboratory testing. The pavement design input parameters are established based on the procedures contained in the 1993 Guide for Design of Pavement Structures by AASHTO. For the basis of the design, MSG assumed the following input parameters:

Table 4.3-1 Assumed Pavement Design Parameters

Design Life	20 Years
Design ESAL	100,000 (Light Duty); 750,000 (Heavy-Duty)
Reliability	80 %
Original Serviceability Index	4.2 (Flexible Paving); 4.5 (Rigid Paving)
Terminal Serviceability Index	2.0
Overall Standard Deviation	0.45 (Flexible Paving); 0.35 (Rigid Paving)

We provided two sections based on anticipated design equivalent single axle loads (ESAL), one for light duty and one for heavy duty indicated in the table above. We assume the heavy-duty sections will primarily be used in areas of increased truck traffic. If additional ESALs are anticipated, the pavement sections should be reevaluated.

For flexible pavement design, MSG assumed structural number coefficients of 0.42 and 0.14 for asphalt concrete and aggregate base, respectively. Based on the above assumptions, recommended flexible pavement sections are provided in the following table.

Table 4.3-2 Recommended Flexible Pavement Sections

Pavement Materials	100,000 ESAL (in.)	750,000 ESAL (in.)
Surface Course	1.5	2.0
Intermediate Course	2.0	2.0
Aggregate Base (MDOT 21AA)	6.0	8.0

*Local codes may require a thicker light duty pavement section

For rigid pavement design, MSG assumed a concrete elastic modulus (E_c) of 5,000,000 psi, a concrete rupture modulus (S'_c) of 700 psi and a load transfer coefficient (J) of 2.7. Based on the above assumptions, recommended rigid pavement sections are provided in the following table.

Table 4.3-3 Recommended Rigid Pavement Sections

Pavement Materials	100,000 ESAL (in.)	750,000 ESAL (in.)
Portland Cement Concrete	6.0	6.0
Aggregate Base (MDOT 21AA)	6.0	8.0

*Local codes may require a thicker light duty pavement section

Site preparation recommendations presented in Section 4.4 shall be followed to provide subgrade conditions suitable for pavement support. Adequate drainage should be provided to the pavement structure to ensure a successful pavement service life is achieved. MSG highly recommends that underdrains be utilized around catch basins and in other low areas of the proposed pavements to limit the accumulation of water below the pavement structures if an asphalt pavement is preferred.

4.4 Site Preparation

Before proceeding with construction, surface soils, vegetation, topsoil, root systems, refuse, asphalt, concrete including any existing abandoned buried foundations, and other deleterious materials should be stripped from the proposed development/construction areas. The bearing soils should be observed by a geotechnical engineer and visually checked for suitability as a bearing soil. Depending on the time of year of construction and the Contractor's Means and Methods at controlling surface water, it may be possible that additional site subgrade material within development/construction areas will be considered unsuitable and/or unstable and will be required to be stripped during site preparation activities.

Cohesive soils are moisture sensitive and could become unstable if proper site water controls are not implemented and/or if they are subject to construction traffic. Every effort should be taken to minimize disturbance during compaction or over excavation. Where possible, free-standing water should be diverted away from the construction perimeters or pumped out using a sump to accommodate the proper compaction techniques.

Generally, areas exposed by stripping operations on which subgrade preparations are to be performed should be compacted in place to 98 percent of Standard Proctor or 95 percent of Modified Proctor MDD within 2 percent of the OMC. Soft, loose, or saturated soils that are difficult to compact may require an undercut and replacement with engineered fill for stabilization. The on-site Geotechnical Engineer or their designated representative should determine required undercut depths if necessary.

It is recommended that the prepared subgrade for pavement and slab-on-grade areas be proof-rolled to detect any unstable areas. Proof-rolling should be accomplished by making a minimum of two complete passes in each of two perpendicular directions with a fully loaded tandem-axle dump truck, or other approved pneumatic-tired vehicle, with a minimum weight of 20 tons. If proof-rolling reveals the presence of unstable areas within the subgrade, certain remedial measures will be required to stabilize the subgrade. Depending on the severity of distress encountered during proof-rolling, undercutting of 12 inches below subgrade and backfilling with engineered fill as outlined in Section 4.4 may be performed. If an undercut and replacement with engineered fill fails to stabilize the subgrade, use of granular backfill with geogrid stabilization may be required. Undercuts may be reduced 6 inches if geogrid and granular backfill is utilized. Granular soils at the subgrade surface may be reworked in place in order to pass a proof-roll. Alternately, chemical stabilization of the upper 14 inches with lime may be performed. It should be noted that MSG does not recommend chemical stabilization if the number of sulfates present in the subgrade soils exceeds 5,000 ppm. The

actual undercut depths and/or subgrade remediation measures required should be determined by the on-site Geotechnical Engineer or a designated representative.

Existing utilities or underground structures within the proposed location were not identified but may be present. If such utilities are present, they should be removed and relocated or abandoned in place. If abandoned in place, it is recommended that the utility pipe be filled with cement grout to mitigate the potential for collapse in the future. Should the utility lines be removed from the site, the resultant trench excavations should be backfilled with well-compacted granular material, placed, and compacted in accordance with the recommendations of Section 4.5.

4.5 Fill Placement and Engineered Fill Requirements

All new fill should consist of inorganic soil that is free from all deleterious materials and construction debris. Fill materials should not be placed in a frozen condition or upon frozen subgrades. Proper drainage should be maintained during and after fill placement to prevent water from impacting compaction efforts or long-term fill integrity. All fine-grained fill soils should be checked for plasticity index and liquid limit before placement. Cohesive fill materials should have a liquid limit less than 40 percent and plasticity index less than 20 percent (i.e., non-expansive). The on-site cohesive soils should be evaluated prior to reuse as structural fill by a qualified geotechnical engineer.

Coarse crushed granular material is recommended as fill for utility trench backfill, undercut areas, and as aggregate base material for pavement and slab-on-grade areas. The granular material shall consist of natural aggregate materials that meet the gradation requirements of MDOT 21AA or engineer approved equivalent. Typical lift thickness utilized for this material is 8 inches. In utility trenches, granular backfill material should extend at least two pipe diameters above the pipe's crown. As an alternative to imported granular fill, excavated soil material may be recompacted back in place so long as the excavated soil material is determined to be suitable. If a working platform for construction is needed, and prior to footing excavation, it is recommended that at least 6 inches of granular base material meeting the gradation requirements MDOT 21AA aggregate.

Fill should be compacted to 98 percent of the Standard Proctor or 95 percent of Modified Proctor MDD and should be compacted within 2 percent of OMC. Fill materials should be placed in horizontal lifts and adequately keyed into stripped and scarified subgrade soils and adjacent fill. A qualified geotechnical consultant should be retained to monitor fill placement in order to assure compaction requirements are achieved. Soil density testing should be performed during fill placement activities to assure proper fill compaction. A commonly used testing criterion is one test per 2,500 square feet per lift in areas to support proposed structures and one test per 5,000 square feet in parking lots, driveways, exterior slabs, etc., with a minimum of three tests per lift. Areas that do not achieve compaction requirements after initial placement should be recompacted to meet project requirements.

The actual lift thickness suitable for fill placement is dependent upon the soil type, compaction equipment, and the compaction specification. In general, fill should be placed in a 9-inch loose lift thickness (8-inch compacted); assuming appropriately weighted and ballasted compaction equipment is utilized. In confined areas where hand operated compaction equipment is required, 4-inch and 6-inch loose lift thickness should be utilized for hand operated vibratory plate compactors and hand operated vibratory drum rollers weighing at least 1,000 pounds, respectively. Sand fills should be compacted using smooth vibratory rollers. Clay fills should be compacted using a sheep foot compactor. The geotechnical engineer, as part of the construction monitoring, should review the equipment utilized for compaction to confirm suitability relative to the specified loose lift thickness. If necessary, the geotechnical engineer will recommend a revised lift thickness suitable to the equipment performing compaction.

To minimize corrosion of existing metallic utilities, topsoil, organic soils, existing fill soils, and mixtures of sand and clay should not be placed adjacent to metallic utilities. In addition, buried utilities of different metallic materials should be electrically isolated from each other to minimize galvanic corrosion.

4.6 Site Seismic Classification

Based on our review of data collected during this investigation, we have classified this site as "Site Class D" based on ASCE 7-22 Table 20.2-1. This is based on the shear strength of the upper 50 feet of soil (the maximum depth for which we have soil information) and assumed subsurface conditions to a depth of 100 feet.

4.7 Lateral Earth Pressures & Retaining Walls

Lateral earth pressures (horizontal stresses) are developed during soil displacements (strains). Lateral earth pressure for design is determined utilizing an earth pressure coefficient to relate horizontal stress to vertical stress. Three separate earth pressure coefficients are used to determine lateral earth pressure: at-rest; active; and passive.

Applied horizontal stress can be determined by multiplying the appropriate earth pressure coefficient by the applied vertical stress. Earth pressure coefficients are a direct function of the internal friction of a soil. Laboratory testing to determine internal friction angles for soil was not performed. However, index laboratory and field data obtained can be utilized to approximate earth pressure coefficients based upon empirical relationships. Lateral earth pressure coefficients for engineered fill are provided in Table 4.7-1.

Table 4.7-1 Recommended Lateral Earth Parameters

Soil Parameters	Engineered Granular Soil	Existing Soils			
		Very Stiff Silty Clay (Stratum 1)	Loose Sands (Stratum 2)	Medium Dense Sands (Stratum 2)	Stiff to Very Stiff Silty Clay (Stratum 3)
Total Unit Weight (pcf)	125	128	120	125	130
Internal Friction Angle (°)	30	25	28	34.0	25
At-rest Pressure Coefficient, K_o	0.50	0.65	0.53	0.45	0.65
Active Pressure Coefficient, K_a	0.33	0.45	0.36	0.28	0.45
Passive Pressure Coefficient, K_p	3.0	2.2	2.8	3.5	2.2
Concrete/Soil Friction Coefficient	0.5	0.0	0.4	0.5	0.0
Concrete/Soil Adhesion Factor	0.0	0.2	0.0	0.0	0.2

To minimize lateral earth pressures, MSG recommends the zone adjacent to any walls be backfilled with granular fill. To provide effective drainage, a zone of free-draining gravel (similar to MDOT 6AA gravel) should be used directly adjacent to the walls with a minimum thickness of 18 inches. This granular zone should drain to weepholes or a pipe drainage system to prevent hydrostatic pressures from developing against the walls.

The type of backfill beyond the free-draining granular zone will govern the magnitude of the pressure to be used for structural design. Clean granular soil is recommended as the backfill material against retaining structures to minimize lateral earth pressure. Lateral earth pressure coefficients for engineered granular backfill is provided in Table 4.7-1.

The coefficients of friction between concrete and soil subgrade were also provided in the table above. These coefficients can be used for evaluating the factor of safety against sliding of foundations. The recommended minimum safety factor against sliding is 1.5. Passive pressure resistance of the top 3 feet below final grade should generally be neglected in designing the retaining walls to resist sliding failure due to the freeze-thaw cycle that can significantly weaken soils and the potential for the material to be removed at a future date for installation of utilities or other construction-related activities.

Any additional lateral earth pressure due to surcharge loading conditions including, but not limited to, floor loads, column loads, sloping backfill, traffic loading, and construction loads, should be incorporated into the wall design. MSG should be retained to perform other detailed geotechnical evaluations for retaining walls, as necessary, including but not limited to, settlement and global stability. A detailed geotechnical evaluation and structural design of retaining walls is beyond the scope of this report.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Groundwater Control

Groundwater was encountered in in each of the fourteen soil borings (SB-01 to SB-14) at depths of 5 to 10 feet below existing grade. The location of the level of groundwater is of importance in shallow foundations for a number of reasons. Most importantly, the bearing capacity of the soil is affected by the presence of a high-water table, decreasing the bearing capacity. Typically, the groundwater elevation fluctuates and is higher during the winter and spring and lower in summer and early fall. It should be noted that groundwater seepage will have a significant impact on construction activities.

The anticipated bottom of the building foundation will be situated above the observed groundwater table; however, excavations for foundations and potential undercuts as required may be situated below the long-term groundwater level. In general, the Contractor should be prepared to address localized groundwater accumulation, perched groundwater, or surface run off (i.e., pumping water from prepared sumps). A more elaborate groundwater management system will be required during construction where excavations extend below the long-term groundwater level. To protect against the settlement of surrounding structures, pavement, and utilities, geotextile filter fabric should be installed around underdrains to limit the loss of fines through the dewatering system. The amount and type of dewatering required during construction will be further impacted by the weather, groundwater levels at the time of construction, the effectiveness of the Contractor's techniques in preventing surface water runoff from entering open excavations, and their ability to lower the groundwater table. The final design of any temporary earth support structures for excavations, as well as the associated dewatering and groundwater control plan, will be completed by the Contractor.

To manage surface water, slopes in pavement areas should consist of 1.5 percent slopes towards inlets or drainage structures, building exteriors should have a minimum of 2 percent slopes away from the building and discharge points (i.e., roof down spouts) should consist of closed conduits and divert away from the buildings to inlets or drainage structures. The use of perimeter drains and/or sub-drains may be necessary on approval of the site civil design engineer. The project civil engineer is responsible for designing the surface drainage improvements.

5.2 Excavations and Slope

Familiarity with applicable local, state and federal safety regulations, including current OSHA excavation and trench safety is vital. Therefore, it should be a requisite for both the Owner and Contractor with the Contractor by and large being responsible for the safety of the site. Activities at the site, such as utilities or building demolition and site preparation, may require excavations at significant depths below the ground surface. Slope height, slope inclination, and excavation depth (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety (OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 Subpart P) regulations. Such regulations are strictly enforced and, if not followed, the Owner, Contractor, or earthwork or utility Subcontractors could be liable for substantial penalties.

The overburden soils encountered during our investigation were generally composed of loose to medium dense sands over stiff to hard clay. Based upon the data obtained, we anticipate OSHA will classify the native sand soils as **Type C** soil, which will be limited to a maximum temporary excavation slope of 1.5(H):1(V). Flatter slopes are required where

soils are stockpiled or in the vicinity of existing structures. If sufficient room is not available for sloping the excavation walls, temporary shoring will be required. It is our recommendation that any excavation in excess of 5 feet in depth, should be designed by a professional engineer.

6.0 GENERAL QUALIFICATIONS AND LIMITATIONS

The evaluations, conclusions and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the preliminary geotechnical investigation, our understanding of the project and our experience during previous work, with similar sites and subsurface conditions. Data used during this exploration included:

- Fourteen (14) exploratory borings performed during this preliminary investigation;
- Fourteen (14) cone penetration tests performed during this preliminary investigation;
- Observations of the project site by our staff;
- Results of laboratory soil testing; and,
- Results of the preliminary geotechnical analyses.

The subsurface conditions discussed in this report and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. MSG is not responsible for independent conclusions, opinions, or recommendations made by others based upon information presented in this report.

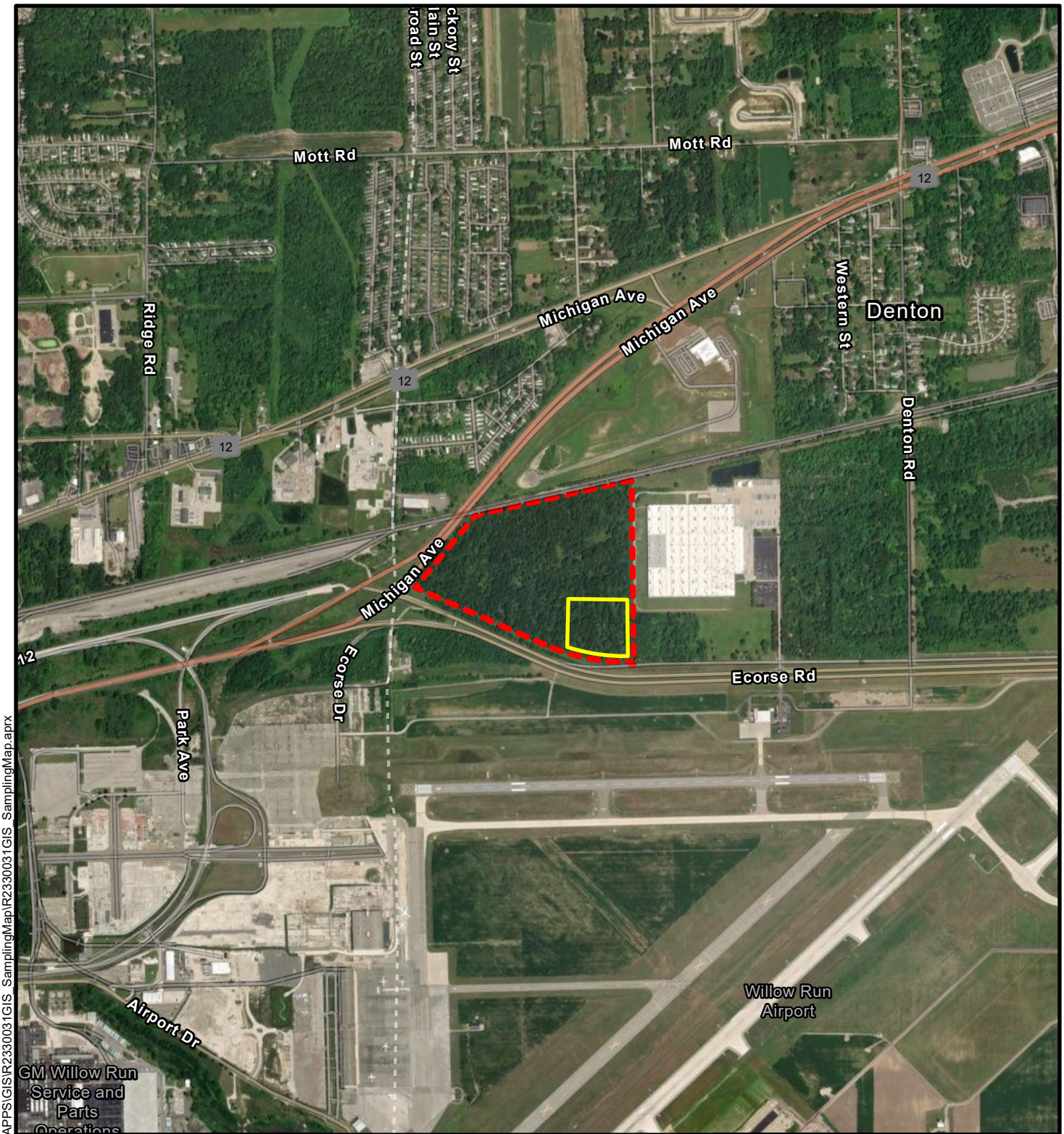
We strongly recommend the final project plans and specifications be reviewed by MSG's geotechnical engineer to confirm that the geotechnical aspects are generally consistent with the recommendations of this report. In particular, the specifications for excavation and foundation construction should be prepared and/or reviewed by MSG's Geotechnical Engineer of Record. In addition, we recommend site subgrade preparation, fill compaction activities, and foundation installation activities should be monitored by MSG's geotechnical engineer or his/her representative.

This report and evaluation reflect only the geotechnical aspects of the subsurface conditions at the site. Review and evaluation of environmental aspects of subsurface conditions are beyond the scope of this report.

APPENDIX A

FIGURE 1 – SITE LOCATION MAP

FIGURE 2 – SOIL BORING LOCATION MAP



Basemap Source: ESRI USA_Topo_Maps Web Service

Fence

Site Location

0 750 1,500

Feet

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FIGURE 1

Site Location

Van Buren West
Michigan Ave & Ecorse Rd
Van Buren Twp, Wayne County, Michigan

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
12/3/2024	JWW	JWW	401.2401193.000

Date Saved: 12/3/2024 12:51 PM Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Path: W:\Projects\Projects P-TVR2330031\ENGAPPS\GIS\R2330031GIS_SamplingMap\R2330031GIS_SamplingMap.aprx

MSG

0 50 100

Sample Locations
Fence
VanBuren RACER Plot Plan

Notes

Imagery Credits: Maxar

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www.MannikSmithGroup.com

FIGURE 2

Boring Location Map

Van Buren West
Michigan Ave & Ecorse Rd
Van Buren Twp, Wayne County, Michigan

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
12/3/2024	JWW	KRB	401.2401193.000

Date Saved: 12/3/2024 12:51 PM
Path: W:\Projects\Projects P-TR\2330031\ENGAPPS\GIS\R2330031GIS_SamplingMap\R2330031GIS_SamplingMap.aprx

APPENDIX B

SOIL BORING LOGS

GENERAL SOIL SAMPLE NOTES

Unless noted, all terms utilized herein refer to the Standard Definitions presented in ASTM D653.

Standard Penetration Test (ASTM D1586): A 2.0-inch outside-diameter (O.D.), 1-3/8-inch inside-diameter (I.D.) split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

COHESIVE SOILS

Consistency	Approximate Range of N	Unconfined Compressive Strength (psf)
Very Soft	0 – 1	Below 500
Soft	2 – 4	500 – 1,000
Medium Stiff	5 – 8	1,000 – 2,000
Stiff	9 – 15	2,000 – 4,000
Very Stiff	16 – 30	4,000 – 8,000
Hard	31 – 50	8,000 – 16,000
Very Hard	Over 50	Over 16,000

COHESIONLESS SOILS

Density Classification	Approximate Range of N
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	Over 50

CLASSIFICATION

The major soil constituent is the principal noun, i.e. sand, silt, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituents (percent by weight)
Trace – 1% to 11%	Trace – 1% to 11%
Adjective – 12% to 35% (clayey, silty, etc.)	Little – 12% to 22%
	Some – 23% to 33%
And – Over 35%	

PARTICLE SIZES

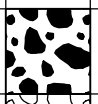
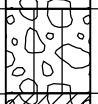
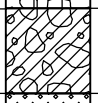
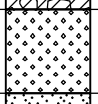
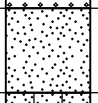
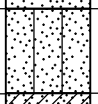
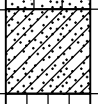
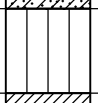
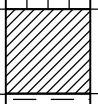
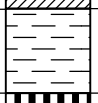
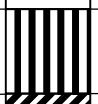
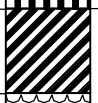
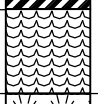
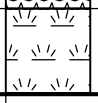
Boulders		- Greater than 12 inches (305 mm)
Cobbles		- 3 inches (76.2 mm) to 12 inches (305 mm)
Gravel:	Coarse	- ¾ inches (19.05 mm) to 3 inches (76.2 mm)
	Fine	- No.4 (4.75 mm) to ¾ inches (19.05 mm)
Sand:	Coarse	- No. 10 (2.00 mm) to No. 4 (4.75 mm)
	Medium	- No. 40 (0.425 mm) to No. 10 (2.00 mm)
	Fine	- No. 200 (0.074 mm) to No. 40 (0.425 mm)
Silt		- 0.005 mm to 0.074 mm
Clay		- Less than 0.005 mm

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier: i.e., silty clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils: i.e., silty clay, trace sand, little gravel.

If sand particle size is greater than 11% by weight of the total sample weight, the adjective (i.e., fine, medium or coarse) is added to the soil description for the sand portion of the sample, provided sand is the major or second major constituent.

SAMPLE DESIGNATIONS

AS	Auger Sample - directly from auger flight	ST	Shelby Tube Sample - 3-inch diameter unless otherwise noted
BS	Miscellaneous Samples - Bottle or Bag	PS	Piston Sample - 3-inch diameter unless otherwise noted
MC	Macro-Core Sample - 2.25-inch O.D., 1.75-inch I.D., 5 feet long polyethylene liner	RC	Rock Core - NX core unless otherwise noted
LB	Large-Bore (Micro-Core) Sample - 1-inch diameter, 2 feet long polyethylene liner	CS	CME Continuous Sample - 5 feet long, 3-inch diameter unless otherwise noted
SS	Split Spoon Sample - 1-inch or 2-inch O.D.	HA	Hand Auger
LS	Split Spoon (SS) Sampler with 3 feet long liner insert	DP	Drive Point
NR	No Recovery	CM	Coring Machine

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW		WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP		POORLY-GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM		SILTY GRAVELS WITH OR WITHOUT SAND
			GC		CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW		WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP		POORLY-GRADED SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OL		ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CH		INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OH		ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

SYMBOLS KEY

SAMPLE TYPES

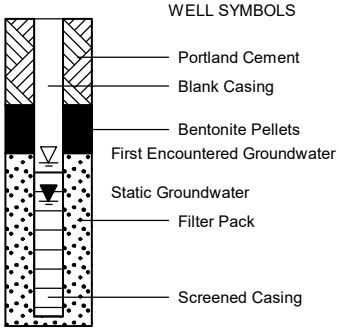

Grab Sample


Rock Core

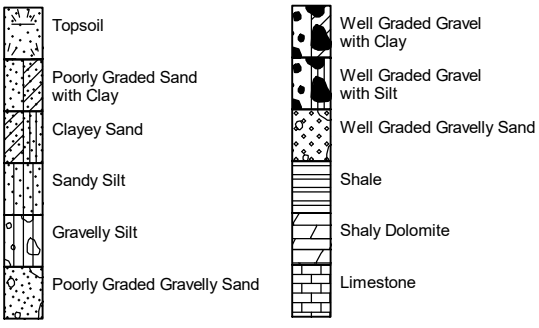

Split Spoon sample, 1 inch or 2 inch outer-diameter.


Shelby Tube sample - 3 inch diameter unless otherwise noted.

WELL SYMBOLS



OTHER MATERIAL SYMBOLS



Mannik Smith GROUP

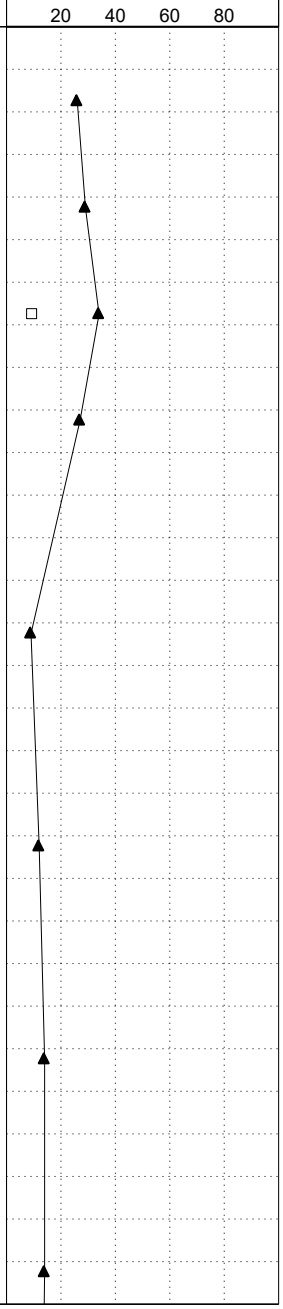
BORING / WELL LOG KEY

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

BOREHOLE NUMBER SB-01

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-14-2024 **COMPLETED** 10-14-2024
POSITION N: 274188.6 ft E: 13348048.6 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 721.8 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RD **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** RJS
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		TOPSOIL - 10 INCHES				
0.8	721.0					
		Lean CLAY with sand (CL): very stiff; brown; dry; some gravel; trace silt.	SPT SS-1	61	8-13-13 (26)	2.00
3.5	718.3					
5	717	Poorly-graded SAND with silt (SP-SM): medium dense; brown; moist; trace gravel.	SPT SS-2	72	10-14-15 (29)	
6.0	715.8					
		Poorly-graded SAND with silt and gravel (SP-SM): dense; brown; moist.	SPT SS-3	50	8-16-18 (34)	
8.5	713.3					
10	712	Well-graded SAND with gravel (SW): medium dense; gray; damp to wet. ▽	SPT SS-4	56	7-12-15 (27)	
13.5	708.3					
15	707	Lean CLAY (CL): medium stiff to very stiff; gray; moist; trace silt and gravel.	SPT SS-5	67	7-6-3 (9)	0.75
20	702		SPT SS-6	61	3-6-6 (12)	2.25
25	697		SPT SS-7	67	3-6-8 (14)	2.00
			SPT SS-8	61	4-5-9 (14)	2.50



LEGEND:

▽ **AT TIME OF DRILLING** 10.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-01

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West **PROJECT**
PROJECT NUMBER 401.2401193.000
LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
			Lean CLAY (CL): medium stiff to very stiff; gray; moist; trace silt and gravel.				
35	687			SPT SS-9	83	3-5-8 (13)	3.00
			38.5 683.3				
			Lean CLAY (CL): very stiff to hard; gray; moist; trace silt and gravel.	SPT SS-10	72	4-6-11 (17)	4.00
40	682						
				SPT SS-11	78	6-9-13 (22)	4.50
45	677						
				SPT SS-12	67	5-9-12 (21)	3.00
50	672		50.0 671.8				
			Terminated at 50.00 ft. Reached Termination Depth.				
55	667						
60	662						
65	657						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ **AT TIME OF DRILLING** ▼ **AT END OF DRILLING** ▼ **AFTER DRILLING**

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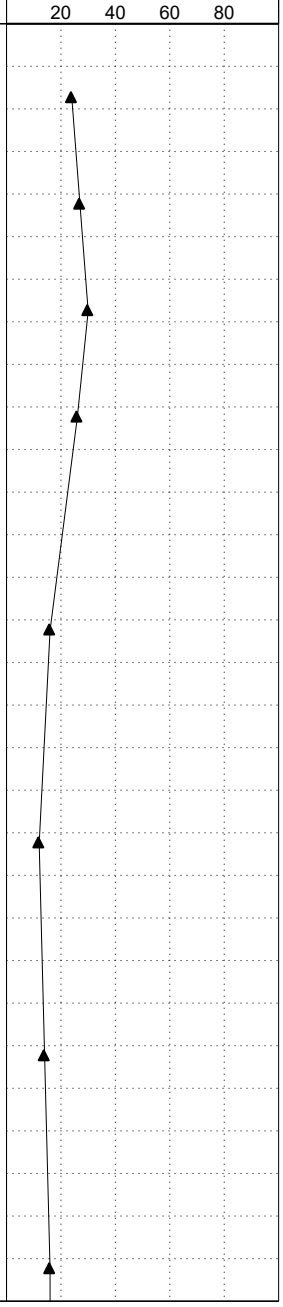
www.manniksmithgroup.com

BOREHOLE NUMBER SB-02

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-14-2024 **COMPLETED** 10-14-2024
POSITION N: 274207.7 ft E: 13348205.1 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 713.8 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RD **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** RJS
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		TOPSOIL - 11 INCHES				
0.9	712.9					
		Lean CLAY with sand (CL): very stiff; brown; moist; trace silt and gravel.	SPT SS-1	56	10-12-12 (24)	
3.5	710.3					
5	709	Poorly-graded SAND (SP): medium dense; brown; moist; trace gravel.	SPT SS-2	83	12-13-14 (27)	
6.0	707.8					
		Well-graded SAND with gravel (SW): medium dense; brown; moist.	SPT SS-3	67	10-14-16 (30)	
8.5	705.3					
10	704	▽ Well-graded SAND with gravel (SW): medium dense; gray; wet.	SPT SS-4	83	8-10-16 (26)	
13.5	700.3					
		Silty SAND (SM): medium dense; gray; wet; trace gravel.	SPT SS-5	61	6-6-10 (16)	
15	699					
18.5	695.3					
		Lean CLAY (CL-ML): stiff to very stiff; gray; damp; trace silt and gravel.	SPT SS-6	78	4-6-6 (12)	1.00
20	694					
25	689		SPT SS-7	78	4-6-8 (14)	2.00
			SPT SS-8	67	5-7-9 (16)	3.00



LEGEND:

▽ **AT TIME OF DRILLING** 9.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-02

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West **PROJECT**
PROJECT NUMBER 401.2401193.000
LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
			Lean CLAY (CL-ML): stiff to very stiff; gray; damp; trace silt and gravel.				
35	679			SPT SS-9	83	4-6-10 (16)	2.50
40	674			SPT SS-10	83	5-7-10 (17)	3.00
45	669			SPT SS-11	78	7-10-14 (24)	4.00
50	664		50.0 663.8	SPT SS-12	67	6-10-12 (22)	3.00
			Terminated at 50.00 ft. Reached Termination Depth.				
55	659						
60	654						
65	649						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ **AT TIME OF DRILLING** ▼ **AT END OF DRILLING** ▼ **AFTER DRILLING**

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

BOREHOLE NUMBER SB-03

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-15-2024 **COMPLETED** 10-15-2024
POSITION N: 274098.6 ft E: 13348352.5 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 714.6 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RD **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** RJS
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 713.9				
		Well-graded SAND with gravel (SW): medium dense; brown; moist; some construction debris; trace clay and organics (FILL).	SPT SS-1	33	6-12-8 (20)	
		3.5 711.1				
	710	Poorly-graded SAND (SP): medium dense; brown; moist.	SPT SS-2	67	8-6-9 (15)	
5		6.0 ▽ 708.6				
		Poorly-graded SAND (SP): medium dense; brown; wet; some clay and gravel.	SPT SS-3	83	9-9-10 (19)	
		8.5 706.1				
	705	Poorly-graded SAND with silt (SP-SM): medium dense to loose; gray; wet; trace clay and gravel.	SPT SS-4	89	12-9-7 (16)	
10						
			SPT SS-5	89	6-6-4 (10)	
	700					
15		16.0 698.6				
		Lean CLAY (CL): stiff to very stiff; gray; moist; trace silt, sand and gravel.	SPT SS-6	100	3-5-8 (13)	2.50
	695					
20						
			SPT SS-7	89	3-3-10 (13)	2.00
	690					
25						
			SPT SS-8	67	4-6-10 (16)	3.00
	685					

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

LEGEND:

▽ **AT TIME OF DRILLING** 6.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-03

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West **PROJECT**
PROJECT NUMBER 401.2401193.000
LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
			Lean CLAY (CL): stiff to very stiff; gray; moist; trace silt, sand and gravel.				
35	680			SPT SS-9	61	3-7-11 (18)	2.50
40	675			SPT SS-10	67	4-7-12 (19)	3.00
45	670			SPT SS-11	67	4-6-12 (18)	3.00
50	665		50.0 664.6	SPT SS-12	61	3-7-10 (17)	2.00
			Terminated at 50.00 ft. Reached Termination Depth.				
55	660						
60	655						
65	650						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ **AT TIME OF DRILLING** ▼ **AT END OF DRILLING** ▼ **AFTER DRILLING**

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BOREHOLE NUMBER SB-04

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-15-2024 **COMPLETED** 10-15-2024
POSITION N: 274044.4 ft E: 13347910.2 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 722.6 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RD **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** RJS
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		TOPSOIL - 10 INCHES				
0.8	721.8					
		Well-graded SAND (SW): medium dense; brown; dry to damp; some gravel.	SPT SS-1	72	8-5-6 (11)	
			SPT SS-2	67	5-8-10 (18)	
5	718					
6.0	716.6					
		Well-graded SAND (SW): medium dense; gray; damp to wet; some gravel. ▽	SPT SS-3	50	5-8-12 (20)	
8.5	714.1					
		Silty SAND (SM): medium dense; gray; wet; trace gravel.	SPT SS-4	61	5-10-15 (25)	
10	713					
13.5	709.1					
		SILT (ML): medium dense; gray; wet; trace clay and sand.	SPT SS-5	83	5-8-10 (18)	
15	708					
			SPT SS-6	78	5-9-15 (24)	
20	703					
23.5	699.1					
		SILTY CLAY (CL-ML): very stiff; gray; damp; trace sand.	SPT SS-7	67	4-8-12 (20)	2.50
25	698					
			SPT SS-8	67	4-7-11 (18)	4.00
	693					

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

LEGEND:

▽ **AT TIME OF DRILLING** 7.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-04

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West **PROJECT**
PROJECT NUMBER 401.2401193.000
LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
35	688		SILTY CLAY (CL-ML): very stiff; gray; damp; trace sand.	SPT SS-9	83	5-8-12 (20)	4.00
			38.5 684.1				
40	683		Lean CLAY (CL): very stiff; gray; damp; trace silt and sand.	SPT SS-10	89	6-13-17 (30)	4.00
45	678			SPT SS-11	89	8-13-17 (30)	3.25
50	673		50.0 672.6	SPT SS-12	83	5-9-18 (27)	4.00
			Terminated at 50.00 ft. Reached Termination Depth.				
55	668						
60	663						
65	658						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ **AT TIME OF DRILLING** ▼ **AT END OF DRILLING** ▼ **AFTER DRILLING**

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BOREHOLE NUMBER SB-05

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-29-2024 **COMPLETED** 10-29-2024
POSITION N: 273807.4 ft E: 13348260.5 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 718.6 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY TCJ **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		TOPSOIL - 10 INCHES				
0.8	717.8					
		Well-graded SAND (SW): medium dense; brown; dry; some clay and gravel.	SPT SS-1	67	6-8-7 (15)	
3.5	715.1					
5	714	Well-graded SAND (SW): medium dense; brown; damp; trace gravel.	SPT SS-2	61	6-8-10 (18)	
6.0	712.6					
		Well-graded SAND with gravel (SW): medium dense; gray; wet. ▽	SPT SS-3	78	7-9-11 (20)	
8.5	710.1					
10	709	Poorly-graded SAND (SP): medium dense; gray; wet; some silt; trace gravel.	SPT SS-4	83	7-10-13 (23)	
13.5	705.1					
15	704	SILTY CLAY (CL-ML): very stiff; gray; moist; trace sand and gravel.	SPT SS-5	61	6-6-10 (16)	4.00
18.5	700.1					
20	699	SILT (ML): medium dense; gray; damp; trace clay, sand, and gravel.	SPT SS-6	72	6-10-14 (24)	
23.5	695.1					
25	694	SILTY CLAY (CL-ML): very stiff; gray; moist; trace sand and gravel.	SPT SS-7	72	6-6-10 (16)	4.00
	689		SPT SS-8	72	4-6-12 (18)	3.50

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

LEGEND:

▽ **AT TIME OF DRILLING** 7.50 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-05

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
			SILTY CLAY (CL-ML): very stiff; gray; moist; trace sand and gravel.				
35	684			SPT SS-9	83	6-8-12 (20)	3.50
			38.5 680.1				
			Lean CLAY with gravel (CL): very stiff to hard; gray; moist; trace silt and sand.	SPT SS-10	83	6-12-16 (28)	4.00
40	679						
				SPT SS-11	78	8-14-20 (34)	3.50
45	674						
				SPT SS-12	78	6-10-14 (24)	4.00
50	669		50.0 668.6				
			Terminated at 50.00 ft. Reached Termination Depth.				
55	664						
60	659						
65	654						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ **AT TIME OF DRILLING** ▼ **AT END OF DRILLING** ▼ **AFTER DRILLING**

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BOREHOLE NUMBER SB-06

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-29-2024 **COMPLETED** 10-29-2024
POSITION N: 273918.0 ft E: 13348179.7 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 715.9 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY TCJ **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 715.2				
		Poorly-graded SAND with silt and gravel (SP-SM): loose; brown; damp to wet; some gravel.	SPT SS-1	72	4-3-3 (6)	
			SPT SS-2	61	4-4-4 (8)	
5	711	▽				
		6.0 709.9				
		Well-graded SAND (SW): medium dense; gray; wet; trace gravel.	SPT SS-3	56	2-6-7 (13)	
			SPT SS-4	50	6-12-10 (22)	
10	706	11.0 704.9				
		Lean CLAY (CL): medium stiff to stiff; gray; damp; trace silt, sand and gravel.	SPT SS-5	50	2-3-4 (7)	2.00
15	701					
			SPT SS-6	67	3-3-4 (7)	2.00
20	696					
		23.5 692.4				
		Lean CLAY (CL): stiff to very stiff; gray; damp; trace silt, sand and gravel.	SPT SS-7	67	3-4-5 (9)	3.00
25	691					
			SPT SS-8	83	2-4-6 (10)	4.00

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

LEGEND:

▽ **AT TIME OF DRILLING** 5.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-06

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
35	681		Lean CLAY (CL): stiff to very stiff; gray; damp; trace silt, sand and gravel.	SPT SS-9	78	4-6-8 (14)	3.00
40	676			SPT SS-10	89	5-7-10 (17)	3.00
45	671			SPT SS-11	83	6-10-14 (24)	3.50
50	666		50.0 665.9	SPT SS-12	78	8-10-10 (20)	3.00
			Terminated at 50.00 ft. Reached Termination Depth.				
55	661						
60	656						
65	651						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ **AT TIME OF DRILLING** ▼ **AT END OF DRILLING** ▼ **AFTER DRILLING**

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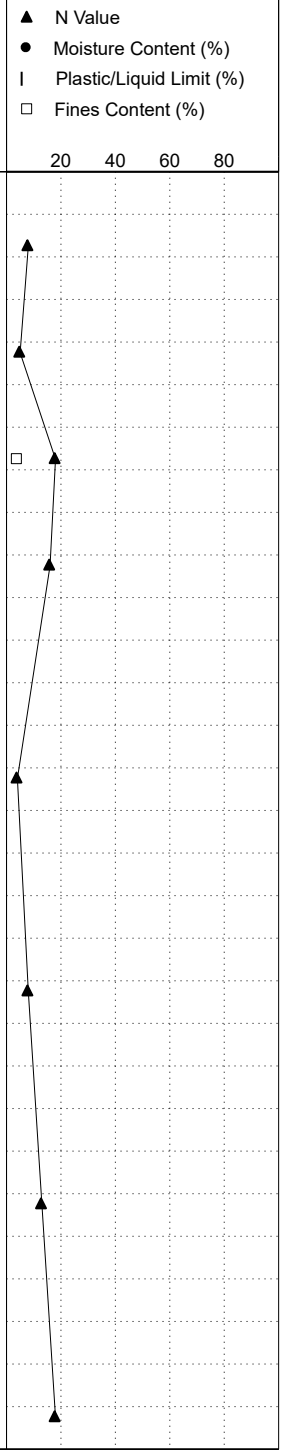
BOREHOLE NUMBER SB-07

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 11-04-2024 **COMPLETED** 11-04-2024
POSITION N: 274154.4 ft E: 13348462.9 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 723.0 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY TCJ **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 722.3				
		Poorly-graded SAND with clay (SP-SC): loose; brown; dry; some gravel; trace organics.	SPT SS-1	33	3-3-5 (8)	
		3.5 719.5				
		Poorly-graded SAND (SP): loose; brown; moist; trace gravel.	SPT SS-2	39	2-3-2 (5)	
5	718	6.0 ▽ 717.0				
		Poorly-graded SAND (SP): medium dense; gray; moist to wet; some gravel.	SPT SS-3	61	7-8-10 (18)	
			SPT SS-4	33	8-9-7 (16)	
10	713					
		13.5 709.5				
		Lean CLAY (CL): soft to medium stiff; gray; moist; trace silt, sand and gravel.	SPT SS-5	61	3-2-2 (4)	1.00
15	708					
			SPT SS-6	78	3-5-3 (8)	2.25
20	703					
		23.5 699.5				
		Lean CLAY (CL): stiff to very stiff; gray; moist; trace silt, sand and gravel.	SPT SS-7	72	4-6-7 (13)	3.00
25	698					
		30.0 693.0	SPT SS-8	89	5-8-10 (18)	2.50

Terminated at 30.00 ft. Reached Termination Depth.



LEGEND:

▽ **AT TIME OF DRILLING** 6.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

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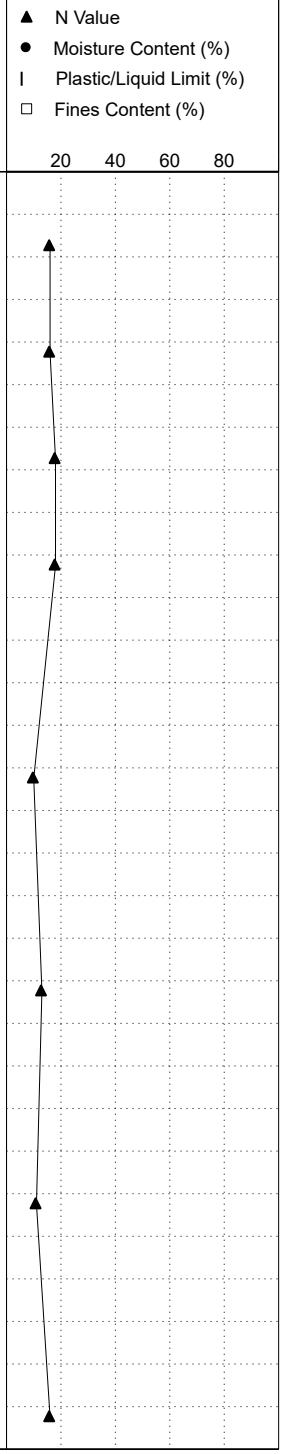
BOREHOLE NUMBER SB-08

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-30-2024 **COMPLETED** 10-30-2024
POSITION N: 273797.9 ft E: 13348140.8 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 721.7 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RSG **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 721.0				
		Sandy Lean CLAY (CL): very stiff; brown; moist; trace gravel.	SPT SS-1	28	6-7-9 (16)	
		3.5 718.2				
5	717	Well-graded SAND with clay (SW-SC): medium dense; brown; damp; trace gravel.	SPT SS-2	72	6-8-8 (16)	
		6.0 ▽ 715.7				
		Well-graded SAND (SW): medium dense; brown; damp to wet; trace gravel.	SPT SS-3	83	7-9-9 (18)	
10	712		SPT SS-4	89	10-9-9 (18)	
		13.5 708.2				
		Well-graded SAND (SW): loose; gray; wet; trace gravel.	SPT SS-5	100	6-5-5 (10)	
15	707					
		17.5 704.2				
		Lean CLAY (CL): stiff to very stiff; gray; moist; trace silt, sand and gravel.	SPT SS-6	100	4-6-7 (13)	1.50
20	702					
			SPT SS-7	89	4-3-8 (11)	2.00
25	697					
			SPT SS-8	67	5-6-10 (16)	1.50
	692	30.0 691.7				

Terminated at 30.00 ft. Reached Termination Depth.



LEGEND:

▽ **AT TIME OF DRILLING** 6.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

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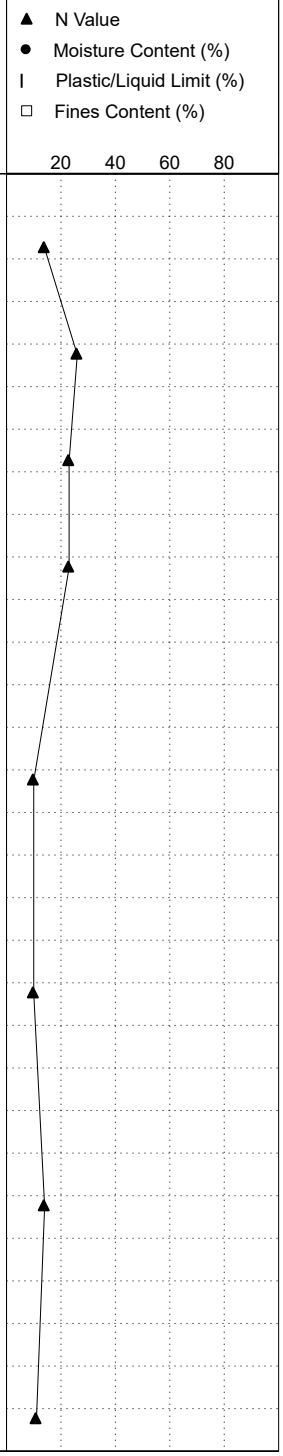
BOREHOLE NUMBER SB-09

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 11-04-2024 **COMPLETED** 11-04-2024
POSITION N: 274007.4 ft E: 13348437.9 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 723.4 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY TCJ **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 722.7				
		Well-graded SAND (SW): medium dense; brown; dry; some clay; trace gravel.	SPT SS-1	33	5-6-8 (14)	
		3.5 719.9				
5	719	Well-graded SAND (SW): medium dense; brown; moist; trace gravel.	SPT SS-2	50	13-12-14 (26)	
		6.0 ▽ 717.4				
		Poorly-graded SAND (SP): medium dense; brown; damp; trace gravel.	SPT SS-3	61	14-13-10 (23)	
		8.5 714.9				
10	714	Lean CLAY with sand (CL): very stiff; gray; damp; some gravel; trace silt.	SPT SS-4	56	9-10-13 (23)	2.00
		13.5 709.9				
15	709	Lean CLAY (CL): stiff to very stiff; gray; moist; trace silt, sand and gravel.	SPT SS-5	67	3-4-6 (10)	1.25
20	704		SPT SS-6	72	2-5-5 (10)	2.50
25	699		SPT SS-7	56	3-6-8 (14)	1.50
	694	30.0 693.4	SPT SS-8	78	2-4-7 (11)	3.00

Terminated at 30.00 ft. Reached Termination Depth.



LEGEND:

▽ **AT TIME OF DRILLING** 6.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

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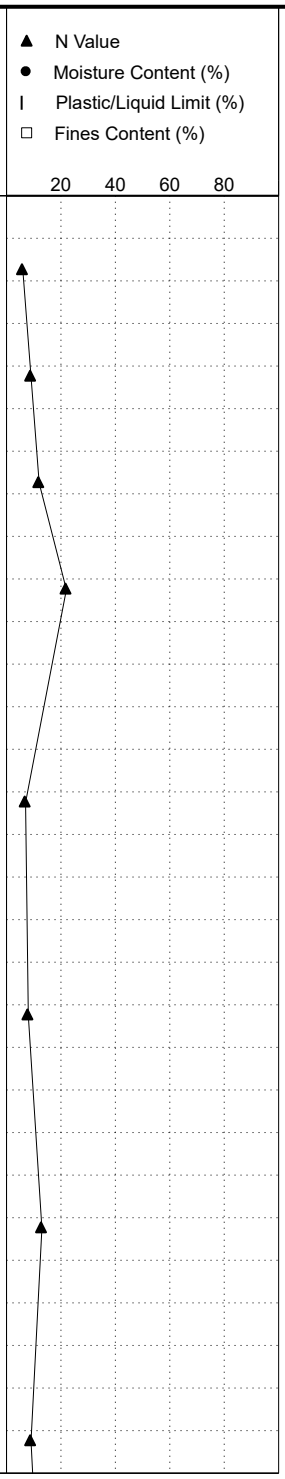
BOREHOLE NUMBER SB-10

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-30-2024 **COMPLETED** 10-30-2024
POSITION N: 273872.3 ft E: 13348310.3 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 723.7 ft **FINAL DEPTH** 50.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RSG **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 723.0				
		Well-graded SAND (SW): loose; brown; moist to wet; trace gravel.	SPT SS-1	67	3-3-3 (6)	
			SPT SS-2	61	3-4-5 (9)	
5	719	▽				
		6.0 717.7				
		Well-graded SAND (SW): medium dense; gray; wet; trace gravel.	SPT SS-3	56	4-6-6 (12)	
			SPT SS-4	44	8-10-12 (22)	
10	714					
		12.5 711.2				
		Lean CLAY (CL): medium stiff to stiff; gray; damp to moist; trace silt, sand and gravel.	SPT SS-5	67	3-4-3 (7)	2.50
15	709					
			SPT SS-6	83	4-4-4 (8)	1.00
20	704					
		23.5 700.2				
		Lean CLAY (CL-ML): stiff to very stiff; gray; moist; some gravel; trace silt and sand.	SPT SS-7	78	5-6-7 (13)	3.50
25	699					
			SPT SS-8	89	3-4-5 (9)	2.25
	694					



LEGEND:

▽ **AT TIME OF DRILLING** 5.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

BOREHOLE NUMBER SB-10

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
35	689		Lean CLAY (CL-ML): stiff to very stiff; gray; moist; some gravel; trace silt and sand.	SPT SS-9	78	5-6-7 (13)	2.75
40	684			SPT SS-10	78	6-8-11 (19)	2.75
45	679			SPT SS-11	83	8-8-12 (20)	3.00
50	674		50.0 673.7 Terminated at 50.00 ft. Reached Termination Depth.	SPT SS-12	83	5-8-13 (21)	3.00
55	669						
60	664						
65	659						

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)

20 40 60 80

LEGEND ▽ AT TIME OF DRILLING ▼ AT END OF DRILLING ▽ AFTER DRILLING

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
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www.manniksmithgroup.com

BOREHOLE NUMBER SB-11

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 11-04-2024 **COMPLETED** 11-04-2024
POSITION N: 273852.6 ft E: 13348491.7 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 733.2 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY TCJ **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 732.5				
		Clayey SAND (SC): loose; mottled brown and gray; moist; trace gravel.	SPT SS-1	44	4-6-2 (8)	
		3.5 729.7				
5	729	Well-graded SAND (SW): very loose; gray; damp; trace gravel.	SPT SS-2	33	2-2-1 (3)	
		6.0 ▽ 727.2				
		Well-graded SAND (SW): medium dense; gray; wet; trace gravel.	SPT SS-3	56	8-7-9 (16)	
10	724		SPT SS-4	22	8-7-8 (15)	
		12.5 720.7				
		Lean CLAY (CL): medium stiff to stiff; gray; moist; trace silt, sand and gravel.	SPT SS-5	56	2-3-4 (7)	1.75
15	719					
20	714		SPT SS-6	72	2-4-6 (10)	2.00
25	709		SPT SS-7	56	3-5-9 (14)	1.75
		28.5 704.7				
	704	Lean CLAY (CL): very stiff; gray; moist; trace silt, sand and gravel.	SPT SS-8	78	4-7-12 (19)	4.00
		30.0 703.2				

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

Terminated at 30.00 ft. Reached Termination Depth.

LEGEND:

▽ **AT TIME OF DRILLING** 6.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

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BOREHOLE NUMBER SB-12

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-16-2024 **COMPLETED** 10-16-2024
POSITION N: 273879.6 ft E: 13348008.4 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 714.7 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RD **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** RJS
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		TOPSOIL - 10 INCHES				
0.8	713.9					
		Silty SAND (SM): dense; dark brown; dry; some clay; trace gravel.	SPT SS-1	61	15-17-20 (37)	
3.5	711.2					
		Poorly-graded SAND (SP): medium dense; moist; trace gravel.	SPT SS-2	72	6-8-10 (18)	
6.0	708.7					
		Well-graded SAND (SW): medium dense; brown; moist to wet; trace gravel.	SPT SS-3	67	4-6-8 (14)	
			SPT SS-4	78	8-10-12 (22)	
13.5	701.2					
		Silty SAND (SM): dense; gray; wet; trace gravel.	SPT SS-5	67	12-15-18 (33)	
18.5	696.2					
		SILTY CLAY (CL-ML): stiff to very stiff; gray; damp to moist; trace sand and gravel.	SPT SS-6	72	2-4-8 (12)	1.00
			SPT SS-7	67	4-6-9 (15)	2.00
30.0	684.7		SPT SS-8	67	4-6-10 (16)	2.50

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

Terminated at 30.00 ft. Reached Termination Depth.

LEGEND:

▽ **AT TIME OF DRILLING** 8.50 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

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BOREHOLE NUMBER SB-13

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 10-30-2024 **COMPLETED** 10-30-2024
POSITION N: 274115.5 ft E: 13348144.4 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 722.3 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY RSG **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
0		TOPSOIL - 10 INCHES				
0.8	721.5	Silty SAND (SM): dense; brown; dry; some clay and gravel.	SPT SS-1	56	15-20-15 (35)	
3.5	718.8	Well-graded SAND (SW): medium dense; brown; moist; some gravel.	SPT SS-2	67	6-8-8 (16)	
5	718		SPT SS-3	61	2-7-10 (17)	
8.5 ▽	713.8	Well-graded SAND with gravel (SW): medium dense; gray; wet.	SPT SS-4	50	6-10-13 (23)	
10	713					
13.5	708.8	Silty SAND (SM): dense; gray; wet; trace gravel.	SPT SS-5	67	10-15-20 (35)	
15	708					
18.5	703.8	SILTY CLAY (CL-ML): stiff to very stiff; gray; moist; trace sand and gravel.	SPT SS-6	78	2-5-7 (12)	2.50
20	703					
	698		SPT SS-7	83	3-7-8 (15)	1.75
25						
	693		SPT SS-8	78	3-6-9 (15)	2.00
30.0	692.3					

▲ N Value
● Moisture Content (%)
I Plastic/Liquid Limit (%)
□ Fines Content (%)
20 40 60 80

Terminated at 30.00 ft. Reached Termination Depth.

LEGEND:

▽ **AT TIME OF DRILLING** 9.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

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BOREHOLE NUMBER SB-14

CLIENT Detroit Regional Partnership
PROJECT NAME RACER Van Buren West
PROJECT NUMBER 401.2401193.000
PROJECT LOCATION Van Buren Township, Michigan
DATE STARTED 11-04-2024 **COMPLETED** 11-04-2024
POSITION N: 273983.8 ft E: 13348360.5 ft (NAD 1983 Michigan South (Intl Feet))
DRILLING CONTRACTOR The Mannik & Smith Group, Inc.
SURFACE ELEVATION 723.5 ft **FINAL DEPTH** 30.0 ft
DRILLING METHOD ASTM D6151
LOGGED BY TCJ **CHECKED BY** CT
EQUIPMENT Geoprobe 3230 DT **Operator** BSM
REMARKS

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		0.7 TOPSOIL - 8 INCHES 722.8				
		Well-graded SAND with gravel (SW): medium dense; brown; dry; some clay.	SPT SS-1	44	5-5-9 (14)	
		3.5 720.0				
5	719	Well-graded SAND (SW): medium dense; gray; moist to wet; some gravel.	SPT SS-2	56	15-13-14 (27)	
			SPT SS-3	67	15-12-14 (26)	
10	714		SPT SS-4	78	10-11-12 (23)	
		13.5 710.0				
15	709	Lean CLAY (CL): stiff to very stiff; gray; moist; trace silt, sand and gravel.	SPT SS-5	72	2-5-6 (11)	2.00
20	704		SPT SS-6	67	2-4-5 (9)	2.25
25	699		SPT SS-7	56	4-5-8 (13)	2.75
	694	30.0 693.5	SPT SS-8	72	3-5-7 (12)	2.75

Terminated at 30.00 ft. Reached Termination Depth.

N Value
Moisture Content (%)
Plastic/Liquid Limit (%)
Fines Content (%)
20 40 60 80

LEGEND:

▽ **AT TIME OF DRILLING** 6.00 ft
▼ **AT END OF DRILLING**
▼ **AFTER DRILLING**

APPENDIX C

SOIL LABORATORY TEST DATA

LABORATORY TEST PROCEDURES

A brief description of the most common laboratory tests performed at the Geotechnical Engineering Laboratory at the Mannik Smith Group is provided in the following sections.

DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D2488)
The visual classification of soil samples are performed in accordance with ASTM D2488 standard. Our engineers use this test method to describe each soil sample using visual examination and simple manual tests. Visual classification helps grouping similar soil samples so that only a minimum number of laboratory tests are required for positive soil classification.

POCKET PENETROMETER
In the pocket penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small, calibrated spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square foot.

NATURAL MOISTURE CONTENT (ASTM D2216)
Natural moisture content represents the ratio of the weight of water in a given amount of soil to the weight of solid particles. Natural moisture content is expressed as a percentage (%). In this test method the water content is measured in the laboratory by noting the weight loss after drying the soil at specific temperature for 24 hours.

ATTERBERG LIMITS (ASTM D4318)
The Atterberg Limits test is performed in accordance with ASTM D4318. Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI) of the soil sample are determined using this test method. The Liquid Limit is the moisture content at which the soil begins to behave as a liquid material and starts to flow. The Plastic Limit is the moisture content at which the soil changes from plastic to semi-solid stage. The Plasticity Index (PI = LL - PL) is the range of moisture content at which the soil is in a plastic stage. Typically, a soil's potential for volume change increases with increase of plasticity indices.

PARTICLE SIZE ANALYSIS (ASTM D421, D422 and D1140)
These tests are performed to determine the partial soil particle size distribution. The soil sample is prepared according to ASTM D421 test method. The amount of material finer than the openings on the No. 200 sieve (0.075 mm) is determined by wash sieve method according to ASTM D1140. The hydrometer test is used to determine particle size distribution of material finer than 0.075 mm according to ASTM D422 test method.

STANDARD PROCTOR COMPACTION TEST (ASTM D698)
The Standard Proctor compaction test is used to determine maximum dry density and optimum moisture content of the soil sample. In this test, the soil is compacted in the Proctor mold in three lifts of equal volume using a standard effort by the free falling of a 5.5 lb rammer from 12 inches above soil surface. The test procedure is repeated on samples at several different moisture contents and a parabolic graph showing the relationship between moisture content and dry density of the soil is established. The maximum dry unit weight of the compacted sample and the respective moisture content is reported as maximum dry density and optimum moisture content of the soil sample.

MODIFIED PROCTOR COMPACTION TEST (ASTM D1557)
Modified Proctor compaction is similar to the Standard Proctor test. In this test, the soil is compacted in the Proctor mold in five lifts of equal volume using a standard effort by the free falling of a 10 lb rammer from 18 inches above the soil surface. The maximum dry unit weight of the compacted sample and the respective moisture content is reported as maximum dry density and optimum moisture content of the soil sample.

LABORATORY CALIFORNIA BEARING RATIO (ASTM D1883)
The CBR value is the ratio of forces required for 0.1-inch penetration of a 2-inch diameter circular plunger at the rate of 0.05 inch/min into a compacted soil sample compared to the same penetration in a certain standard crushed stone.

LOSS ON IGNITION TEST (LOI) (ASTM D2974)
LOI tests are performed on peat or suspected organic soils. An oven-dried sample is ignited in a furnace at 440°C (Method C) or 750°C (Method D). The ash content of the soil sample is determined as a percentage of the weight of the oven-dried sample. The organic content is the loss of weight due to ignition and reported as a percentage of the weight of the oven-dried sample.

ONE-DIMENSIONAL CONSOLIDATION TEST (ASTM D2435)
The consolidation test data is used to estimate the magnitude and rate of both differential and total settlement of a structure. A one-dimensional consolidation test is performed in a consolidation ring that does not allow lateral displacement of the sample. The sample is subjected to various vertical loading and unloading cycles. The deformation of the sample due to loading and unloading is recorded and used for the plotting a void ratio-applied pressure graph. The pre-consolidation pressure for the soil can also be determined from this test.

UNCONFINED COMPRESSION TEST ON ROCK SAMPLES (ASTM D7012)

In the unconfined compression test, the unconfined compressive strength (q_u) of a rock sample is estimated by measuring the resistance of the sample in compression when an axial loading is applied to the cylindrical specimen (with a height to diameter ratio of approximately 2) to reach the failure condition.

UNCONFINED COMPRESSION TEST ON SOIL SAMPLES (ASTM D2166)

In the unconfined compression test, the unconfined compressive strength (q_u) of a cohesive soil sample is estimated by measuring the resistance of the sample in compression when an axial loading is applied to the cylindrical specimen (with a height to diameter ratio of 2 to 2.5) to reach the failure condition or 15 percent (%) of axial deformation, whichever is secured first.

UNCONSOLIDATED-UNDRAINED (UU) TRIAXIAL COMPRESSION TEST (ASTM D2850)

Triaxial Shear tests are used to determine the shear strength of soil samples under various loading conditions. The test is performed on a relatively undisturbed sample extruded from a Shelby tube. In this test method, fluid flow is not permitted into or out of the soil specimen as the load is applied (undrained condition), therefore pore pressure builds up in the sample. The compressive strength of a soil is determined in terms of the total stress. The various confining pressures help determining the shear strength of the soil at different depths.

CONSOLIDATED-UNDRAINED (CU) TRIAXIAL COMPRESSION TEST (ASTM D4767)

The shear characteristics of cohesive samples (collected from relatively undisturbed sample extruded from a Shelby tube) are measured in this test under undrained conditions. This test represents field conditions where fully consolidated soils under one set of stresses are subjected to a sudden change in stress without sufficient time for further consolidation (undrained condition). The data from this test is used to analyze the shear strength parameters of the soil at different depths. The compressive strength of a soil is reported in terms of the effective stress.

WATER SOLUBLE SULFATE, RESISTIVITY AND PH

To evaluate the corrosion potential of the site, MSG performs sulfates (Ohio DOT Supplement 1122), resistivity (ASTM G187), and pH tests (ASTM D4972) on select soil samples.

SPECIFIC GRAVITY (ASTM D854)

Specific gravity is defined as the ratio of the unit weight of soil solids only to unit weight of water at a specific temperature. MSG performs specific gravity tests for soils according to ASTM D854 test procedure.

PERMEABILITY (ASTM D2434 and ASTM D5084)

This test method covers laboratory measurements of the hydraulic conductivity (the coefficient of permeability) of water-saturated granular and cohesive materials. MSG performs multiple methods for permeability tests according to ASTM D2434 and ASTM D5084.

DIRECT SHEAR TEST (ASTM D3080)

The direct shear tests are performed to determine the maximum and residual shear strength. A horizontal load is applied at a constant rate of strain. The soil sample is placed in a box where the lower half of the box is mounted on rollers and is pushed forward at a uniform rate by a motorized apparatus. The upper half of the box bears against a steel proving ring, the deformation of which is shown on a dial gauge indicating the shear force. The various information that can be obtained from the results includes the maximum (peak) shear strength and the ultimate (residual) shear strength.

ATTERBERG LIMITS' RESULTS

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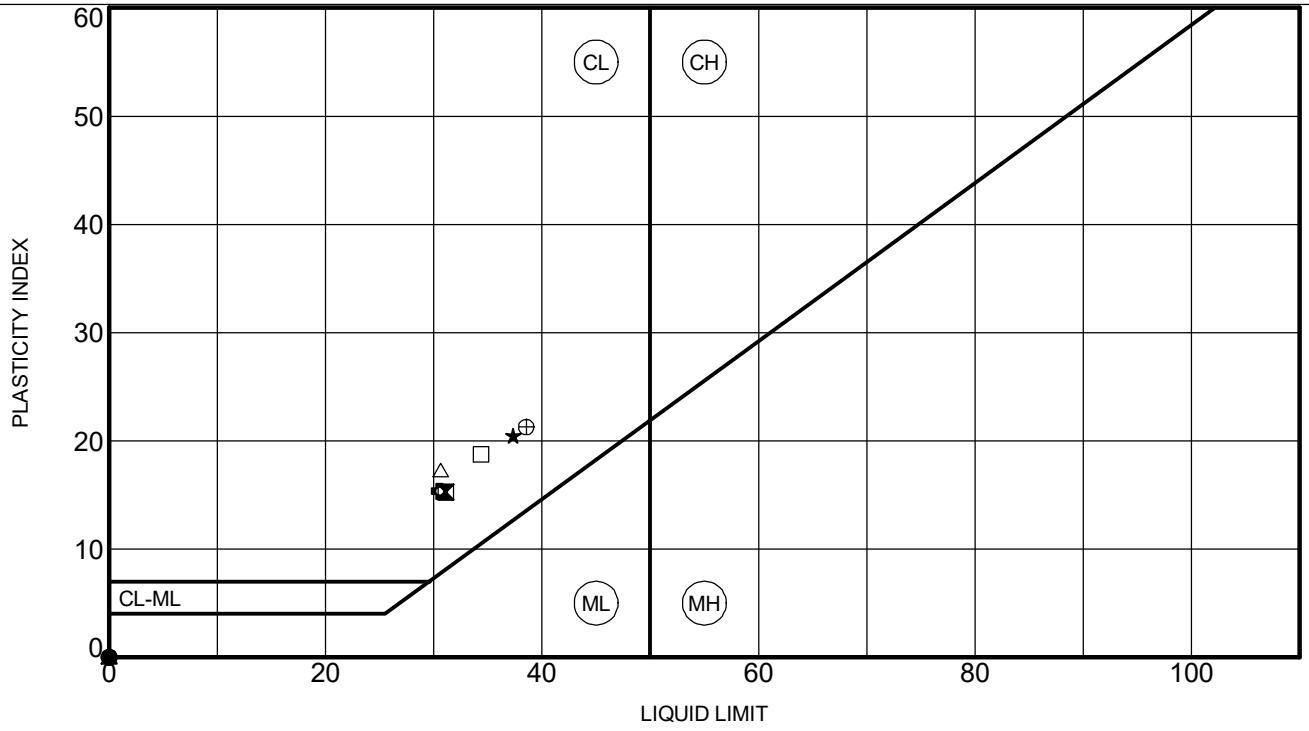
AASHTO R18

CLIENT Detroit Regional Partnership **PROJECT NAME** RACER Van Buren West

PROJECT NUMBER 401.2401193 **PROJECT LOCATION** Van Buren, Michigan



	Specimen Identification		LL	PL	PI	Fines	Classification
●	SB-01 / 6.0 ft	6.0	NP	NP	NP	9	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)
⊠	SB-01 / 18.5 ft	18.5	31	16	15		
▲	SB-03 / 8.5 ft	8.5	NP	NP	NP	7	POORLY GRADED SAND with SILT (SP-SM)
★	SB-03 / 18.5 ft	18.5	37	17	20		
⊙	SB-05 / 8.5 ft	8.5	NP	NP	NP	2	POORLY GRADED SAND (SP)
✿	SB-05 / 13.5 ft	13.5	31	15	16		
○	SB-06 / 3.5 ft	3.5	NP	NP	NP	9	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)
△	SB-06 / 28.5 ft	28.5	31	13	18		
⊗	SB-07 / 6.0 ft	6.0	NP	NP	NP	4	POORLY GRADED SAND (SP)
⊕	SB-07 / 13.5 ft	13.5	39	17	22		
□	SB-11 / 18.5 ft	18.5	34	16	18		

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-01 SS-1	Date:	12/9/2024
Visual Soil Description:	Sand	Depth:	1.0'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	60.4
B= Mass of Oven Dried Sample (g)	57.0

Oven Dried MC%	6.1

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	57.0
C= Mass of Ash (g)	56.3

D= Ash Content %	98.8

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	1.2

Computed By:	MJG	Checked By:	Cathal Taylor

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-03 SS-1	Date:	12/9/2024
Visual Soil Description:	Sand	Depth:	1.0'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	55.0
B= Mass of Oven Dried Sample (g)	48.7

Oven Dried MC%	13.0

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	48.7
C= Mass of Ash (g)	47.4

D= Ash Content %	97.4

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	2.6

Computed By:	MJG	Checked By:	Cathal Taylor

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-04 SS-2	Date:	11/20/2024
Visual Soil Description:	Sand	Depth:	3.5'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	82.1
B= Mass of Oven Dried Sample (g)	73.0

Oven Dried MC%	12.5

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	73.0
C= Mass of Ash (g)	72.7

D= Ash Content %	99.6

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	0.4

Computed By:	MJG	Checked By:	Cathal Taylor

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-05 SS-2	Date:	11/20/2024
Visual Soil Description:	Sand	Depth:	3.5'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	76.4
B= Mass of Oven Dried Sample (g)	68.9

Oven Dried MC%	10.9

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	68.9
C= Mass of Ash (g)	68.7

D= Ash Content %	99.7

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	0.3

Computed By:	MJG	Checked By:	Cathal Taylor

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-06 SS-1	Date:	12/2/2024
Visual Soil Description:	Sand	Depth:	1.0'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	61.1
B= Mass of Oven Dried Sample (g)	57.8

Oven Dried MC%	5.7

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	57.8
C= Mass of Ash (g)	57.5

D= Ash Content %	99.4

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	0.6

Computed By:	MJG	Checked By:	Cathal Taylor

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-07 SS-3	Date:	1/7/2025
Visual Soil Description:	Sand	Depth:	6.0'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	55.4
B= Mass of Oven Dried Sample (g)	48.2

Oven Dried MC%	14.9

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	48.2
C= Mass of Ash (g)	47.9

D= Ash Content %	99.4

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	0.6

Computed By:	MJG	Checked By:	Cathal Taylor

MOISTURE, ASH, AND ORGANIC MATTER OF PEAT AND OTHER ORGANIC SOILS
ASTM D2974 and SOIL pH

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-11 SS-2	Date:	1/7/2025
Visual Soil Description:	Sand	Depth:	3.5'

Moisture Content: Test Method A

Note: **Moisture Contents are determined by proportion of as-received mass**

A= Mass of Moist Sample (g)	78.0
B= Mass of Oven Dried Sample (g)	68.0

Oven Dried MC%	14.8

Ash Content: Test Method C

Note: **Furnace temperature used for ash content determination= 440 ºC**

B= Mass of Oven Dried Sample (g)	68.0
C= Mass of Ash (g)	67.3

D= Ash Content %	98.9

Organic Matter

Formula: **Organic Matter,%=100 - D**

Organic Matter %	1.1

Computed By:	MJG	Checked By:	Cathal Taylor

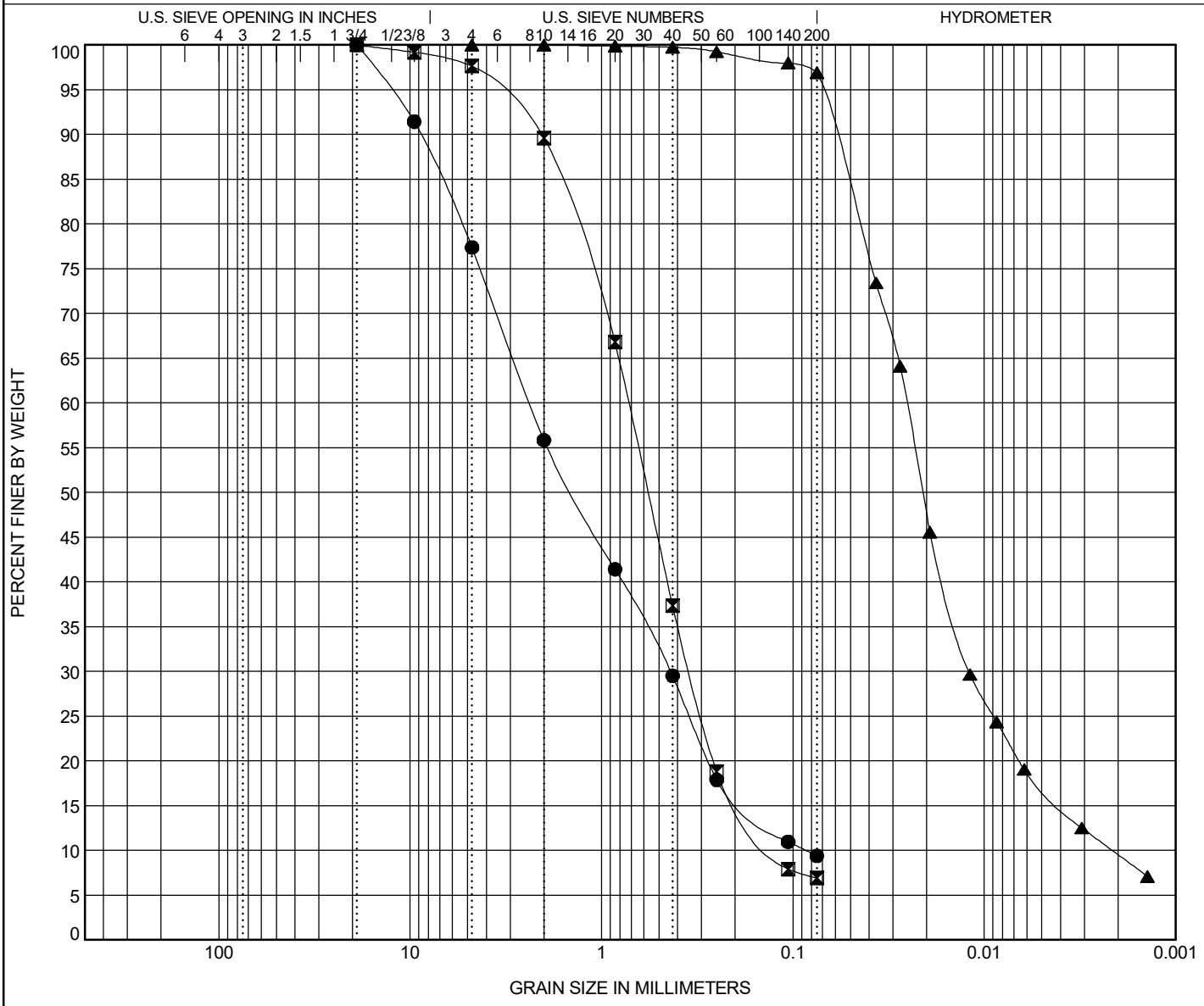
GRAIN SIZE DISTRIBUTION

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

AASHTO R18

CLIENT Detroit Regional Partnership **PROJECT NAME** RACER Van Buren West

PROJECT NUMBER 401.2401193 **PROJECT LOCATION** Van Buren, Michigan



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● SB-01 / 6.0 ft	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	NP	NP	NP	0.94	27.59
⊠ SB-03 / 8.5 ft	POORLY GRADED SAND with SILT (SP-SM)	NP	NP	NP	1.31	5.81
▲ SB-04 / 13.5 ft	SILT (ML)				2.66	11.85

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● SB-01 / 6.0 ft	19	2.363	0.437	0.086	22.6	68.0	9.4	
⊠ SB-03 / 8.5 ft	19	0.724	0.344	0.125	2.4	90.7	6.9	
▲ SB-04 / 13.5 ft	4.75	0.025	0.012	0.002	0.0	3.1	87.4	9.5

GRAIN SIZE DISTRIBUTION

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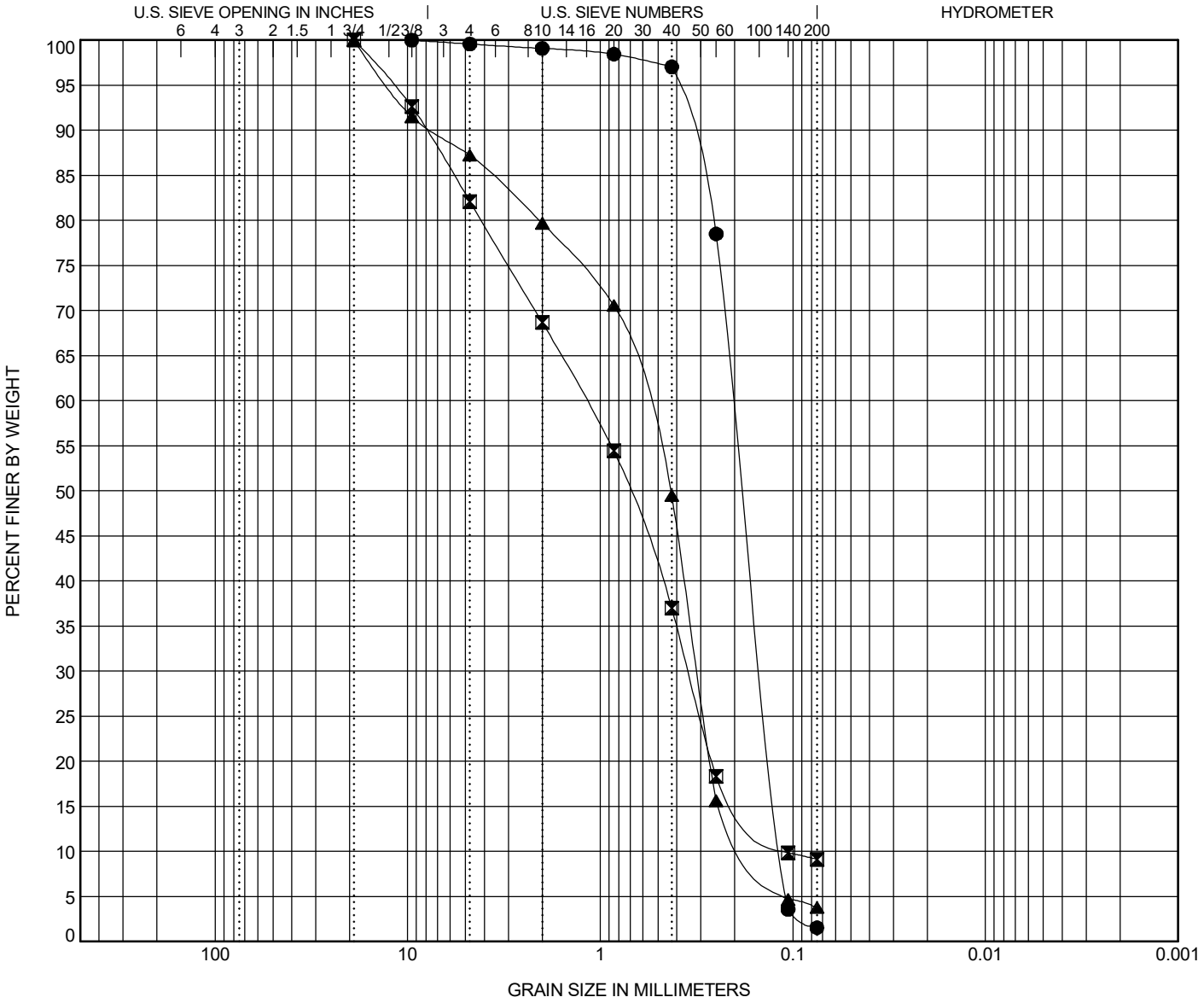
www.manniksmithgroup.com

AASHTO R18

CLIENT Detroit Regional Partnership **PROJECT NAME** RACER Van Buren West

PROJECT NUMBER 401.2401193 **PROJECT LOCATION** Van Buren, Michigan



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● SB-05 / 8.5 ft	POORLY GRADED SAND (SP)	NP	NP	NP	0.89	1.77
⊠ SB-06 / 3.5 ft	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	NP	NP	NP	0.95	11.06
▲ SB-07 / 6.0 ft	POORLY GRADED SAND (SP)	NP	NP	NP	1.02	3.74

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● SB-05 / 8.5 ft	9.525	0.202	0.143	0.114	0.4	98.0	1.5	
⊠ SB-06 / 3.5 ft	19	1.188	0.348	0.107	17.9	73.0	9.1	
▲ SB-07 / 6.0 ft	19	0.601	0.313	0.161	12.8	83.5	3.8	

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-01 SS5	Date:	1/6/2025
Visual Soil Description:	Clay	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-01	1.3	1,300.00	24.4	N/A

ρ(ohm-cm) = AR/d		
A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-03 SS7	Date:	1/6/2025
Visual Soil Description:	Clay	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-03	1.7	1,700.00	16.9	N/A

ρ(ohm-cm) = AR/d

A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-04 SS4	Date:	1/6/2025
Visual Soil Description:	Sand	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-04	2.8	2,800.00	20.3	N/A

ρ(ohm-cm) = AR/d		
A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-05 SS3	Date:	1/6/2025
Visual Soil Description:	Sand	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-05	3.9	3,900.00	11.3	N/A

ρ(ohm-cm) = AR/d		
A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-06 SS3	Date:	1/6/2025
Visual Soil Description:	Sand	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-06	2.4	2,400.00	13.7	N/A

ρ(ohm-cm) = AR/d

A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-07 SS2	Date:	1/6/2025
Visual Soil Description:	Sand	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-07	3.4	3,400.00	17.5	N/A

ρ(ohm-cm) = AR/d

A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

SOIL RESISTIVITY
ASTM G57

Project Name:	RACER Van Buren West	Project No.	401.2401193.000
Sample No.	SB-11 SS4	Date:	1/6/2025
Visual Soil Description:	Sand	Tested By:	Michael Gerdeman
Meter Used:	Nilsson 400A and Miller Box		
Soil Box Factor:	4.25" X 1.25" Box		

Sample Number	Measured Resistance in Lab (KΩ)	Resistivity (As Received) in Lab (Ω-cm)	As Received Moisture Content (%)	PH
SB-11	3.1	3,100.00	17.5	N/A

ρ(ohm-cm) = AR/d		
A= Exposed Area, cm^2	R= Resistance in Ohms	d= Distance between electrodes, cm

Computed By:	MJG	Checked By:	Cathal Taylor

Mannik Smith Group, Inc.
DETERMINING SULFATE CONTENT IN SOILS
SUPPLEMENT 1122
LABORATORY TEST SHEET

Project No.	401.2401193.000
Date	12/20/2024
Tested by:	MJG
Checked by:	Cathal Taylor

Sample or Boring ID	Start Soak Date/Time	Start Filter Date/Time	Start Test Date/Time	Soaking Time (hr)	Dilution Ratio	Replicate Sample Readings			Average Reading	Sulphate Content (ppm)
						1	2	3		
SB01 SS2	11/19/24 3:15pm	11/20/24 3:45pm	12/20/24 12:00pm	24.5	1:20	3	3	3	3	60
SB03 SS3	11/19/24 3:15pm	11/20/24 3:45pm	12/20/24 12:15pm	24.5	1:20	1	1	1	1	20
SB04 SS5	11/19/24 3:00pm	11/20/24 4:00pm	12/20/24 12:30pm	25	1:20	25	25	25	25	500
SB05 SS1	11/19/24 3:30pm	11/20/24 4:00pm	12/20/24 12:45pm	24.5	1:20	1	2	2	2	40
SB06 SS2	11/19/24 2:30pm	11/20/24 2:30pm	12/20/24 1:00pm	24	1:20	4	4	4	4	80
SB07 SS4	11/19/24 3:00pm	11/20/24 3:00pm	12/20/24 1:15pm	24	1:20	13	13	12	13	260
SB11 SS2	11/19/24 3:00pm	11/20/24 3:00pm	12/20/24 1:30pm	24	1:20	4	4	3	4	80

FREE SWELL TEST

Project Name:	RACER Van Buren West	Project No:	401.2401193
Sample No.	SB-1 SS-6	Date:	1/22/2025
Visual Soil Description:	Lean Clay	Depth:	18.5-20.0'

Formula

$$Sf = \frac{Vf - Vi}{Vi} * 100$$

S_f = Free Swell
V_i = initial dry volume of poured soil
V_f = final volume of poured soil

V_f	V_i	S_f
0.0006	1.000	0.060

Computed By:	MJG	Checked By:	C. Taylor

FREE SWELL TEST

Project Name:	RACER Van Buren West	Project No:	401.2401193
Sample No.	SB-3 SS-8	Date:	1/21/2025
Visual Soil Description:	Lean Clay	Depth:	28.5-30.0'

Formula

$$Sf = \frac{Vf - Vi}{Vi} * 100$$

S_f = Free Swell
V_i = initial dry volume of poured soil
V_f = final volume of poured soil

V_f	V_i	S_f
0.0009	1.000	0.090

Computed By:	MJG	Checked By:	C. Taylor

FREE SWELL TEST

Project Name:	RACER Van Buren West	Project No:	401.2401193
Sample No.	SB-5 SS-5	Date:	1/21/2025
Visual Soil Description:	Lean Clay	Depth:	13.5-15.0'

Formula

$$Sf = \frac{Vf - Vi}{Vi} * 100$$

S_f = Free Swell
V_i = initial dry volume of poured soil
V_f = final volume of poured soil

V_f	V_i	S_f
0.0005	1.000	0.050

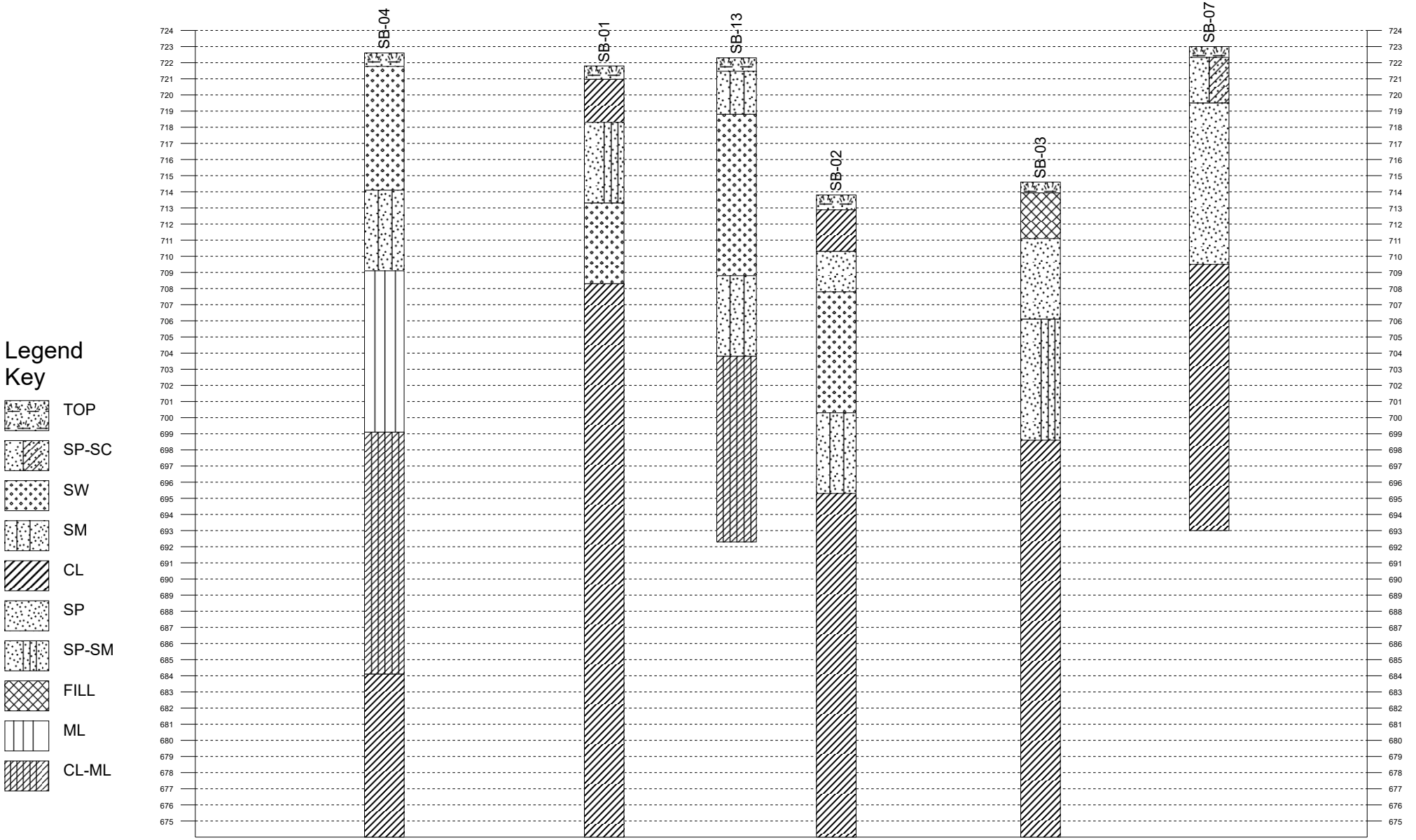
Computed By:	MJG	Checked By:	C. Taylor

APPENDIX D

SECTIONAL DRAWINGS

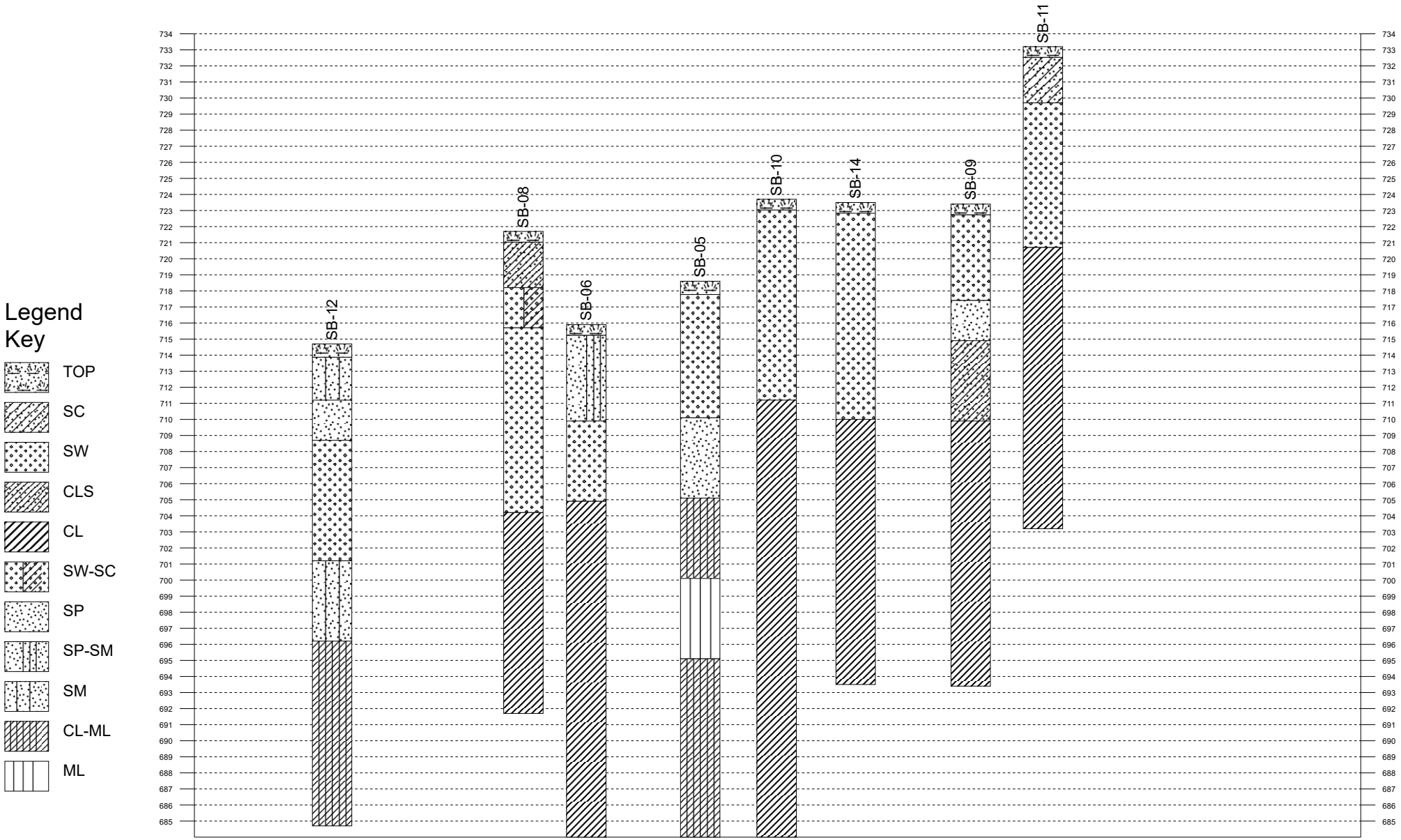
Section 1

CLIENT Detroit Regional Partnership
PROJECT NUMBER 401.2401193.000
PROJECT NAME RACER Van Buren West
PROJECT LOCATION Van Buren Township, Michigan
VERTICAL SCALE 1:100
HORIZONTAL SCALE 1:1095



Section 2

CLIENT Detroit Regional Partnership
PROJECT NUMBER 401.2401193.000
PROJECT NAME RACER Van Buren West
PROJECT LOCATION Van Buren Township, Michigan
VERTICAL SCALE 1:100
HORIZONTAL SCALE 1:1090

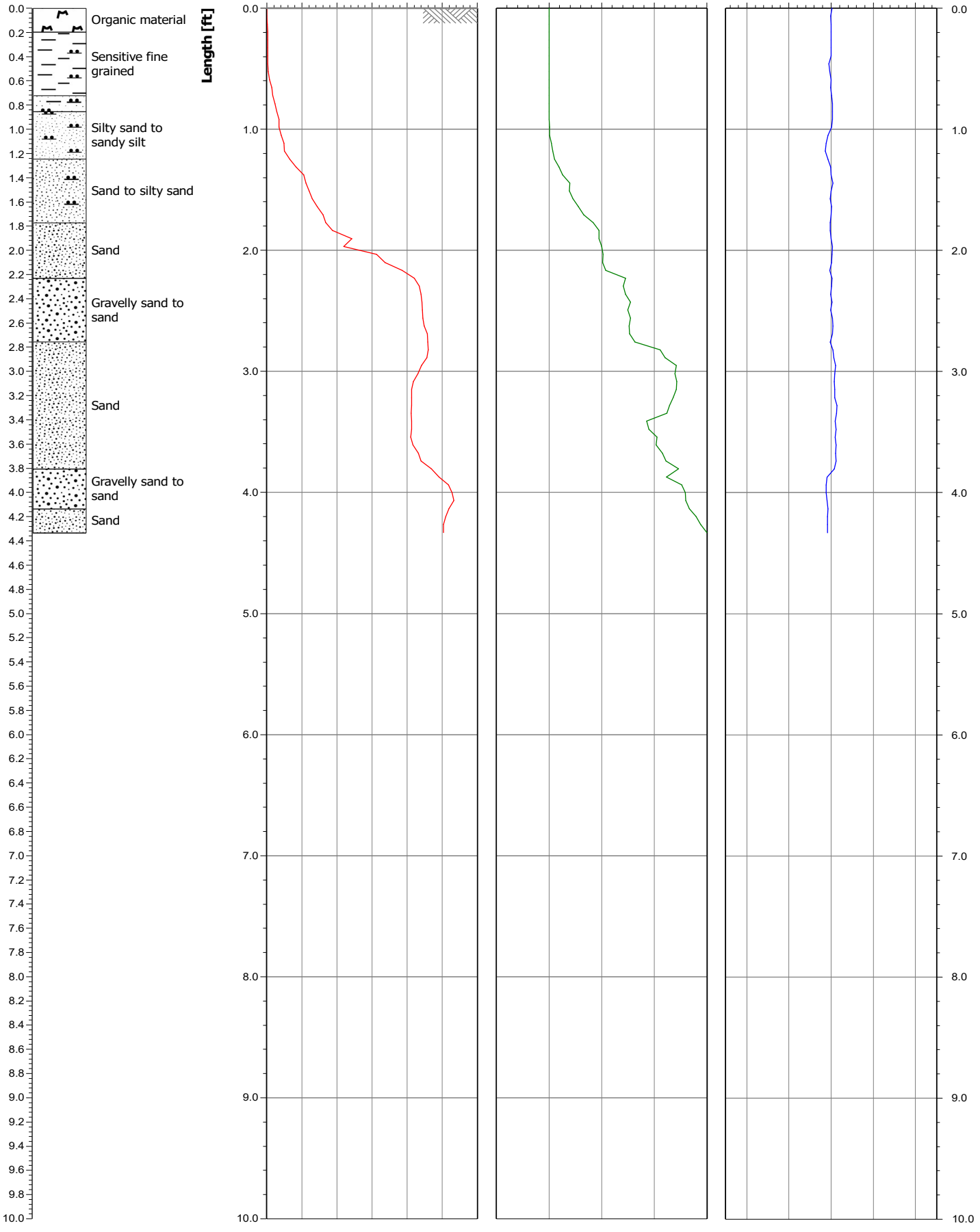


APPENDIX E

CONE PENETRATION TEST LOGS

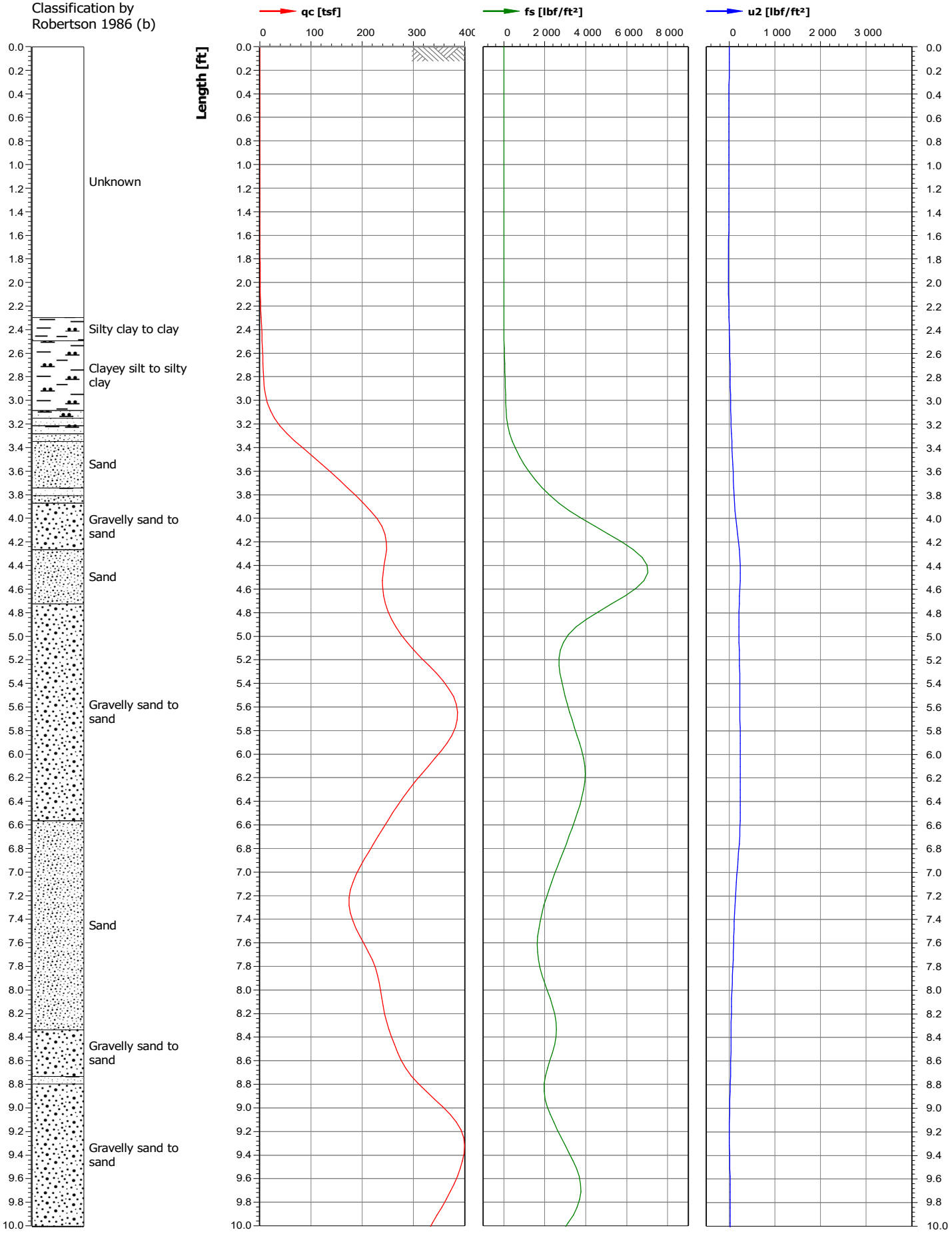
Test ID	Project name	Coordinate system used	Z value
CPT-SB-01	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

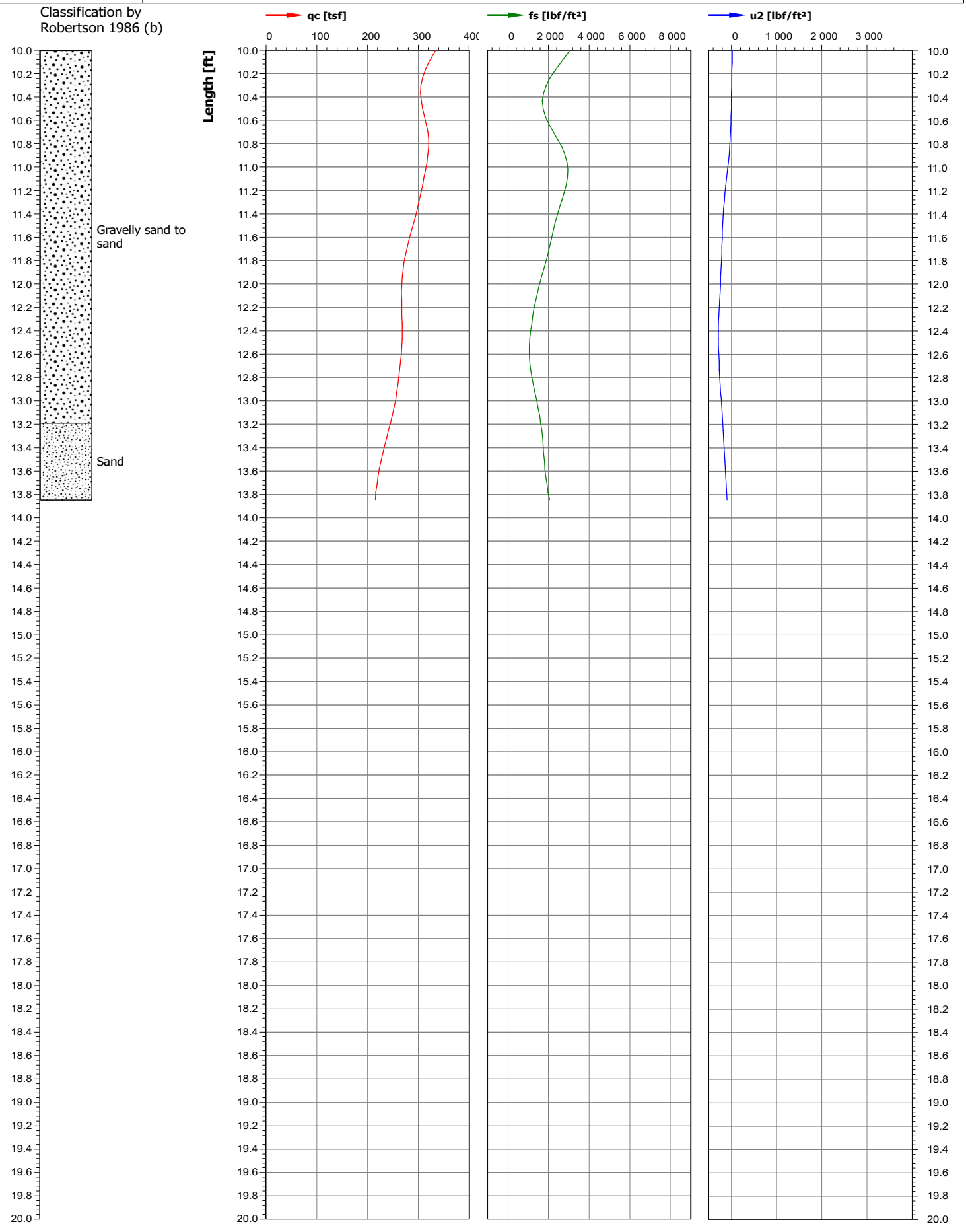


Test ID: CPT-SB-01A	Project name: RACER Van Buren West	Lat / Long:	Z value: 0.00
Client: Detroit Regional Partnership	Project location name: Van Buren, Michigan	Cone serial number: 5484	Date investigation: 10/31/2024
Remarks:			

Classification by Robertson 1986 (b)

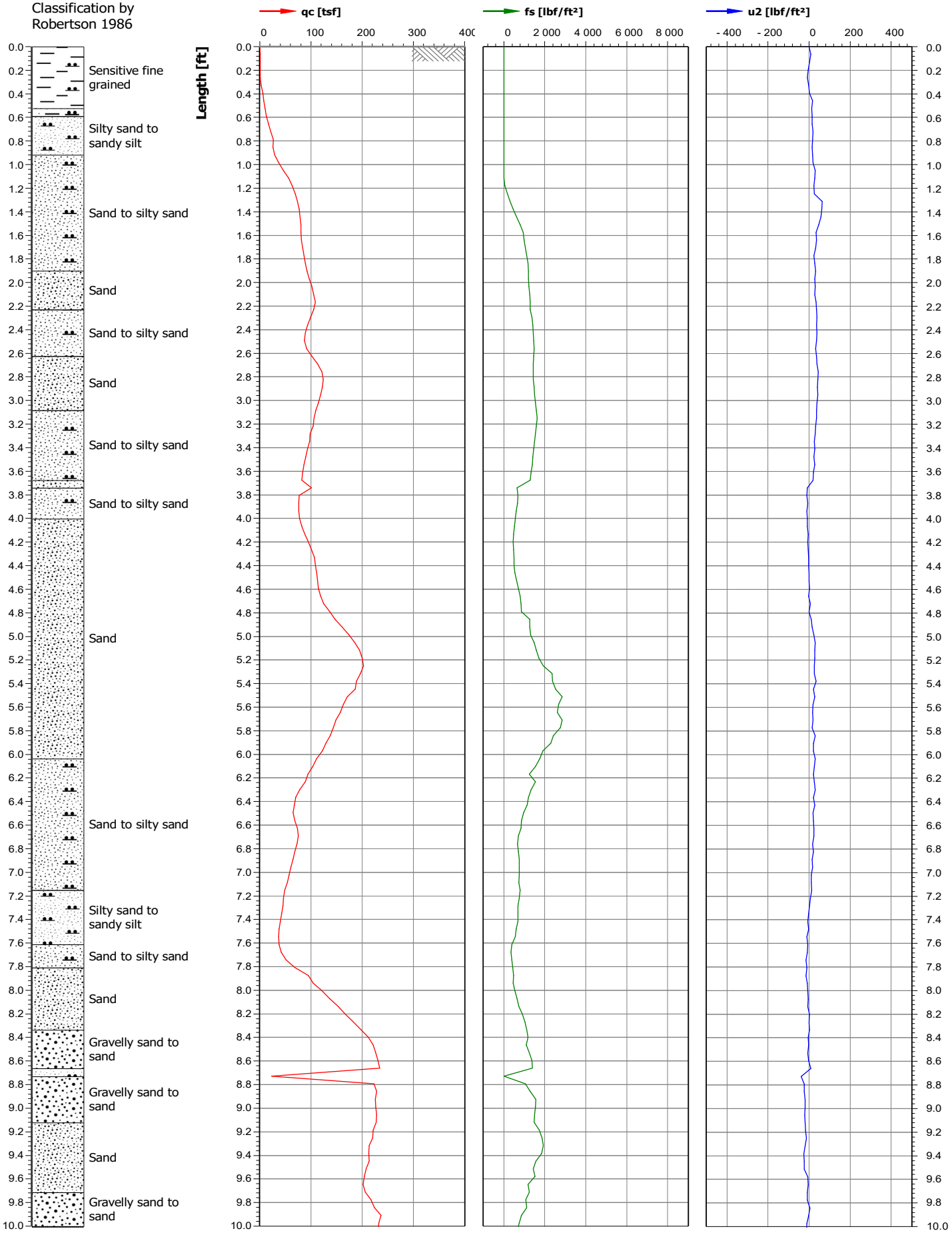


Test ID	Project name	Lat / Long	Z value
CPT-SB-01A	RACER Van Buren West		0.00
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			



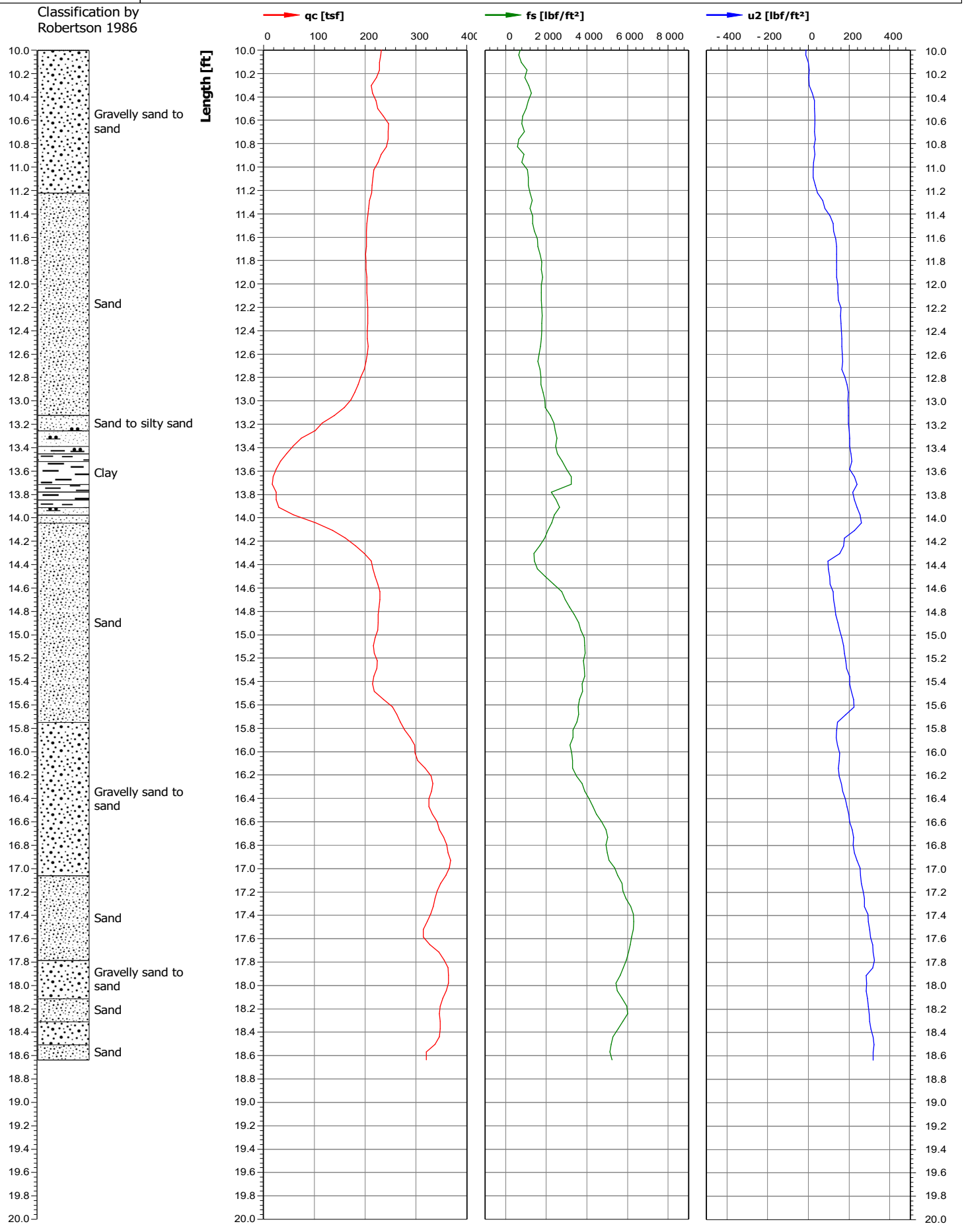
Test ID	Project name	Coordinate system used	Z value
CPT-SB-02	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

Classification by Robertson 1986

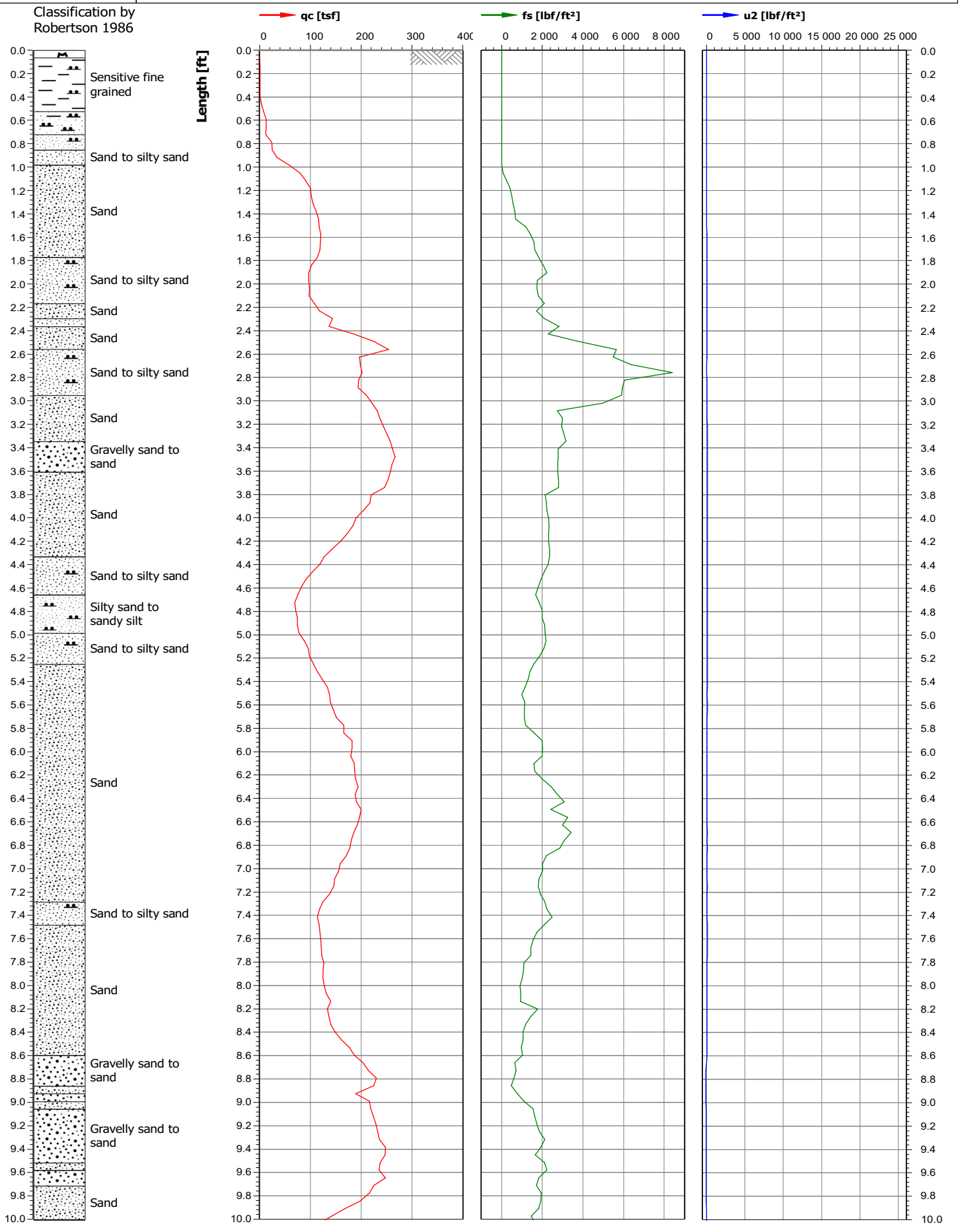


Test ID	Project name	Coordinate system used	Z value
CPT-SB-02	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

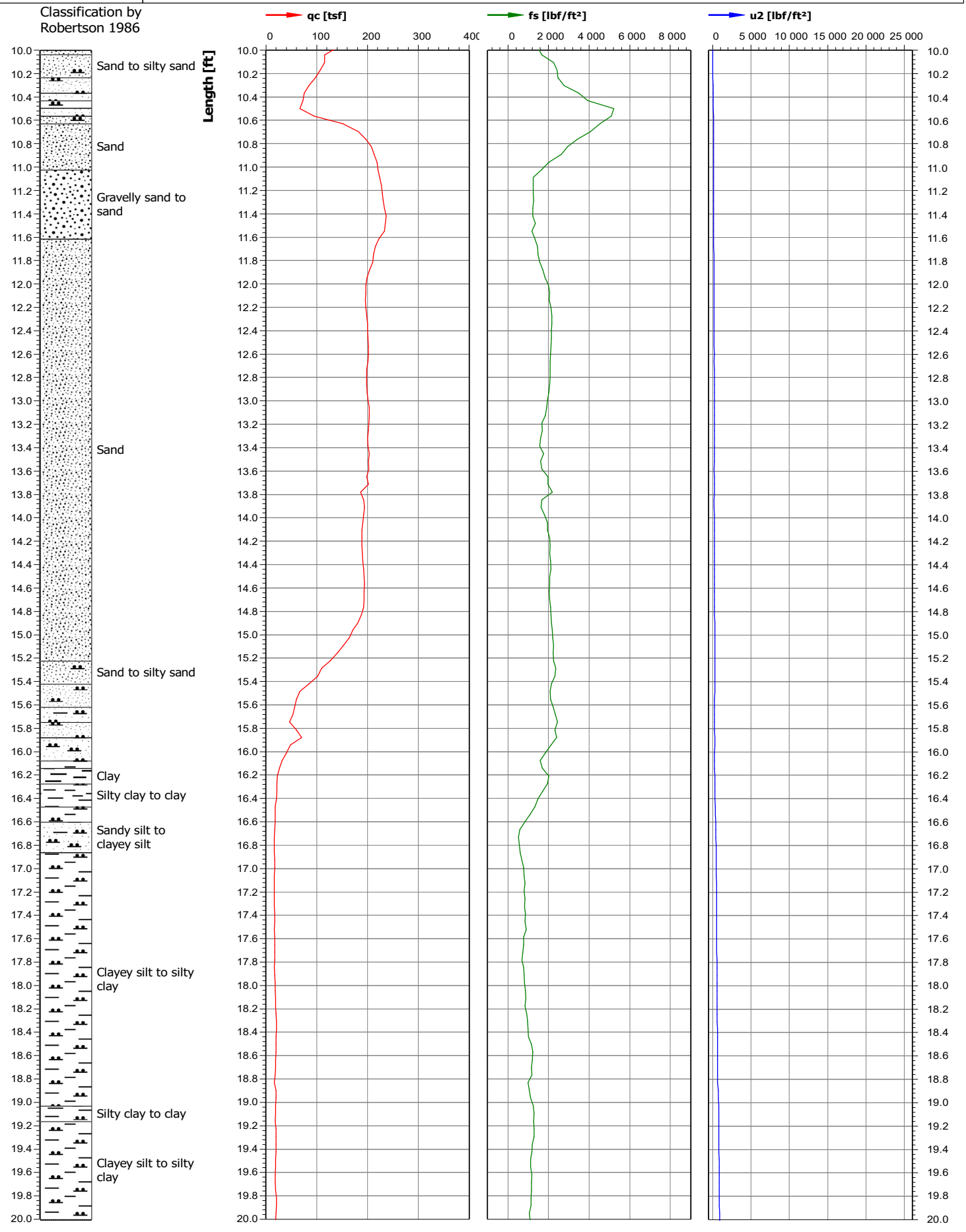
Classification by Robertson 1986



Test ID	Project name	Coordinate system used	Z value
CPT-SB-03	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks1			



Test ID	Project name	Coordinate system used	Z value
CPT-SB-03	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks1			



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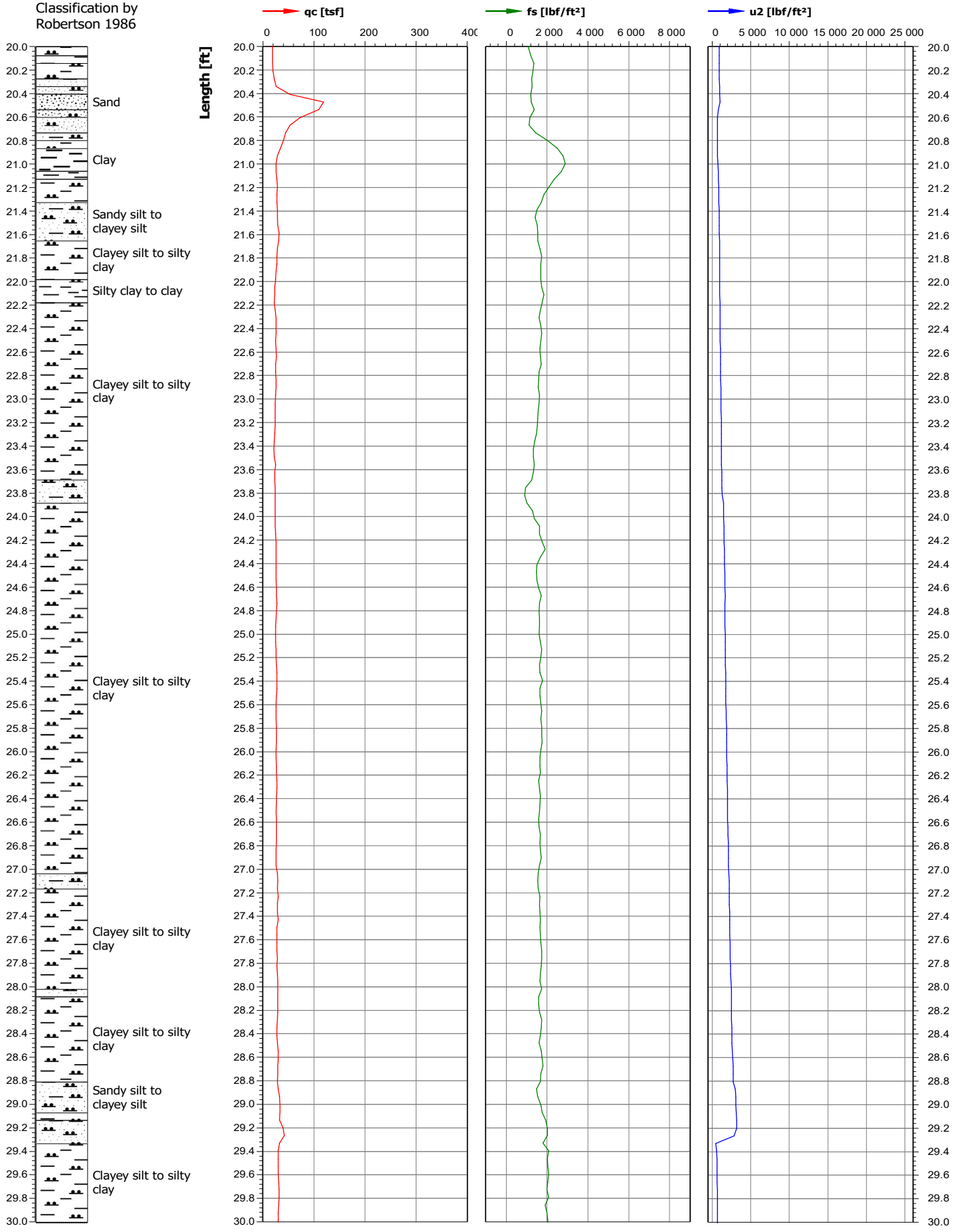
CPT-SB-03	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks1			

Classification by Robertson 1986



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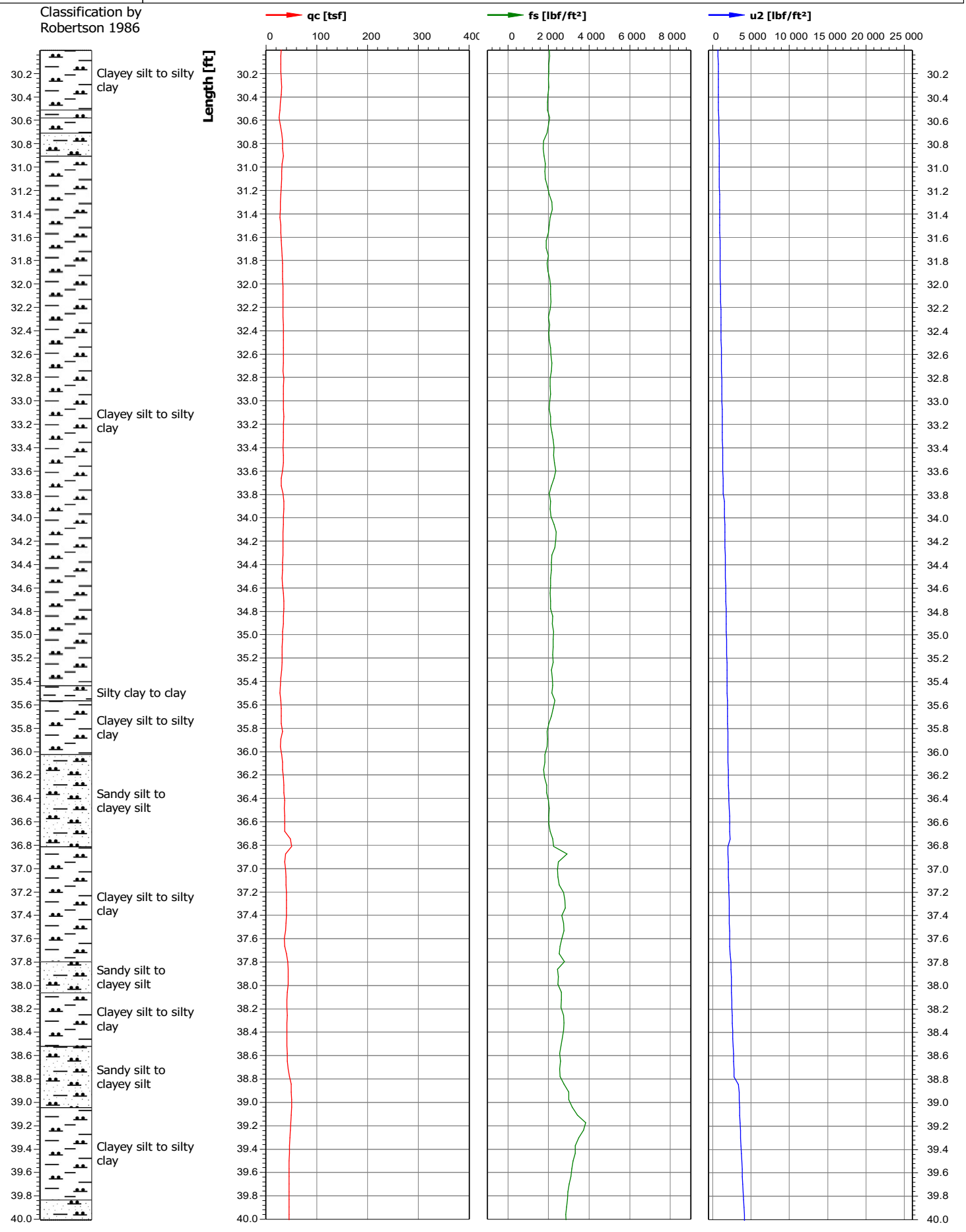
CPT-SB-03	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks1			



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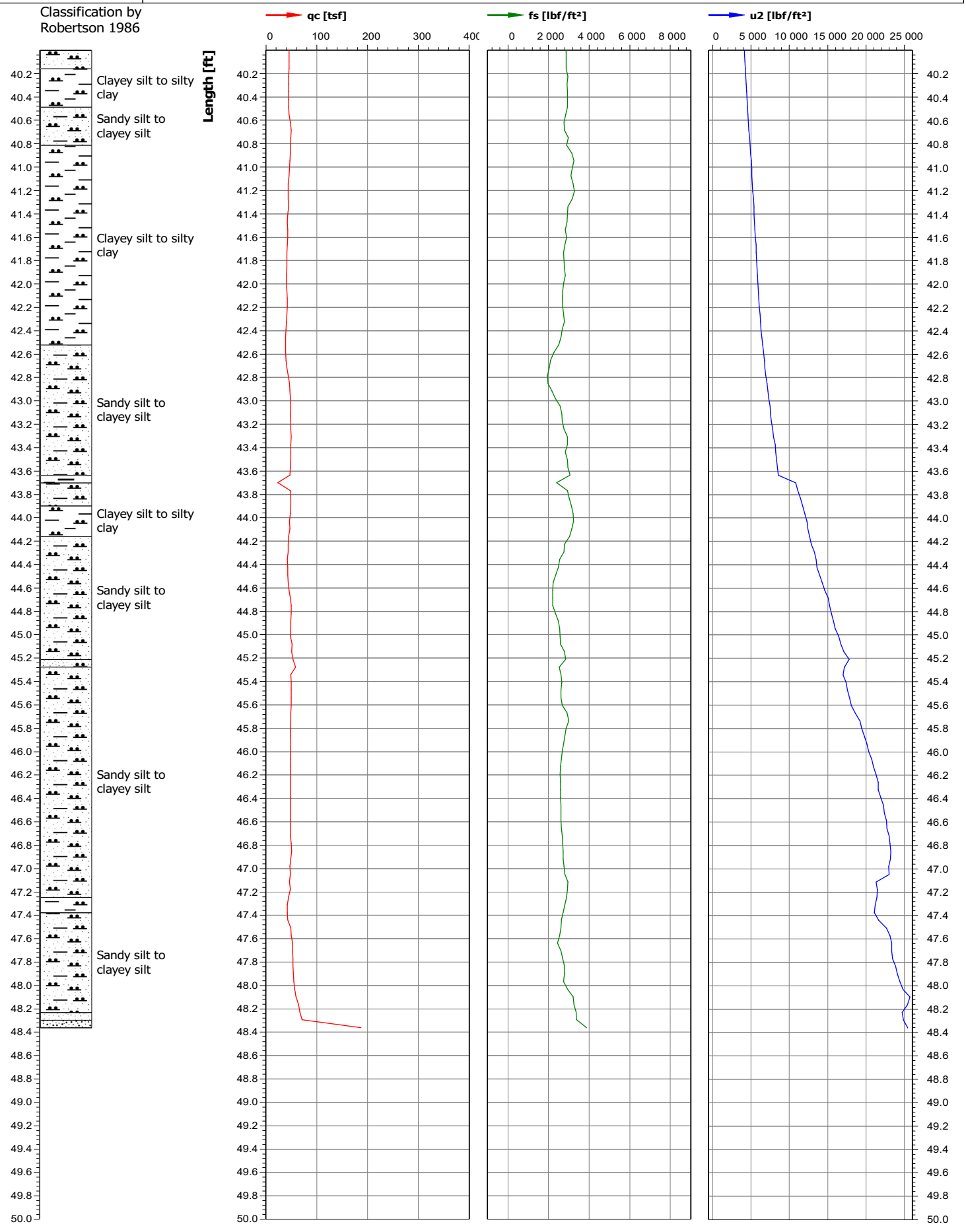
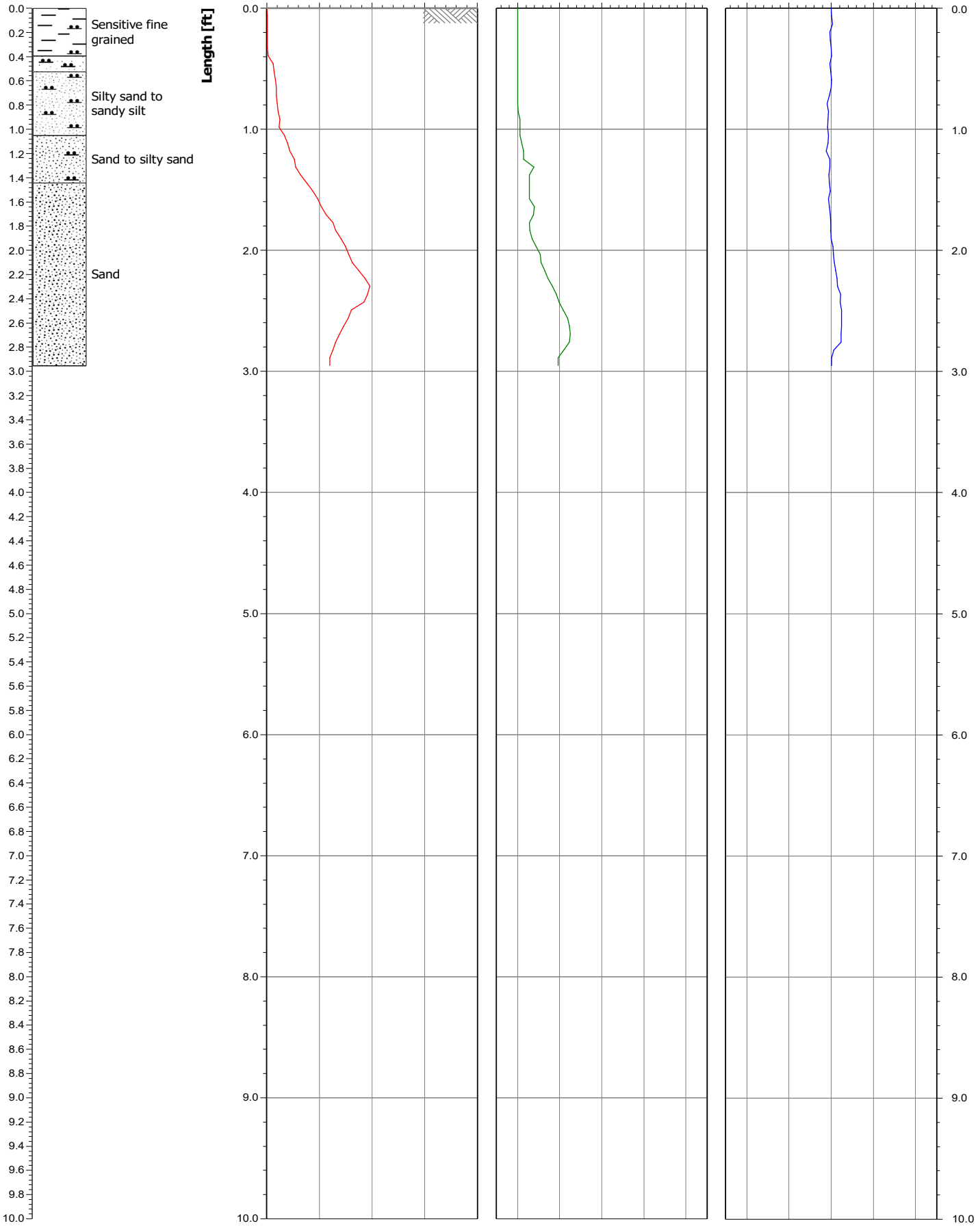
CPT-SB-03	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks1			

Classification by Robertson 1986



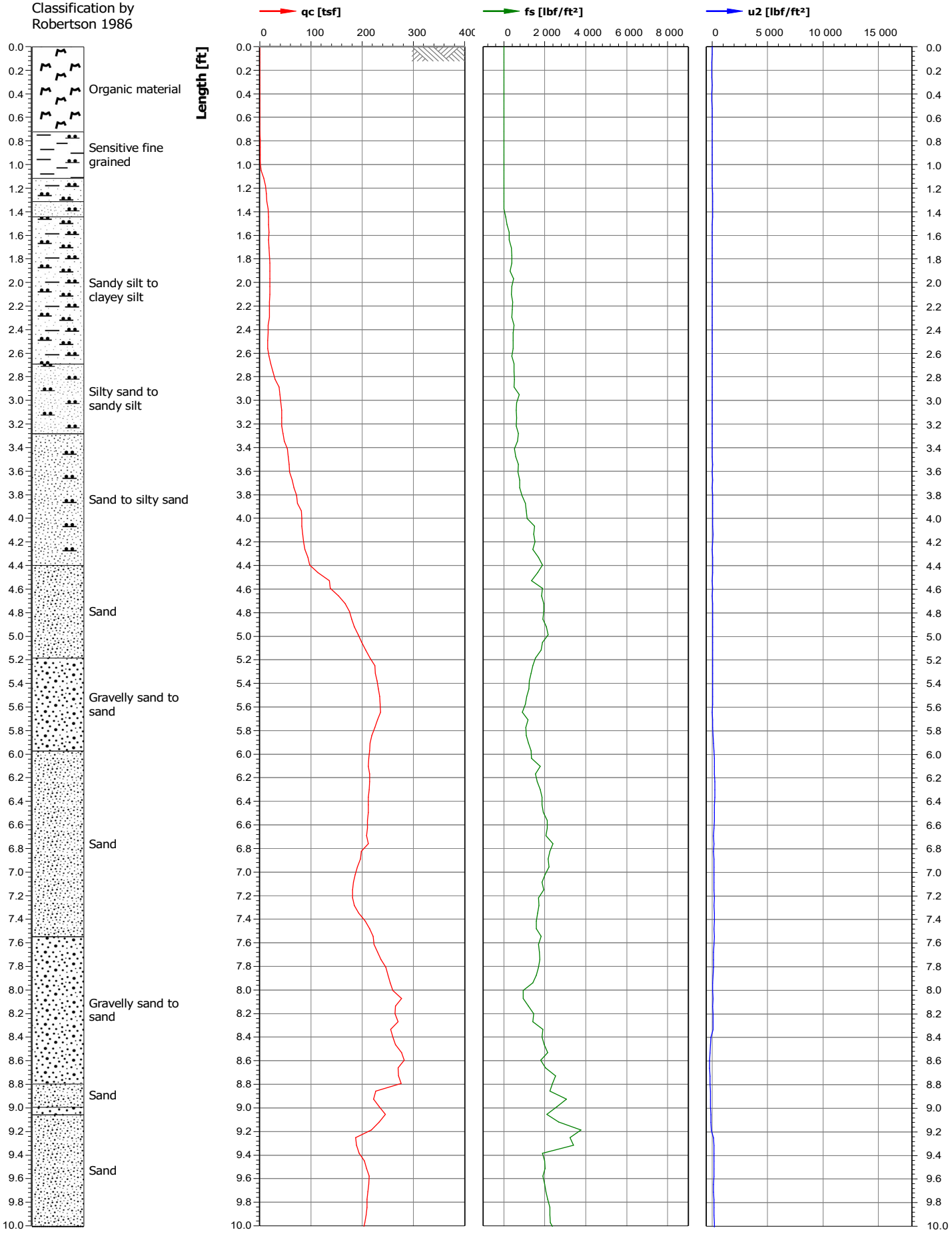
Test ID	Project name	Coordinate system used	Z value
CPT-SB-04	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			

Classification by Robertson 1986



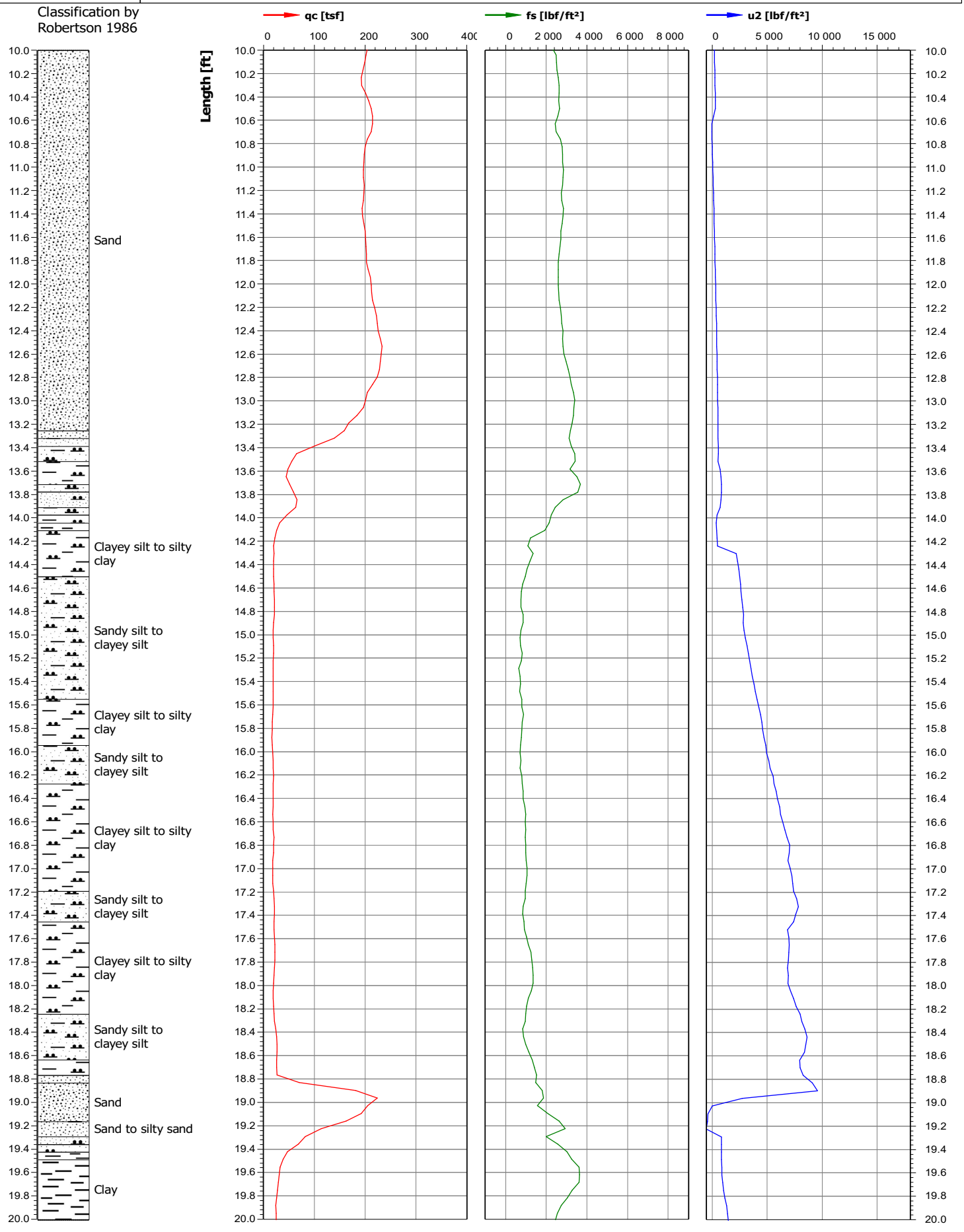
Test ID	Project name	Coordinate system used	Z value
CPT-SB-05	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

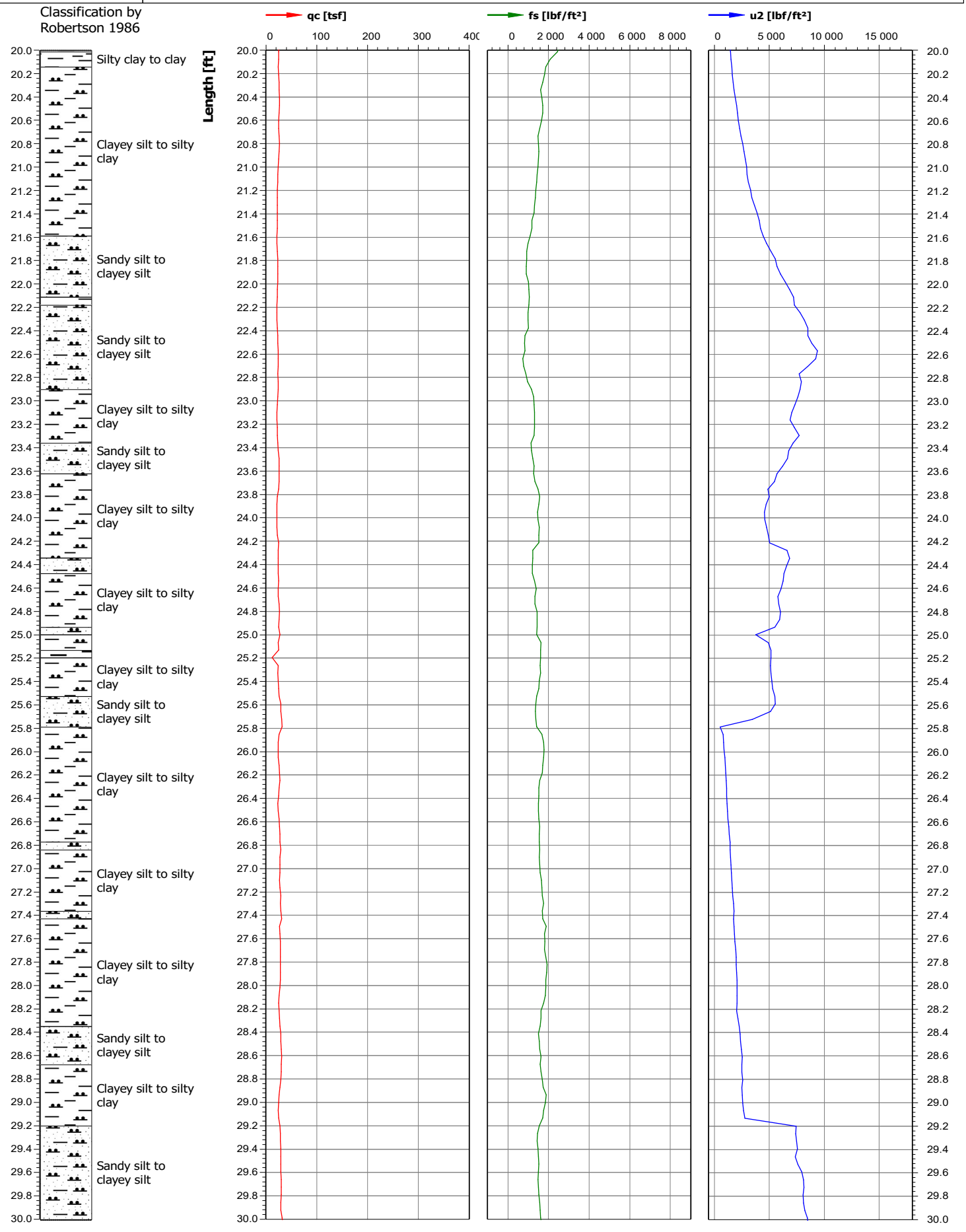


Test ID	Project name	Coordinate system used	Z value
CPT-SB-05	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

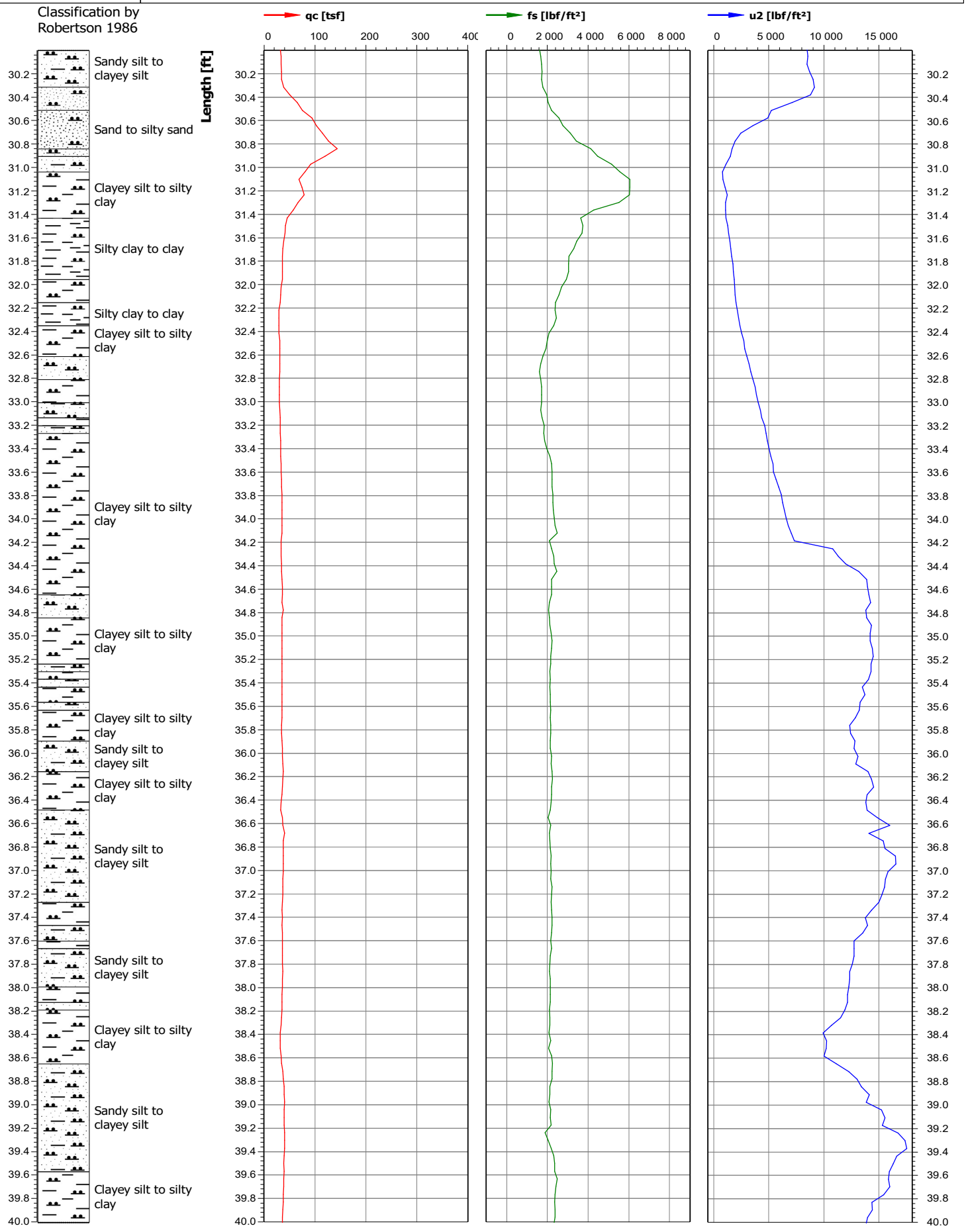


Test ID	Project name	Coordinate system used	Z value
CPT-SB-05	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			



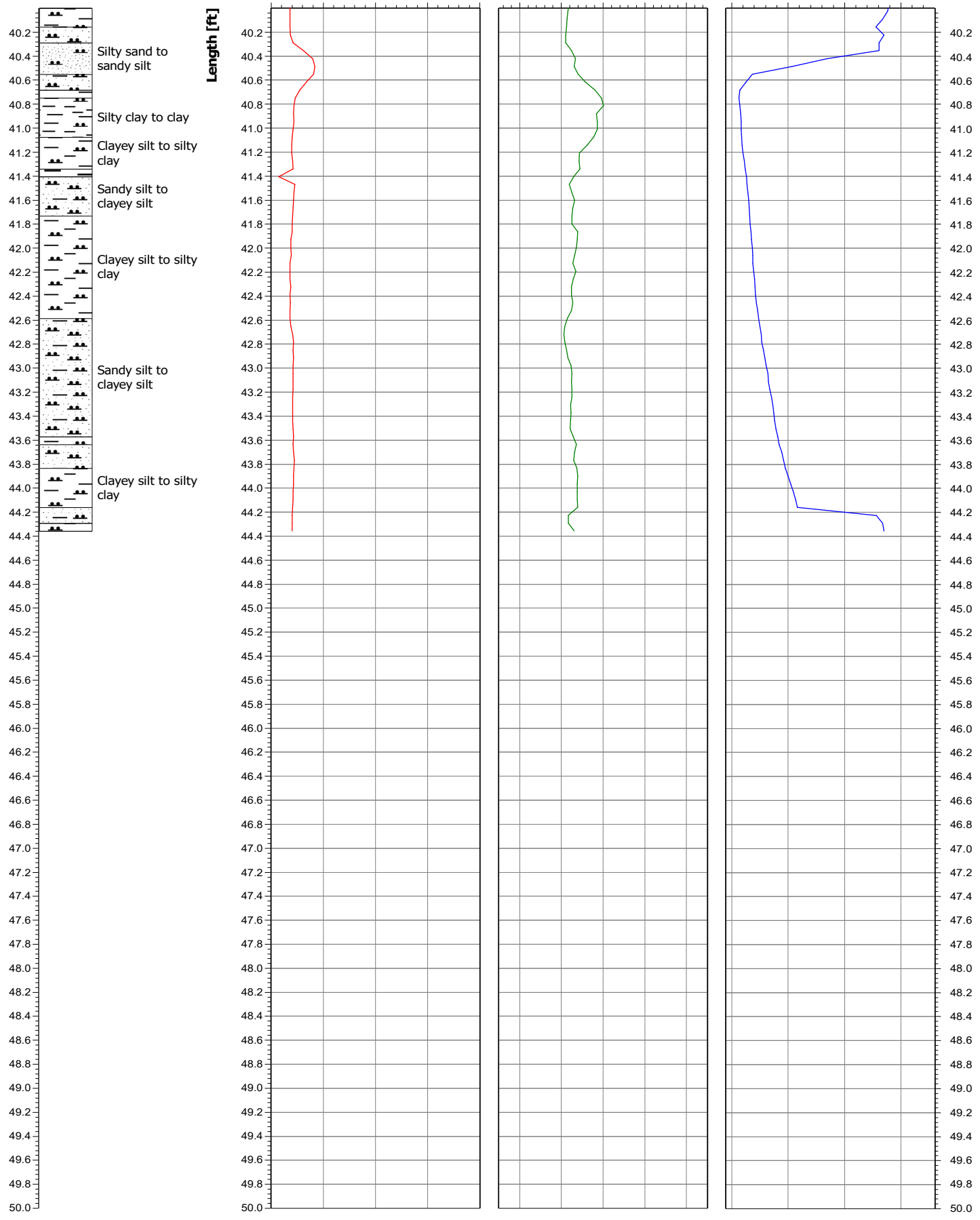
Test ID	Project name	Coordinate system used	Z value
CPT-SB-05	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

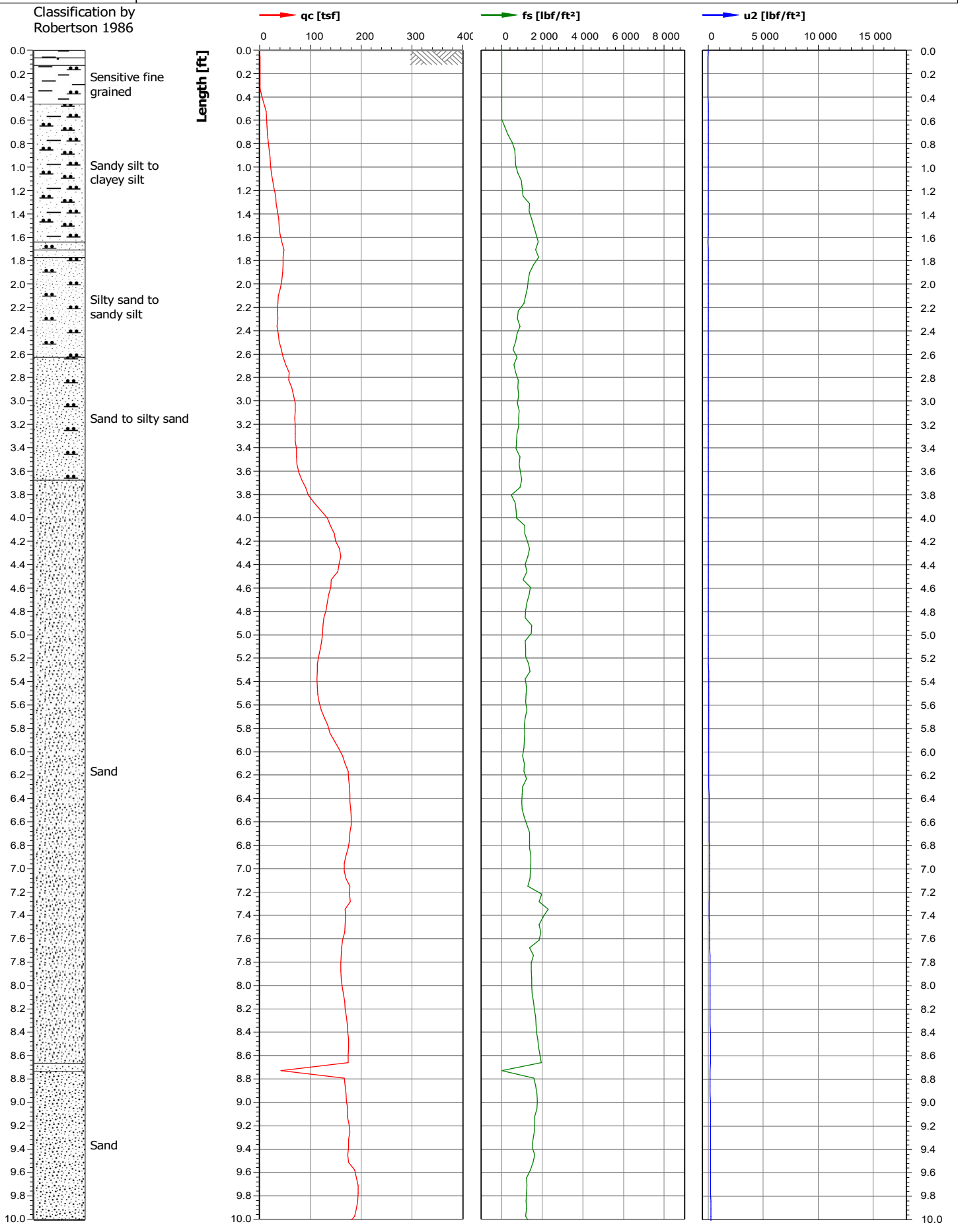


Test ID	Project name	Coordinate system used	Z value
CPT-SB-05	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

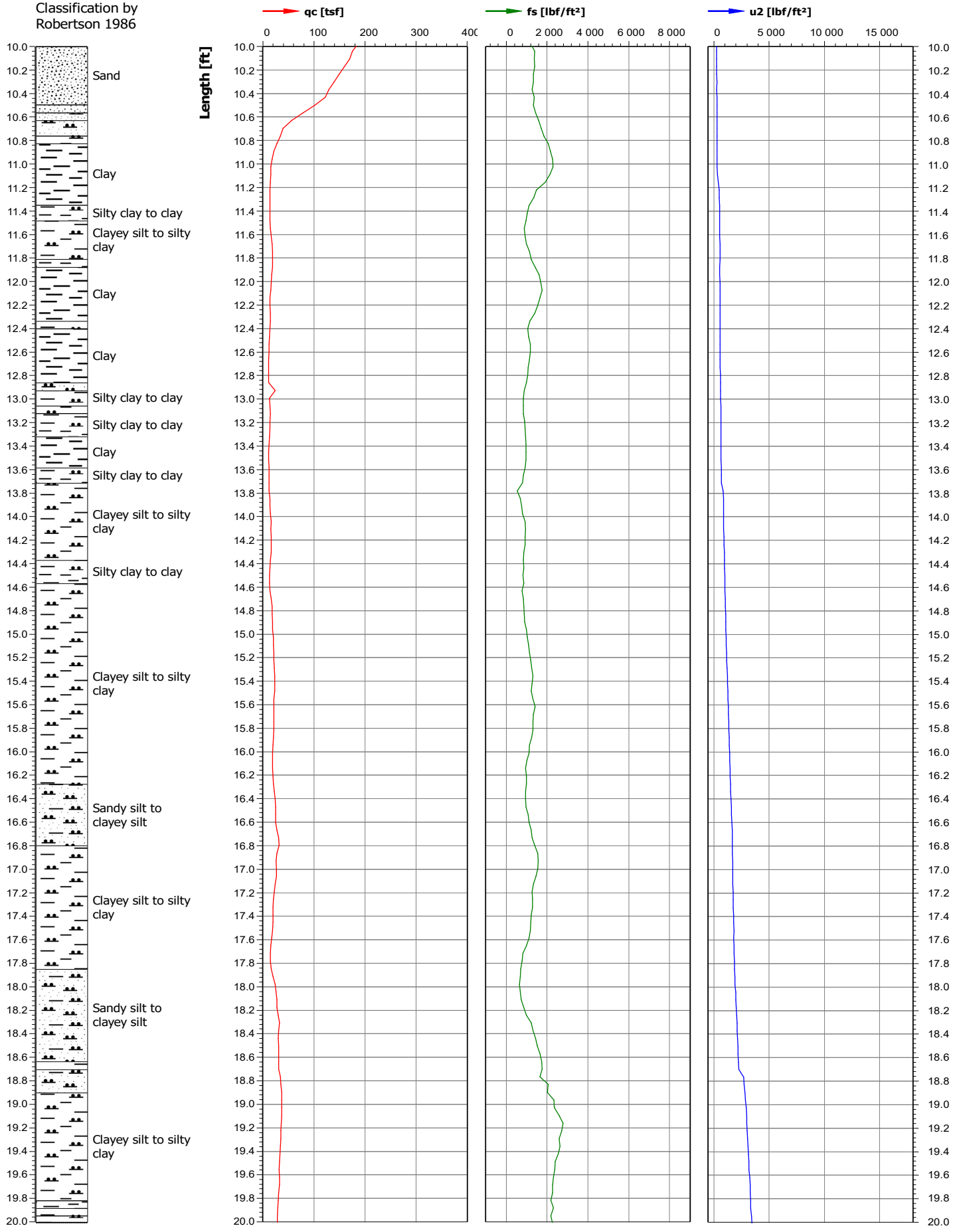


Test ID	Project name	Coordinate system used	Z value
CPT-SB-06	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			



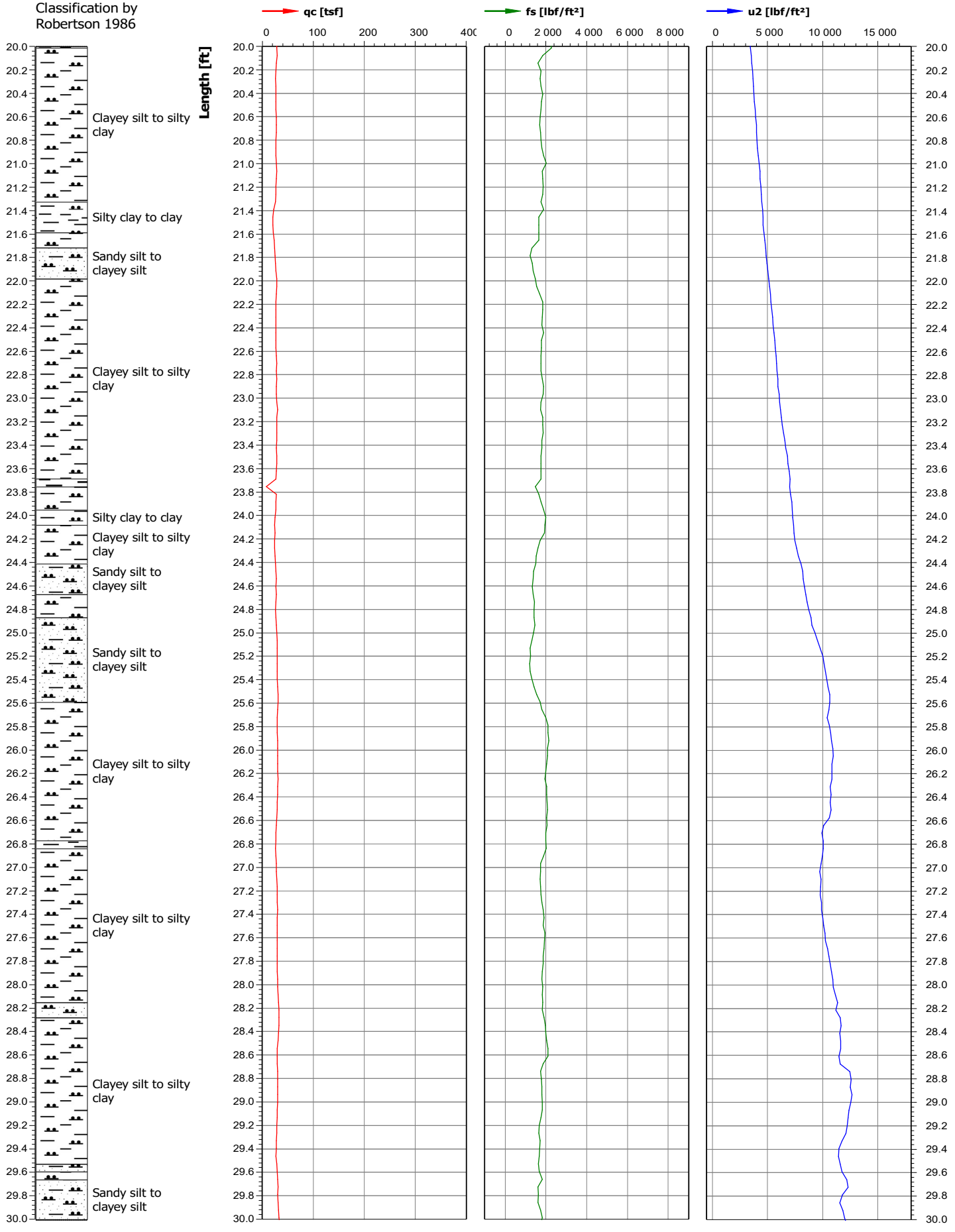
Test ID	Project name	Coordinate system used	Z value
CPT-SB-06	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			

Classification by Robertson 1986



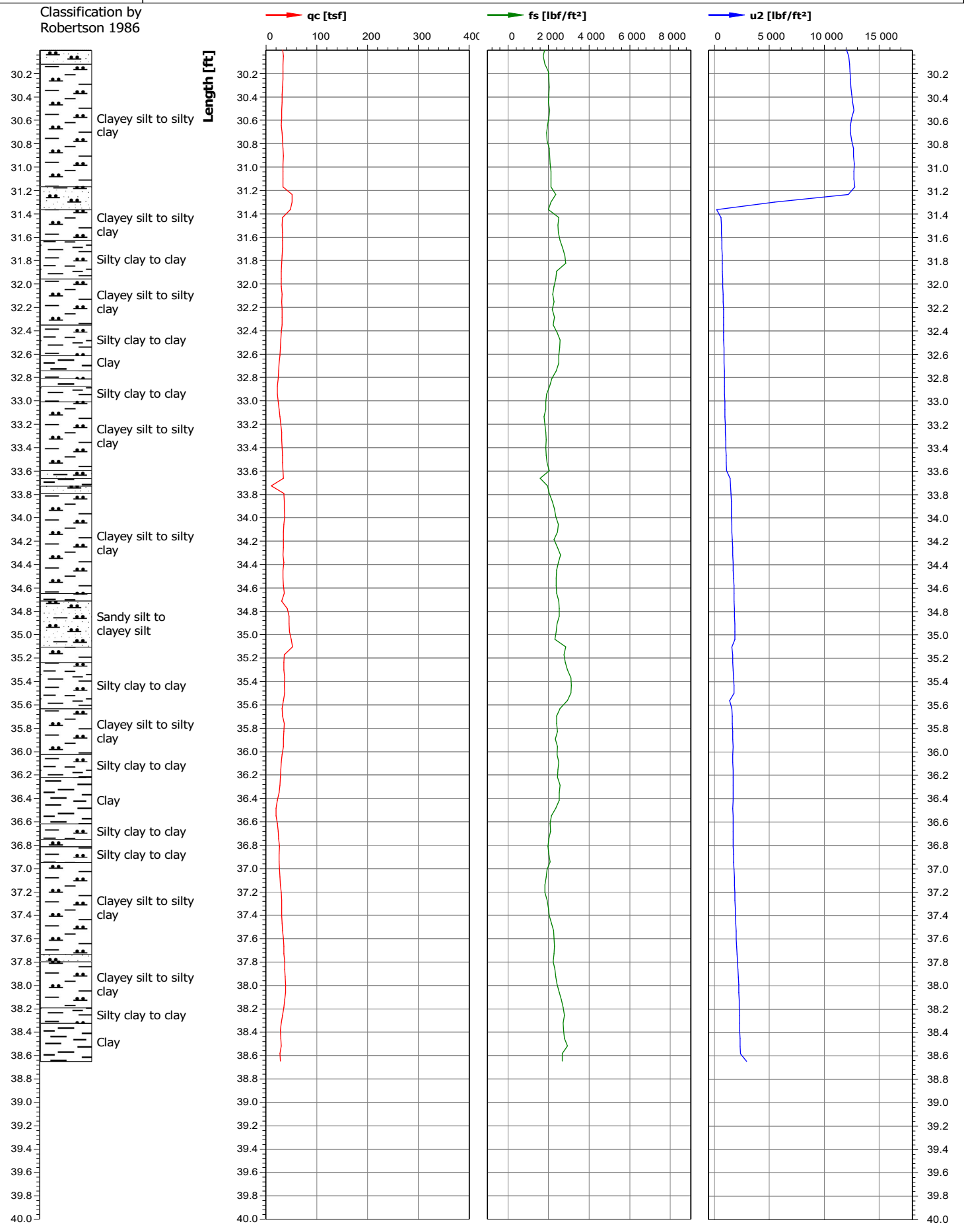
Test ID	Project name	Coordinate system used	Z value
CPT-SB-06	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			

Classification by Robertson 1986

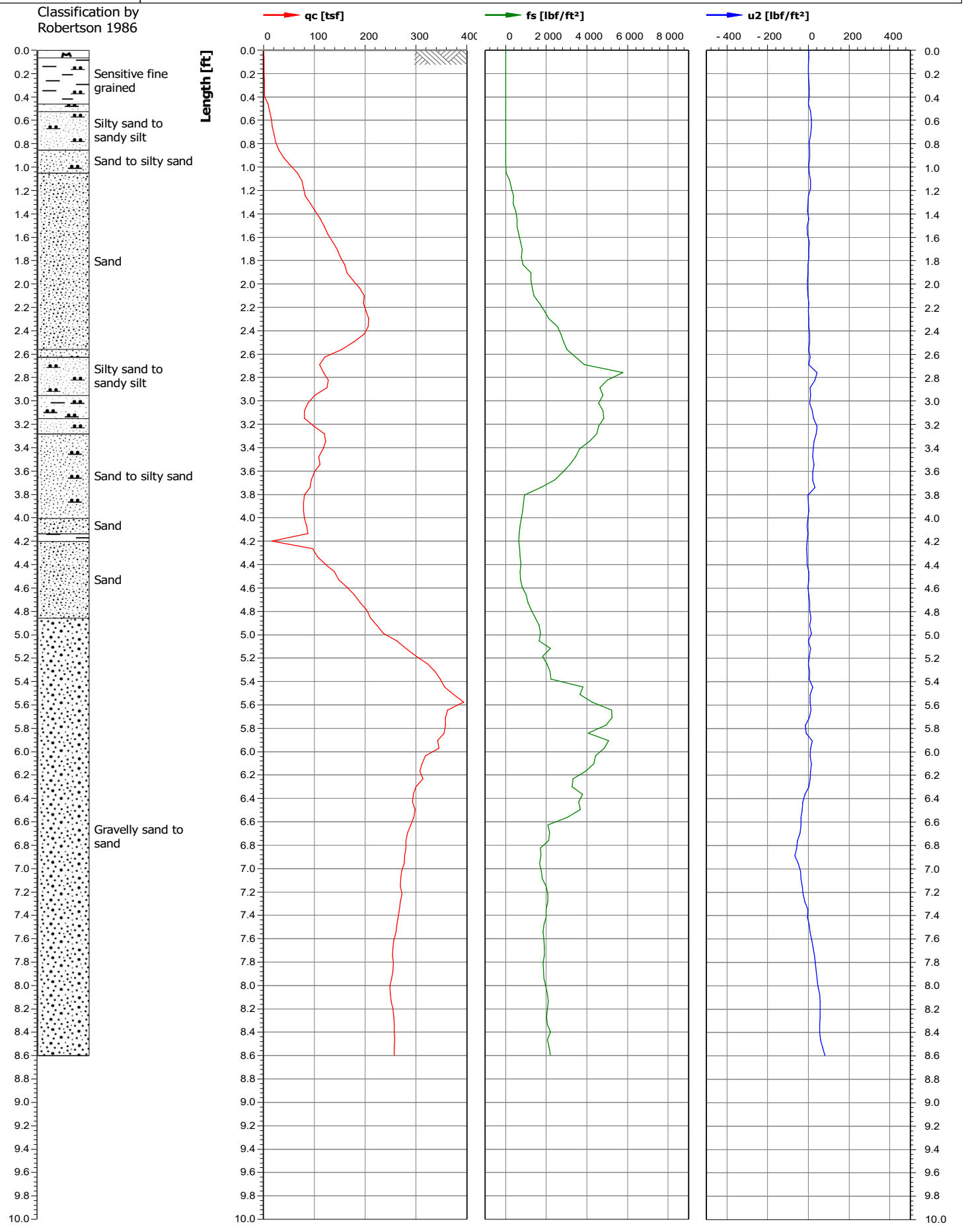


Test ID	Project name	Coordinate system used	Z value
CPT-SB-06	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			

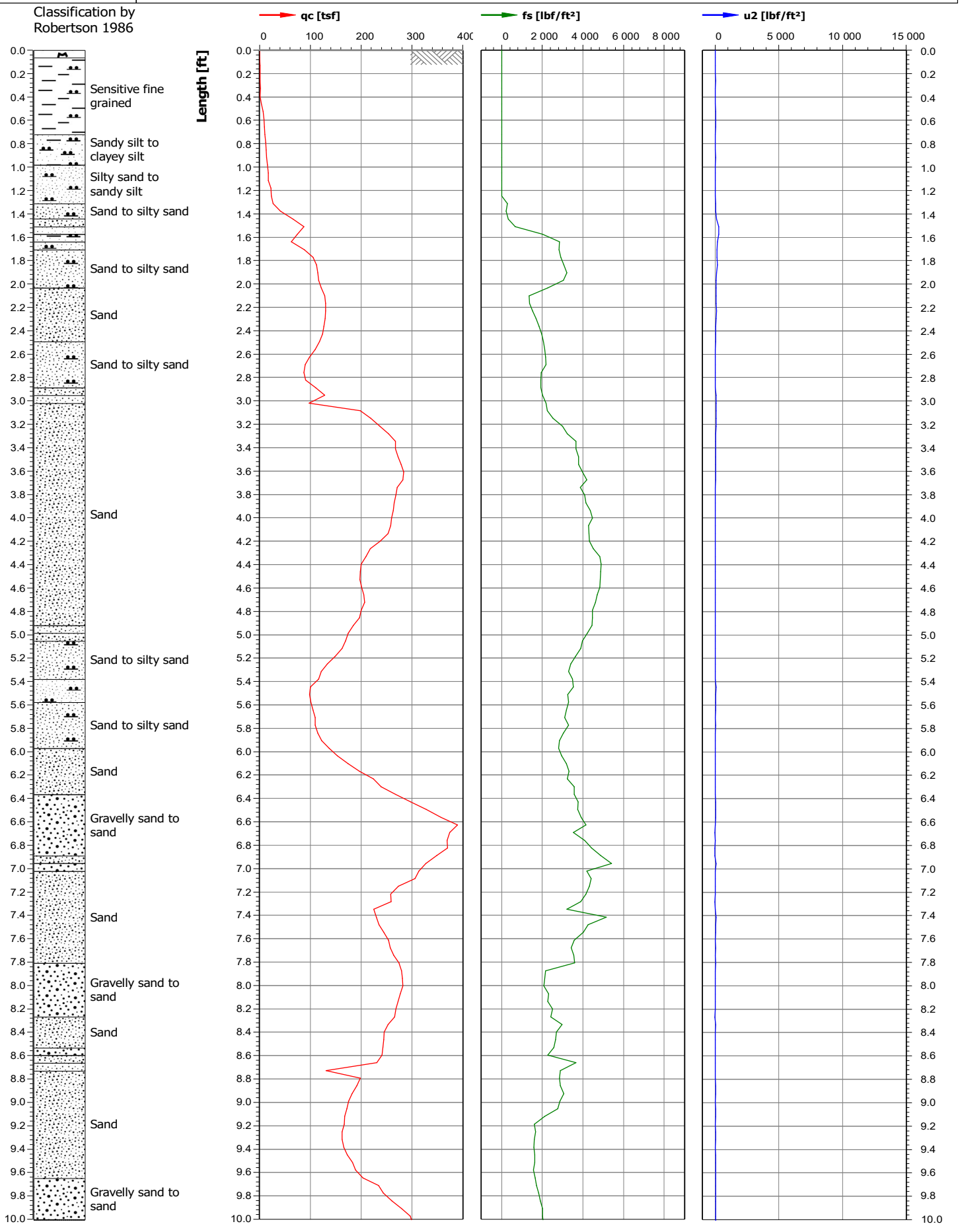
Classification by Robertson 1986



Test ID	Project name	Coordinate system used	Z value
CPT-SB-07	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

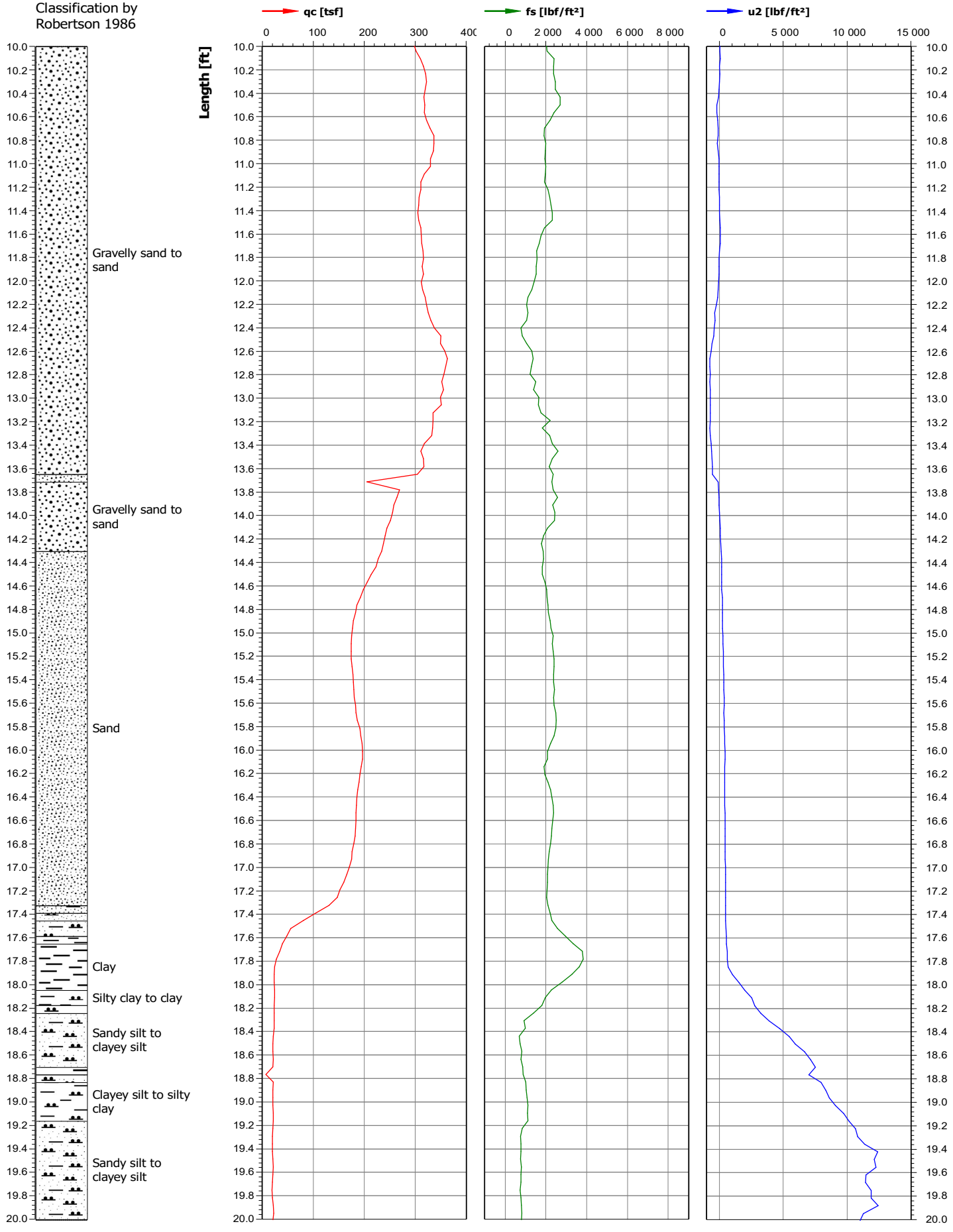


Test ID	Project name	Coordinate system used	Z value
CPT-SB-08	DRACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

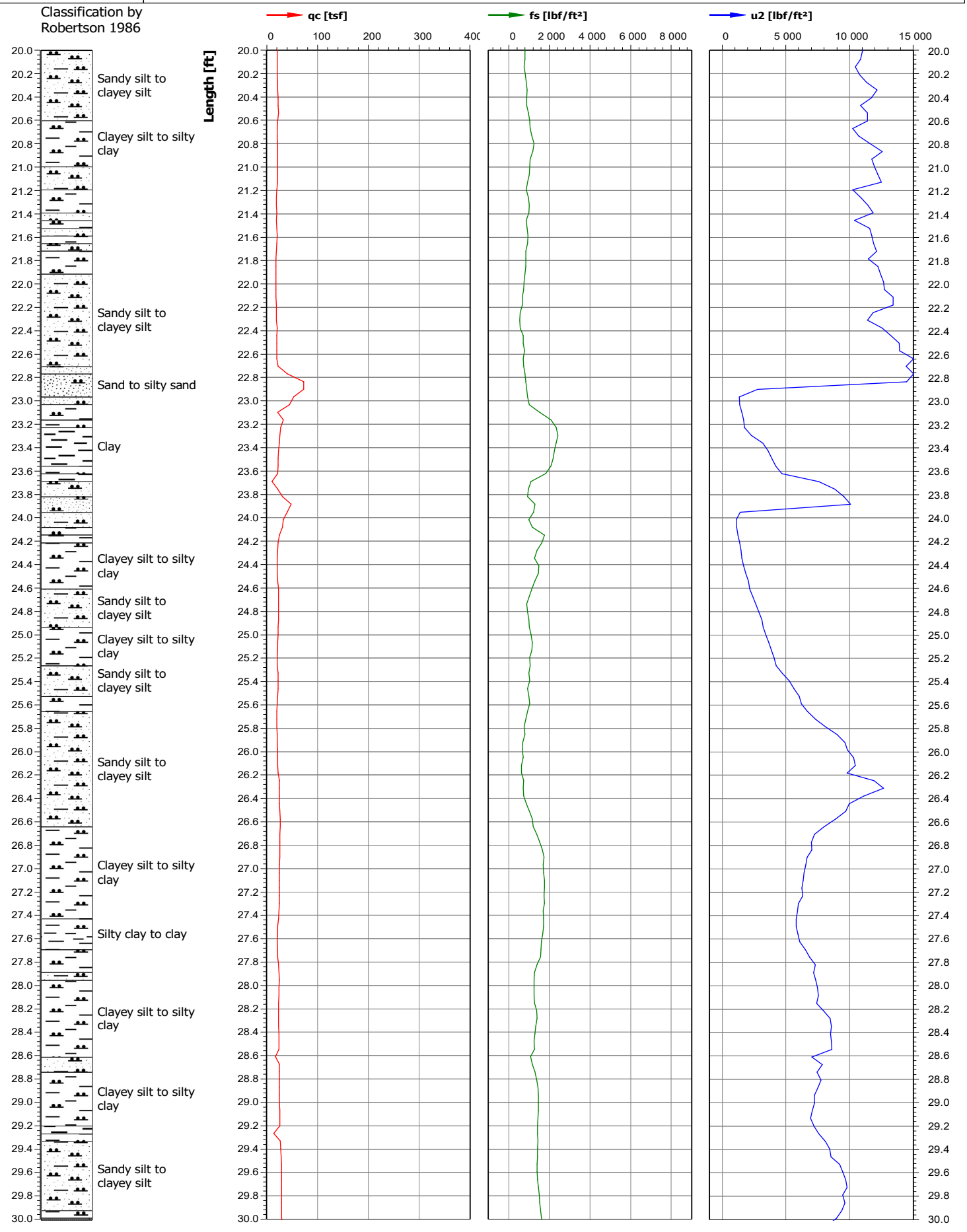


Test ID	Project name	Coordinate system used	Z value
CPT-SB-08	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

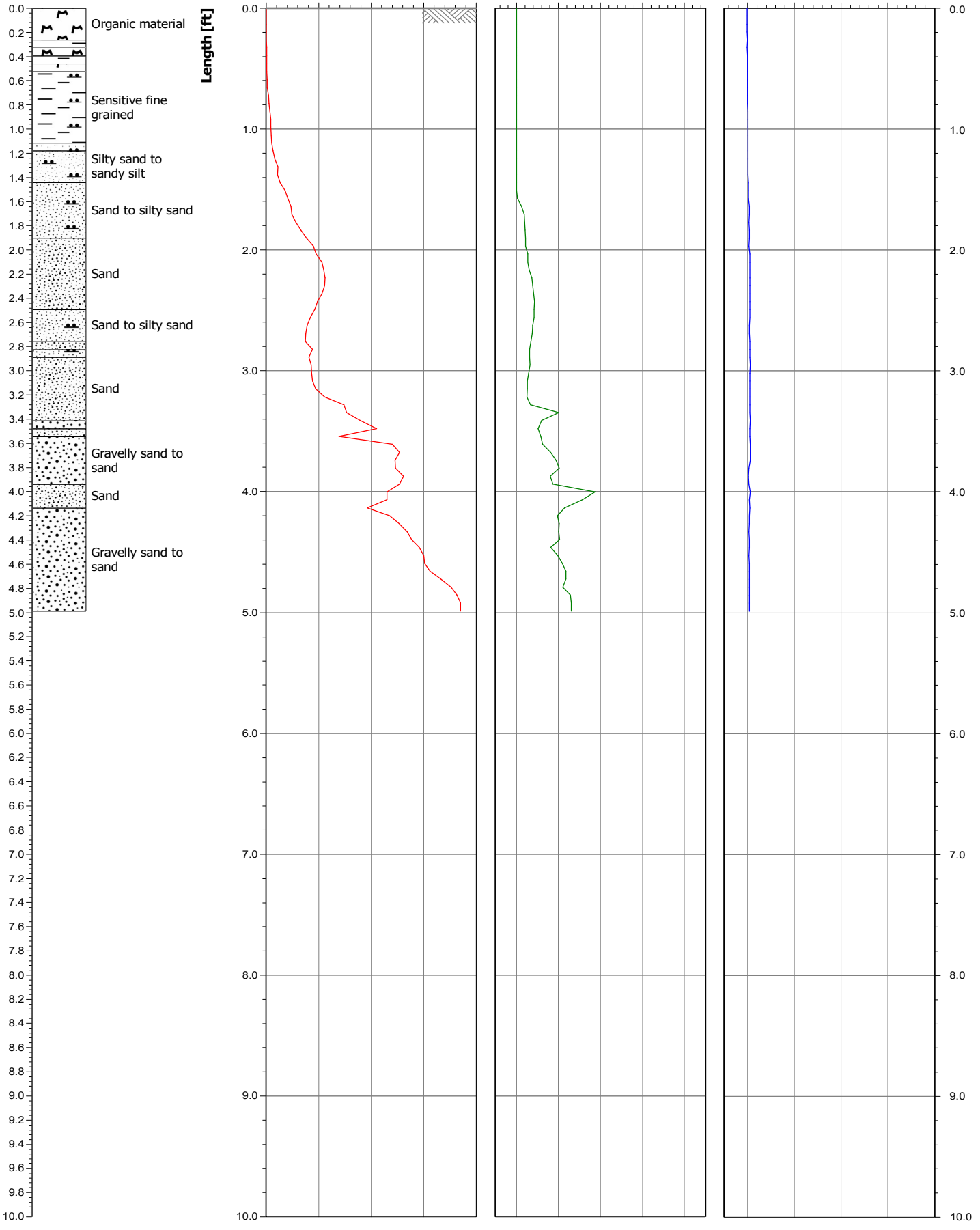


Test ID	Project name	Coordinate system used	Z value
CPT-SB-08	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

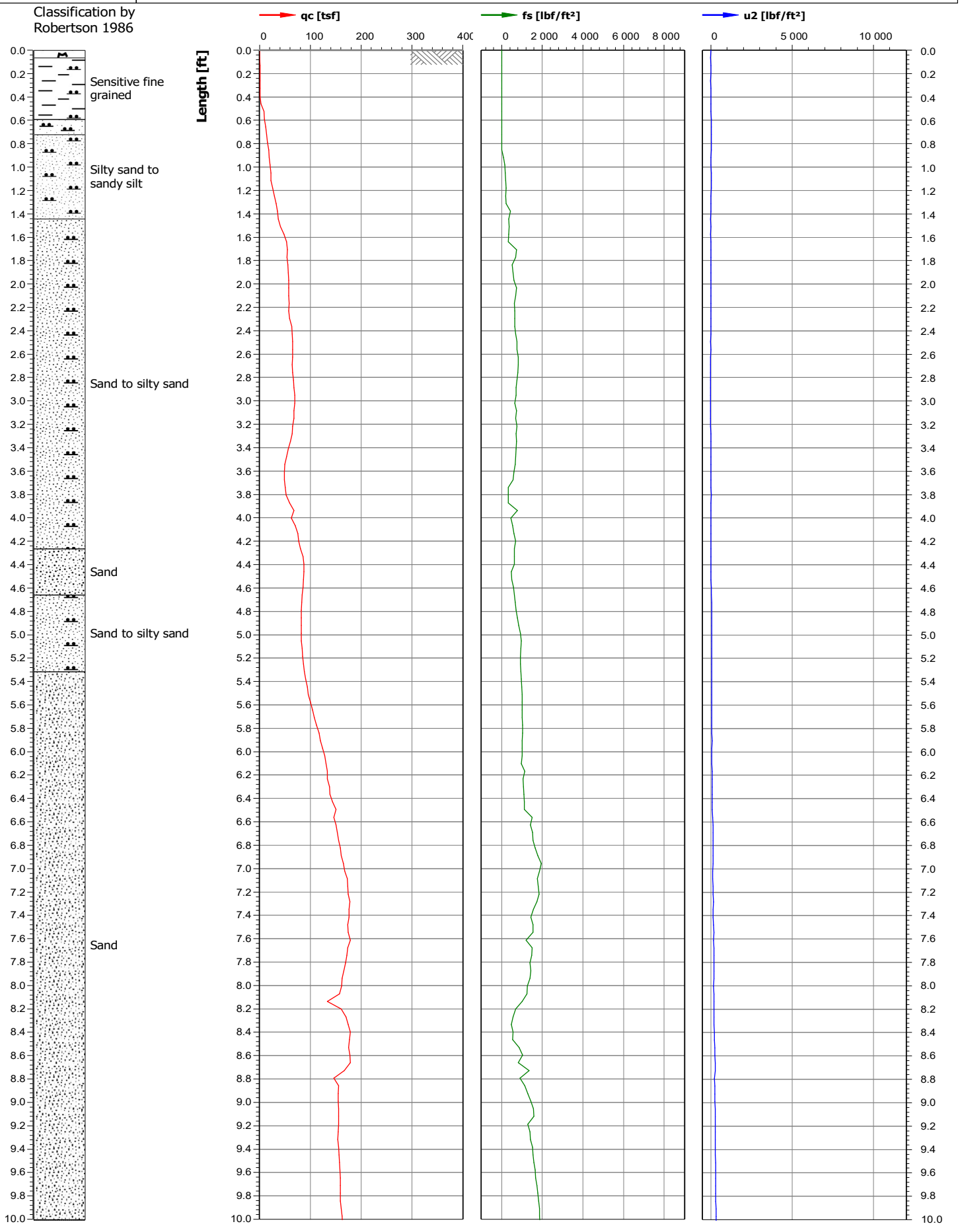


Test ID	Project name	Coordinate system used	Z value
CPT-SB-09	RACER Van Buren West		0.00
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

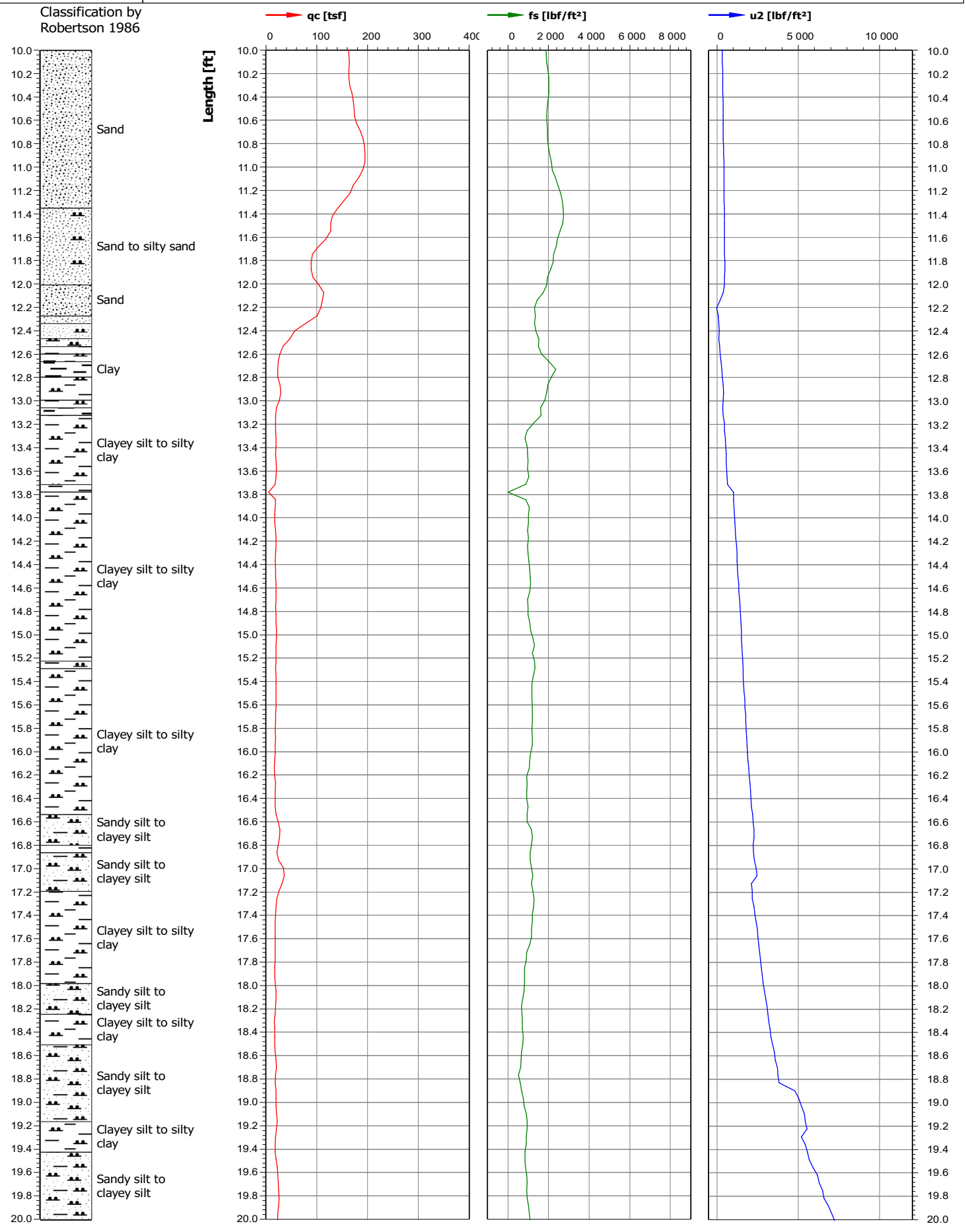
Classification by Robertson 1986



Test ID	Project name	Coordinate system used	Z value
CPT-SB-10	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

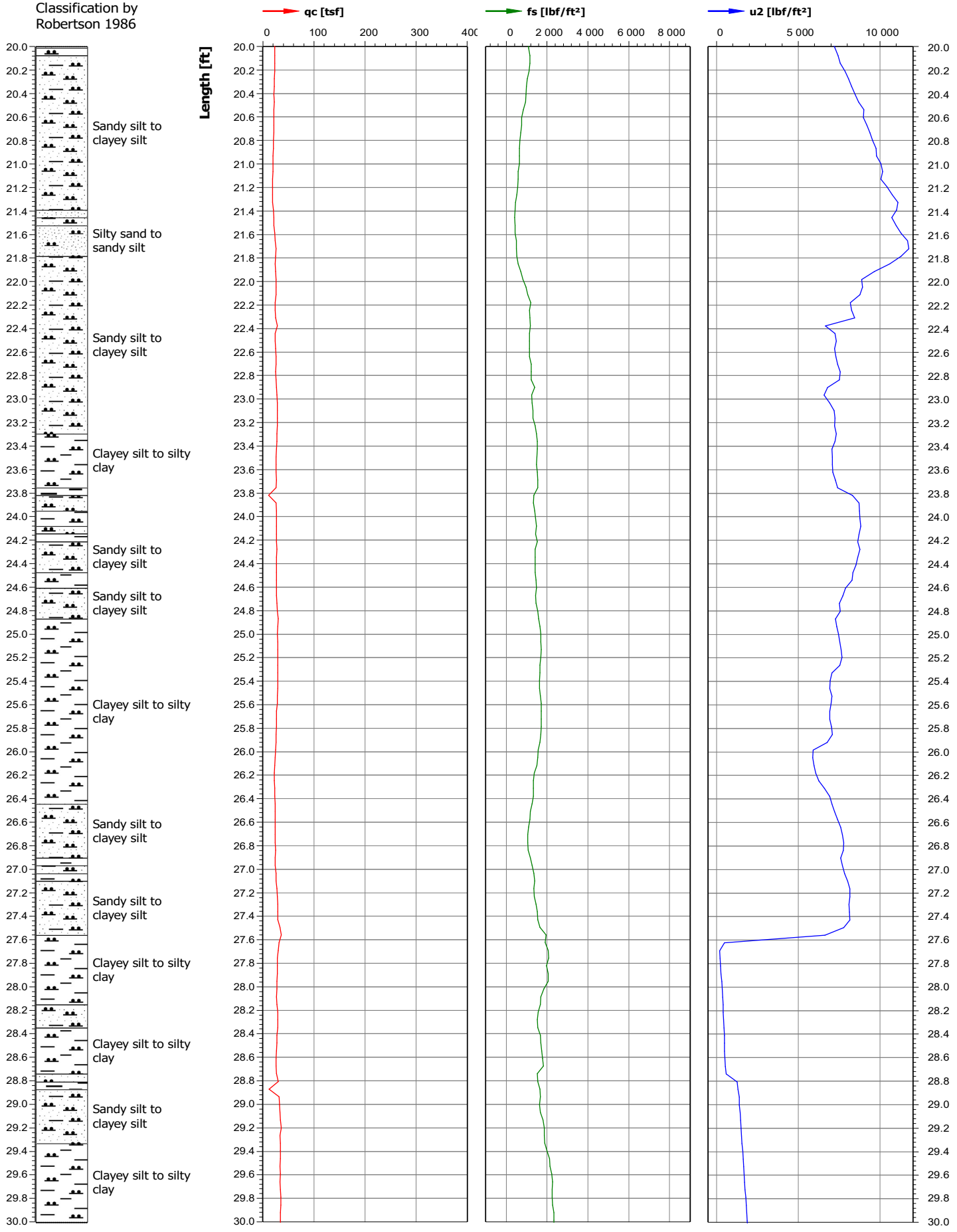


Test ID	Project name	Coordinate system used	Z value
CPT-SB-10	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			



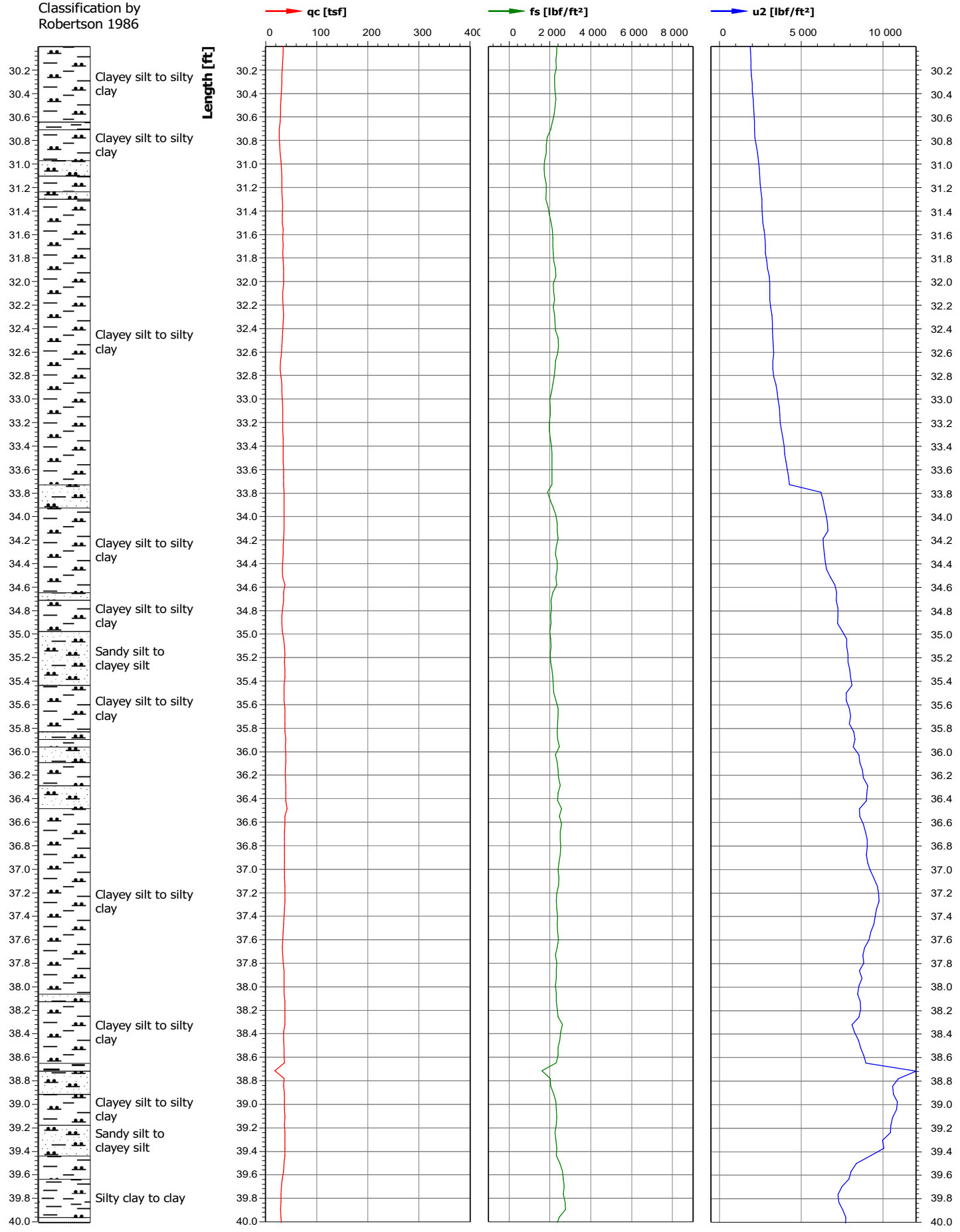
Test ID	Project name	Coordinate system used	Z value
CPT-SB-10	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986



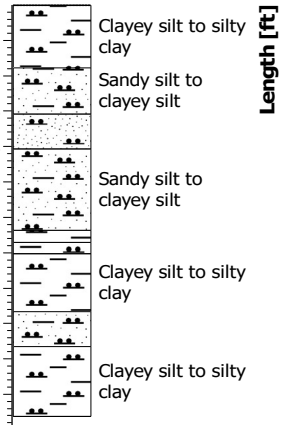
Test ID	Project name	Coordinate system used	Z value
CPT-SB-10	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

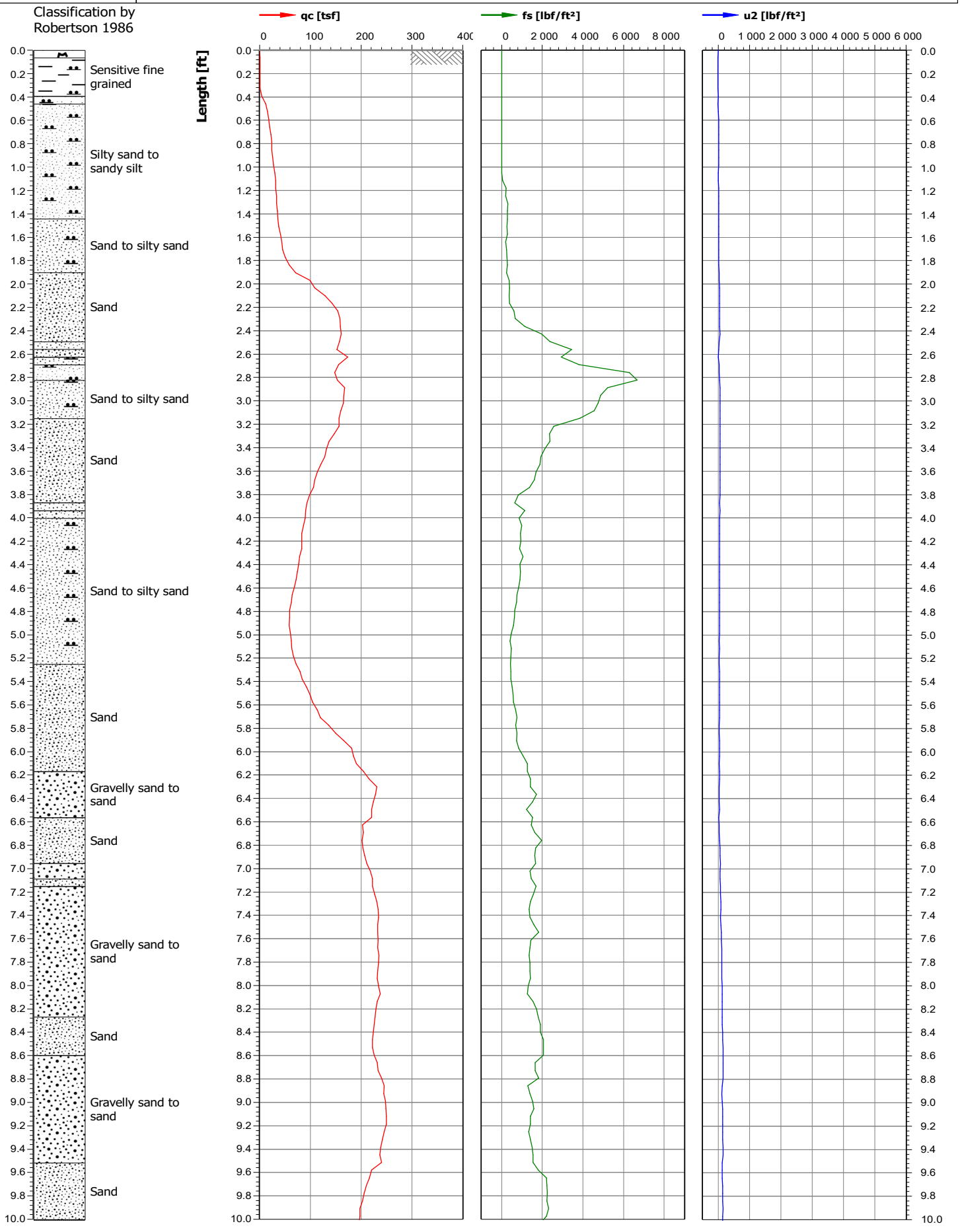


Test ID	Project name	Coordinate system used	Z value
CPT-SB-10	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

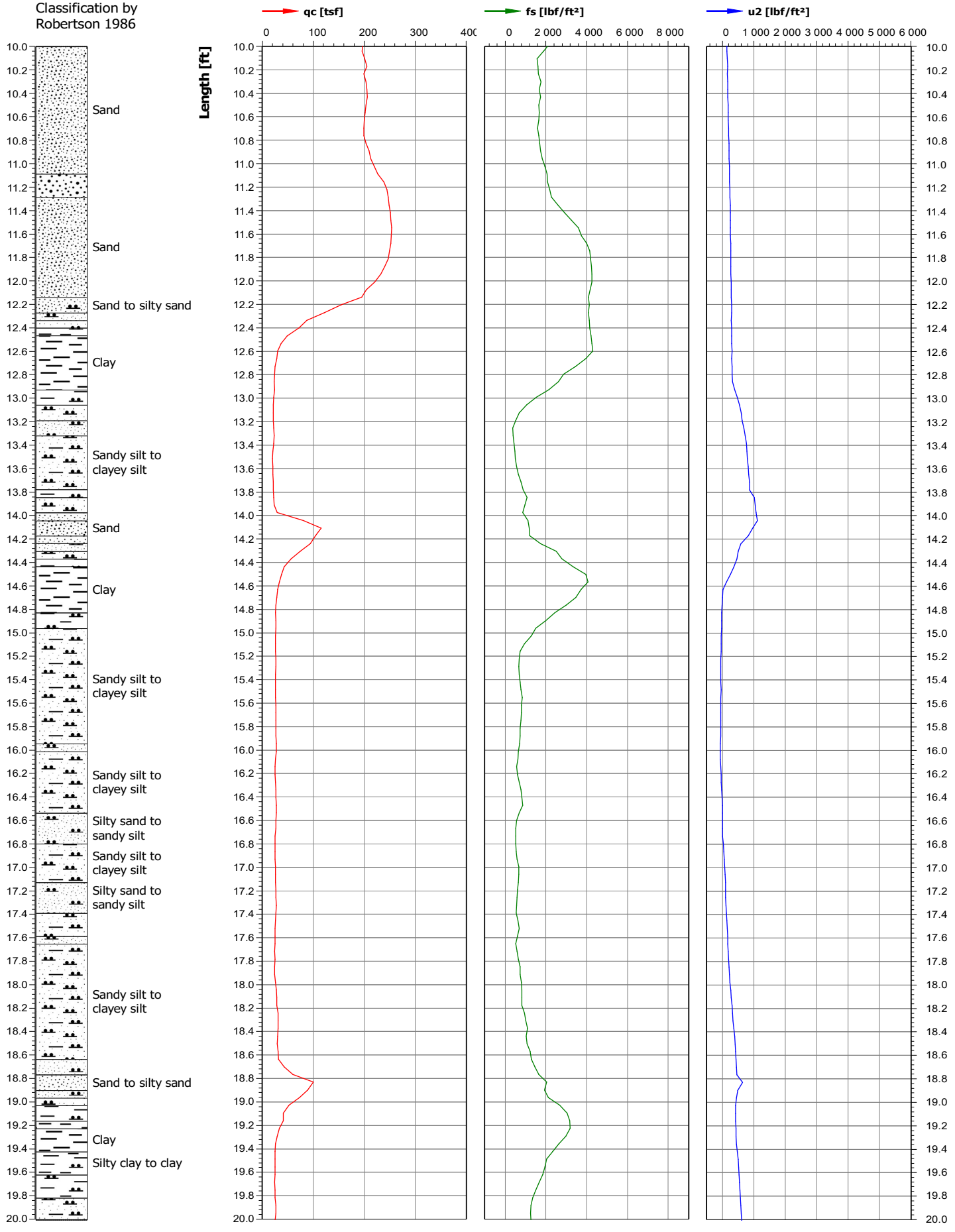


Test ID	Project name	Coordinate system used	Z value
CPT-SB-11	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

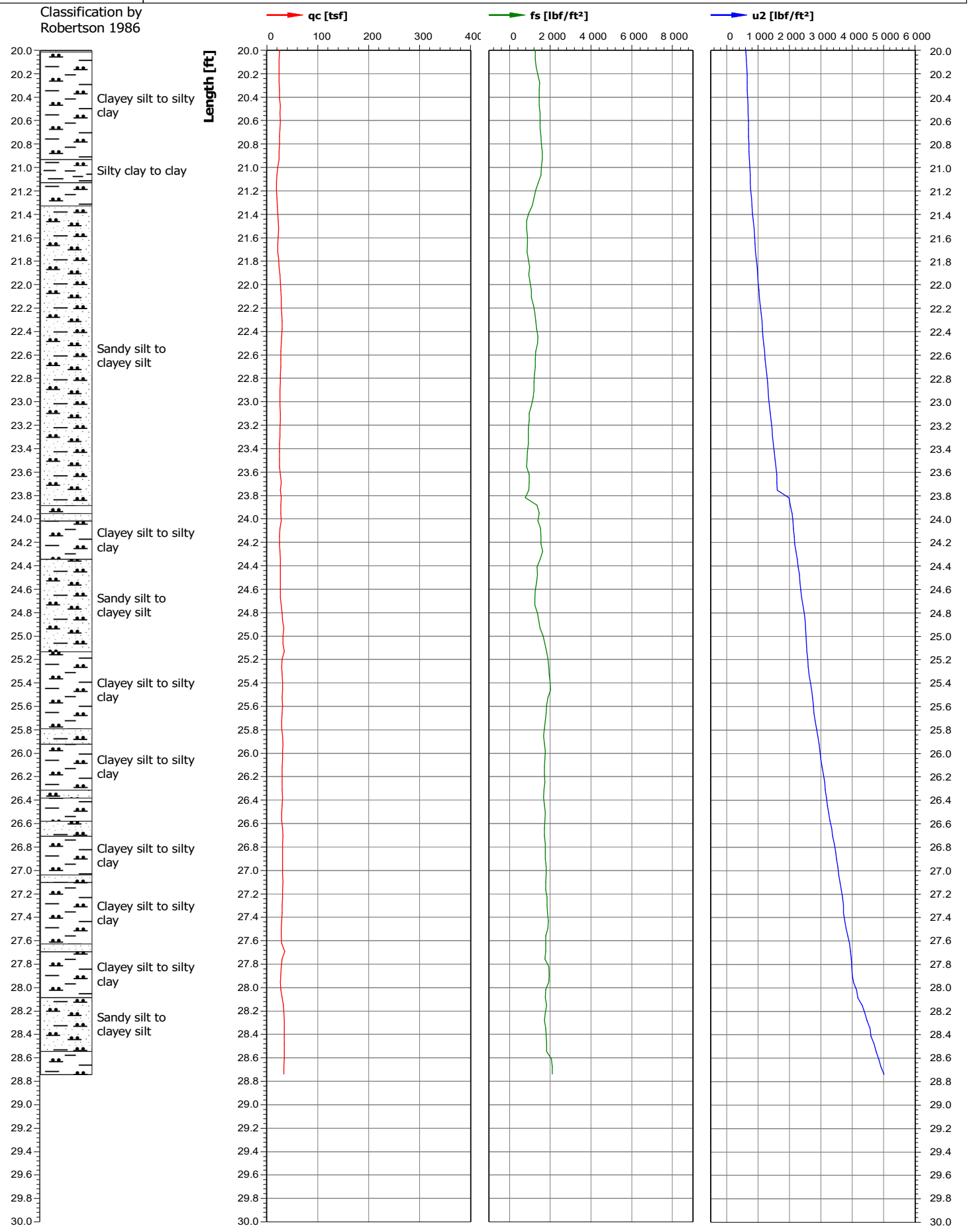


Test ID	Project name	Coordinate system used	Z value
CPT-SB-11	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

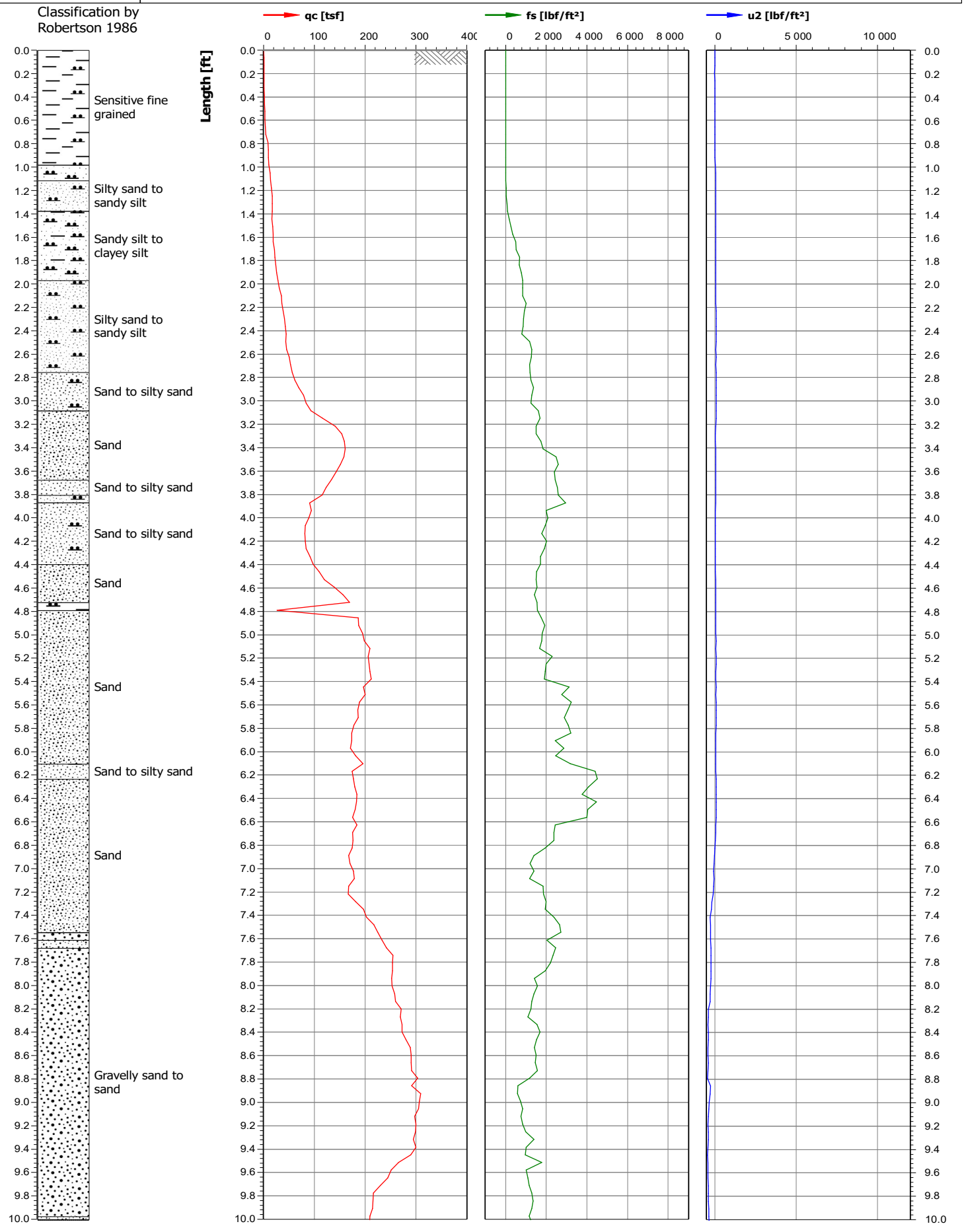
Classification by Robertson 1986



Test ID	Project name	Coordinate system used	Z value
CPT-SB-11	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

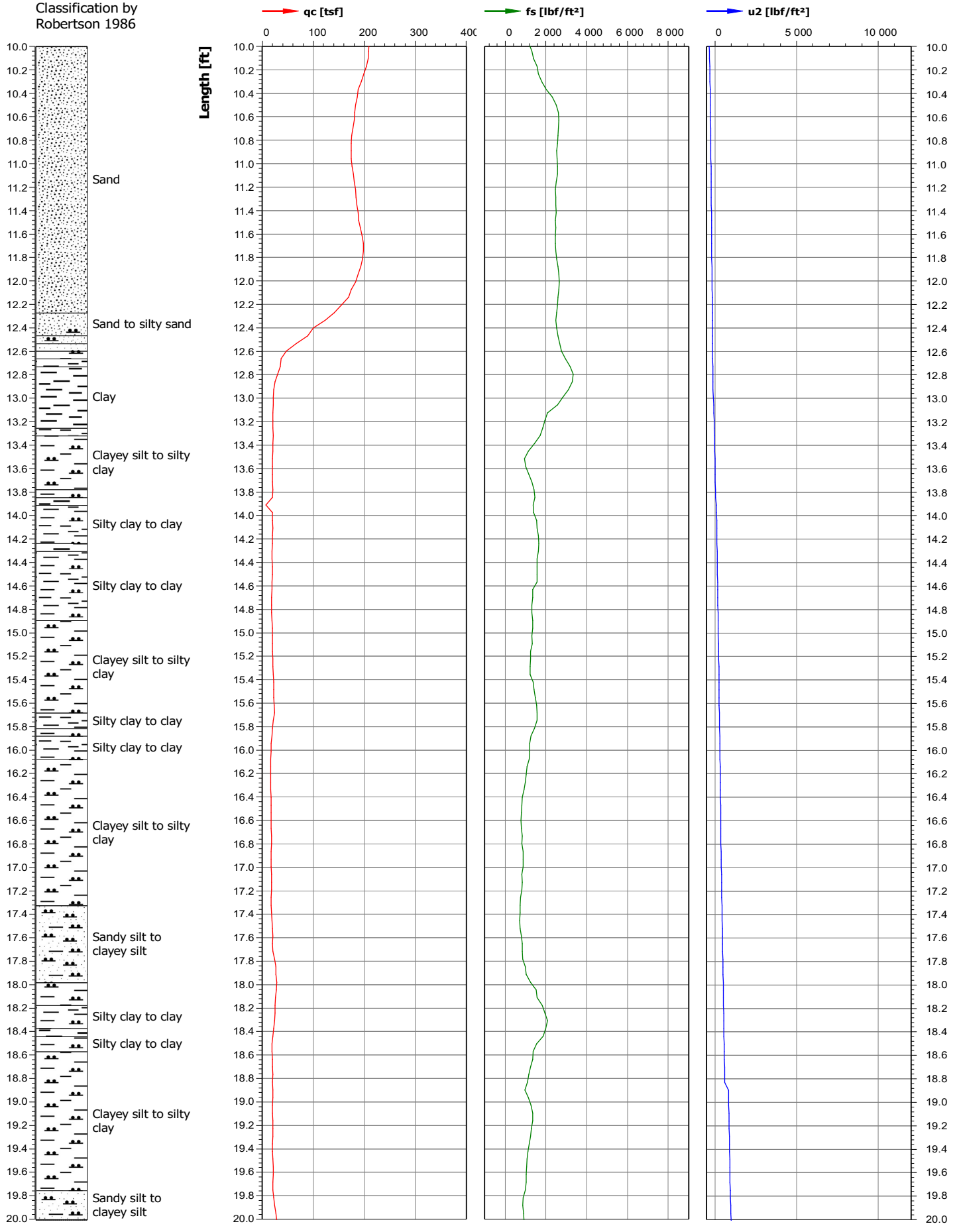


Test ID	Project name	Coordinate system used	Z value
CPT-SB-12	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			



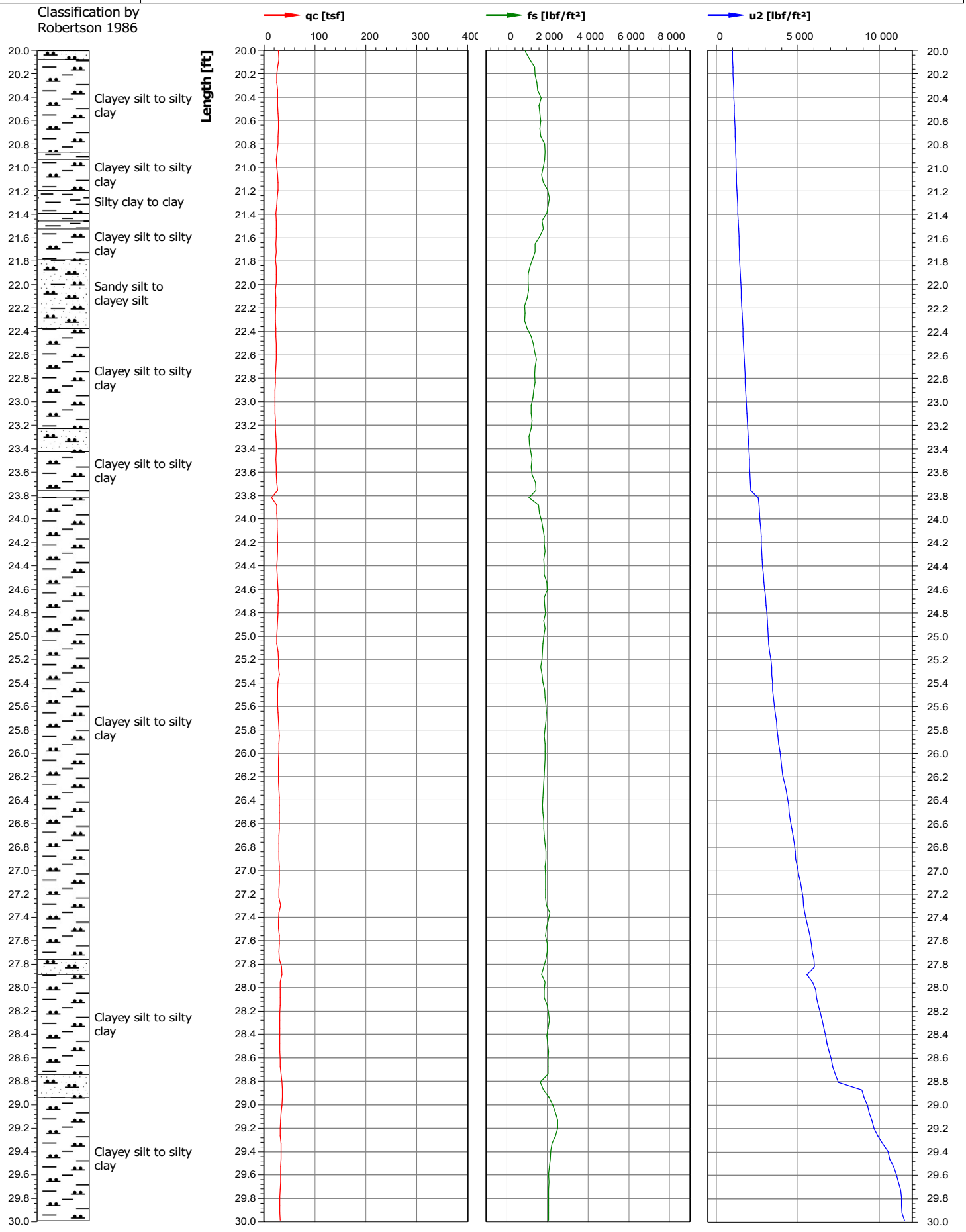
Test ID	Project name	Coordinate system used	Z value
CPT-SB-12	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			

Classification by Robertson 1986



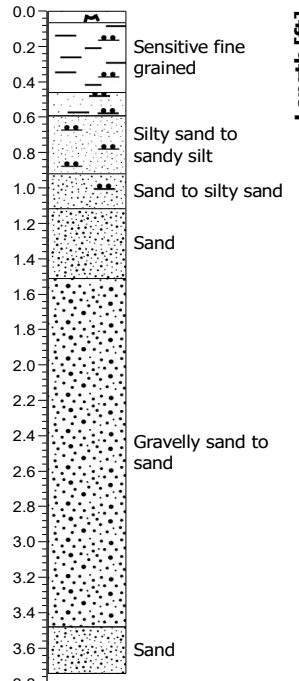
Test ID	Project name	Coordinate system used	Z value
CPT-SB-12	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/29/2024
Remarks			

Classification by Robertson 1986



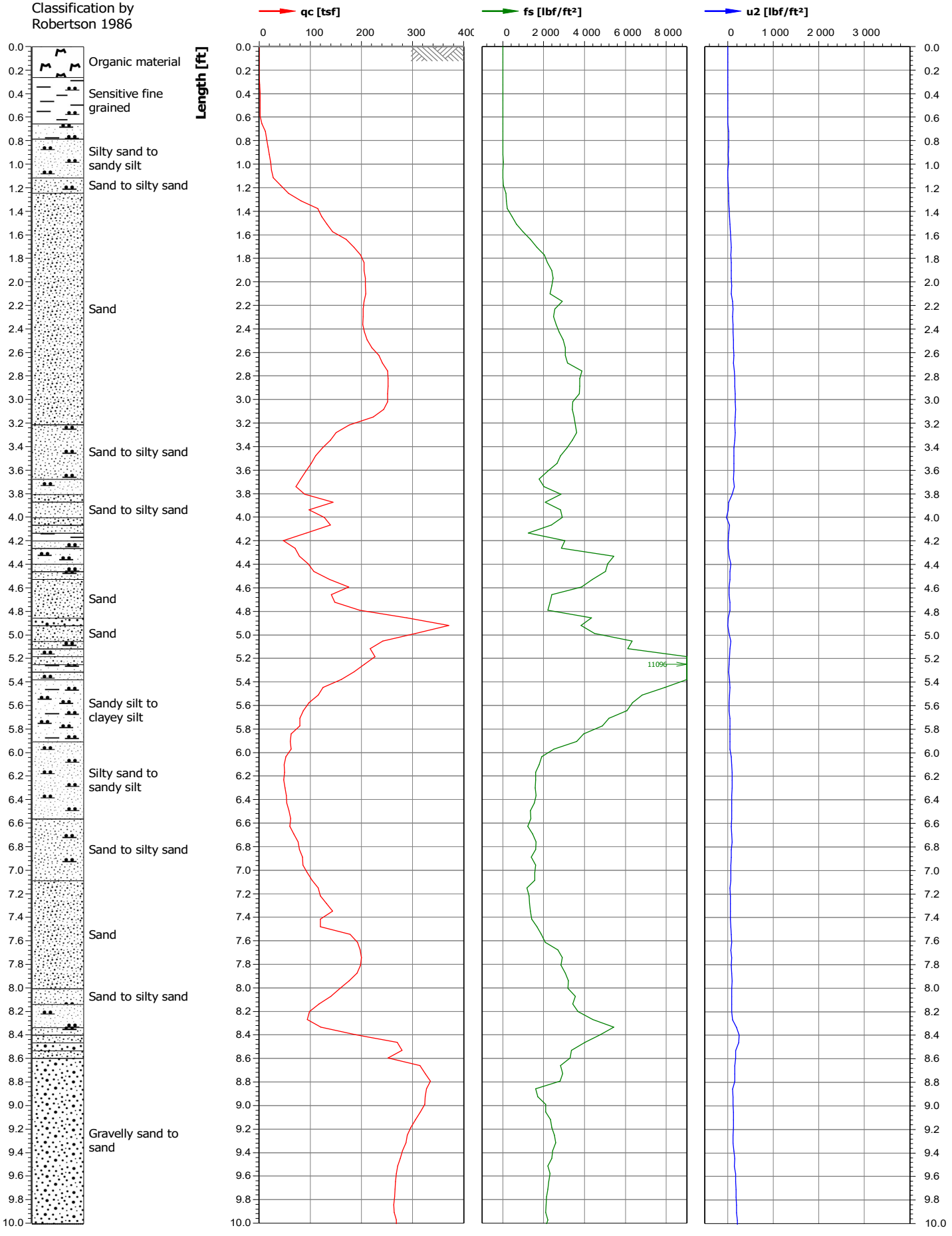
Test ID	Project name	Coordinate system used	Z value
CPT-SB-13	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	10/31/2024
Remarks			

Classification by Robertson 1986

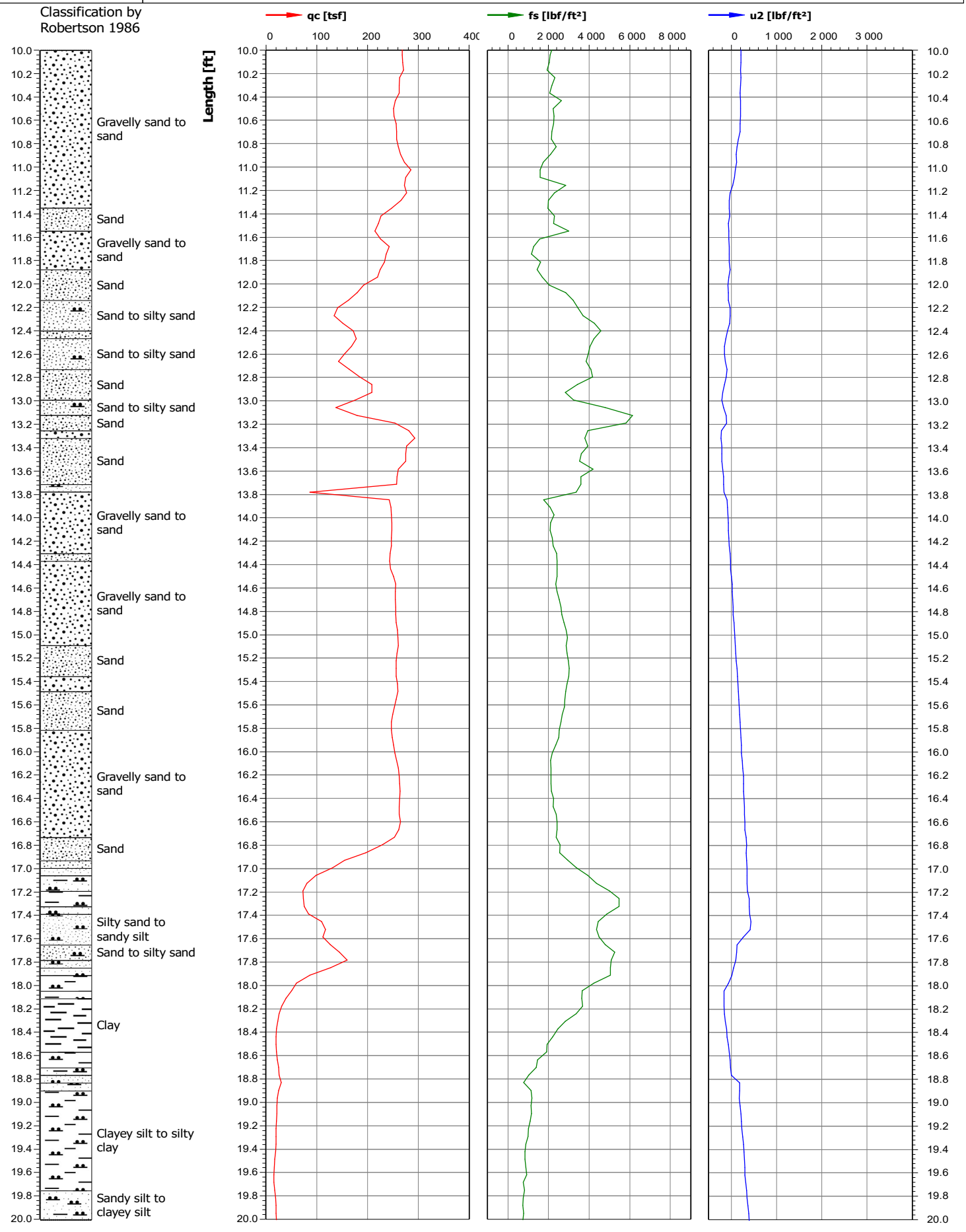


Test ID	Project name	Coordinate system used	Z value
CPT-SB-14	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

Classification by Robertson 1986



Test ID	Project name	Coordinate system used	Z value
CPT-SB-14	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			



Test ID	Project name	Coordinate system used	Z value
SB-14	RACER Van Buren West		
Client	**Project location name**	**Cone serial number**	**Date investigation**
Detroit Regional Partnership	Van Buren, Michigan	5484	11/1/2024
Remarks			

Classification by Robertson 1986