ACKENHEIL ENGINEERS, INC.
GEOTECHNICAL · CIVIL · INSPECTION · TESTING
1000 Banksville Road, Pittsburgh, Pennsylvania 15216
Ph 412-531-7111 · Fax 412-531-4334 · www.ackenheil.com

October 12, 2015

Mr. Gregory D. McDowell
CDM Smith
503 Martindale Street, Suite 500
Pittsburgh, PA 15212

Subject: Geotechnical Investigation Report
Trees Fields Renovations X5743
University of Pittsburgh, Oakland, PA
Ackenheil Project No. 15131

Dear Mr. McDowell:

We are pleased to present our report on the geotechnical investigation performed for the Trees Field Renovation project at the University of Pittsburgh in Oakland, Pennsylvania. This report includes our conclusions and recommendations based on the data obtained at the test boring locations.

We appreciate the opportunity to be of service to you on this project. If you have any questions or comments about this report, please contact our office at 412-531-7111.

Very truly yours,

ACKENHEIL ENGINEERS, INC.

(for LRL)

Lance R. LaRue, P.E.
Senior Project Engineer

Burton R. Holt, P.E.
Technical Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
BURTON R. HOLT
ENGINEER
NO. 52044-E

BRH/LRL:brh

Enclosure

Your Project is Our Priority

TREES FIELD RENOVATION PROJECT

UNIVERSITY OF PITTSBURGH

OAKLAND, ALLEGHENY COUNTY, PENNSYLVANIA

GEOTECHNICAL INVESTIGATION REPORT

PREPARED FOR

CDM SMITH

PITTSBURGH, PENNSYLVANIA

PREPARED BY

ACKENHEIL ENGINEERS, INC.

PITTSBURGH, PENNSYLVANIA

AE PROJECT NO. 15131

OCTOBER 12, 2015

TABLE OF CONTENTS

Page No.

1.0 INTRODUCTION

1.1 Background 1
1.2 Authorization 1
1.3 Report Use 1
1.4 Purpose 1
1.5 Scope 1

2.0 CONCLUSIONS

2.1 Fill Conditions 3
2.2 Soil Conditions 4
2.3 Bedrock Conditions 4
2.4 Groundwater Conditions 4
2.5 Mining Conditions 5

3.0 RECOMMENDATIONS

3.1 Spread Footing Foundations 6
3.2 Foundation and Wall Lateral Load Design Parameters and Backfill 6
3.3 Athletic Fields Subgrade Preparation 8
3.4 Drainage Considerations 8
3.4 Athletic Fields Subgrade Preparation 8
3.5 Structural Fill Placement and Compaction 8
3.6 Permanent Site Grading and Temporary Excavations 9
3.7 Additional Services and Project Representative During Construction 9

4.0 DATA OBTAINED

4.1 General Information 10
4.2 Subsurface Investigation 10
4.3 Fill and Soil Conditions 11
4.4 Bedrock Conditions 13
4.5 Groundwater Conditions 13
4.6 Mining Conditions 13
4.7 Laboratory Testing 13

ATTACHMENTS

Attachment 1 - Site Vicinity Map and W.P.A. Mine Map
Attachment 2 - Test Boring Location Plan
Attachment 3 - Engineers Field Boring Logs
Attachment 4 - Laboratory Test Reports
Attachment 5 – Definitions, Limitations and Important Information

1.0 INTRODUCTION

1.1 BACKGROUND

This geotechnical investigation was performed for CDM Smith (CDM) to obtain subsurface information for the proposed Trees Field Renovation project at the University of Pittsburgh in the City of Pittsburgh, Pennsylvania. The location of the site is shown on the Site Vicinity Map in Attachment 1 of this report.

1.2 AUTHORIZATION

Our work was performed according to our Proposal for Geotechnical Investigation dated May 11, 2015. The work was authorized by an Agreement between Ackenheil Engineers, Inc. (Ackenheil), and CDM executed on August 20, 2015.

1.3 REPORT USE

This report has been prepared in accordance with generally accepted soil and foundation engineering practices for the use of CDM and the University of Pittsburgh for design purposes. No other warranty, expressed or implied, is made as to the professional advice included in this report. In the event that conclusions or recommendations based upon the data obtained in this report are made by others, such conclusions or recommendations are their responsibility.

In the event that the final design differs with respect to function, purpose, location, layout or elevation from that on which we based this report, Ackenheil must review our recommendations with respect to the proposed revisions.

1.4 PURPOSE

The purpose of this investigation was to present conclusions on the fill, soil, rock, groundwater and mining conditions encountered at the test boring locations and to provide foundation, retaining wall, athletic field, and general earthwork conclusions and recommendations for the proposed Trees Field Renovation project.

1.5 SCOPE

1. Reviewed selected in-house geotechnical and geologic literature of the site as well as selected plans, reports and literature of the site provided to us by the University of Pittsburgh and CDM Smith.

2. Drilled 16 standard test borings at the site. Continuous split-spoon samples, or split-spoon samples at 3-foot intervals, of the soil encountered were obtained in each test boring. In addition, approximately 10 feet of NX/NQ rock core was obtained in three (3) test borings (B-7, B-15 and B-16).

3. Provided a full-time field engineer during drilling to log the test borings.

4. Prepared a Test Boring Location Plan (using the site mapping provided by CDM Smith) and a typed Engineers Field Boring Log for each test boring.

5. Performed laboratory testing on the samples obtained including soil classification, moisture content, modified proctor, direct shear, corrosivity and rock unconfined compression.

6. Performed geotechnical analysis on the data obtained to evaluate the impacts of the site subsurface conditions encountered on the proposed new facilities and to provide the following design recommendations:

   - Evaluation of slope stability.
   - Maximum permanent cut and fill slope inclinations.
   - Suitability of the soil and rock encountered for re-use as structural fill.
   - Retaining wall types and design parameters.
   - Structure foundation types, depths and design parameters.
   - Playing field subgrade preparation and design parameters.

7. Prepared this Geotechnical Investigation Report presenting the data obtained, the results of our analysis on the data obtained, and our conclusions and recommendations.

2.0 CONCLUSIONS

The following conclusions are presented based on the data obtained, laboratory test results, and analysis.

2.1 FILL CONDITIONS

1. Fill was encountered in all sixteen (16) test borings extending to approximate depths varying from 1.7 to 53.0 feet below the existing ground surface.

2. Visual descriptions and SPT blow counts of the samples obtained indicate that the existing fill is a mixture of (primarily) medium dense sand, clay, silt, and rock fragments with occasional brick fragments, coal and cinders.

3. Laboratory tests on eight (8) samples of the existing fill indicate that the six (6) of the samples tested have USCS Classifications of SC (AASHTO Classifications of A-6, A-2-4 and A-2-6), one (1) of the samples tested has a USCS Classification of GC (AASHTO Classification of A-2-4) and one (1) of the samples tested has a USCS Classification of ML (AASHTO Classification of A-6).

4. The existing fill is relatively compressible and variable in classification and relative density. Heavily or moderately loaded structures bearing directly on these materials at their current condition could experience damaging settlements. Consequently, a relatively low allowable bearing pressure will be required for the design of structures placed on the fill to limit settlement. In addition, re-compaction of the existing fill to a minimum depth of 12 inches below the base of spread footing foundations will be required to provide a uniform bearing surface.

5. The existing fill encountered is suitable to support floor slabs, pavements and athletic fields if the top 12 inches of the subgrade can be compacted and is in a stable, non-yielding, condition prior to placement of the slab or pavement.

6. Moisture content testing of the existing fill indicates that the in-situ moisture content may be above the estimated optimum moisture content in some areas. Laboratory moisture content testing of the existing fill indicates in-situ moisture contents varying from 7.0 % to 18.0% with an optimum moisture contents 8.3% in the samples tested. Consequently, some of the existing fill will not be suitable for reuse as structural fill unless it is allowed to dry prior to placement.

7. The existing fill has a moderate shear strength based on re-molded direct shear test results. Consequently, permanent cut slopes in the existing fill should have maximum inclinations of 2.h:1v for stability, and new embankments placed on the existing fill should have toe benches and maximum inclinations of 2h:1v for stability.

2.2 SOIL CONDITIONS

1. Residual soil was encountered below the existing fill in eight (8) of the sixteen (16) test borings, with an approximate thickness varying from 0.1 to 7.8 feet above the top-of-rock.

2. The residual soil layer is suitable to support the structure foundations on spread footings at low to moderate allowable bearing pressures. However, residual soil was encountered at a relatively shallow depth only in Test Borings B-2, B-6 and B-12.

3. The residual soil encountered is suitable to support floor slabs, pavements and athletic fields.

4. The residual soil will generally be suitable for reuse as structural fill.

5. The residual soil has a moderate to high shear strength.

2.3 BEDROCK CONDITIONS

1. The top-of-rock was encountered in eight (8) of the sixteen (16) test borings at approximate depths ranging from 3.2 feet to 60.0 feet below the existing ground surface.

2. Approximately ten (10) feet of bedrock was cored in the Test Borings B-7, B-15 and B-16. The bedrock cored consists of slightly to highly weathered, soft to hard, claystone, shale, and sandstone bedrock. The percent recoveries varied from 83% to 100% and the Rock Quality Designations (RQD's) varied from 0% to 87% in the bedrock cored.

3. The bedrock is suitable to support the proposed structures on spread footing foundations, if encountered at the bottom of footing elevations or on deep foundations.

4. Excavated bedrock (if free of carbonaceous materials and with a maximum particle size of 6") will be generally be suitable for reuse as structural fill.

2.4 GROUNDWATER CONDITIONS

1. Groundwater was not encountered during drilling in any of the 16 test borings and the borings were dry when measured prior to backfilling.

2. Groundwater seepage into foundation or utility trench excavations is not considered likely, but could be encountered especially during periods of precipitation.

2.5 MINING CONDITIONS

The Work Program Administration (W.P.A.) Pittsburgh Sheet No.1 Mine Map provided in Attachment 1 indicates a Pittsburgh Coal Seam outcrop elevation of EL. 1060 at the site. Since the top-of-rock (TOR) was encountered above EL. 1060 in Test Borings B-2, B-6, B-13 and B-14 (approximate TOR elevations between 1070.2 and 1092.0), the southern portion of the site may be undermined at the Pittsburgh Coal Seam. The base of the fill in Test Borings B-7, B-15 and B-16 is below the anticipated base of the Pittsburgh Coal Seam elevation in the northern portion of the site. Consequently, the Pittsburgh Coal Seam in the northern portion of the site was likely removed by strip mining activities at the outcrop and backfilled with a portion of the existing fill encountered in the test borings.

Mine subsidence damage to structures placed in the southern portion of the site from past mining activities at the Pittsburgh Coal Seam is a concern. Additional investigation, including additional test borings at final structure locations in the southern portion of the site, will be required to in order to determine the magnitude of the risk of mine subsidence damage to new structures and to provide remedial recommendations. We are available to provide a proposal to perform the additional investigation upon request.

3.0 RECOMMENDATIONS

The following recommendations are presented based on the data obtained, laboratory test results, and analysis.

3.1 SPREAD FOOTING FOUNDATIONS

The new structures and retaining walls can be placed on spread footing foundations. However, in areas where existing fill is encountered at the proposed foundation elevation, the top 12 inches should be compacted to 95 percent of the maximum dry density per ASTM D-1557 (Modified Proctor) and be in a stable, non-yielding condition at the time of concrete placement. Overexcavate and replace materials which cannot be compacted or which yield excessively under proofrolling with structural fill in accordance with Section 3.5 of this report.

Design the structures for an allowable bearing pressure of 2,000 psf and a coefficient of friction of 0.5, with a total post-construction settlement of up to one (1) inch and differential settlements less than one-half (0.5) inch under the allowable bearing pressure. Use a minimum spread footing foundation width of 24 inches and a minimum frost depth of 36 inches.

3.2 FOUNDATION AND WALL LATERAL LOAD DESIGN PARAMETERS AND BACKFILL

Foundations and retaining walls backfilled on one side only should be designed to resist lateral earth pressures imposed by the soils retained by these structures. The following lateral load design parameters are recommended for foundations and retaining walls backfilled with AASHTO #57 coarse aggregate for a minimum width equal to 50% of the wall height with a maximum wall height of 12 feet:

Parameter	Design Value
Active Equivalent Fluid Pressure[1] (K_A)	35 pcf[2]
At-Rest Equivalent Fluid Pressure[1] (K_o)	46 pcf
Passive Earth Pressure (K_p)	350 pcf
Coefficient of Friction	0.50
Soil Unit Weight (AASHTO #57)	120 pcf

Notes:
1) For restrained walls which cannot deflect at least 0.002 times the wall height, use the At-Rest Earth Pressure.
2) Pcf is pounds per cubic foot.

The values given above are to be used for design of permanent foundation and retaining walls only. An appropriate safety factor should be applied when designing the walls. Use a safety factor of at least 1.5 for overturning and sliding.

Traffic, slope or other surcharge loads should be added to the above lateral pressures. Heavy construction equipment should not be operated behind foundation walls within the distance equal to the height of the wall, unless the walls are designed for the additional lateral pressures resulting from the equipment. Place and compact backfill with hand-operated equipment.

Based on site constraints and the depth of the existing fill encountered in Test Borings B-7, B-15 and B-16, we anticipate that the proposed retaining wall adjacent to the north corner of the new athletic field will be a mechanically stabilized earth (MSE) retaining wall. The height of the wall is anticipated to be up to approximately 50 feet. It is further anticipated that the wall will be designed and constructed by the Contractor. Based on the data obtained and the laboratory test results, design the MSE wall in accordance with the following design parameters:

Existing Fill (Global Stability)
Effective Friction Angle: 30°
Moist Unit Weight: 130 pcf
Effective Cohesion: 100 psf
Maximum Allowable Bearing Pressure: 3,500 psf

Residual Soil/Weathered Rock (Global Stability)
Effective Friction Angle: 33°
Moist Unit Weight: 130 pcf
Effective Cohesion: 100 psf

Structural Fill (Wall Backfill/Internal Stability)
2A (Limestone) Coarse Aggregate
Effective Friction Angle: 32°
Moist Unit Weight: 140 pcf
Effective Cohesion: 0 psf

Place footing drains at the base of all foundation wall and retaining wall footings. Surround the footing drain by at least six (6) inches of one-inch-minus washed rock wrapped in non-woven geotextile filter fabric. At the highest point, place the perforated pipe invert at least as low as the top of the footing and slope it for positive drainage. Outlet the footing drains into the stormwater system, if possible. If the drains must outlet into a drainage channel or dry well, the outlet should be a minimum of 100 feet from any building or the top of any slopes.

3.3 ATHLETIC FIELD SUBGRADE PREPARATION

Place the new athletic fields on the existing fill and/or residual soil, provided these soils can be compacted to 95 percent of the maximum dry density per ASTM D-1557 (Modified Proctor) and are in a stable, non-yielding condition at the time of construction. Overexcavate and replace materials which cannot be compacted or which yield excessively under proofrolling with structural fill in accordance with Section 3.5 of this report.

Design the athletic fields, floor slabs and pavements using a California Bearing Ratio (CBR) of 10.

3.4 DRAINAGE CONSIDERATIONS

Water was not eecountered during drilling in any of the 16 test borings. Consequently, groundwater seepage into excavations is not considered likely, but is possible especially during periods of precipitation. If encountered, groundwater seepage should be drained away from the excavations by pumping from sumps at the bottom of the excavation.

At all times, the site should be graded so that surface water is directed away from areas of structures and the tops of slopes. Water should not be allowed to stand in any area where foundations, slabs, or pavements are to be constructed. Any exposed slopes should be covered with plastic to minimize erosion. Final site grading in areas adjacent to buildings should be sloped at least two percent (2%) away from the building, unless the area is paved, to direct surface water away from the building.

3.5 STRUCTURAL FILL PLACEMENT AND COMPACTION

Structural fill is defined as any fill placed under the proposed foundations, athletic fields, floor slabs and pavements, and behind foundation or retaining walls. All structural fill should be placed in horizontal lifts with a moisture content which is within 2% of the optimum moisture content for cohesive soils and with 3% of the optimum moisture for granular soils. The optimum moisture content is that which results in the greatest compacted dry density. Maximum particle size should not exceed six (6) inches in any dimension.

The allowable lift thickness of the fill will depend on the material type, compaction equipment and the number of passes made to compact the lift. In no case should the lifts exceed ten (10) inches in loose thickness.

All structural fill placed under foundations, athletic fields, floor slabs and pavements should be compacted to at least 95% of maximum dry density as determined by ASTM D-1557 (Modified Proctor). Free-draining structural fill placed behind foundation and retaining walls should be compacted to non-movement.

The existing fill, residual soil and bedrock (if free of carbonaceous materials and with a maximum particle size of 6") are suitable for re-use as structural fill. The in-situ moisture contents of these materials, however, may be above the optimum moisture content in some areas. Consequently, air drying may be required to achieve the required compaction if these materials are used as structural fill. Due to its high fines content, the site soils are not suitable to backfill retaining walls. Additionally, the existing site soils will be difficult to place and compact in wet weather, limiting their suitability as structural fill to dry weather construction (summer construction).

Imported material for use as structural fill and for MSE wall backfill should have a gradation similar to PennDOT 2A structural fill. Material for use as conventional wall backfill should be AASHTO #57 coarse aggregate.

3.6 PERMANENT SITE GRADING AND TEMPORARY EXCAVATIONS

Design permanent cut slopes for a maximum inclination of 2h:1v.

Specify that seeps or springs encountered in the cut slopes be directed to the base of the cut slope using R-4 riprap lined drainage ditches discharging into a drainage swale at the base of the cut slope. Also, specify that cut slopes be re-vegetated to inhibit erosion.

As with all cut slopes, some slope maintenance of the cut slope (i.e. re-grading to remove overhangs, removal of slough at the base of the slope, etc.) over time will be required.

Design permanent embankment slopes placed above the existing fill or residual soil to have maximum inclinations of 2h:1v.

Specify that all fill placed in embankments be placed in horizontal lifts not to exceed twelve (12) inches in loose thickness with a moisture content which is within 3 percent of the optimum moisture content. Specify that all fill placed in embankments be compacted to at least 95% of maximum dry density in accordance with ASTM D-1557.

Design all temporary excavations to have slopes which conform to CFR 29, Part 1926, Subpart P, (OSHA) 1926.650 through 1926.652 and Appendices A through F. The Soil Classification for the existing fill soil is Type C and for the residual soil is Type B.

3.7 ADDITIONAL SERVICES AND PROJECT REPRESENTATIVE DURING CONSTRUCTION

We recommend that an Ackenheil representative be on-site to observe the bottom of foundation excavations and overexcavations for structures and retaining walls to document that the recommended bearing material has been reached. We also recommend that an Ackenheil representative be on-site to observe the proof-rolling of all athletic fields, floor slab and pavement subgrades. Ackenheil can also provide structural fill compaction and concrete testing services upon request.

4.0 DATA OBTAINED

4.1 GENERAL INFORMATION

1. Location of Project: The existing Trees Field is located on the University of Pittsburgh campus south of the intersection of Robinson Street Extension and Centre Avenue in the City of Pittsburgh, Allegheny County, Pennsylvania (see the Site Location Map in Attachment 1).

2. Existing Structures: The property is currently developed with an artificial turf soccer field and a natural grass baseball field.

3. Existing Topography: The existing ground surface of Trees Field is essentially flat and bordered by a steep slope (up to approximately 56 feet high and with an approximate 2h:1v inclination) on the north and west sides and by an existing retaining wall (up to approximately 30 feet in height) on the south side. The east side is bordered by Harold Street. Based on mapping provided by CDM, existing site grades vary from a high of approximate EL. 1096 to a low of approximate elevation of EL. 940 (along the property line near Centre Avenue).

4. Proposed Construction: The Trees Field Renovation project will consist of the construction of new artificial turf multi-use athletic field along with the associated bleachers, press boxes, score boards and lighting structures. Foundation loads on the new structures are anticipated to be low, less than 2 kips/linear foot. The proposed renovation will include a retaining wall along the north side of the new field approximately 20 feet in maximum height.

   The Test Boring Location Plan in Attachment 2 provides additional information on the current anticipated layout of the proposed renovation.

4.2 SUBSURFACE INVESTIGATION

Sixteen (16) test borings were drilled by Pennsylvania Company, Inc., on September 21 thru September 25, 2012, at the approximate locations shown on the Test Boring Location Plan in Attachment 2. Continuous soil sampling, or soil sampling at 3-foot or 5-foot centers, was performed in the soil zone in each test boring. Approximately ten (10) feet of NQ rock core was obtained of the bedrock encountered below the top-of-rock in Test Borings B-7, B-15 and B-16. The test borings were backfilled with drill cuttings upon completion of the drilling.

The locations of the test borings were selected by CDM. The elevations were also provided by CDM.

4.3 FILL AND SOIL CONDITIONS

1. Sample Descriptions: The fill and native soil samples obtained in the test borings were examined by an Ackenheil representative. An Engineers Field Boring Log was developed describing the subsurface conditions encountered at each boring. The Engineers Field Boring Logs are included in Attachment 3 of this report.

2. Composition: Fill was encountered immediately below the ground surface in all sixteen (16) test borings. Visual descriptions indicate the fill encountered is a mixture of clay, silt, sand, and rock fragments with occasional brick fragments, coal and cinders.

   Native soils were encountered underlying the fill in eight (8) of the sixteen (16) test borings. Visual descriptions of the native soil indicate the soil is primarily weathered rock fragments and sand with lesser amounts of silt and clay.

3. Origin: The fill encountered in the test borings was probably placed during the past development of the site to provide the nearly level athletic fields. In addition, the presence of coal fragments in the fill indicates that the some of the fill was probably placed during previous strip mining activity at the Pittsburgh Coal Seam Outcrop. The native soils observed at the test boring locations consisted of residual soil (formed by the in-place weathering of claystone, limestone, shale and sandstone bedrock).

4. Thickness: As shown in Table 1, the existing fill (encountered in all of the test borings) varies in approximate thickness from 1.7 feet in Test Boring B-2 to 53.0 feet in Test Boring B-15.

   The residual soil (encountered in all of the test borings that completely penetrated the fill) varies in approximate thickness from 0.1 feet to 7.8 feet above auger refusal at the top-of-rock.

5. Moisture Content: The moisture contents of the samples obtained were described and recorded in the Visual Description section of the Engineers Field Boring Logs. The descriptions are Dry, Moist, Very Moist or Wet. Cohesive soils are further described as being above or below their estimated plastic limits (+PL or -PL).

6. Relative Density and Consistency: The relative density of a non-cohesive soil or fill and the consistency of a cohesive soil or fill is an indicator of shear strength. The relative density or consistency of the materials encountered in the test borings, based on SPT blow counts, is indicated in the Visual Description section of the Engineers Field Boring Logs.

   The existing fill encountered in all sixteen (16) test borings has a loose to dense (typically medium dense) relative density. The residual soil encountered has a medium dense to very dense relative density.

TABLE 1
Summary of Test Boring Data

Test Boring ID	Approx. Surface Elev. (ft)	Approx. Bottom Elev. (ft)	Soil			Approx. Top of Rock Elev. (ft)	Rock Core Depth (ft)	Total Drilling Depth (ft)	Measured Water Depth (ft)
			Fill Material Drilled (ft)	Residual Soil Drilled (ft)	Total Soil Drilled (ft)				
B-1	1093.5	1083.0	10.5	0.0	10.5	NA	NA	10.5	DRY
B-2	1094.4	1091.2	1.7	1.5	3.2	1091.2	0.0	3.2	DRY
B-3	1092.5	1067.0	25.5	0.0	25.5	NA	0.0	25.5	DRY
B-4	1094.4	1088.4	6.0	0.0	6.0	NA	0.0	6.0	DRY
B-5	1094.4	1088.4	6.0	0.0	6.0	NA	0.0	6.0	DRY
B-6	1094.9	1089.3	5.5	0.1	5.6	1089.3	0.0	5.6	DRY
B-7	1093.4	1024.4	53.0	6.0	59.0	1034.4	10.0	69.0	DRY
B-8	1095.0	1085.9	9.1	0.0	9.1	NA	0.0	9.1	DRY
B-9	1095.0	1056.0	39.0	0.0	39.0	NA	0.0	39.0	DRY
B-10	1095.3	1089.3	6.0	0.0	6.0	NA	0.0	6.0	DRY
B-11	1095.7	1089.7	6.0	0.0	6.0	NA	0.0	6.0	DRY
B-12	1095.2	1092.0	2.3	0.9	3.2	1092.0	0.0	3.2	DRY
B-13	1094.5	1070.2	16.5	7.8	24.3	1070.2	0.0	24.3	DRY
B-14	1095.2	1087.0	7.7	0.5	8.2	1087.0	0.0	8.2	DRY
B-15	1094.1	1024.1	53.0	7.0	60.0	1034.1	10.0	70.0	DRY
B-16	1040.0	1012.5	13.5	4.0	17.5	1022.5	10.0	27.5	DRY
		Totals:	261.3	27.8	289.1		30.0	319.1	

Notes: Soil Layer thicknesses are based on interpretation of test boring data and are approximate. Actual Thicknesses may vary from those indicated.

4.4 BEDROCK CONDITIONS

Bedrock was cored in three (3) of the sixteen (16) test borings (B-7, B-15 and B-16). The top-of-rock (TOR), as defined in Attachment 5, was encountered at the approximate depths and elevations provided in Table 1.

The bedrock cored consists of slightly to highly weathered, soft to hard, claystone, shale, and sandstone bedrock. The percent recoveries varied from 83% to 100% and the Rock Quality Designations (RQD's) varied from 0% to 87% in the bedrock cored.

Based on geologic maps, the bedrock cored in the northern portion of the site (Test Borings B-7, B-15 and B-16) is located just below the Pittsburgh Coal Seam (outcrop EL. 1060 feet). Consequently, the bedrock underlying the northern portion of the site belongs to the Pittsburgh Limestone Bed, Little Pittsburgh Member, Casselman Formation, Conemaugh Group. The Pittsburgh Limestone Bed consists of interbedded sandstone, limestone, shale, siltstone and claystone bedrock. The TOR was encountered in the southern portion of the site (Test Borings B-2, B-6, B-12, B-13 and B-14) at elevations above the estimated outcrop elevation of the Pittsburgh Coal Seam (EL. 1060). Consequently, the bedrock underlying the southern portion of the site belongs to the Pittsburgh Sandstone Bed, Pittsburgh Member, Pittsburgh Formation, Monongahela Group. The Pittsburgh Sandstone Bed consists of sandstone with occasional black silty or carbonaceous shale.

4.5 GROUNDWATER CONDITIONS

Groundwater was not encountered during drilling in any of the 16 test borings and the borings were dry when measured prior to backfilling.

4.6 MINING CONDITIONS

The Work Program Administration (W.P.A.) Pittsburgh Sheet No.1 Mine Map provided in Attachment 1 indicates that the southern portion of the site may be undermined at the Pittsburgh Coal Seam with a coal seam outcrop elevation of EL. 1060.

4.7 LABORATORY TESTING

1. Soil Classification: Eight (8) split-spoon and bag (bulk) soil samples were tested and classified based on their liquid and plastic limits and grain size distribution. The results of these tests are provided in Attachment 4 and are indicated on the Engineers Field Boring Logs in Attachment 3.

2. Soil Moisture Content: Forty seven (47) moisture content tests were performed on split-spoon and bulk soil samples. The results of these tests are provided in Attachment 4 and are indicated on the Engineers Field Boring Logs.

3. Soil Modified Proctor: One (1) modified proctor test (in accordance with ASTM D-1557) was performed on the combined bulk samples. The results of this test are provided in Attachment 4.

4. California Bearing Ratio (CBR): One (1) CBR test (in accordance with ASTM D-1883) was performed on the combined bulk samples. A CBR value of 10.7 was obtained at a density of 96.4% of the modified proctor maximum dry density (MDD). The results of this test are provided in Attachment 4.

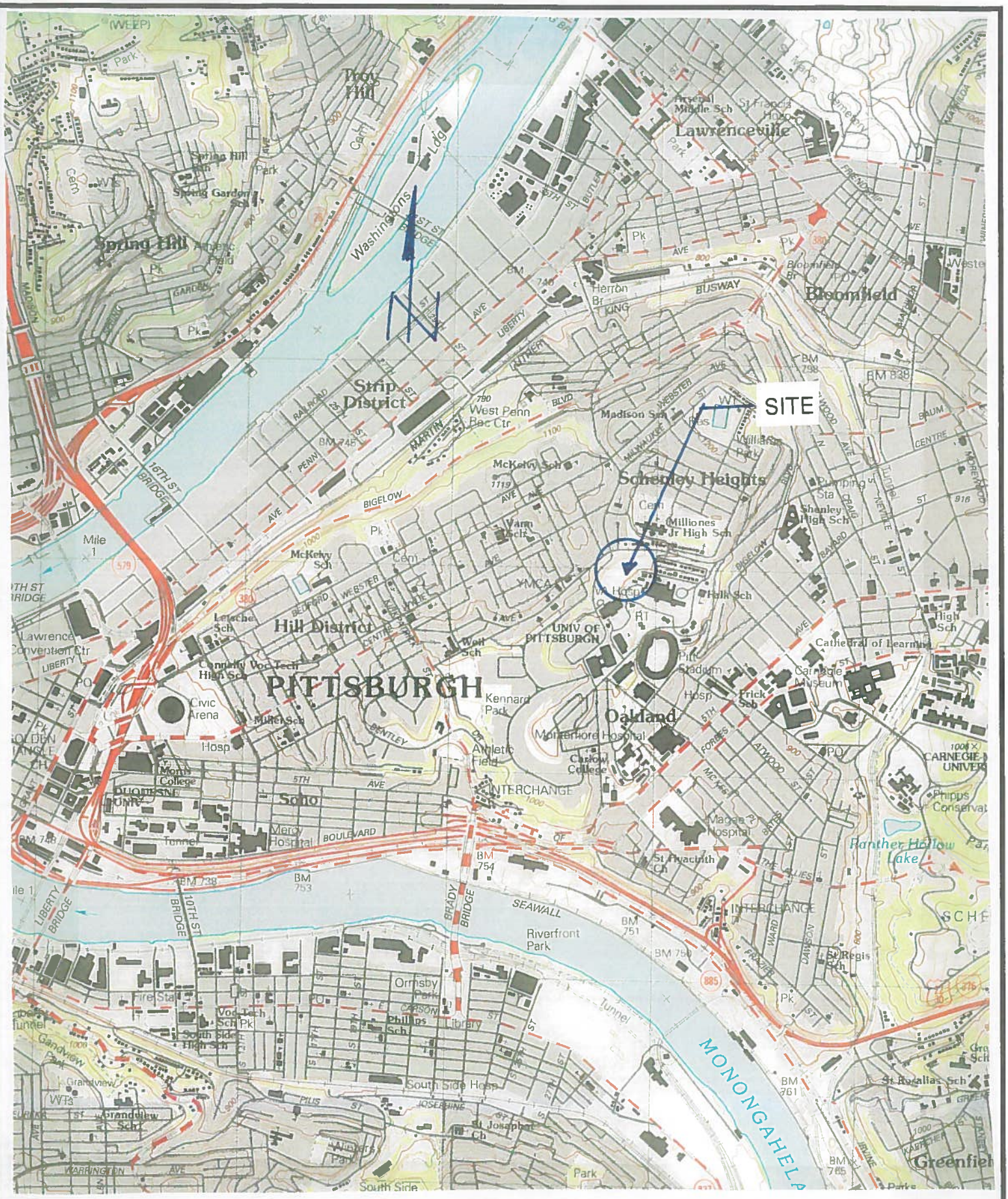
5. Direct Shear: Two (2) direct shear tests (in accordance with ASTM D-3080) were performed on the combined split-spoon samples from Test Brings B-3 and B-15. The samples were remolded to approximately 95% of MDD. The tests resulted in a internal angle of friction (Ø) of 29.9° and a cohesion (c) of 440 psf for B-3, and a Ø = 28.9° and c = 367 psf for B-15. The results of these tests are provided in Attachment 4.

6. Soil Resistivity: One (1) soil resistivity test (in accordance with ASTM G-57) was performed on the combined split-spoon samples from Test Boring B-8. The result of this test is provided in Attachment 4.

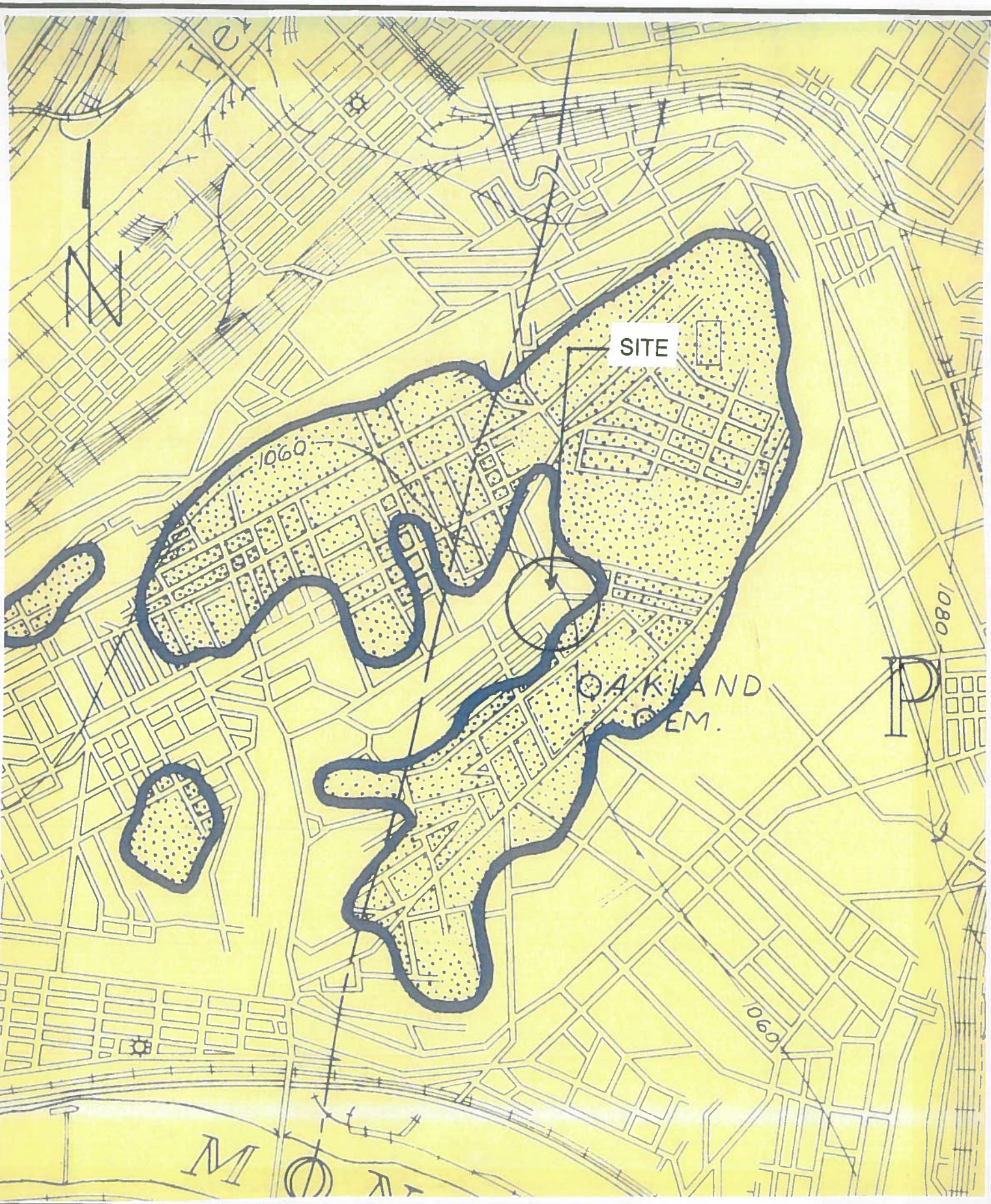
ATTACHMENTS

Attachment 1

Site Vicinity Map
and
W.P.A. Mine Map, Pittsburgh Sheet No. 1



DATE:	10/9/15	TREES FIELD RENOVATION PROJECT	SITE VICINITY MAP
SCALE:	N.T.S.	UNIVERSITY OF PITTSBURGH, ALLEGHENY COUNTY, PENNSYLVANIA	
PREPD BY:	BRH	**ACKENHEIL ENGINEERS, INC.**	
PRJ. NO.:	15131	1000 Banksville Road, Pittsburgh, PA 15215	



DATE:	10/9/15	TREES FIELD RENOVATION PROJECT	W.P.A.
SCALE:	N.T.S.	UNIVERSITY OF PITTSBURGH, ALLEGHENY COUNTY, PENNSYLVANIA	MINE MAP
PREPD BY:	BRH	**ACKENHEIL ENGINEERS, INC.**	PITTSBURGH
PRJ. NO.:	15131	1000 Banksville Road, Pittsburgh, PA 15215	SHEET NO. 1

Attachment 2

Test Boring Location Plan

DATE:	10/9/2015	TREES FIELD RENOVATION PROJECT	TEST BORING LOCATION PLAN
SCALE:	N.T.S.	UNIVERSITY OF PITTSBURGH, ALLEGHENY COUNTY, PENNSYLVANIA	
PREPARED BY:	BRH	**ACKENHEIL ENGINEERS, INC**	
PRJ. NO.:	15131	1000 Banksville Road, Pittsburgh, Pennsylvania 15216	

Attachment 3

Engineers Field Boring Logs

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-1
SHEET 1 OF 1
DATE: START 9/21/15
END 9/21/15
O.G. ELEV. 1093.5

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,228.896 EAST 109,668.165
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 2 5	1.1'	-			M	TOPSOIL AND ORGANICS, dark brown, black, moist, loose.	
1.5									1092.0
3.0	S-2	10 10 13	1.3'	-		SC / A-2-6	8.7%	GRAVEL WITH CLAY AND SAND, brown, light brown, gray, dry to moist, medium dense to dense, NP (fines are -PL), heterogeneous, sand is fine to medium grain, gravel is angular sandstone and siltstone fragments. (FILL)	
4.5	S-3	12 9 9	0.8'	-			D TO M		
6.0	S-4	6 8 12	1.2'	-			D TO M		
7.5	S-5	10 15 22	1.4'	-			D TO M		
9.0	S-6	10 11 14	1.4'	-			D TO M		
10.5	S-7	8 10 12	1.4'	-			D TO M		
								10.5	1083.0
								END OF BORING AT 10.5 FEET	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-2
SHEET 1 OF 1
DATE: START 9/21/15
END 9/21/15
O.G. ELEV. 1094.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,158.400 EAST 109,808.077
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 3 9	1.3'	-			M	TOPSOIL AND ORGANICS, dark brown, black, moist.	
1.0									1093.4
1.5	S-2	40 50/0.2	0.5'	-			D	GRAVEL AND SAND, brown, gray, dry to moist, dense, NP, sand is fine to medium-grain, gravel is angular. (FILL)	
1.7									1092.7
2.2	A-N			-				SILTY GRAVEL, gray and light gray, dry, very dense, NP, homogeneous, gravel is weathered siltstone. (RESIDUAL)	
3.0									
3.2	S-3	50/0.2	0.2'				D		
									1091.2

END OF BORING AT 3.2 FEET
AT TOP OF ROCK

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 1 OF 2
DATE: START 9/21/15
END 9/21/15
O.G. ELEV. 1092.5

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,380.882 EAST 109,628.365
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	3 4 7	0.9'	-			Da TO M	TOPSOIL AND ORGANICS, dark brown, damp to moist, medium dense.	
1.0									1091.5
1.5	S-2	11 13 13	1.1'	-			13.3%	GRAVEL WITH SAND, SOME CLAY, brown, light brown, gray, blue-gray, gray-brown, medium dense, NP, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone and siltstone fragments. (FILL)	
3.0	S-3	8 8 11	1.2'	-			13.2%		
4.5	S-4	10 11 10	1.5'	-			7.0%	Mostly light gray silty gravel from 5.2' - 6.0'.	
6.0	S-5	7 7 9	1.1'	-			20.8%	Wood and brick fragments in S-5.	
7.5	S-6	6 8 8	0.4'	-			10.4%		
9.0	S-7	20 12 8	0.5'	-			9.2%		
10.5									
11.0									1081.5
12.0	S-8	6 9 6	1.5'	-			17.0%	GRAVEL WITH CLAY AND SAND, brown, gray, dark brown, blue-gray, orange-brown, dry to moist, loose to medium dense, NP (fines are near PL), heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and claystone fragments. (FILL)	
13.5	S-9	4 6 5	0.6'	-			12.2%		
15.0	S-10	2 4 4	1.2'	-			14.7%		
16.5	S-11	8 9 16	1.5'	-			13.8%		
18.0	S-12	18 14 12	1.1'	-			13.6%		
19.5	S-13	8 6 7	1.5'	-			13.1%		
		6					13.5%	MATCH TO SHEET 2	

NOTE:

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1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 2 OF 2
DATE: START 9/21/15
END 9/21/15
O.G. ELEV. 1092.5

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,380.882 EAST 109,628.365
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
21.0	S-14	7 11	1.5'	-			13.5%	GRAVEL WITH CLAY AND SAND, brown, gray, dark brown, blue-gray, orange-brown, dry to moist, loose to medium dense, NP (fines are near PL), heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and claystone fragments. (FILL) *(continued)*	
22.5	S-15	9 9 11	1.0'	-			12.1%		
24.0	S-16	10 11 11	1.5'	-			15.0%		
25.5	S-17	5 8 7	1.3'	-			11.6%	25.5	1067.0
								END OF BORING AT 25.5 FEET	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-4
SHEET 1 OF 1
DATE: START 9/21/15
END 9/21/15
O.G. ELEV. 1094.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,414.540 EAST 109,774.931
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 3 18	1.3'	-			M	TOPSOIL AND ORGANICS, black, brown, moist. 0.8	1093.6
1.5	S-2	14 18 22	1.0'	-			D TO M	GRAVEL WITH SAND, SOME CLAY, brown, tan, dark brown, gray, orange-brown, dry to moist, medium dense to dense, NP (fines are near PL), heterogeneous, sand is fine to medium-grain, gravel is angular sandstone and siltstone fragments. (FILL)	
3.0	S-3	9 12 12	1.4'	-			10.2%		
4.5	S-4	9 8 9	1.3'	-			D TO M		
6.0								6.0	1088.4
								END OF BORING AT 6.0 FEET	

NOTE:

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1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
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ENGINEERS FIELD BORING LOG

BORING NO. B-5
SHEET 1 OF 1
DATE: START 9/21/15
END 9/21/15
O.G. ELEV. 1094.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,311.006 EAST 109,858.562
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0								0.5 TOPSOIL AND ORGANICS, brown, black, moist.	1093.9
	S-1	2 4 7	1.1'	-			M	GRAVEL WITH CLAY AND SAND, brown, dark brown, gray, tan, moist, medium dense to very dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone and siltstone fragments. (FILL)	
1.5									
2.2	S-2	4 50/0.2	0.7'	-			M		
3.0	A-N			-					Sandstone boulder at 2.2'
	S-3	6 9 9	0.9'	-			M		
4.5									
	S-4	6 6 10	1.4'	-			M		
6.0								6.0	1088.4
								END OF BORING AT 6.0 FEET	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-6
SHEET 1 OF 1
DATE: START 9/22/15
END 9/22/15
O.G. ELEV. 1094.9

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,317.492 EAST 110,003.510
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	3 3 5	1.2'	-			M	TOPSOIL AND ORGANICS, black, brown, moist.	
1.0									1093.9
1.5	S-2	14 17 23	1.2'	-			D TO M	GRAVEL AND SAND, brown, tan, gray, brown-gray, medium dense to dense, NP, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone and shale fragments. (FILL)	
3.0	S-3	8 8 8	1.5'	-		SC / A-2-4	15.2%		
4.5	S-4	9 31 50/0.1	1.1'	-			M TO D		
5.5								Carbonaceous material right above residual soil.	1089.4
5.6								SANDY GRAVEL, gray, dry, very dense, NP, gravel is weathered shale. (RESIDUAL)	1089.3
								END OF BORING AT 5.6 FEET AT TOP OF ROCK	

NOTE:

ACKENHEIL ENGINEERS, INC
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PITTSBURGH, PA 15216
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ENGINEERS FIELD BORING LOG

BORING NO. B-7
SHEET 1 OF 4
DATE: START 9/24/15
END 9/24/15
O.G. ELEV. 1093.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,527.957 EAST 109,833.580
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS 3 ft Centers, 5 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	3 4 9	1.1'	-			D TO M	TOPSOIL AND ORGANICS, brown, black, dry to moist.	
1.0									1092.4
1.5								GRAVEL AND SAND, SOME CLAY, tan, brown, beige, gray, light gray, dark gray, orange-brown, dry to moist, medium dense to dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, and claystone fragments. (FILL)	
	A-N			-					
3.0									
	S-2	8 11 12	1.5'	-			D TO M		
4.5									
	A-N			-					
6.0									
	S-3	7 36 31	1.3'	-			D TO M	Coarse sandstone gravel in S-3.	
7.5									
	A-N			-					
9.0									
	S-4	4 7 8	1.4'	-			D TO M		
10.5									
	A-N			-					
12.0									
	S-5	8 11 13	0.6'	-			D TO M		
13.5									
	A-N			-					
15.0									
	S-6	9 9 9	0.6'	-			D TO M		
16.5									
	A-N			-					
18.0									
	S-7	7 8 9	1.3'	-			D TO M		
19.5									
20.0	A-N			-				MATCH TO SHEET 2	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-7
SHEET 2 OF 4
DATE: START 9/24/15
END 9/24/15
O.G. ELEV. 1093.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,527.957 EAST 109,833.580
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS 3 ft Centers, 5 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
21.5	S-8	8 10 12	1.5'	-			D TO M	GRAVEL AND SAND, SOME CLAY, tan, brown, beige, gray, light gray, dark gray, orange-brown, dry to moist, medium dense to dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, and claystone fragments. (FILL) *(continued)*	
25.0	A-N			-					
26.5	S-9	34 27 12	1.2'	-			D TO M		
30.0	A-N			-					
31.5	S-10	8 8 11	1.5'	-		GC / A-2-4	13.0%		
								MATCH TO SHEET 3	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-7
SHEET 3 OF 4
DATE: START 9/24/15
END 9/24/15
O.G. ELEV. 1093.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,527.957 EAST 109,833.580
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS 3 ft Centers, 5 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	A-N			-				GRAVEL AND SAND, SOME CLAY, tan, brown, beige, gray, light gray, dark gray, orange-brown, dry to moist, medium dense to dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, and claystone fragments. (FILL) *(continued)*	
59.0								59.0	1034.4
				100				CLAYSTONE... MATCH TO SHEET 4	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-7
SHEET 4 OF 4
DATE: START 9/24/15
END 9/24/15
O.G. ELEV. 1093.4

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,527.957 EAST 109,833.580
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS 3 ft Centers, 5 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
62.5	R-1		3.5'	0				CLAYSTONE, some staining, gray, brown-gray, olive-gray, soft, moderately weathered, indistinctly bedded, broken to closely fractured. (Unit RQD = 0%) *(continued)*	
63.0									1030.4
67.5	R-2		5.0'	100 / 50				SANDSTONE, calcareous, gray, light gray, medium hard to hard, moderately weathered, intensely bedded, very closely to widely fractured (RD= 0-60). (Unit RQD = 58%)	Rock U.C. Strength from 63.0' - 63.5' is 5,860 psi
69.0	R-3		1.5'	100 / 87					
								END OF BORING AT 69.0 FEET NEVER LOST DRILL WATER RETURN	1024.4

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-8
SHEET 1 OF 1
DATE: START 9/22/15
END 9/22/15
O.G. ELEV. 1095.0

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,481.423 EAST 109,978.375
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 3 4	1.1'	-			M	TOPSOIL AND ORGANICS, black, brown, moist, loose.	
1.0									1094.0
1.5	S-2	11 20 20	1.5'	-			D TO M	GRAVEL AND SAND, SOME CLAY, brown, tan, gray, orange-brown, olive-brown, dry to moist, medium dense to very dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and shale fragments. (FILL)	
3.0	S-3	13 17 21	1.5'	-			D TO M		
4.5	S-4	16 16 14	1.5'	-			D TO M		
6.0	S-5	12 15 9	1.0'	-			D TO M		
7.5	S-6	20 18 20	1.5'	-			D TO M		
9.0									
9.1	S-7	50/0.1	0.1'	-			D		1085.9
								END OF BORING AT 9.1 FEET	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-9
SHEET 1 OF 2
DATE: START 9/23/15
END 9/23/15
O.G. ELEV. 1095.0

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,547.963 EAST 110,089.800
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	1 6 12	1.0'	-			M	TOPSOIL AND ORGANICS, black, brown, moist.	
0.8									1094.2
1.5	S-2	24 24 20	1.5'	-			D TO M	GRAVEL AND SAND, trace clay, tan, brown, gray-brown, dry to moist, medium dense to dense, NP, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone and siltstone fragments. (FILL)	
3.0	S-3	35 30 16	0.5'	-			D TO M		
4.5	S-4	8 9 9	0.4'	-			D TO M		
6.0	S-5	9 10 14	0.2'	-			D TO M		
7.5	S-6	20 22 24	0.5'	-			D TO M		
9.0	S-7	16 16 18	1.0'	-			D TO M		
10.5	S-8	14 22 11	1.1'	-			D TO M		
12.0									
12.0									1083.0
13.5	S-9	6 7 9	1.5'	-			M	CLAYEY SAND WITH GRAVEL, gray, brown, tan, black, dry to moist, medium dense to dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, shale, and claystone fragments. (FILL)	
15.0	S-10	5 7 9	1.5'	-		SC / A-2-6	17.4%		
16.5	A-N			-					
18.0	S-11	16 17 19	1.5'	-			D TO M		
19.5	A-N			-					
		12					D TO	MATCH TO SHEET 2	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-9
SHEET 2 OF 2
DATE: START 9/23/15
END 9/23/15
O.G. ELEV. 1095.0

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,547.963 EAST 110,089.800
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
21.0	S-12	13 16	0.7'	-			M D TO M	CLAYEY SAND WITH GRAVEL, gray, brown, tan, black, dry to moist, medium dense to dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, shale, and claystone fragments. (FILL) *(continued)*	
22.5	A-N			-					
24.0	S-13	11 13 16	1.2'	-			D TO M		
25.5	A-N			-					
27.0	S-14	16 16 18	0.7'	-			D TO M		
28.5	A-N			-					
30.0	S-15	9 6 9	0.6'	-			M		
31.5	A-N			-					
33.0	S-16	8 16 22	1.5'	-			M		
34.5	A-N			-					
36.0	S-17	15 21 26	1.5'	-			M		
37.5	A-N			-					
39.0	S-18	10 15 17	1.5'	-			D TO M	Low-grade coal in S-18. 39.0	1056.0
								END OF BORING AT 39.0 FEET	

NOTE:

ACKENHEIL ENGINEERS, INC
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PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-10
SHEET 1 OF 1
DATE: START 9/22/15
END 9/22/15
O.G. ELEV. 1095.3

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,530.348 EAST 110,177.392
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	6 4 8	1.5'	-			M	TOPSOIL AND ORGANICS, black, brown, moist. 0.9	1094.4
1.5	S-2	6 8 14	1.0'	-			10.0%	GRAVEL AND SAND, trace clay, tan, gray, brown, dark brown, dark gray, dry to moist, medium dense, NP, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, and shale fragments. (FILL)	
3.0	S-3	8 9 9	1.0'	-			D TO M		
4.5	S-4	5 5 6	0.4'	-			D TO M		
6.0								6.0	1089.3
								END OF BORING AT 6.0 FEET	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
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ENGINEERS FIELD BORING LOG

BORING NO. B-11
SHEET 1 OF 1
DATE: START 9/22/15
END 9/22/15
O.G. ELEV. 1095.7

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,450.056 EAST 110,186.403
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 3 10	1.1'	-			M	TOPSOIL AND ORGANICS, black, brown, moist, loose.	
1.3									1094.4
1.5	S-2	12 13 15	1.5'	-			12.0%	GRAVEL AND SAND, trace clay, brown, gray-brown, dark gray, dry to moist, medium dense to dense, NP, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and shale fragments. (FILL)	
3.0	S-3	21 21 15	1.5'	-			D TO M		
4.5	S-4	10 11 16	1.5'	-			D TO M		
6.0									1089.7
								END OF BORING AT 6.0 FEET	

NOTE:

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PITTSBURGH, PA 15216
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ENGINEERS FIELD BORING LOG

BORING NO. B-12
SHEET 1 OF 1
DATE: START 9/22/15
END 9/22/15
O.G. ELEV. 1095.2

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,406.661 EAST 110,277.302
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 2 8	1.2'	-			M	TOPSOIL AND ORGANICS, black, brown, moist.	
1.0									1094.2
1.5	S-2	8 13 50/0.4	1.5'	-			M	GRAVEL AND SAND, trace clay, brown, tan, gray, medium dense, NP, heterogeneous, sand is fine to medium-grain. (FILL)	
2.3									1092.9
2.9	A-N	50/0.2	0.2'	-			D	GRAVEL AND SAND, black, brown, dry, very dense, NP, homogeneous, gravel is weathered shale. (RESIDUAL)	
3.0									1092.0
3.2	S-3			-					
								END OF BORING AT 3.2 FEET AT TOP OF ROCK	

NOTE:

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PITTSBURGH, PA 15216
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ENGINEERS FIELD BORING LOG

BORING NO. B-13
SHEET 1 OF 2
DATE: START 9/23/15
END 9/23/15
O.G. ELEV. 1094.5

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,569.338 EAST 110,256.435
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	4 6 12	1.1'	-			M	TOPSOIL AND ORGANICS, black, brown, moist. 0.8	1093.7
1.5	S-2	24 32 33	1.0'	-			D TO M	GRAVEL AND SAND, trace clay, tan, brown, gray-brown, dry to moist, medium dense to very dense, NP, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone and siltstone fragments. (FILL)	
3.0	S-3	17 18 20	0.9'	-			D TO M		
4.5	S-4	20 21 28	1.2'	-			D TO M		
6.0	S-5	22 24 29	0.9'	-			D TO M		
7.5	S-6	14 14 18	1.4'	-			D TO M		
9.0	S-7	11 11 13	1.0'	-			D TO M		
10.5	S-8	9 20 21	1.5'	-			M	11.0	1083.5
12.0	S-9	16 17 19	0.8'	-			M	CLAYEY SAND WITH GRAVEL, brown, tan, gray, dark gray, moist, medium dense to very dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and shale fragments. (FILL) Hit brick in S-10.	
13.5	S-10	50	0.6'	-			D TO M		
14.1	A-N	50/0.1		-					
15.0	S-11	12 12 15	1.0'	-			M	16.5	1078.0
16.5	S-12	25 29 36	1.5'	-			D TO M	SAND AND GRAVEL, trace clay, tan, brown, dark gray, dry to moist, dense to very dense, NP, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, claystone, and shale fragments. (RESIDUAL)	
18.0	S-13	19 21 36	1.5'	-			D TO M		
19.5		18					D TO	MATCH TO SHEET 2	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-13
SHEET 2 OF 2
DATE: START 9/23/15
END 9/23/15
O.G. ELEV. 1094.5

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,569.338 EAST 110,256.435
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
21.0	S-14	19 21	1.4'	-			M D TO M	SAND AND GRAVEL, trace clay, tan, brown, dark gray, dry to moist, dense to very dense, NP, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, claystone, and shale fragments. (RESIDUAL) *(continued)*	
	A-N			-					
24.0								24.0	1070.5
24.3	S-15	50/0.3	0.3'	-			D	24.3 GRAVEL, black, dark brown, dry, very dense, NP, homogeneous, gravel is carbonaceous weathered shale. (RESIDUAL)	1070.2

END OF BORING AT 24.3 FEET
AT TOP OF ROCK

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-14
SHEET 1 OF 1
DATE: START 9/22/15
END 9/22/15
O.G. ELEV. 1095.2

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,387.231 EAST 110,109.096
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 5 5	1.2'	-			M	TOPSOIL AND ORGANICS, brown, black, moist.	
1.0									1094.2
1.5	S-2	9 12 13	1.5'	-			D TO M	GRAVEL AND SAND, trace clay, tan, brown, orange-brown, gray, dark gray, dry to moist, medium dense to dense, NP, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, and shale fragments. (FILL)	
3.0	S-3	14 19 19	0.5'	-			D TO M		
4.5	S-4	17 13 9	0.7'	-			D TO M		
6.0	S-5	8 7 7	1.1'	-			D TO M		
7.5									
7.7									1087.5
8.2	S-6	31 50/0.2	0.7'	-			D	SANDY GRAVEL, gray-brown, dry, very dense, NP, gravel is weathered sandy shale. (RESIDUAL)	
8.2									1087.0
								END OF BORING AT 8.2 FEET AT TOP OF ROCK	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-15
SHEET 1 OF 4
DATE: START 9/23/15
END 9/24/15
O.G. ELEV. 1094.1

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,536.591 EAST 109,946.360
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 4 8	1.1'	-			M	TOPSOIL AND ORGANICS, black, brown, moist. 1.0	1093.1
1.5	S-2	8 11 16	1.0'	-			11.1%	GRAVEL AND SAND, SOME CLAY, tan, brown, gray, dark gray, gray-brown, orange-brown, dry to moist, medium dense to very dense, NP (fines are near PL), heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and claystone fragments. (FILL)	
3.0	S-3	10 11 14	1.4'	-			8.4%		
4.5	S-4	9 7 6	1.3'	-			13.6%		
6.0	S-5	6 6 7	0.9'	-			18.7%		
7.5	S-6	5 6 8	0.8'	-			14.5%		
9.0	S-7	5 8 8	1.4'	-			15.5%		
10.5	S-8	10 10 14	1.2'	-			13.4%		
12.0	S-9	10 9 9	0.9'	-			11.1%		
13.5	S-10	6 12 11	1.5'	-			10.1%		
15.0	S-11	15 12 13	1.3'	-			11.3%		
16.5	S-12	8 11 15	0.3'	-			11.2%		
18.0	S-13	10 9 11	1.5'	-			14.5%	Brick fragments in S-13.	
19.5		7					9.6%	MATCH TO SHEET 2	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-15
SHEET 2 OF 4
DATE: START 9/23/15
END 9/24/15
O.G. ELEV. 1094.1

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,536.591 EAST 109,946.360
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
21.0	S-14	9 10	1.4'	-			9.6%	GRAVEL AND SAND, SOME CLAY, tan, brown, gray, dark gray, gray-brown, orange-brown, dry to moist, medium dense to very dense, NP (fines are near PL), heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and claystone fragments. (FILL) *(continued)*	
22.5	A-N			-					
24.0	S-15	7 10 11	1.4'	-			10.9%		
25.5	A-N			-					
27.0	S-16	14 16 18	1.5'	-			13.8%		
28.5	A-N			-					
30.0	S-17	11 11 14	1.5'	-			13.7%	Brick fragment in bottom of S-17.	
31.5	A-N			-					
33.0	S-18	3 10 11	1.5'	-			15.5%		
34.5	A-N			-					
36.0	S-19	10 11 19	1.5'	-			15.8%		
37.5	A-N			-					
39.0	S-20	10 12 21	1.0'	-			13.8%		
	A-N			-				MATCH TO SHEET 3	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-15
SHEET 3 OF 4
DATE: START 9/23/15
END 9/24/15
O.G. ELEV. 1094.1

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,536.591 EAST 109,946.360
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40.5								GRAVEL AND SAND, SOME CLAY, tan, brown, gray, dark gray, gray-brown, orange-brown, dry to moist, medium dense to very dense, NP (fines are near PL), heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and claystone fragments. (FILL) *(continued)*	
42.0	S-21	11 15 19	1.5'	-			13.5%		
43.5	A-N			-					
45.0	S-22	27 46 31	0.3'	-			13.9%		
46.5	A-N			-					
47.7	S-23	7 38 50/0.2	1.2'	-			D TO M		
49.5	A-N			-					
51.0	S-24	7 9 16	1.5'	-			M		
52.5	A-N			-					
53.2	S-25	WOH 50/0.2	0.7'	-			D TO M	53.0	1041.1
55.5	A-N			-				GRAVEL WITH CLAYEY SAND, gray, brown, black, tan, dark brown, white-gray, dry, very dense, fines are near PL, heterogeneous, gravel is sandstone, siltstone, and claystone. (RESIDUAL)	
55.9	S-26	50/0.4	0.4'	-			D		
58.5	A-N			-					
59.3	S-27	50 50/0.3	0.8'	-			D		
60.0	A-N			-				60.0 MATCH TO SHEET 4	1034.1

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-15
SHEET 4 OF 4
DATE: START 9/23/15
END 9/24/15
O.G. ELEV. 1094.1

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,536.591 EAST 109,946.360
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 3 ft Centers, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	R-1		2.5'	83 / 30				CLAYSTONE, staining, gray, light brown-gray, soft, moderately weathered, indistinctly bedded, broken to closely fractured. (Unit RQD = 0%)	
61.6									1032.5
63.0	R-2		5.0'	100 / 62				SANDSTONE, calcareous, gray, light gray, medium hard to hard, moderately weathered, intensely bedded, very closely to widely fractured (RD= 0-45). (Unit RQD = 67%)	Rock U.C. Strength from 62.1' - 62.5' is 5,416 psi
68.0	R-3		2.0'	100 / 80					
70.0									1024.1
								END OF BORING AT 70.0 FEET NEVER LOST DRILL WATER RETURN	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-16
SHEET 1 OF 2
DATE: START 9/25/15
END 9/25/15
O.G. ELEV. 1040.0

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,623.938 EAST 109,896.556
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0.0	S-1	2 6 9	1.2'	-			M	TOPSOIL AND ORGANICS, brown, black, moist. 0.8	1039.2
1.5	S-2	12 10 10	1.4'	-			M	CLAYEY SAND WITH GRAVEL, brown, dark brown, tan, black, dark gray, orange-brown, dry to moist, medium dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is sandstone, siltstone, and claystone fragments. (FILL)	
3.0	S-3	7 8 8	1.5'	-			M		
4.5	S-4	10 9 8	1.5'	-			D	More gravel in S-4, less clay.	
6.0	S-5	7 7 7	1.0'	-			D	6.9	1033.1
7.5	S-6	6 7 9	1.5'	-			D	LOW-GRADE COAL, black, dry, soft. 9.0	1031.0
9.0	S-7	5 7 7	1.5'	-		ML / A-6	13.8%	CLAYEY SAND WITH GRAVEL, brown, tan, orange-brown, gray, dark gray, dry to moist, loose to medium dense, fines are near PL, heterogeneous, sand is fine to medium-grain, gravel is angular sandstone, siltstone, and claystone fragments. (FILL)	
10.5	S-8	5 5 5	1.4'	-			M		
12.0	S-9	8 9 11	1.3'	-			M	13.5	1026.5
13.5	S-10	50/0.4	0.4'	-			M	SANDY GRAVEL WITH CLAY, brown, tan, gray, dry to moist, very dense, NP, gravel is sandstone and claystone fragments. (RESIDUAL)	
13.9	A-N			-					
15.0	S-11	22 26 50/0.3	1.3'	-			D TO M		
16.3	A-N			-				17.5	1022.5
17.5				100				SANDSTONE, calcareous, iron staining, medium hard, moderately weathered, indistinctly bedded, closely to widely fractured. (Unit RQD = 81%) MATCH TO SHEET 2	

NOTE:

ACKENHEIL ENGINEERS, INC
1000 BANKSVILLE ROAD
PITTSBURGH, PA 15216
412-531-7111

ENGINEERS FIELD BORING LOG

BORING NO. B-16
SHEET 2 OF 2
DATE: START 9/25/15
END 9/25/15
O.G. ELEV. 1040.0

PROJECT NAME Trees Field Renovation PROJECT # 15131
COUNTY Allegheny S.R. / SEC.: NORTH 105,623.938 EAST 109,896.556
STATION OFFSET FROM CENTERLINE
INSPECTOR Kathleen Staub DRILLERS NAME/COMPANY Dustin Dye/Pennsylvania Drilling Co.
EQUIPMENT USED Acker XLS Rubber Track Rig with Cathead
DRILLING METHODS Continuous SPT's, 7 1/4" Hollow Stem Augers, NQ2 Wireline Coring
CASING: SIZE: NA ; DEPTH: NA ; WATER: DEPTH: TIME: DATE:
CHECKED BY: Burt R. Holt, P.E. ; DATE: 10/5/15 DEPTH: TIME: DATE:
NOT ENCOUNTERED [X]

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	R-1		5.0'					20.6	1019.4
								ARGILLACEOUS SHALE, slightly sandy, gray, olive-brown, soft to medium hard, moderately to highly weathered, very thinly bedded, closely fractured (RD= 0-20). (Unit RQD = 0%)	
22.5				50				22.0	1038.0
	R-2		5.0'	100				SANDSTONE, calcareous, gray, medium hard, moderately weathered, intensely bedded, moderately to very closely fractured (RD= 0-30). (Unit RQD = 38%)	
								24.9	1015.1
								CLAYSTONE, gray, dark gray, slightly calcareous, soft, moderately weathered, blocky, very broken. (Unit RQD = 0%)	
								26.6	1013.4
27.5				40				SANDSTONE, calcareous, gray, highly weathered, medium hard, intensely bedded, moderately fractured (RD= 0-10). (Unit RQD = 100%) 27.5	1012.5
								END OF BORING AT 27.5 FEET	

NOTE:

Attachment 4

Laboratory Test Reports

ACKENHEIL ENGINEERS, INC.

1000 Banksville Road, Pittsburgh, Pennsylvania 15216
Ph 412-531-7111 Fax 412-531-4334 www.ackenheil.com

MOISTURE CONTENT RESULTS

ASTM D-2216

(Samples are oven-dried at 110°C)

Project: Trees Field Renovation Project
AE Project #: 15131
Client: CDM Smith
Date: 10/8/2015
Matrix: Soil

Boring Designation	Sample	Depth	Moisture Content
B-4,5,10,11	BULK	0.0' - 6.0'	8.4%
B-1	S-2	1.5' - 3.0'	8.7%
B-4	S-3	3.0' - 4.5'	10.2%
B-6	S-3	3.0' - 4.5'	15.2%
B-7	S-10	30.0' - 31.5'	13.0%
B-8	S-[2-6]	1.5' - 9.0'	12.5%
B-9	S-10	13.5' - 15.0'	17.4%
B-10	S-2	1.5' - 3.0'	10.0%
B-11	S-2	1.5' - 3.0'	12.0%
B-16	S-7	9.0' -10.5'	13.8%

ACKENHEIL ENGINEERS, INC.

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MOISTURE CONTENT RESULTS

ASTM D-2216

(Samples are oven-dried at 110°C)

Project: Trees Field Renovation Project

AE Project #: 15131

Client: CDM Smith

Date: 10/8/2015

Matrix: Soil

Boring Designation	Sample	Depth	Moisture Content
B-15	S-2	1.5' - 3.0'	11.1%
B-15	S-3	3.0' - 4.5'	8.4%
B-15	S-4	4.5' - 6.0'	13.6%
B-15	S-5	6.0' - 7.5'	18.7%
B-15	S-6	7.5' - 9.0'	14.5%
B-15	S-7	9.0' - 10.5'	15.5%
B-15	S-8	10.5' - 12.0'	13.4%
B-15	S-9	12.0' - 13.5'	11.1%
B-15	S-10	13.5' - 15.0'	10.1%
B-15	S-11	15.0' - 16.5'	11.3%
B-15	S-12	16.5' - 18.0'	11.2%
B-15	S-13	18.0' - 19.5'	14.5%
B-15	S-14	19.5' - 21.0'	9.6%
B-15	S-15	22.5' - 24.0'	10.9%
B-15	S-16	25.5' - 27.0'	13.8%
B-15	S-17	28.5' - 30.0'	13.7%
B-15	S-18	31.5' - 33.0'	15.5%
B-15	S-19	34.5' - 36.0'	15.8%
B-15	S-20	37.5' - 39.0'	13.8%
B-15	S-21	40.5' - 42.0'	13.5%
B-15	S-22	43.5' - 45.0'	13.9%

ACKENHEIL ENGINEERS, INC.

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Ph 412-531-7111 Fax 412-531-4334 www.ackenheil.com

MOISTURE CONTENT RESULTS

ASTM D-2216

(Samples are oven-dried at 110°C)

Project:	Trees Field Renovation Project
AE Project #:	15131
Client:	CDM Smith
Date:	10/8/2015
Matrix:	Soil

Boring Designation	Sample	Depth	Moisture Content
B-3	S-2	1.5' - 3.0'	13.3%
B-3	S-3	3.0' - 4.5'	13.2%
B-3	S-4	4.5' - 6.0'	7.0%
B-3	S-5	6.0' - 7.5'	20.8%
B-3	S-6	7.5' - 9.0'	10.4%
B-3	S-7	9.0' - 10.5'	9.2%
B-3	S-8	10.5' - 12.0'	17.0%
B-3	S-9	12.0' - 13.5'	12.2%
B-3	S-10	13.5' - 15.0'	14.7%
B-3	S-11	15.0' - 16.5'	13.8%
B-3	S-12	16.5' - 18.0'	13.6%
B-3	S-13	18.0' - 19.5'	13.1%
B-3	S-14	19.5' - 21.0'	13.5%
B-3	S-15	21.0' - 22.5'	12.1%
B-3	S-16	22.5' - 24.0'	15.0%
B-3	S-17	24.0' - 25.5'	11.6%

ACKENHEIL ENGINEERS, INC.

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CORROSIVITY TEST RESULTS

Project: Trees Field Renovation

Project No.: 15131

Client: CDM Smith

Date: 10/13/2015

Matrix: Soil						
Location	**Sample No.**	**Depth**	**pH (pH units) T-289**	**Chloride (ppm) CalDOT 422**	**Sulfate (ppm) CalDOT 417**	**Min. Resistivity (Ohm-cm) PTM 133**
B-8	S-[2-6}	1.5' - 9.0'	7.56	36	789	1,200

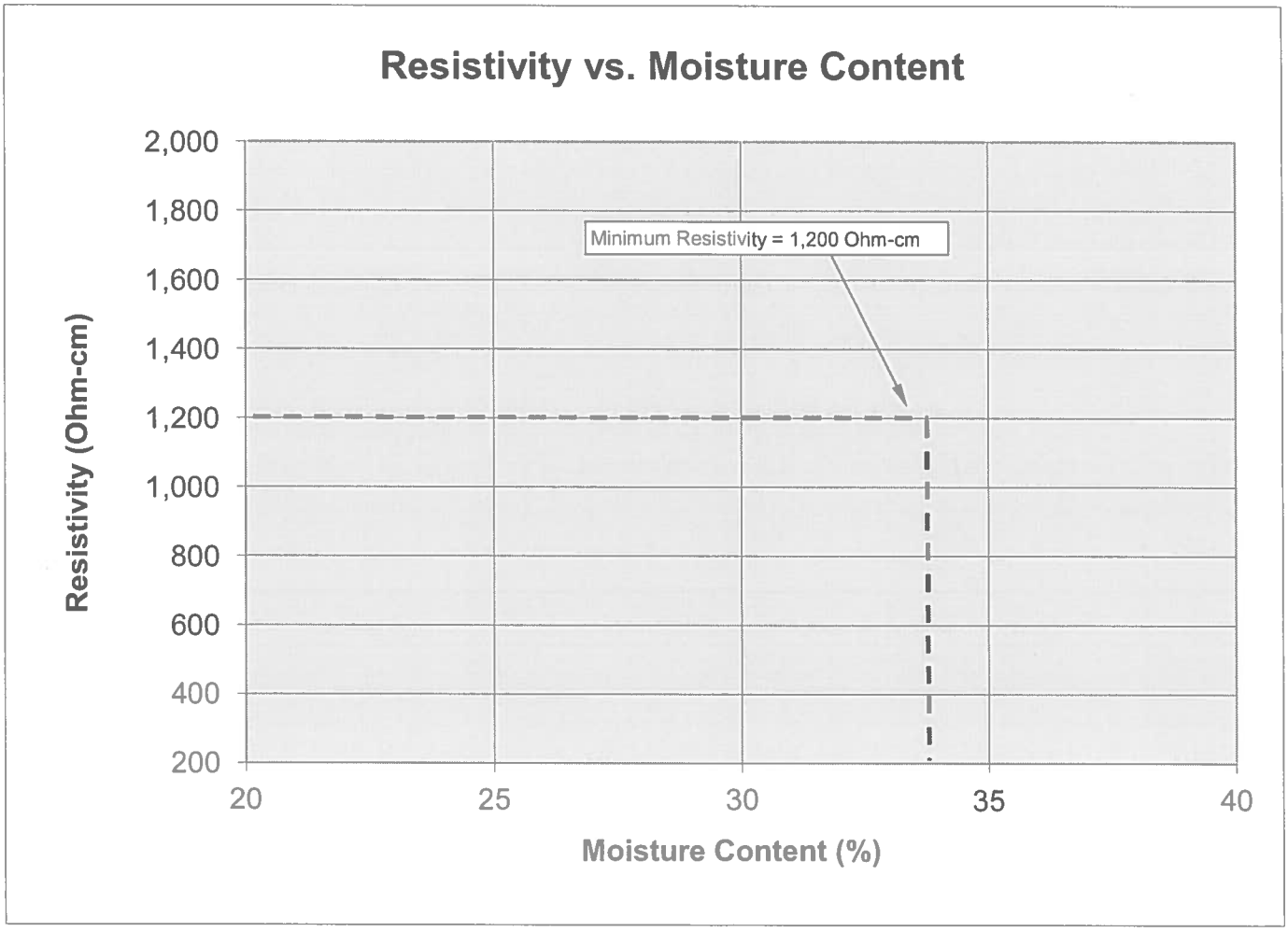
ACKENHEIL ENGINEERS, INC.
TEST REPORT
Soil Resistivity (ASTM G-57)

PROJECT INFORMATION		SAMPLE INFORMATION	
Date of Test:	10/1/2015	Boring Number:	B-8
AE Project Number:	15131	Sample Number:	S-[2-6]
Project Name:	Trees Field Renovation Project	Sample Interval (ft)	1.5' - 9.0'
		Sample Type:	Split Spoon Sample

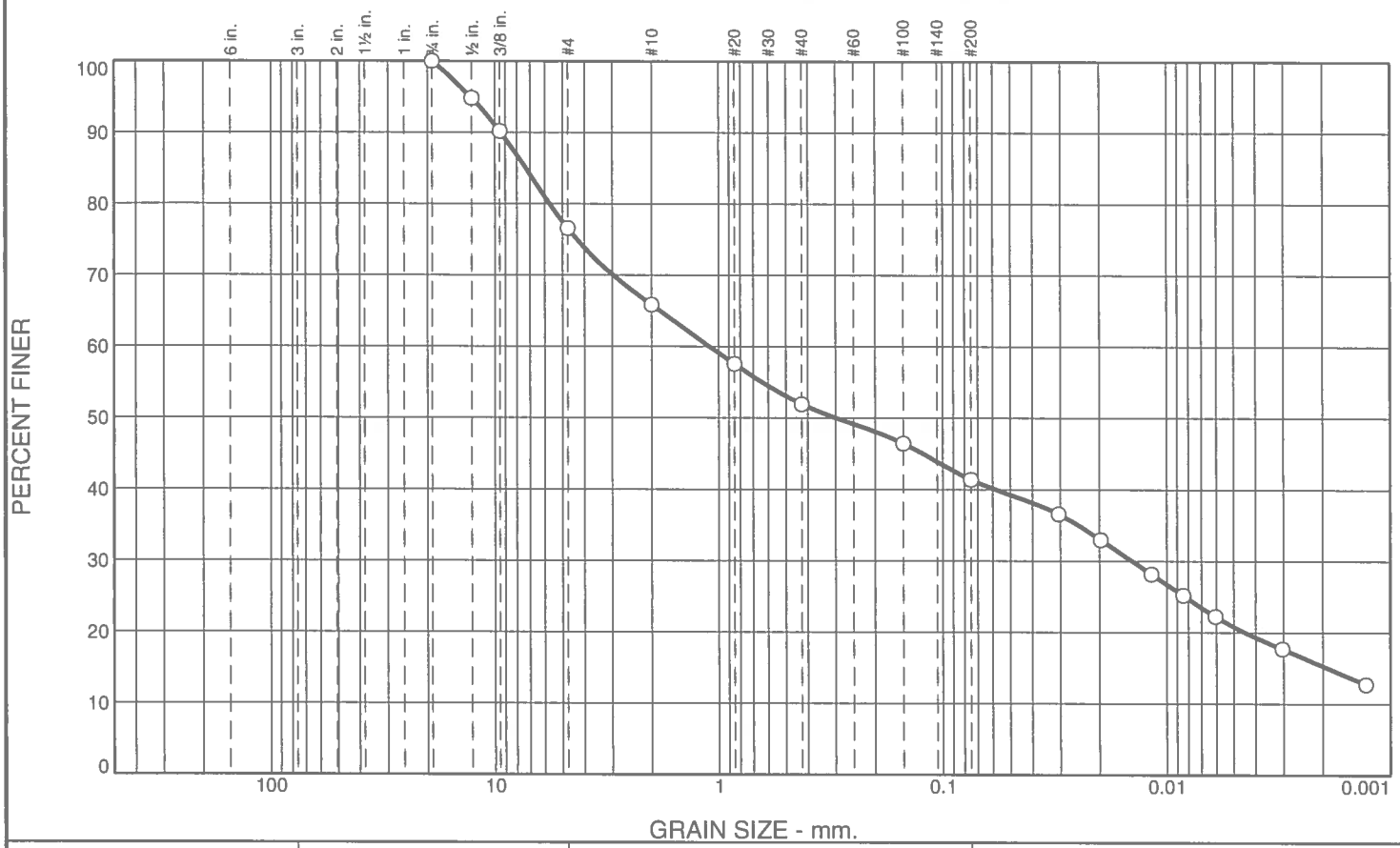
SOIL BOX DATA	
Box Length (cm):	11.20
Box Area (cm2):	6.89
Electrode Spacing (cm):	6.89
Box Factor (Area/Spacing):	1.00
Box Volume (cm3):	77.00
Box Weight (gm):	133.02

RESISTIVITY TEST DATA				
Moisture Content (%)	Measured Resistance (ohms)	Box Factor	Soil Resistivity (Ohm-cm)	% Change
33.9%	1,200	1	1,200	NA

MINIMUM RESISTIVITY TEST RESULTS		SOIL DESCRIPTION	
Moisture Content:	**33.9%**	**Moisture Content:**	**12.50%**
Minimum Resistivity (Ohm-cm):	**1,200**	**Visual Description:**	**clayey gravel with sand**



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.4	10.8	13.9	10.5	20.6	20.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	94.8		
3/8	90.1		
#4	76.6		
#10	65.8		
#20	57.6		
#40	51.9		
#100	46.4		
#200	41.4		
0.0305 mm.	36.5		
0.0197 mm.	32.9		
0.0117 mm.	28.2		
0.0084 mm.	25.2		
0.0061 mm.	22.2		
0.0030 mm.	17.7		
0.0013 mm.	12.7		

* (no specification provided)

Soil Description

USCS Group Name: clayey sand with gravel

Atterberg Limits

PL= 20 LL= 36 PI= 16

Coefficients

D_{90}= 9.4502 D_{85}= 7.3186 D_{60}= 1.1009
D_{50}= 0.2994 D_{30}= 0.0143 D_{15}= 0.0019
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Moisture Content: 8.4%

Source of Sample: B-4,5,10,11 **Depth:** 0.0' - 6.0'
Sample Number: Bulk 1,2,3,4 **Date:** 10/8/15

ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL

COMPACTION TEST REPORT

Test specification: ASTM D 1557-07 Method B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
0.0' - 6.0'	SC	A-6(3)	8.4%		36	16	9.9	41.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 127.6 pcf Optimum moisture = 8.3 %	USCS Group Name: clayey sand with gravel
Project No. 15131 **Client:** CDM Smith **Project:** Trees Field Renovation Project ○ **Source of Sample:** B-4,5,10,11 **Sample Number:** Bulk 1,2,3,4	**Remarks:** Proctor Date: 9/30/15
ACKENHEIL ENGINEERS, INC. **Pittsburgh, PA**	**Figure**

Tested By: SDJ **Checked By:** JTL

ACKENHEIL ENGINEERS, INC.

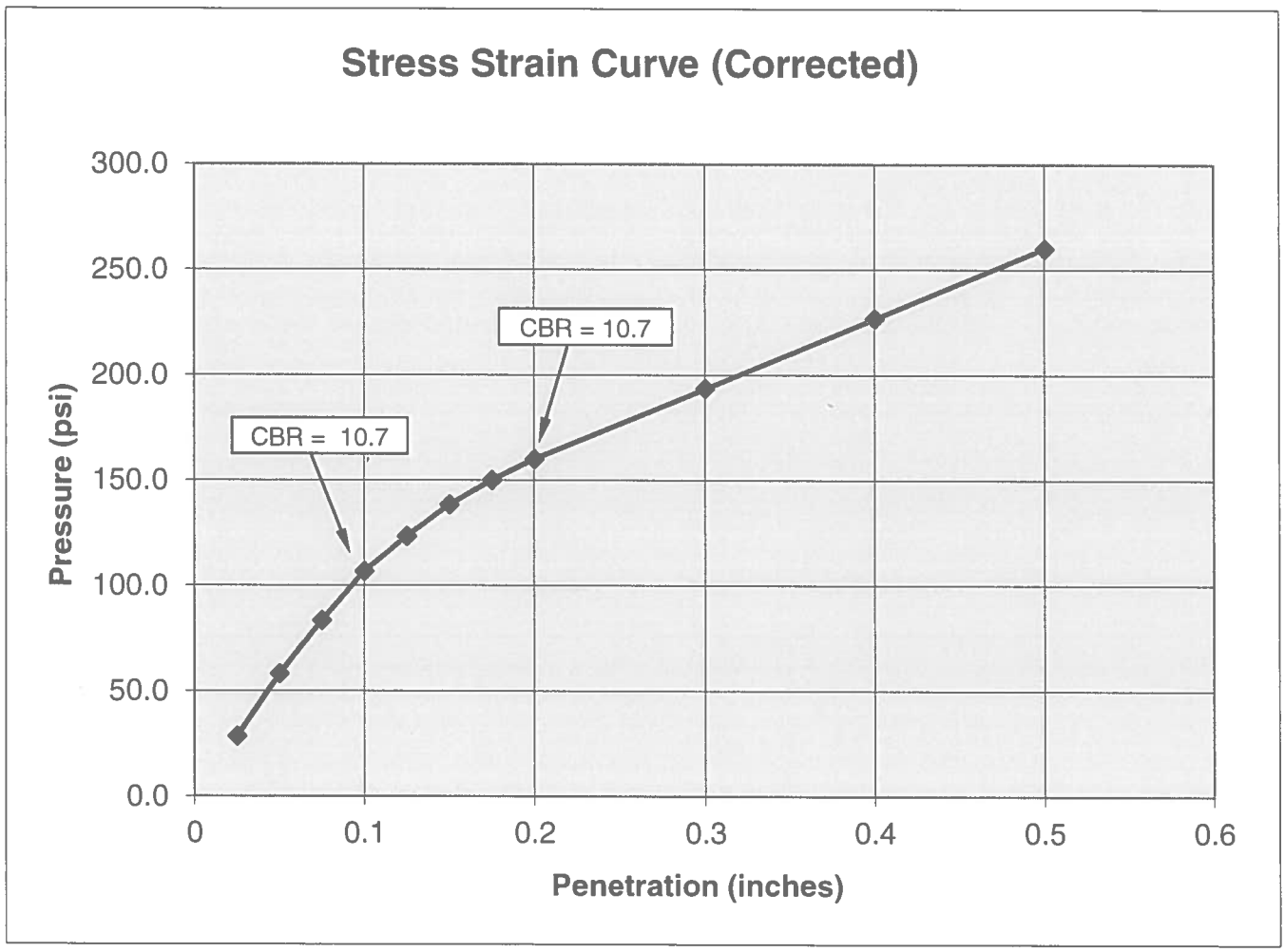
TEST REPORT

CALIFORNIA BEARING RATIO (CBR)

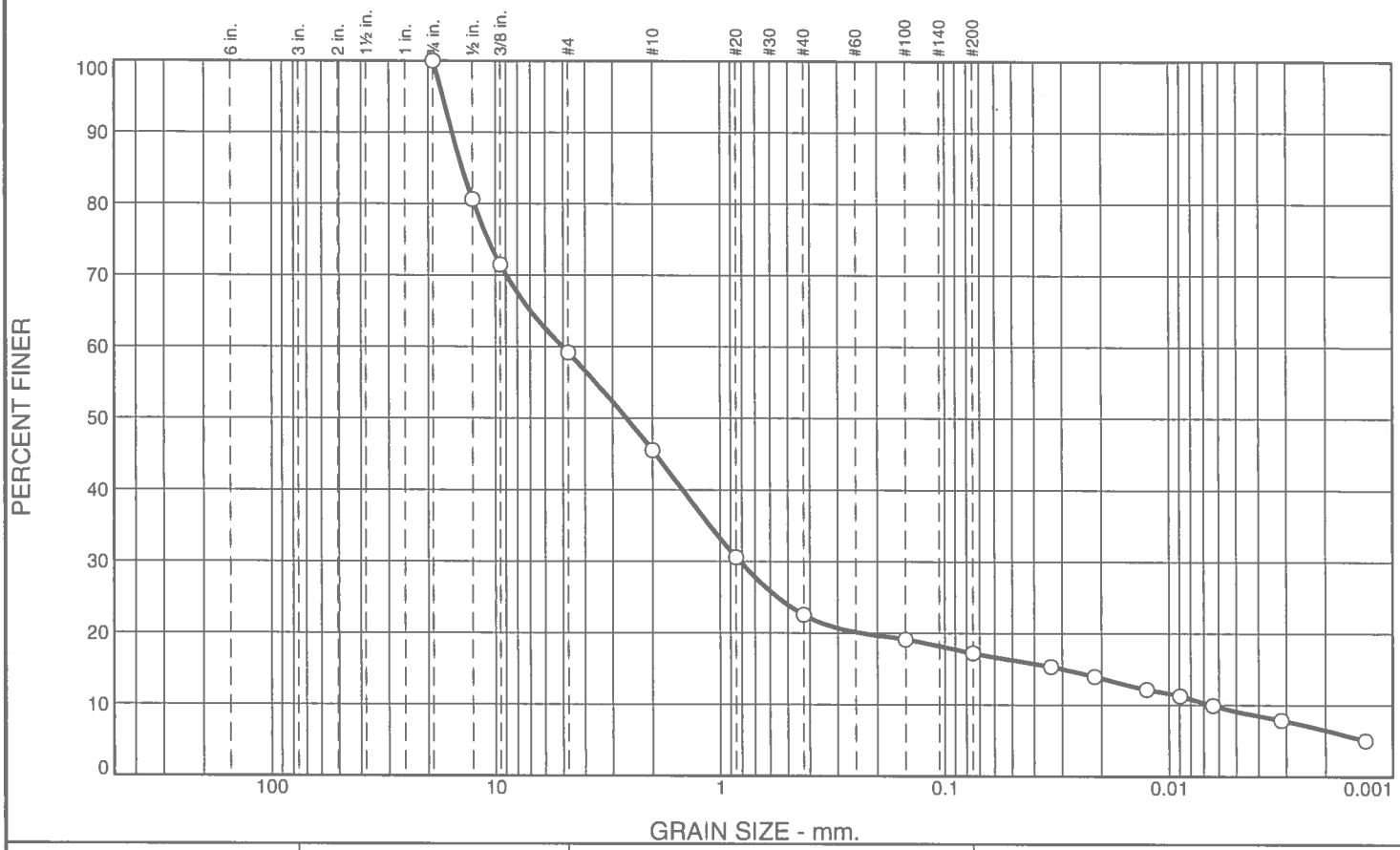
(ASTM D 1883)

PROJECT INFORMATION		SAMPLE INFORMATION	
Date of Test:	10/6/2015	Boring Number.:	B-4,5,10,11
Project Number:	15131	Sample:	BULK
Project:	Trees Field Renovation Project	Sample Interval (ft):	0.0' - 6.0'
Client:	CDM Smith	Sample Type:	Bags

PROCTOR TEST DATA (ASTM D 1557)		CBR TEST DATA (ASTM D 1883)	
Standard Method of Testing:	Modified B	Dry Density as Molded (pcf):	123.0
Maximum Dry Density (pcf):	127.6	Percent Compaction of MDD:	96.4%
Optimum Moisture Content:	8.3%	Moisture Content as Molded:	8.5%
Moisture Content as Received:	8.4%	Surcharge Weight (lbs):	10 lbs.
Burmister Group Name:		Sample Condition:	Soaked 96 Hours
		Percent Swell:	2.5%
USCS Group Name:	clayey sand with gravel	**CBR Value @ 0.1" :**	**10.7**
USCS / AASHTO:	SC / A-6(3)	**CBR Value @ 0.2" :**	**10.7**
POST CBR TEST DATA			
Average Moisture Content:	14.0%		
Moisture Content of Top 1":	14.5%		



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	40.8	13.7	23.0	5.3	8.1	9.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	80.6		
3/8	71.5		
#4	59.2		
#10	45.5		
#20	30.6		
#40	22.5		
#100	19.1		
#200	17.2		
0.0336 mm.	15.3		
0.0215 mm.	13.9		
0.0126 mm.	12.1		
0.0089 mm.	11.2		
0.0064 mm.	9.9		
0.0031 mm.	7.9		
0.0013 mm.	5.0		

* (no specification provided)

Soil Description

USCS Group Name: clayey sand with gravel

Atterberg Limits

PL= 20 LL= 31 PI= 11

Coefficients

D_{90}= 15.6654 D_{85}= 14.0925 D_{60}= 5.0371
D_{50}= 2.6077 D_{30}= 0.8194 D_{15}= 0.0301
D_{10}= 0.0066 C_u= 768.92 C_c= 20.35

Classification

USCS= SC AASHTO= A-2-6(0)

Remarks

Moisture Content: 8.7%

Source of Sample: B-1 **Depth:** 1.5' - 3.0'
Sample Number: S-2 **Date:** 10/8/15

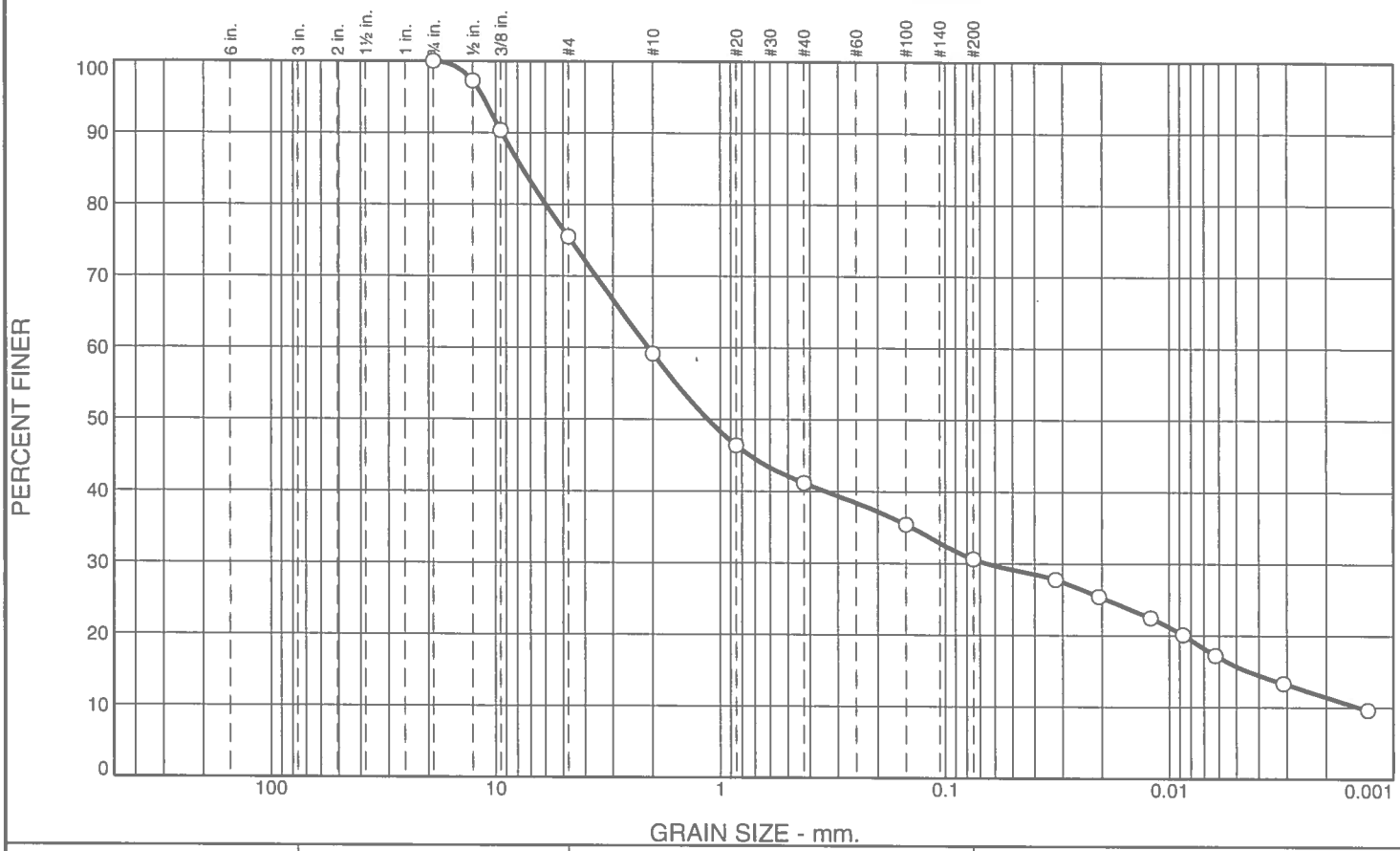
ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	24.5	16.3	18.1	10.5	14.9	15.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	97.2		
3/8	90.3		
#4	75.5		
#10	59.2		
#20	46.4		
#40	41.1		
#100	35.4		
#200	30.6		
0.0322 mm.	27.7		
0.0206 mm.	25.4		
0.0121 mm.	22.4		
0.0087 mm.	20.1		
0.0062 mm.	17.2		
0.0031 mm.	13.3		
0.0013 mm.	9.6		

* (no specification provided)

Soil Description

USCS Group Name: clayey sand with gravel

Atterberg Limits

PL= 23 LL= 33 PI= 10

Coefficients

D_{90}= 9.4000 D_{85}= 7.6155 D_{60}= 2.0962
D_{50}= 1.1374 D_{30}= 0.0656 D_{15}= 0.0044
D_{10}= 0.0014 C_u= 1461.06 C_c= 1.43

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

Moisture Content: 15.2%

Source of Sample: B-6 **Depth:** 3.0' - 4.5'
Sample Number: S-3

Date: 10/8/15

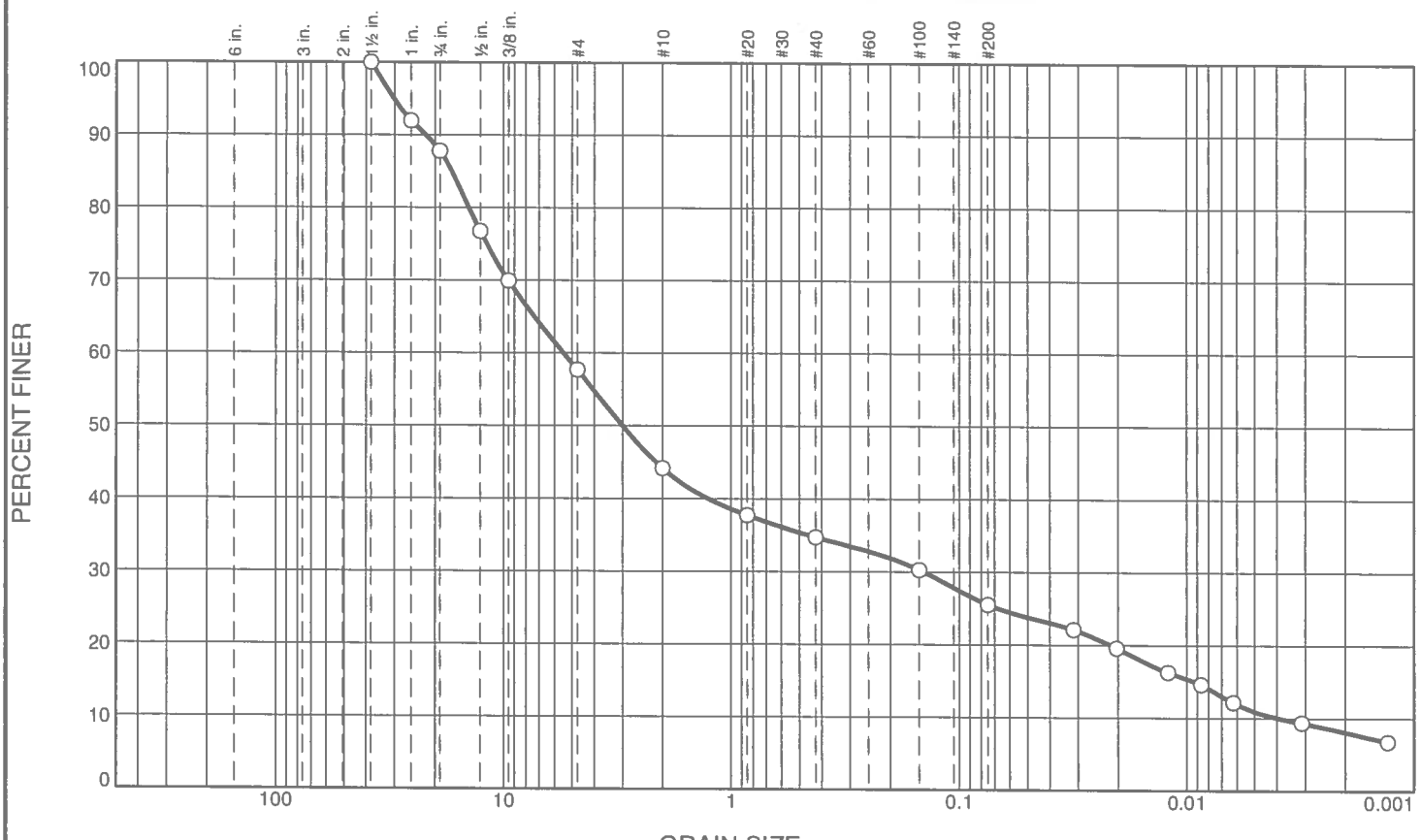
ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.2	30.1	13.6	9.4	9.2	14.6	10.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2	100.0		
1	91.9		
3/4	87.8		
1/2	76.7		
3/8	69.9		
#4	57.7		
#10	44.1		
#20	37.7		
#40	34.7		
#100	30.3		
#200	25.5		
0.0314 mm.	22.1		
0.0203 mm.	19.6		
0.0121 mm.	16.3		
0.0086 mm.	14.6		
0.0062 mm.	12.1		
0.0031 mm.	9.3		
0.0013 mm.	6.7		

* (no specification provided)

Soil Description

USCS Group Name: clayey gravel with sand

Atterberg Limits

PL= 21 LL= 31 PI= 10

Coefficients

D_{90}= 21.9976 D_{85}= 16.9222 D_{60}= 5.4689
D_{50}= 3.0096 D_{30}= 0.1441 D_{15}= 0.0093
D_{10}= 0.0039 C_u= 1389.13 C_c= 0.96

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

Moisture Content: 13.0%

Source of Sample: B-7 **Depth:** 30.0' - 31.5'
Sample Number: S-10

Date: 10/8/15

ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL

Ackenheil Engineers, Inc.

ROCK UNCONFINED COMPRESSION TEST- ASTM D 7012

PROJECT INFORMATION

Project:	Trees Field Renovation Project	Project Number:	15131
Client:	CDM Smith	Report Date:	10/8/15

SAMPLE DATA

Specimen Boring No.	B-7
Specimen Boring Inclination	VERTICAL
Specimen Boring Run	R2
Specimen Depth	63.0 - 63.5 ft
Specimen Description	Sandstone
Specimen Tested Date	10/8/2015
Specimen Moisture (Before Test)	Damp
Specimen End Prep'n. Method. (Saw-Cut, Ground, Capped...)	Saw-Cut
Specimen Diameter	1.98 in.
Specimen Height	4.06 in.
Aspect Ratio	2.06
Conformance with Dimensional Requirements	Yes
Test Temperature	Room Temp.

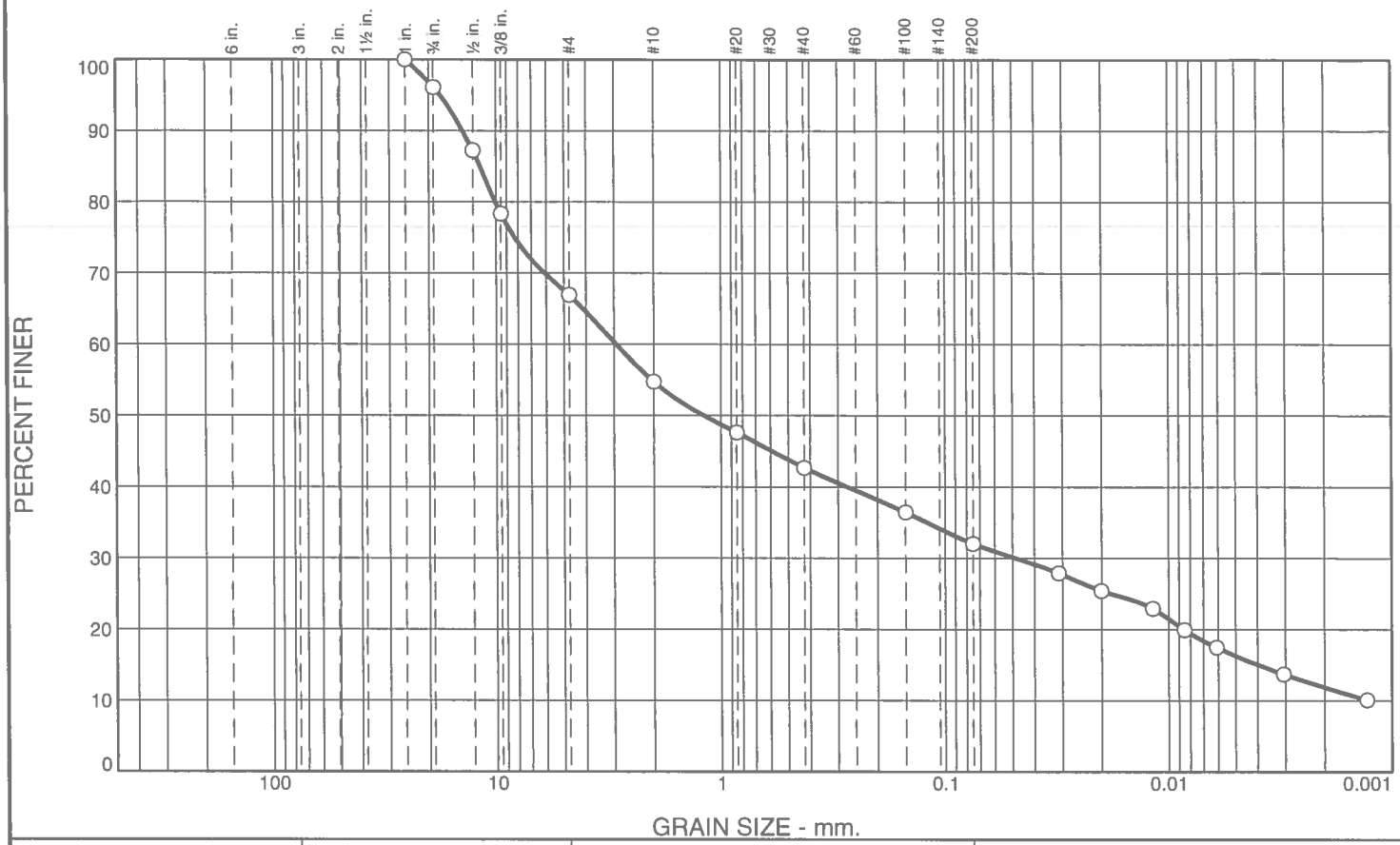
TEST RESULTS

Load At Failure	17,960 lbs
Unconfined Compressive Strength	5,860 psi
Unit Weight	169.9 pcf
Load Rate	5,987 lbs./min.

NOTES

PICTURE OF FAILURE SURFACE

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.9	29.2	12.2	12.0	10.7	15.7	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	96.1		
1/2	87.2		
3/8	78.3		
#4	66.9		
#10	54.7		
#20	47.6		
#40	42.7		
#100	36.4		
#200	32.0		
0.0311 mm.	27.9		
0.0200 mm.	25.4		
0.0118 mm.	22.9		
0.0085 mm.	19.9		
0.0061 mm.	17.5		
0.0031 mm.	13.7		
0.0013 mm.	10.1		

* (no specification provided)

Soil Description

USCS Group Name: clayey sand with gravel

Atterberg Limits

PL= 21 LL= 33 PI= 12

Coefficients

D_{90}= 14.0883 D_{85}= 11.8219 D_{60}= 2.9388
D_{50}= 1.1979 D_{30}= 0.0488 D_{15}= 0.0040
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-6(0)

Remarks

Moisture Content: 17.4%

Source of Sample: B-9 **Depth:** 13.5' - 15.0'
Sample Number: S-10 **Date:** 10/8/15

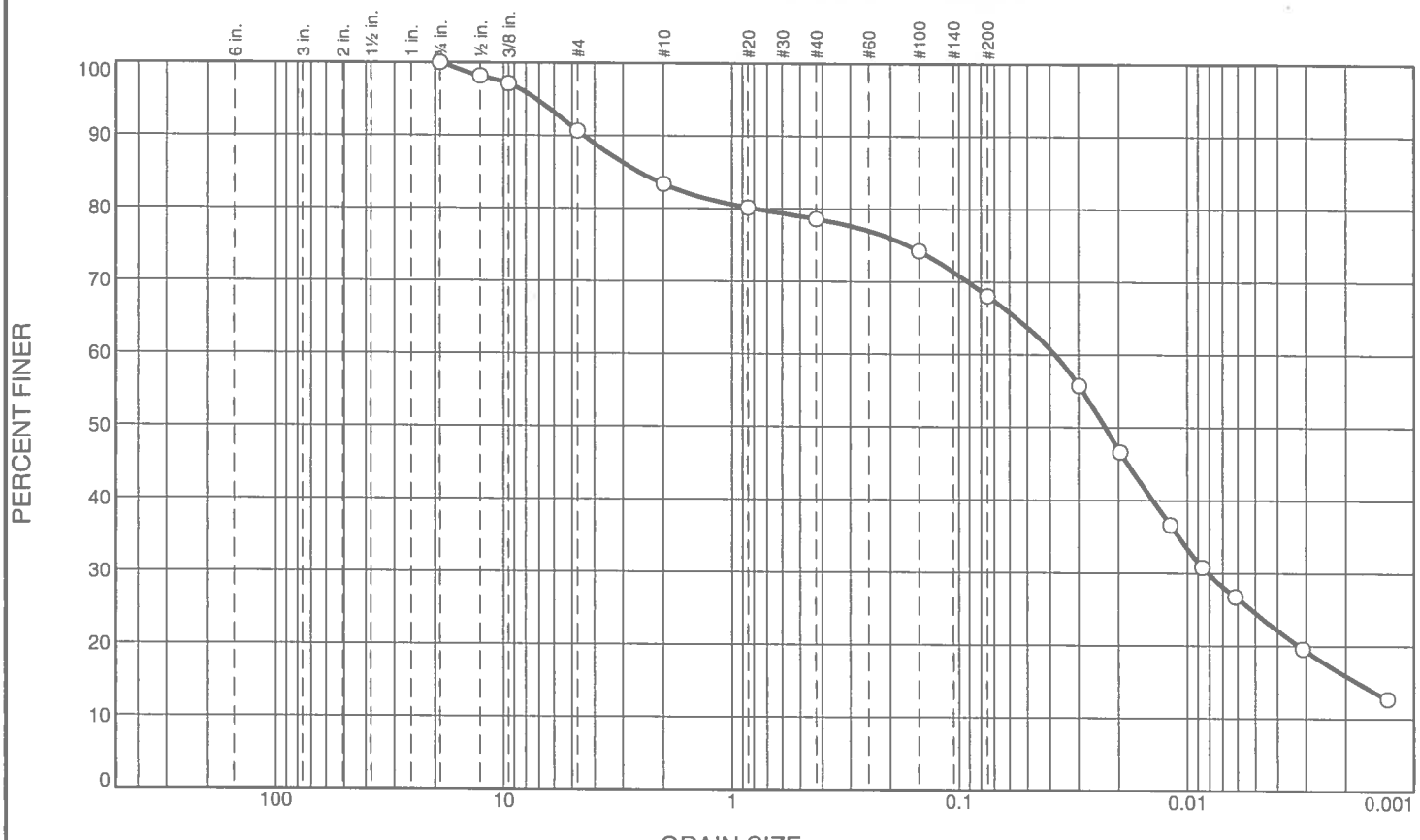
ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.4	7.3	4.7	10.6	43.5	24.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	98.1		
3/8	97.1		
#4	90.6		
#10	83.3		
#20	80.1		
#40	78.6		
#100	74.2		
#200	68.0		
0.0298 mm.	55.7		
0.0197 mm.	46.6		
0.0119 mm.	36.6		
0.0086 mm.	30.8		
0.0062 mm.	26.7		
0.0031 mm.	19.6		
0.0013 mm.	12.7		

* (no specification provided)

Soil Description

USCS Group Name: sandy silt

Atterberg Limits

PL= 25 LL= 36 PI= 11

Coefficients

D_{90}= 4.4750 D_{85}= 2.5669 D_{60}= 0.0379
D_{50}= 0.0229 D_{30}= 0.0082 D_{15}= 0.0018
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-6(6)

Remarks

Moisture Content: 13.8%

Source of Sample: B-16 **Depth:** 9.0' - 10.5'
Sample Number: S-7

Date: 10/8/15

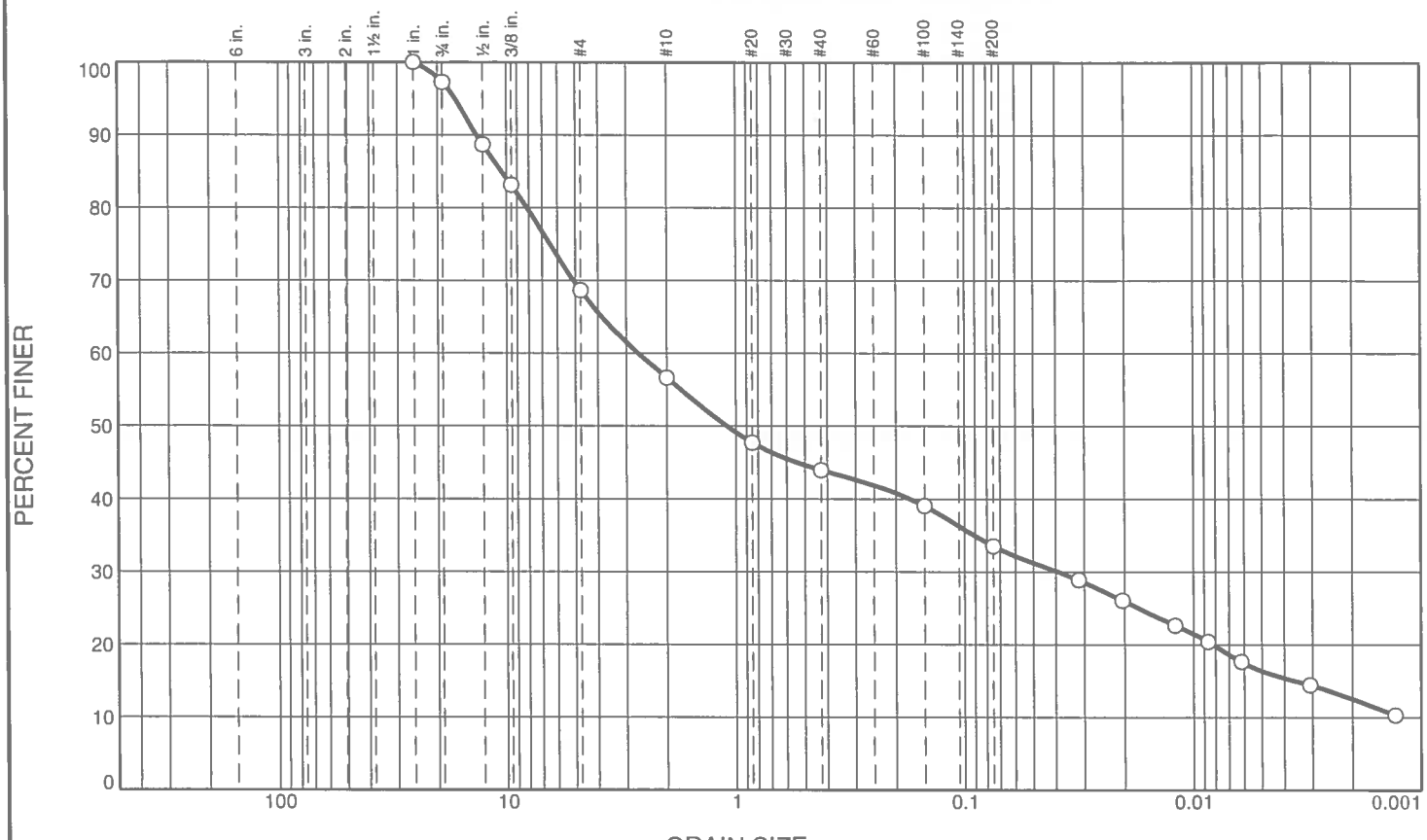
ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.8	28.6	12.0	12.7	10.4	17.2	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	97.2		
1/2	88.6		
3/8	83.1		
#4	68.6		
#10	56.6		
#20	47.7		
#40	43.9		
#100	39.0		
#200	33.5		
0.0317 mm.	28.9		
0.0204 mm.	26.0		
0.0120 mm.	22.6		
0.0086 mm.	20.4		
0.0062 mm.	17.6		
0.0031 mm.	14.4		
0.0013 mm.	10.3		

* (no specification provided)

Soil Description

USCS Group Name: clayey sand with gravel

Atterberg Limits

PL= 19 LL= 32 PI= 13

Coefficients

D_{90}= 13.5052 D_{85}= 10.5174 D_{60}= 2.6646
D_{50}= 1.0991 D_{30}= 0.0393 D_{15}= 0.0036
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

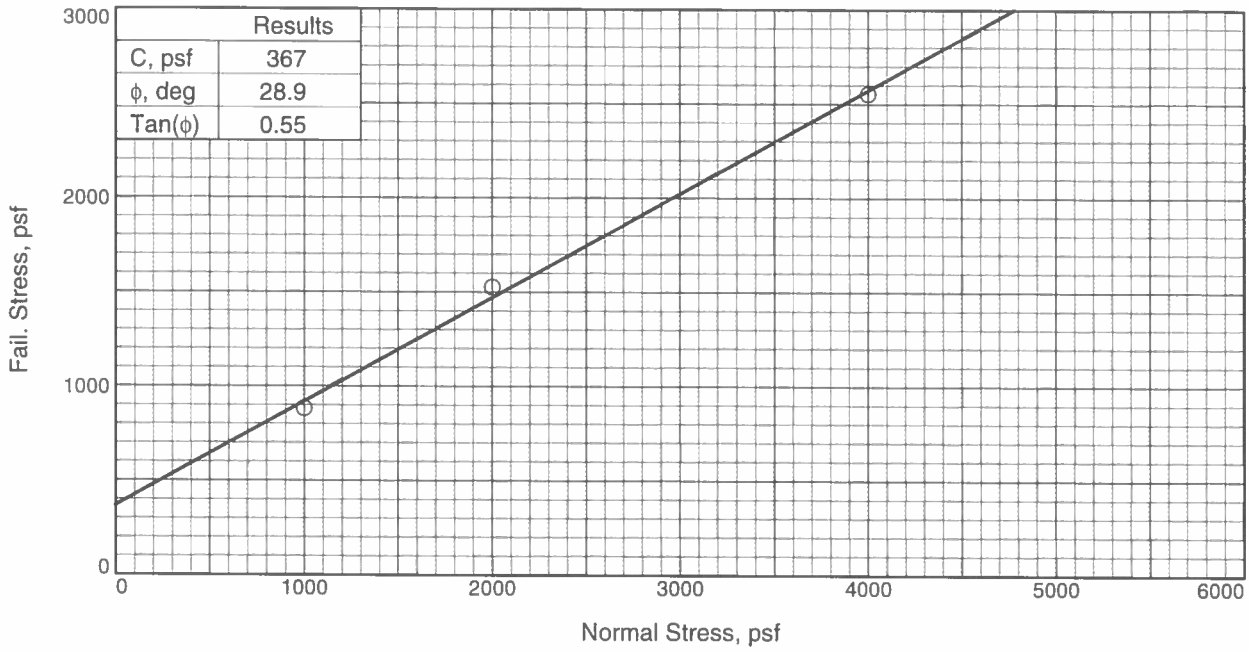
Source of Sample: B-15 **Depth:** 1.5' - 45.0'
Sample Number: S-2 thru S-22 **Date:** 10/8/15

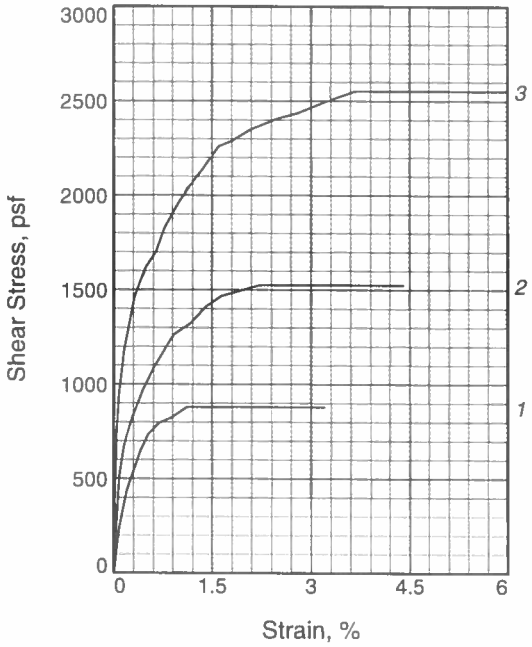
ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL





Sample No.		1	2	3
Initial	Water Content, %	9.2	9.2	9.2
	Dry Density, pcf	115.6	115.9	115.9
	Saturation, %	56.7	57.1	57.2
	Void Ratio	0.4315	0.4280	0.4272
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.001	1.004	1.007
At Test	Water Content, %	15.4	15.2	14.8
	Dry Density, pcf	117.5	117.5	118.4
	Saturation, %	99.6	98.5	98.5
	Void Ratio	0.4085	0.4077	0.3978
	Diameter, in.	2.500	2.500	2.500
	Height, in.	0.985	0.990	0.986
Normal Stress, psf		1000	2000	4000
Fail. Stress, psf		880	1525	2552
Strain, %		1.1	2.2	3.7
Ult. Stress, psf				
Strain, %				
Strain rate, in./min.		0.002	0.002	0.002

Sample Type: Remolded Direct Shear
Description: USCS Group Name: clayey sand with gravel
LL= 32 **PL=** 19 **PI=** 13
Assumed Specific Gravity= 2.65
Remarks: Remolded to a Target Dry Density of 121.2 pcf at a Moisture Content of 9.0%

Figure _____

Client: CDM Smith

Project: Trees Field Renovation Project

Source of Sample: B-15 **Depth:** 1.5' - 45.0'
Sample Number: S-2 thru S-22
Proj. No.: 15131 **Date Sampled:**

DIRECT SHEAR TEST REPORT
ACKENHEIL ENGINEERS, INC.
Pittsburgh, PA

Tested By: JTL **Checked By:** BRH

Ackenheil Engineers, Inc.

ROCK UNCONFINED COMPRESSION TEST- ASTM D 7012

PROJECT INFORMATION

Project:	Trees Field Renovation Project	Project Number:	15131
Client:	CDM Smith	Report Date:	10/8/15

SAMPLE DATA

Specimen Boring No.	B-15
Specimen Boring Inclination	VERTICAL
Specimen Boring Run	R1
Specimen Depth	62.1 - 62.5 ft
Specimen Description	Sandstone
Specimen Tested Date	10/8/2015
Specimen Moisture (Before Test)	Damp
Specimen End Prep'n. Method. (Saw-Cut, Ground, Capped...)	Saw-Cut
Specimen Diameter	1.97 in.
Specimen Height	4.07 in.
Aspect Ratio	2.06
Conformance with Dimensional Requirements	Yes
Test Temperature	Room Temp.

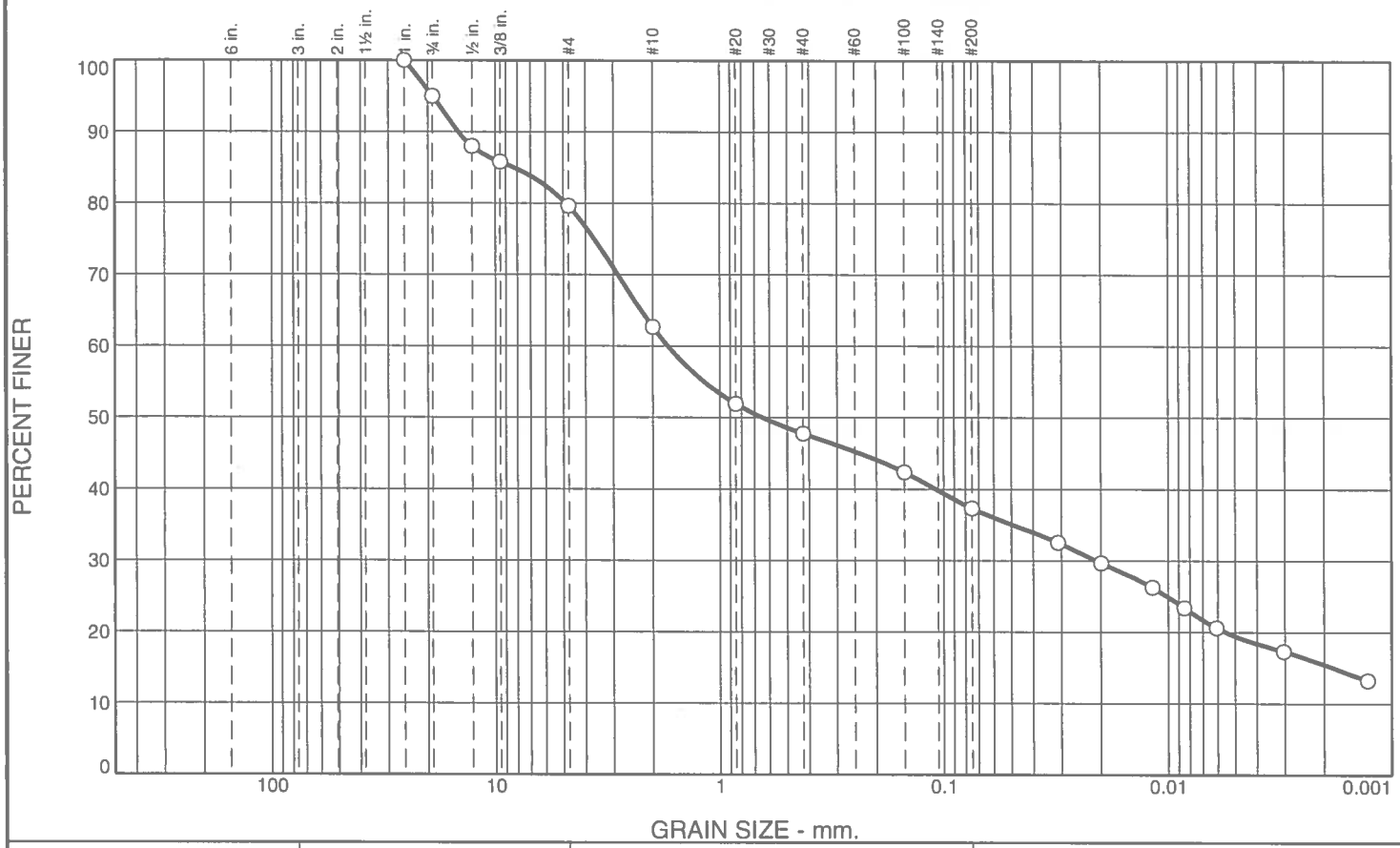
TEST RESULTS

Load At Failure	16,550 lbs
Unconfined Compressive Strength	5,416 psi
Unit Weight	166.2 pcf
Load Rate	5,517 lbs./min.

NOTES

PICTURE OF FAILURE SURFACE

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	15.4	16.9	15.0	10.4	17.9	19.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	95.0		
1/2	88.0		
3/8	85.8		
#4	79.6		
#10	62.7		
#20	51.9		
#40	47.7		
#100	42.3		
#200	37.3		
0.0310 mm.	32.5		
0.0200 mm.	29.7		
0.0118 mm.	26.2		
0.0085 mm.	23.4		
0.0061 mm.	20.6		
0.0030 mm.	17.3		
0.0013 mm.	13.2		

* (no specification provided)

Soil Description

USCS Group Name: clayey sand with gravel

Atterberg Limits

PL= 19 LL= 34 PI= 15

Coefficients

D_{90}= 14.5988 D_{85}= 8.3068 D_{60}= 1.7106
D_{50}= 0.6477 D_{30}= 0.0211 D_{15}= 0.0018
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(1)

Remarks

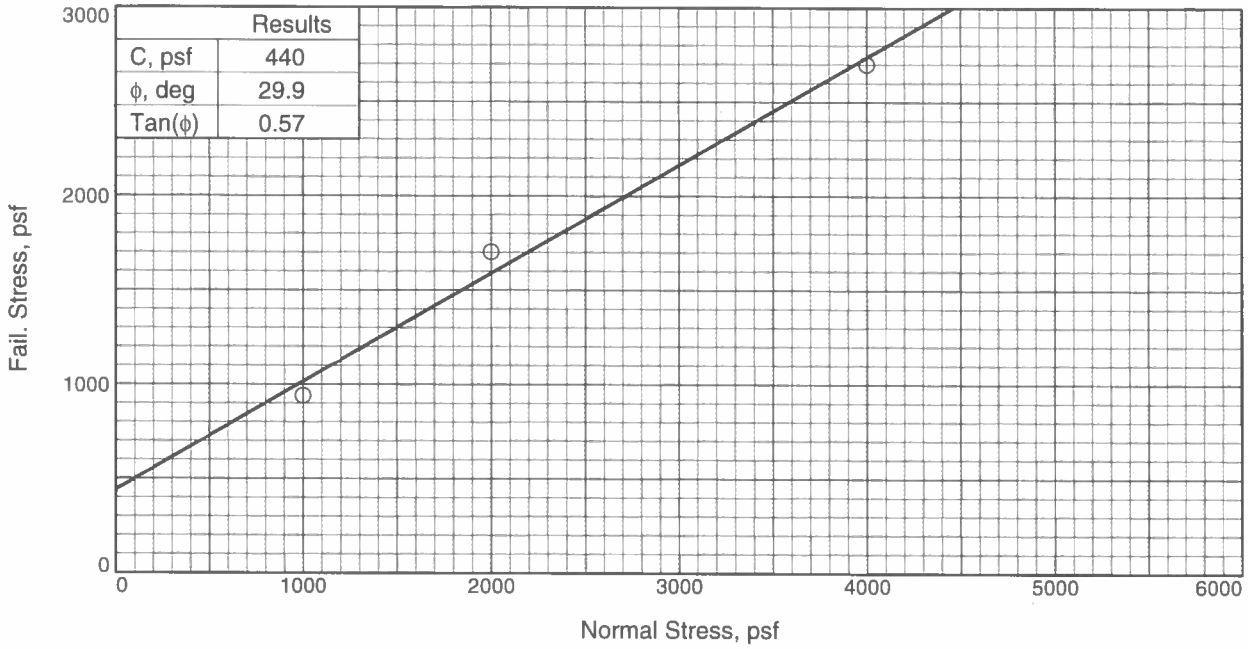
Source of Sample: B-3 **Depth:** 1.5' - 25.5'
Sample Number: S-2 thru S-17 **Date:** 10/8/15

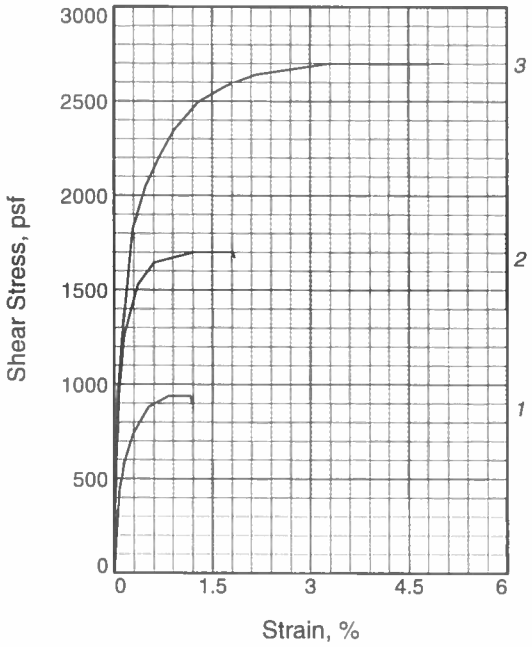
ACKENHEIL ENGINEERS, INC.

Pittsburgh, PA

Client: CDM Smith
Project: Trees Field Renovation Project
Project No: 15131 **Figure**

Tested By: KHS **Checked By:** JTL





Sample No.		1	2	3
Initial	Water Content, %	10.0	10.0	10.0
	Dry Density, pcf	118.9	119.6	118.9
	Saturation, %	71.5	73.0	71.4
	Void Ratio	0.3647	0.3572	0.3655
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.004	1.001	1.004
At Test	Water Content, %	13.6	13.2	12.7
	Dry Density, pcf	119.6	120.1	121.1
	Saturation, %	99.1	97.4	97.3
	Void Ratio	0.3567	0.3511	0.3406
	Diameter, in.	2.500	2.500	2.500
	Height, in.	0.998	0.996	0.986
Normal Stress, psf		1000	2000	4000
Fail. Stress, psf		939	1701	2699
Strain, %		0.8	1.2	3.3
Ult. Stress, psf				
Strain, %				
Strain rate, in./min.		0.002	0.002	0.002

Sample Type: Remolded Direct Shear
Description: USCS Group Name: clayey sand with gravel
LL= 34 **PL=** 19 **PI=** 15
Assumed Specific Gravity= 2.6
Remarks: Remolded to a Target Dry Density of 121.2 pcf at a Moisture Content of 9.0%

Figure _____

Client: CDM Smith

Project: Trees Field Renovation Project

Source of Sample: B-3 **Depth:** 1.5' - 25.5'
Sample Number: S-2 thru S-17
Proj. No.: 15131 **Date Sampled:**

DIRECT SHEAR TEST REPORT
ACKENHEIL ENGINEERS, INC.
Pittsburgh, PA

Tested By: JTL **Checked By:** BRH

Attachment 5

Definitions, Limitations and Important Information

DEFINITIONS AND LIMITATIONS

1.0 DEFINITIONS

The following definitions are provided to aid in better understanding of the terms and contents of this report. These definitions may or may not be specifically applicable to this particular report. Please contact us if any questions exist concerning terms contained in this report.

Disturbed Samples: Soils were sampled using a standard 2-inch outside diameter (O.D.) 1.375-inch inside diameter (I.D.) split-spoon sampler. The split-spoon sampler is also termed a split-barrel sampler.

Standard Penetration Test (SPT): The standard split-spoon sampler was driven using a 140-pound hammer falling 30 inches. The sampler was driven 18 inches into soil or until the sampler was refused on rock. The top-of-rock is defined as at least 50 blows per 0.4-foot penetration of soil. The number of blows to drive the sampler through each 6-inch interval of soil was recorded on the Test Boring Logs. The number of blows per foot (N) required to drive the sampler may be an indication of the relative density or consistency of the soil. The N value is usually calculated by omitting the blow count for the first one-half foot penetration of soil.

Shelby Tube: A Shelby tube is a 3 inch O.D. seamless, thin wall metal tube. Shelby tubes were pushed using hydraulically driven drilling tools. Tubes were pushed into the soil for the purpose of obtaining a relatively undisturbed sample.

Visual Soil Descriptions: The sample descriptions on the Test Boring Records use the following terms:

PRINCIPAL CONSTITUENTS, other constituents, color, consistency or relative density, moisture content and other information.

The relative percentage of each constituent is indicated in the following manner:

and	35+ percent (co-principals)
(y) or (ey)	20 to 34 percent (i.e.; silty or clayey)
some	15 to 19 percent
little	11 to 15 percent
trace	0 to 10 percent

Residual Soils and Decomposed Bedrock: Soils formed in place by the disintegration and decomposition of rocks and the consequent weathering of the mineral materials.

Colluvial Soils: Loose and incoherent soil deposits usually at the foot of slopes or cliffs and brought there chiefly by gravity.

Alluvial Soils: Soils which are transported and deposited by water.

Fill: Materials consisting of natural soils and/or waste materials which were deposited by man.

Loess: Wind-blown sediments.

Glacial Till: Soils which have been transported and deposited by glaciers.

Top-of-Rock: The top-of-rock is generally defined by us as at least 50 blows per 0.4-foot penetration of soil or as the point at which continuous core drilling was used to advance the test borings.

Base of Primary Weathering (B1W): This is the point below which it is visually estimated the rock becomes relatively unweathered and where clay seams and extensive staining due to groundwater activity are generally absent.

Visual Rock Descriptions: The sample descriptions on the Test Boring Logs use the following terms:

PRINCIPAL ROCK TYPE, accessory constituents, accessory rock types, color, hardness, weathering, bed thickness, bedding inclination, fracture spacing, fracture inclination, and other information.

The relative percentage of accessory rock types is indicated in the following manner:

and	35+ percent (co-principals)
some	20 to 35 percent
little	10 to 20 percent
trace	0 to 10 percent

Claystone: Clay size particles compacted by overburden pressure to form bedrock.

Sandstone: Cemented or otherwise compacted particles or fragments from eroded pre-existing rocks composed predominantly of quartz grains, the grades of the latter being those of sand.

Shale: A laminated sedimentary rock in which the principal constituent particles are clay particles compacted by overburden pressure.

Limestone: A bedded sedimentary deposit consisting chiefly of calcium or magnesium carbonate. It is the consolidated equivalent of limey mud, calcareous sand, and shell fragments.

Siltstone: Cemented or otherwise compacted particles or fragments from eroded pre-existing rocks composed predominantly of quartz grains, the grades of the latter being those of silt.

Cemented Shale: Hardened shale, the mineral particles of which are bound by siliceous or calcareous cement.

Compaction Shale: A shale type which was formed by compaction rather than cementation.

Banded: The property of rocks having thin and nearly parallel bands of different textures, colors, or minerals.

Laminations: Bedding in thin layers which vary in grain size or composition.

Slickenside: The polished surface on interior joints or rock mass.

Streaks: Some mineral constituents so arranged as to give the rock a striped or streaked appearance.

Parting: Thin layers of shale occurring in a coal seam.

Inclusions: The fragments of one rock type enclosed in another rock type.

Broken: A descriptive term for recovered core samples which indicates the rock sample was fractured vertically and/or diagonally.

Calcareous: Descriptive term which indicates some reaction to hydrochloric acid.

Stained: Descriptive term which indicates discoloration on the surface of rock core samples.

Interbedded: Used to indicate an alternating sequence of seams of two rock types.

Bedding: The bedding of the rock is based on the spacing of bedding contacts for each distinct rock type layer as indicated in the following table.

Term	Bed Thickness
Massive	Bed 3 - 10 feet
Thick	Bed 1 - 3 feet
Moderate	Bed 4 - 12 inches
Thin	Bed 1 - 4 inches
Very Thin	Bed 1/2 - 1 inches
Laminated	Bed less than 1/2 inch
Indistinct	Bed thickness not discernible due to weathering or cementation

Fracturing: The fracturing of the rock is based on the core recovery as indicated in the following table.

Term	Fracture Spacing
Very Wide	Core pieces 3 - 10 feet
Wide	Core pieces 1 - 3 feet
Moderate	Core pieces 4 - 12 inches
Close	Core pieces 1 - 4 inches
Very Close	Core pieces 1/2 - 1 inch
Fissile	Core pieces less than 1/2 inch

Bedrock Samples: Bedrock was sampled continuously in some test borings using a diamond bit which provides a core of about 2 inches in diameter.

2.0 LIMITATIONS

The following are limitations that apply to this study.

Subsurface Variations: The conclusions and recommendations submitted in this report are based upon the data obtained at the test boring locations. This report does not reflect any variations which may occur between the test borings. The nature and extent of variations between the test borings may not become evident until excavation is performed. If, during construction, soil, rock, and groundwater conditions appear to be different from those described herein, this office should be advised at once so that re-evaluation of the recommendations may be made.

Water Readings: The water level readings and time after drilling that the readings were taken are shown on the Field Test Boring Logs. The water levels measured after drilling may not be indicative of the true groundwater levels in the test borings because the water level may not have stabilized before backfilling.

Water Level Variations: Water level readings have been taken. However, it must be noted that fluctuations in the level of the groundwater may occur depending on the time of the year and the amount of precipitation. Design drawings and specifications should accommodate such possibilities and construction planning should be based upon assumed variations.

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

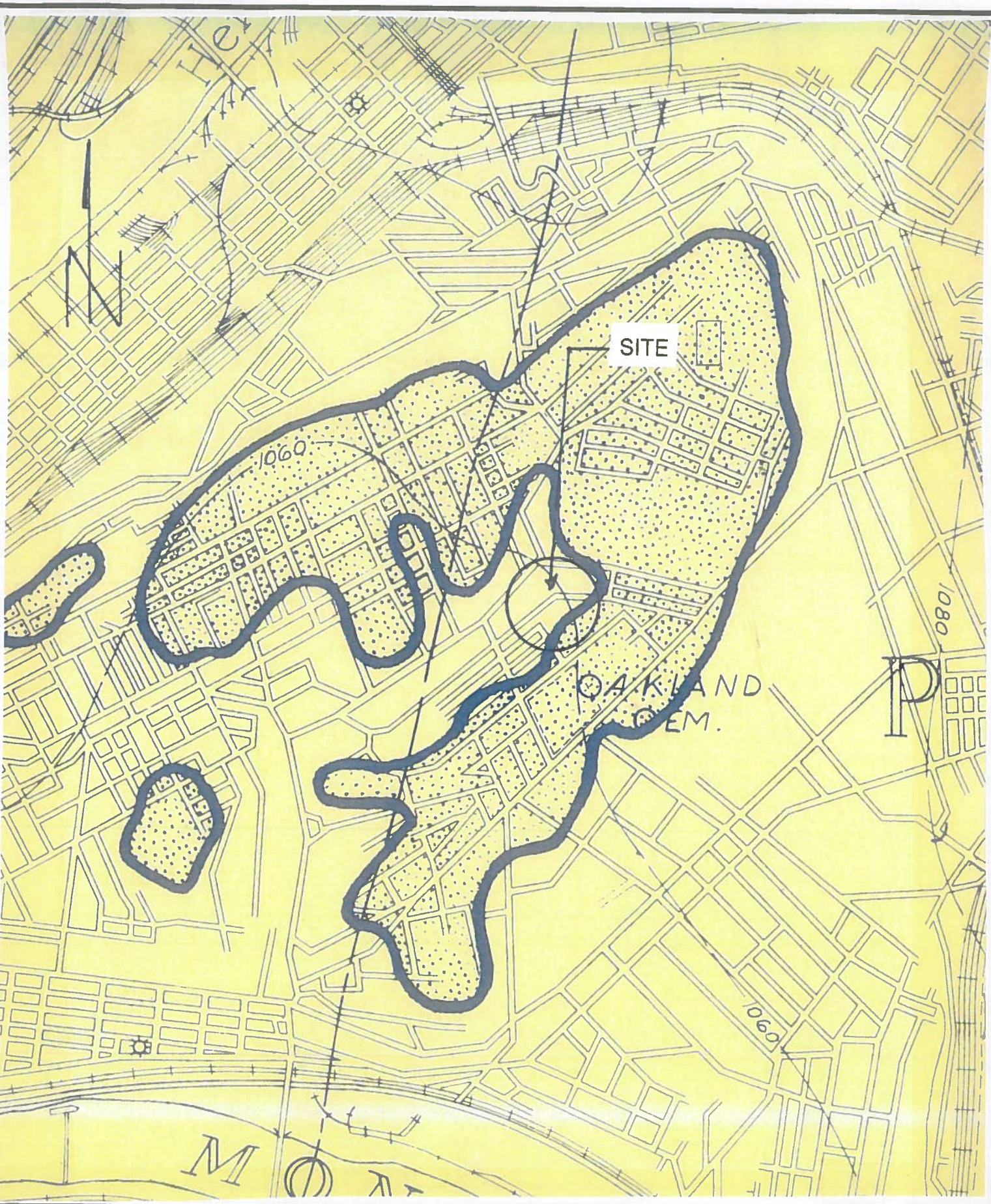
A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual



DATE:	10/9/15	TREES FIELD RENOVATION PROJECT	W.P.A.
SCALE:	N.T.S.	UNIVERSITY OF PITTSBURGH, ALLEGHENY COUNTY, PENNSYLVANIA	MINE MAP
PREPD BY:	BRH	**ACKENHEIL ENGINEERS, INC.**	PITTSBURGH
PRJ. NO.:	15131	1000 Banksville Road, Pittsburgh, PA 15215	SHEET NO. 1