

GEOTECHNICAL ENGINEERING REPORT

***Proposed Distribution Center AR Sort FC
3025 W. Hopkins Street
Milwaukee, Wisconsin***

***GESTRA Project No.: 18051-10
March 23, 2018***

***Prepared For:
Hillwood Development Company, LLC
9525 West Bryn Mawr Ave
Rosemont, IL 60018***



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Report Prepared by:

**GESTRA Engineering, Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207**

Phone (414) 933-7444

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1.0 INTRODUCTION

GESTRA Engineering, Inc. (GESTRA) was authorized by Hillwood Development Company, LLC (Hillwood) to complete a subsurface exploration and geotechnical report for the development of the property located at 3025 W. Hopkins Street in Milwaukee, Wisconsin. This report describes the exploration program, laboratory test results, and recommendations pertaining to the design and construction of the proposed project. The engineering recommendations and analysis contained within this report are based on the following project information which is a projection of our understanding of the project. If for any reason the actual project information differs from what is reported below, GESTRA should be contacted so that the recommendations can be reviewed in light of the new information.

1.1 Project Information

The development will consist of the construction of a four story building with an approximate 2.6 million square feet of commercial space. The building will be located in the center of the property with parking lots to the east and north of the building for small vehicles (cars and pick-up trucks) and parking lots and loading docks south and west of the building for semi-trucks. Two additional smaller vehicle parking lots will be constructed on the properties located at 2823 and 2900 W. Hopkins Street, and an additional semi parking lot on the property at 3424 N. 27th Street.

The proposed building will be a slab on grade structure with majority of the building having 4 stories, with the exception of a 30,000 square area on the eastside of the building for office space. The footprint of the building will cover an approximate area of 640,000 square feet. The building will be steel framed with maximum column loads of 1,900 kips and assumed maximum perimeter wall loads of 4 kips per lineal foot.

2.0 SCOPE OF SERVICES

GESTRA has performed the following services for the project:

1. Contacted Diggers Hotline to identify the utility locations prior to drilling.
2. Located the boring locations on site using a Geomax Zenith 35 GNSS-INS (GPS) receiver. Elevation and coordinates of the boring locations determined by the GPS equipment were referenced to Wisconsin State Plane South Coordinate System (NAVD88) and converted to City of Milwaukee Datum (CMD).
3. Performed 35 standard penetration test (SPT) borings, 15 borings within the footprint of the proposed building and 20 borings within the planned parking lot and drive lanes. At the completion of drilling operations, the boreholes were abandoned per WDNR requirements.
4. Spoils produced from the boreholes were containerized in a 10 cubic yard drop box. Spoils were characterized and disposed of offsite by North Shore Environmental Construction, Inc., a subcontractor to GESTRA.

5. Completed 7 pressuremeter tests which included 2 test in borings B-2, B-5 and B-13 and 1 test in boring B-11.
6. Reviewed the 2018 Shallow Groundwater Flow Map, provided by AECOM.
7. Performed laboratory tests to determine engineering properties of the soils. Testing included hand penetrometer, moisture and organic content, Atterberg limits, hydrometer, grain size analysis, percent passing the number 200 sieve (P200) and unconfined compression tests.
8. Prepared this geotechnical engineering report presenting the results of the field exploration, laboratory testing, and providing recommendations for deep foundations, estimated capacity for driven H-piles and drilled shafts, slab on grade recommendations and soil improvements, seismic site classification, pavement design parameters, pavement sections based on the anticipated traffic volumes provided, and site preparation.

3.0 EXPLORATION RESULTS

3.1 Site Conditions

The current site at 3025 W. Hopkins Street is undeveloped with the exception of two buildings located in the southeast corner and a detention pond in the northeast corner of the property. Historical aerial photos from the Milwaukee County LIO website indicate that the site was once occupied by large manufacturing buildings. The buildings covered almost the entire area of the property. Between year 2010 and 2013, these buildings were demolished. It is our understanding that the foundations and slabs have been removed for all of the building, except for building 28 (which was located near the western property line directly across from the new entrance constructed between 2015 and 2017, and in an area currently used for crushing and storing concrete) and building 70 (west of the existing detention pond). No records of earthwork performed as part of the demolition were available at the time of this report.

The current sites at 2823 W. Hopkins Street and 3424 N. 24th Street are asphalt parking lots. Historical aerial photos indicate that the parking lots were constructed between 1970 and 1975. Prior to year 1970, the lots were occupied by residential and or small commercial buildings.

The site at 2900 W. Hopkins Street is a vacant landscape lot. Historical aerial photos indicate that a parking lot once occupied the western portion of the property with residential properties occupying the eastern portion of the property.

3.2 Subsurface Soil Profile

Fill Material

Fill material was encountered throughout the project site. The fill material typically varied in depth from 3 feet to 6 feet, with deeper fill at a few isolated locations. Deeper fill was observed at the following boring locations within the proposed building foot print: B-1, B-7, B-10, and B-13.

The fill material primarily consisted of clayey soil mixed with possible foundry material, crushed brick, concrete and other types of debris. The N-value typically ranged between 2 to 10 blows per foot (bpf) with the exception where possible larger pieces of debris may have been encountered. The lower N-values of the fill material with periodic higher N-values indicate that the existing fill material may not have been placed in a controlled manner. Due to the site being a former industrial site there may be a possibility of larger buried debris within the fill material. It is important to note

that our borings were performed within small diameter holes and we may not be able to determine cause of obstructions encountered. Additional test pit exploration would assist in determining amount and type of debris that may be encountered during construction and the cause of the obstructions and higher N-Values in our borings.

Native Soils

The general profile of the native soils consisted of a buried topsoil/ soft clay layer which was observed to extend to an elevation between 75 feet and 80 feet. The soil then transitioned to stiff to hard lean clay soils with various amounts of sand and gravel. At an elevation between 52 feet and 66 feet the native soils then transitioned into Intermediate Geo-Material.

Possible Buried Topsoil/Soft to Medium Stiff Clay: The layers of black clay is an indication of possible buried topsoil which was not stripped prior to fill being placed above it. The layers of possible buried topsoil were typically encountered in the southern portion of the building and in areas where fill depths were less than 4 feet. The possible buried topsoil layers were generally underlain by olive gray/ bluish gray clay and soft brown clay soils. The soils observed within this stratum typically had N-values less than 10 blows per foot (bpf) and hand penetrometer readings between 0.25 to 1.00 tons per square foot (tsf). The moisture and organic content tested on the possible buried topsoil samples typically varied between 28% and 46%, and 9% and 12%, respectively.

Native Stiff to Hard Cohesive Soil: The native cohesive soils typically consisted of stiff to hard lean clay with N-values typically between 10 and 40 bpf, and hand penetrometer readings from 1.0 to greater than 4.5 tsf. The moisture content tested on the native cohesive samples typically varied between 10% and 25%.

Intermediate Geo-Material (IGM): IGM is defined as the transition material from soil to bedrock. Typically, the SPT N-values are greater than 50 bpf, uniaxial strength in the range of 10 ksf to 100 ksf as defined by O'Neill and Reese (1999). For the purpose of this report, we are referring to the very dense silts and sands as IGM.

IGM was encountered in all of the borings performed within the building foot print. The IGM material was encountered between an elevation of 52 feet and 66 feet. The IGM material typically consisted of silty clayey sand/ silty sand material with SPT N-values between 45 and 70 bpf. However, multiple split spoon samples encountered refusal (N-values great then 50 blows per 6-inches). The moisture content tested on the IGM samples typically varied between 6% and 12%.

Results of the field and laboratory tests and observations are depicted on the individual test boring logs included in the Appendix I. Soils were grouped together based on similar observed properties. The stratification lines were estimated by the reviewing engineer based on the available data and experience. The actual in-situ changes between layers may differ slightly and may be more gradual than depicted on the boring logs. Subsurface and groundwater conditions can vary between borehole locations and in areas not explored.

It is important to note that the soil observations and soil layer thickness estimates were made in small diameter boreholes. Therefore, it should be understood that thicker or thinner deposits of the individual strata are likely to be encountered within other portions of the project site. Furthermore, the estimation of strata thickness, such as topsoil or fill, at a particular location can differ from person to person due to a sometimes indistinct transition between the soils encountered. Additionally, it must be recognized that in the absence of foreign substances and/or debris within

the soil samples obtained, it is sometimes difficult to distinguish between natural soils and clean soil fill.

3.3 Groundwater Observations

Groundwater observations were made during and at the completion of drilling operations for each borehole. Table 3-1 provides a summary of the borehole locations where water was observed. If a boring is not listed in the below table water was not encountered at this location.

Table 3-1 - Groundwater Observations During and At the Completion of Drilling Operations

Boring Location	Approximate Ground Surface Elevation (feet)	Groundwater Observation During Drilling		Groundwater Observation At the Completion of Drilling		Color Change Observation	
		Depth (feet)	Elevation (feet)	Depth (feet)	Elevation (feet)	Depth (feet)	Elevation (feet)
B-1	84.3	NE	--	22	62.3	13.5	70.8
B-2	85.3	14	71.3	32	53.3	12	73.3
B-3	85.7	23	62.7	NE	--	10.9	74.8
B-4	84.8	7	77.8	12	72.8	12	72.8
B-5	84.7	25.4	59.3	29	55.7	6.5	78.2
B-6	84.7	4.5	80.2	10	74.7	8.8	75.9
B-7	86.4	24	62.4	2	84.4	[1]	[1]
B-8	85.9	7	78.9	15	70.9	14	81.9
B-9	84.3	4.5	79.8	18	66.3	13.7	70.6
B-10	84.8	12	72.8	17	67.8	8	76.8
B-11 ^[1]	85.8	22	63.8	24	61.8	9.5	76.3
B-12	85.2	43	42.2	45	40.2	10.5	74.7
B-13	85.5	30	55.5	35	50.5	[1]	[1]
B-14 ^[1]	84.3	3	81.3	45	39.3	11.3	73.0
B-15	84.4	19.5	64.9	18	66.4	8.5	75.9
B-17	76.1	7	69.1	7	69.1	[1]	[1]
B-26	87.4	7	80.4	4	83.4	[1]	[1]
B-29	82.3	7	75.3	9.5	72.8	10	72.3
B-30	83.8	2	81.8	7	76.8	[1]	[1]
B-32	82.9	7	75.9	6	76.9	[1]	[1]

NE= Not Encountered, NMR = No Measurement Recorded.

^[1] Color transition was not observed within fine grained soils.

Another indication of groundwater depth can be made by observing changes in soil color. Typically, fine grained soils of the type encountered in the borings are brown when they occur

above, and gray when they occur below, the shallowest past groundwater table elevation. This change reflects oxidation of the soil above the groundwater table. Color changes were noted on the boring logs at elevations between 70 and 82 feet. Table 3-1 also provides a summary of the borehole locations where color change was observed. For the purposes of our analyses, we assumed a groundwater elevation to be at 78 feet.

Based on the 2018 Shallow Groundwater Flow Map (included in Appendix III), prepared by others under a previous contract for the City of Milwaukee, water was observed in monitoring wells on January 28, 2018 and varied between elevation 75 feet and 86 feet (CMD). Water elevation shown on the map indicate that the water was observed near the existing ground surface. Due to the site having a significant amount of loosely compacted fill material, and the underlying soils typically consisting of native clay soils or very dense material, it is our opinion that the water presented on the 2018 Shallow Groundwater Flow Map is likely a trapped water table within the loosely compacted fill material.

Groundwater level fluctuations may occur with time and seasonal changes due to variations in precipitation, evaporation, surface water runoff and local dewatering. Perched water pockets and a higher water table may also be encountered during wet weather periods, particularly in more permeable silt and sand seams or granular fill material overlying less permeable clays. Deeper monitor wells would need to be installed below the fill material and readings taken to determine more accurately a long term static groundwater elevation.

3.4 Pressuremeter Test Results

The pressuremeter test intervals were selected based on the anticipated foundation bearing depth(s) and soils encountered. A summary of the pressuremeter test intervals and corresponding results are provided in Table 3-2. The individual pressuremeter test results are also included in Appendix II.

Table 3-2 Pressuremeter Test Results

Boring Number	Test Depth (Midpoint) (feet)	Test Elevation (Midpoint) (feet)	P _o (tsf)	P _r (tsf)	P _l (tsf)	E _d (tsf)	E ⁺ (tsf)	E _d /E ⁺	E _d /P _l	P _l /P _r
B-2	27	58.3	2.4	13.3	18.8	107	505	0.21	5.7	1.8
	35	50.3	7.4	21.1	51.84	499	4,938	0.10	9.6	2.5
B-5	21	63.8	1.7	5.3	14.3	103	472	0.22	7.2	2.7
	38 ^[1]	46.8	--	--	--	--	--	--	--	--
B-11	34	51.8	3.4	11.5	34.1	432	1,411	0.31	12.7	3.0
B-13	31	54.5	3.0	6.8	30.0	274	598	0.46	9.1	4.4
	38	47.5	5.2	16.0	72.4	551	2,153	0.26	7.6	4.5

^[1] Pressuremeter test performed to capacity of equipment and stopped before failure could occur.

In a classical-shaped pressuremeter curve, the initial portion of the curve represents the pressures at which the probe is expanding to come in contact with the soil. The pressure corresponding to the beginning of the straight-line portion of the graph represents the “at rest” earth pressure (P_o). The slope of the straight-line portion of the graph represents the initial loading modulus (E_d) of the soil. Typically, each of the tests included one unload/reload cycle. The slope of the line representing the reload portion of the test is defined as the reload modulus (E⁺). The pressure at

the end of the straight-line portion of the curve is termed the creep pressure (P_f), which is the limit of the pseudo-elastic zone above which point deformation may continue without an increase in load. The limit pressure (P_l) is the pressure at which complete failure has occurred and the soil cannot carry any additional load.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 General Site Preparation

Site preparation should start with removal of surficial topsoil, vegetation, roots, debris (if present) or other deleterious material. All unused utilities or drain tile that may be present should be properly removed, rerouted and reconnected, or abandoned. Material removed from the project site should be disposed in accordance with all applicable federal, state, and local regulations. Soil should not be stockpiled near or adjacent to the excavations.

In slab on grade and pavement areas after the initial site preparation, we recommend recompacting the exposed material and a proof roll should be performed with a minimum 20-ton tri-axle dump truck or like machinery imparting similar static loading on the soil moving at no more than a walking speed. Proof rolling is recommended prior to any new fill and/or base course material placement. A geotechnical engineer or their designated representative should be present during the proof roll in order to identify soft or unstable areas, if any, and subsequently recommend remediation procedures.

It is our understanding that most of the foundation walls and floor slabs for the former buildings have been removed and any large pieces of debris from the foundation walls and slabs have been crushed prior to backfilling. It is also our understanding that the fill material used to grade the site during demolition was not placed in a controlled manner. Therefore, instability should be anticipated through the entire project site during proof rolling.

If instability is observed, these areas could be disked, dried, and re-compacted if weather permits. However, difficulty may be encountered in trying to stabilize the existing clayey fill material, especially during wet and cold times of the year or if the unstable material extends to greater depths. An aggressive construction schedule or construction during seasons with limited drying time may require alternate subgrade preparation methods. Alternative subgrade preparation methods are discussed in Section 4.3 and Section 4.5 for soils within the building pad area and parking lot areas, respectively.

New fill placement should not exceed 12 inches for granular soils and 9 inches for cohesive soil and the maximum particle size should be limited to 2 inches. The contractor should be responsible for having the necessary compaction and related equipment on site to achieve proper compaction of the material being placed. Engineered fill placed within building pad should be compacted to a minimum of 95% of the modified Proctor maximum dry density value. Structural soil fill should be placed a minimum of five feet beyond the edges of the new building and pavements and an additional foot horizontally for each vertical foot of new fill to be placed to provide adequate lateral confinement. The existing inorganic material on site may be reused as general engineered fill (unless other fill specified), but moisture conditioning of the material should be anticipated and sorting to remove unsuitable soils.

This geotechnical report identifies or recommends material that may be used as engineered fill, but the contractor is responsible for utilizing materials that meet the project requirements and determining means and methods required for placement and compaction. Typically, clay soils are easier to dry or rework when placed over large open areas. Additionally, clay soils can be difficult

to compact or moisture condition in trench backfill situations and may increase potential for consolidation and settlement of the backfill if it is not placed or compacted properly. Granular soils may be easier to place and compact in trench backfill situations, but may increase construction costs if the material has to be imported.

Site grading should direct runoff away from planned building and pavement areas and should be maintained throughout construction so that the potential for the softening of the foundation and subgrade soils is reduced. Equipment and working traffic should also be kept to a minimum on subgrade and foundation bearing surfaces, especially during times of precipitation or following spring thaw. The contractor is responsible for maintaining completed earthwork areas. Consideration should be given to installing construction roads or utilizing the existing gravel drive areas for construction traffic to reduce disturbance to the subgrade soils.

4.2 Foundation Discussion

4.2.1 Shallow Foundations

The subsurface soil conditions observed within the borings indicated deeper fill material and soft to stiff clay soils to a depth of 9 to 15 feet below existing grades. Based on the anticipated column and wall loads, depth to suitable bearing material and the amount of contaminated soils on site, it is our opinion that shallow foundations may not be the most economical foundation system for the project.

GESTRA could perform further analysis to evaluate shallow foundations as other factors could affect the cost effectiveness. These factors may include lower structural loads from those presented in this report or if the project elects to perform compacted aggregate piers or removal and replacement for the support of the slab on grade. Depending on the design loads for the interior and perimeter walls and lightly loaded columns, these may be designed to be supported on the compacted aggregate piers.

It is our recommendation that the building be supported on either driven piles or drilled shafts (caisson). The following sections 4.2.2 and 4.2.3 provide recommendations for both types of foundation systems. The designer will need to determine which foundation system will be most cost effective for the project.

4.2.2 Driven Pile Recommendations

Based on the presence of contaminated soils on site, it is our opinion that driven piles may be a more feasible option over caissons. If the piles can be installed without preboring this will eliminate any spoils produced and in return eliminate the cost associated with disposing of contaminated fill material. However, if large debris, obstructions and or foundation and lower level floor slabs are encountered within the fill material this may require additional excavation or preboring to ensure the piles extend to suitable native bearing soils.

In the Wisconsin Commercial Building Code, SPS 362.1810 the Factor of Safety used for pile design depends on the extent of field testing performed to verify capacity.

- “If the ultimate capacity is assessed solely by static analysis, a minimum factor of safety of 3.0 shall be applied to the ultimate capacity to determine allowable load capacity.”
- “If only static analysis and dynamic field testing are performed, a minimum factor of safety of 2.5 shall be applied to the ultimate capacity to determine load capacity.”

- “If one or more static load tests are performed, in addition to a static analysis, a minimum factor of safety of 2.0 shall be applied to the ultimate allowable capacity.”

Our evaluation assumed two different H-pile sizes, HP 10x42 and HP 12x53. The available capacity is generally related to the structural capacity of the pile, the pile size, and depth the piles are driven. Our recommendations included a general evaluation of driving resistance for these assumed pile types.

Based on the conditions encountered in the soil borings, we anticipate pile refusal (end bearing) may be encountered at depths ranging from 20 feet to 35 feet (elevation 50 feet to 69 feet). Estimated pile depth at each borehole location is listed in Table 4-1.

Table 4-1: Estimated Pile Depths

Boring No.	Estimated Driven Elevation (feet)	Boring No.	Estimated Driven Elevation (feet)	Boring No.	Estimated Driven Elevation (feet)
East Perimeter Wall		Interior Columns		West Perimeter Wall	
B-1	64	B-6	54 ^[1]	B-11	60
B-2	50 ^[1]	B-7	66 ^[1]	B-12	50 ^[1]
B-3	55 ^[1]	B-8	55 ^[1]	B-13	65
B-4	64	B-9	69	B-14	59 ^[1]
B-5	54 ^[1]	B-10	64	B-15	63

^[1] Early refusal may be encountered due to presence of boulder or very dense soil layer at shallower depth.

Capacities are dependent on conditions at a specific location and actual capacity and depth driven will vary across the site. As indicated in the above Table, variability in the actual pile embedment depth should be expected. A lateral analysis will need to be performed to confirm that the soils above the estimated refusal depth will provide sufficient resistance against lateral forces. A properly planned and implemented pile testing program is recommended to confirm the pile are being driven to the recommended bearing layer.

Actual pile design will need to account for allowable stress of the pile material type and Factor of Safety used in the design. Table 4-2 provides allowable structural capacities for both pile types based on the extent of testing and related Factor of Safety chosen as described at the beginning of Section 4.2.2.

Table 4-2: Estimated Pile Capacity

Pile Type	Allowable Capacity Related to Factor of Safety		
	FS = 3.0	FS = 2.5	FS = 2.0
10x42 H-pile	65	80	100

Pile Type	Allowable Capacity Related to Factor of Safety		
	FS = 3.0	FS = 2.5	FS = 2.0
12x53 H-pile	80	100	125

^[1] Maximum allowable capacity was restricted to the structural capacity of 200 kips for 10x42 H-piles and 250 kips for 12x53 H-piles, respectively.

Table 4-1 identifies estimated driven depth for the above capacities. We recommend performing drivability analysis for the actual project pile type and proposed hammer selected to check that the pile can be driven to attain the planned depth without damaging the piles. The recommended capacities in Table 4-2 did not consider pile group effects. A minimum spacing of 3 pile diameters between centers of piles is recommended to eliminate reduction of the pile capacity as a result of group action. The piles could be spaced closer, but a lower capacity would be recommended due to reduced efficiency of the pile group.

Also, note that the recommended capacities in Table 4-2 are based on our understanding that subgrade improvement will be performed on the subgrade soils prior to the fill material being placed within the building footprint. Therefore, any downdrag forces on the piles due to the site being raised may be negligible and can be ignored. However, if the subgrade soils are not improved the allowable pile design capacities will need to be adjusted to account for downdrag forces from settlement of the new fill material, existing loosely compacted fill material and the upper soft native clayey soils. We estimate downdrag forces will be on the order of 20 kips and 25 kips, for 10x42 H-piles and 12X53 H-piles, respectively.

It is recommended that the pile driving operations be observed by a representative of the geotechnical engineer on a full-time basis to confirm that the required depth for the design capacity is achieved and that the piles are driven according to the required driving criteria. The pile sweeps should also be checked to confirm that they are within tolerable limits and that the piles are not damaged by overdriving.

Care must be taken during pile driving operations so that the piles are not damaged above or below the ground surface during driving. As previous noted in Section 3.0 large pieces of debris and the foundation and lower level floor slab for some of the former buildings may still be in place. Currently, we are only aware of the floor slab still in place for two of the former buildings, building 28 (which was located near the western property line directly across from the new entrance constructed between 2015 and 2017, currently used for crushing and storing concrete) and building 70 (west of the existing detention pond). Where obstructions are encountered, it may be necessary to pre-drill or core through the obstruction, offset piles from their originally planned locations or drive additional piles. Pile tips or end plates may be needed because of rubble, cobbles, boulders or dense gravel.

4.2.3 Drilled Shafts (Caisson) Recommendations

Another suitable foundation type would be caissons. As noted before, this foundation type may not be the most feasible option due to the cost of disposing contaminated spoils produced from installation and the possibility of time delay for redesign if unanticipated soils are encountered during installation.

If caissons are selected, we recommend the caissons be supported within the Intermediate Geo-Material (IGM) encountered. Caissons supported in this material may be designed for a net allowable soil bearing pressure of 20,000 pounds per square foot (psf). The maximum net allowable soil bearing pressure incorporates a factor of safety of 3. The estimated bearing depth at each borehole location is listed in Table 4-2.

Table 4-2: Estimated Caisson Bearing Elevations ^[2]

Boring No.	Estimated Bearing Elevation ^[2] (feet)	Boring No.	Estimated Bearing Elevation ^[2] (feet)	Boring No.	Estimated Bearing Elevation ^[2] (feet)
East Perimeter Wall		Interior Columns		West Perimeter Wall	
B-1	63	B-6	53 ^[1]	B-11	54
B-2	50 ^[1]	B-7	51 ^[1]	B-12	50 ^[1]
B-3	55	B-8	55 ^[1]	B-13	63
B-4	63	B-9	67	B-14	58 ^[1]
B-5	54 ^[1]	B-10	63	B-15	63

[1] Obstructions may be encountered due to presence of boulder or very dense soil layer at shallower depth.

[2] Elevations referenced to City of Milwaukee Datum

A lateral analysis will need to be performed to confirm that the soils above the estimated refusal depth will provide sufficient resistance against lateral forces. Actual capacity and depth of caisson will vary across the site. As indicated in the above Table, variability in the actual caisson depth should be expected.

Settlement estimates are calculated using pressuremeter modulus values obtained from pressuremeter tests performed in four soil borings (B-2, B-5, B-11 and B-13). The maximum settlement for a 20,000 psf load is estimated to be 1 inch or less. The caisson base diameter used in our calculations was based on the maximum column load of 1,900 kips and the maximum diameter estimated was 9 feet. Elastic shortening of the caisson shafts should be added to this value. Maximum differential settlements between similarly loaded adjacent columns are estimated to typically amount to about ½ of the total settlement.

Since the building will not contain a basement or other below grade areas, caissons will most likely be installed from the existing ground surface. Due to the unknown demolition of the former buildings and the placement of the existing fill material; large debris, old foundation walls and floor slabs may be encountered during caisson installation. The depth of fill material varies across the site and was typically observed to extend between 3 to 6 feet below the existing ground surface. However, fill material was encountered to a depth to 9 to 12 feet below the ground surface at boring locations B-1, B-7 and B-13. Temporary steel casing will be required to extend the excavation through the existing rubble, soft clay and granular deposits of sand and silt to prevent sloughing of these materials and seepage of water into the shafts. Ground loss must be avoided to minimize adjacent ground movement. Means and method of drilling and installation of casing should be selected by the caisson contractors based on the observed soil conditions. Due to the similarity of the bearing soils and above soils, it may be difficult to visually determine when

drilling operations have extended in to the suitable bearing soils. We recommend additional borings be performed during field testing to confirm that the design and construction depth for the caissons will extend to the suitable bearing soils.

Based on the sand content of the soils encountered in the borings, it appears that caisson belling operations are likely to be difficult within the IGM soils. We recommend that a test excavation be performed prior to designing the belled caissons to confirm the constructability of belled caissons in IGM. If belled caissons can be successfully constructed in IGM, the caisson should have a minimum shaft diameter of 3 feet, the minimum caisson base angle should be 60 degrees (from horizontal), and the bell diameter should not exceed 3 times the shaft diameter. We recommend that caisson bells be designed for 15 percent additional bearing area (maximum 1 foot increase in bell diameter) and any loose soil be back bladed to the bell periphery. Depth measurement of the caisson bottom before and after belling is essential to confirm that no spoil build-up has occurred in the shaft causing the belling tool to “ride-up”, creating a layer of smooth appearing, but soft spoil across the entire bell bottom.

Water was observed within multiple borings above the estimated depth of caisson. If water bearing soils are encountered, concrete should be placed in the shafts from the bottom up using a tremie pipe. There should be a minimum 5-foot positive head of concrete maintained at all times above the static water table to prevent necking of the shaft. Temporary casing should be extracted at a slow enough rate to prevent necking of the concrete. The shaft concrete should have a slump in the range of six to seven inches to reduce the possibility of the concrete arching across the temporary casing as the casing is withdrawn and adequate head of concrete should be maintained during casing removal to maintain the shaft integrity.

Completing construction of each caisson in a rapid manner will minimize the possibility of problems developing. Drilled caisson design and construction procedures should be reviewed with the caisson contractor selection for this work, prior to start of construction.

4.3 Floor Slab Recommendations

Due to the anticipated high floor slab loads (500 psf), depth of fill material and buried topsoil, settlement of slab on grade is a concern for the proposed building. If the project considers supporting the slab on grade over the existing fill and compressible soil deposits, the contractor and owner must understand and accept the potential risks related to the unknown nature of the fill placement and leaving the compressible soil deposits in place. These risks may include excessive total and differential settlement, buried unsuitable material or inconsistent material that could result in additional site excavation, subgrade instability, or other potential detrimental conditions that would affect the performance of the slab. If the owner and contractor cannot accept these risks, then the project should consider either a structurally supported slab or some type of ground improvement below the slab. Below we have presented options that can be considered to mitigate the potential impact of the site soils on the building slab.

Removal and Replacement

Based on the review of the borings performed within the building footprint, 2 feet to 12 feet of over-excavation may be anticipated. Deeper fill material was encountered in borings B-1, B-2, B-6 and B-7, located in the northeast corner and borings B-10, B-13 and B-15, located in the southwest corner of the proposed building. In addition, deeper possible buried topsoil or soft soil was observed directly below the fill material in borings B-2 and B-6, located in the northeast corner and borings B-4, B-9 and B-14, located near the south end of the proposed building.

If removal and replacement is chosen as the preferred option, the fill material and soft soils excavated may be reused as engineered fill to backfill the over-excavation, provided they follow the recommendations presented in Section 4.0 of this report. However, it should be noted that the soils on site may contain contaminants and the designer should review the environmental study performed by others to determine the amount of excavated material/ soil that may not be suitable for reuse. In addition, buried topsoil, debris, deleterious material and large pieces of concrete will need to be removed in their entirety before material is replaced in an excavation.

Soil Improvement using Aggregate Piers

Compacted aggregate piers or a similar soil improvement system like stone columns is a possible alternative to over-excavation of the existing fill material and or the use of a structural supported slab. In general, these improvements consist of drilling a hole and backfilling the excavation with compacted crushed stone. This method of ground improvement increases the stiffness of the soil, thus reduces settlement. If this ground improvement method is chosen it should be used to support the entire slab on grade area and should extend outside the footprint for a sufficient distance to support the loads.

The evaluation of the soil conditions along with the specific design is typically provided by specialty contractors installing the system. It should also be noted and recognized that construction problems should be anticipated during installation of compacted aggregate piers in some areas due to the possible presence of large pieces of debris and former foundations and lower level floor slab within the existing fill. Typically, an additional test pit exploration is performed to evaluate the potential issues that may arise when installing aggregate piers through existing fill material. If the structure is designed with an aggregate pier system, the designer should ensure that total and differential settlements are within the tolerances of the structure and that installation through the fill material is achievable.

Soil Improvement using Rigid Inclusion

Rigid Inclusion is similar to compacted aggregate piers. This improvement method consists of drilling a hole, similar to compacted aggregate piers; however, backfilling the excavation consisted of using either an aggregate mix with cement or grout, or elements made of plain concrete. As noted above in the aggregate pier section we also recommend an additional test pit exploration be performed to evaluate the potential issues that may arise when installing rigid inclusion piers through existing fill material.

Structurally Supported Slab

Structurally supported slab will need to be designed to carry loads from the slab to the building foundations. A structural engineer will need to determine the detailed reinforcement layout and slab thickness suitable for the designed loads.

Dynamic Compaction

Dynamic compaction was also reviewed as a possible option. However, due to the underlying buried topsoil and soft native soils, possible large debris and documented shallow perched water, dynamic compaction may not be a suitable option for the site as it may not be effective in improving the entire building pad subsurface conditions.

We recommend the installation of a capillary moisture break to be placed directly below the slab on grade. A typical design may consist of at least 6 inches of free-draining sand and/or gravel with a maximum 1-inch particle size and contain no more than 10% passing the number 200 sieve (fines). It is recommended the need for a vapor retarder and location of installation be determined

by the structural engineer, architect, or manufacturer of a floor covering and they should consider the concrete curing and the effects of moisture on future flooring materials. If a vapor retarder is used, we recommend it be placed in accordance with ACI 302.1 Section 3.2 and should meet the requirements of ASTM E1745. The vapor retarder should include proper sealing at penetrations, overlap at joints, and sealing at the interface of the wall and slab and may require an adequate cushion material to prevent damage.

If a slab on grade is selected, we recommend that the floor slabs be suitably reinforced and designed to be separate from the foundation system in order to allow for independent movements. It is recommended the structural engineer specify the floor slab thickness, reinforcing, joint details and other parameters. At a minimum, the floor slabs are recommended to be reinforced or the concrete contain an appropriate fiber mesh additive to help control shrinkage cracking.

4.4 Seismic Site Classification

Section 1613 of the International Building Code 2015 (IBC) was used to assign a soil site classification. Based on the native soil conditions observed and assuming these are consistent or better to a depth of 100 feet, the soil site classification **C** (stiff soil) should be used in the structural design of the proposed building. Based on site class C, and mapped spectral response acceleration for S_s and S_1 for Milwaukee, Wisconsin, the site coefficient F_a and F_v are 1.2 and 1.7, respectively.

4.5 Pavement Recommendations

The pavement subgrade soils should be prepared, and proof rolled following the recommendations in this report. Based on the soils encountered throughout the site, we anticipate majority of the site will require some type of subgrade improvement. Any topsoil, buried topsoil (if exposed), vegetation, roots, debris (if present) or other deleterious material should be removed if exposed in the pavement subgrade. Remnants of previous buildings, such as foundation walls should be removed to a minimum of 2 feet below the proposed pavement structure. Fill material was encountered in most of the pavement borings (B-16 through B-35) and varied up to a depth of 10 feet, at some locations. In addition, possible buried topsoil was observed in multiple borings below the fill material.

The following options can be considered for the subgrade improvement. In areas of excessive soft soils or deeper soft soils, geogrid can be used to reduce the amount of excavation needed and can reduce the cost for disposal of contaminated soils.

- Rework the existing material by disking, drying and re-compaction.
- Excavate the soft or unstable soil and replace with engineered fill. A geotextile fabric should be included if an open graded (clear stone) fill is used as the new fill.
- Excavate and place a geogrid material with an approved granular fill. Various options of geogrid strength and related thickness of granular fill are available, but the system selected should be designed by an experienced contractor or geogrid supplier based on the site soil conditions.

Our recommendations below assume the subgrade conditions are consistent with the results of our subsurface testing evaluation and that the subgrade is thoroughly prepared for construction based on the recommendations developed in this report. Additional corrective action may be determined at the time of construction for areas where it is necessary to provide a more consistent subgrade.

The Wisconsin Asphalt Pavement Association (WAPA) Pavement Design Guide, AASHTO 2018,

and the results of the geotechnical evaluation were used to provide the recommendations for the new asphalt pavement. Based on subgrade soil consisting of clayey fill and the fill material containing pieces of crushed debris, GESTRA recommends that “poor soil” (estimated CBR value between 2 and 5, SSV = 2.5) conditions should be assumed as the subgrade soils.

Based on the design information provided by Hillwood, the pavement should be designed for a 15-year service life for a maximum daily traffic volume of 357 semi-trucks in and out of the facility per day.

Table 4-4 below presents the recommended hot mix asphalt and base course thicknesses for the Small Vehicle Parking Lots (Autos and Single Unit Trucks) and Large Semi-Truck Parking Lots. Pavement sections may be modified if the traffic volumes are different than what is presented below.

Table 4-4: Pavement Design Recommendations for Parking Lots

Traffic Class	Pavement Layer Type	Thickness	Material Type	WisDOT Specifications
Traffic Class II, (Auto and Single Unit Trucks), parking lot ≥ 50 stalls, 20 year ESALs < 2million ^[1]	Hot Mix Asphalt	4.0	LT	Section 460
	Base Course (Dense Graded)	9.0	1-1/4 inch Crushed Stone	Section 305
Traffic Class IV, (Semi-Truck), 20 year ESALs 2-8 million ESALs ^[1]	Hot Mix Asphalt	6.0	MT	Section 460
	Base Course	12.0	1 1/4 inch Dense Graded Base	Section 305

^[1] Based on Table 6.1 of 2018 WAPA Asphalt Pavement Design Guide

One of the important considerations in designing a high quality and durable pavement is providing adequate drainage. Drainage design for the proposed pavement section is out of GESTRA’s scope for this project. It is important that bird baths (leeching basins) and surface waves are not created during construction of the HMA layer. A proper slope should be allowed and drainage should be provided along the edges of pavements and catch basins to prevent the accumulation of free water within the base course, which otherwise may result in subgrade softening or swelling, and pavement deterioration under exposure and repeated traffic conditions.

Pavement sections presented in the above table should not be used for areas for equipment or truck parking, truck dolly pads, entrances and exit aprons, or contain trash dumpster loading zones. In the areas listed above, a Portland Cement Concrete (PCC) pavement should be used. The PCC layer thickness is recommended to be 6.0 inches, with a minimum of 6.0 inch-thick crushed stone base course, but may be modified depending on the final design. The reinforcement details for PCC layers should be designed by the project design engineer as the project conditions dictate.

All pavements require regular maintenance and repair in order to maintain the serviceability of the pavement. These repairs and maintenance are due to normal wear and tear of the pavement surface and are required in order to extend the serviceability life of the pavement. However, after 20 years

of service, a normal pavement structure is likely to deteriorate to a point where pavement rehabilitation may be required to maintain the serviceability.

4.6 Construction Consideration

The detailed means and methods of excavation and construction should be decided by the contractor and approved by the project design team. Based on the geotechnical exploration results, the following issues should be taken in consideration during construction.

Dewatering

Based on the 2018 Shallow Groundwater Flow Map, water may be anticipated to be encountered directly below the existing ground surface within the fill material. The water observed in the fill material is likely a trapped water within the existing fill. Based on the borings performed, we anticipated long term static ground water level to be between an elevation of 70 feet and 82 feet.

For shallow excavations typically less than 5 feet below existing grades, we anticipate temporary sump pits and pumps would be adequate to remove water within the excavation. However, a construction dewatering plan should be prepared for all excavations, including cassion construction, and the plan should account for known contamination at the site. If an excavation retention and/or dewatering system below the groundwater table is not properly designed, a boiling and/or heaving subgrade could occur possibly resulting in loss of ground support and detrimental effect to the system and any nearby existing construction. We recommend that a qualified dewatering contractor design the dewatering system, including well locations, well depths and pumping rates. We also recommend the geotechnical engineer be provided the dewatering plans before construction for review and comments. Water from other sources such as surface runoff from rain events should be controlled and prevented from entering site excavations. The contractor should be prepared to control the water and prevent it from accumulating in excavations or otherwise affecting construction.

Excavation Stability

Caving is a common issue for excavation side walls during construction, especially within existing fill and granular soils. An excavation plan should be developed and the length of excavation left open should be limited to prevent caving soil from covering the suitable bearing soils. The contractor must comply with the federal, state, local and updated OSHA regulations during excavation and in retention system design to ensure excavation safety. Care must be taken so that any adjacent, roadways, utilities and other construction do not become undermined during and after excavation and construction of the proposed building.

OSHA has instituted strict standards for temporary construction excavations. These standards are outlined in 29 CFR Part 1926 Subpart P. Excavations within unstable soil conditions or extending five feet or more in depth should be adequately sloped or braced according to these standards. Excavation safety is the responsibility of the contractor. Material stockpiles or heavy equipment should not be placed, or operate near, the edge of the excavations. The actual stable slope angle should be determined during construction by the contractor and will depend upon the loading, soil, and groundwater conditions encountered.

Weather Implications

The subgrade soil or the soil at foundation level might become unstable with exposure to adverse weather such as rain, snow and freezing temperatures. The unstable areas due to weather exposure may require an additional undercut or stabilization and the representative geotechnical engineer

should assist with the determination of the depth of additional undercut or stabilization procedure based on observation of the field condition.

Soil Sensitivity

Soil at the construction site will be exposed to moisture and disturbance from construction traffic, construction equipment and human factors. Due to the disturbance, soil may become sensitive with contact of water. Contractor should try to lessen the exposure the soil at the construction site may encounter to moisture and disturbances. Therefore, foundations, floor slabs and pavement should be constructed immediately after the review of the representative geotechnical engineer.

Pile Driving

Pile driving operations may cause ground vibrations that could affect nearby existing structures, utilities, or other construction. It is recommended that vibrations caused by the pile driving operations be closely monitored to enable modifications to be made for reducing the potential for damage to existing buildings, utilities, or other construction. If the vibrations exceed specified levels, the driving operations should be adjusted to control potential damage.

5.0 EXPLORATION AND TESTING PROCEDURES

5.1 Layout and Elevation Procedures

Thirty-five (35) SPT soil borings were completed at the locations shown on the attached Borehole Location Map in Appendix I. The locations of the boreholes were selected and located in the field by GESTRA. Borehole locations were established using a Geomax Zenith 35 GNSS-INS (GPS) receiver. Elevation and coordinates of the boring locations are included on the boring logs and referenced to City of Milwaukee Datum. It should be noted that the boring locations were not surveyed by a licensed surveyor.

5.2 Field Testing Procedures

The boreholes were drilled using either a truck mounted or track mounted drill rig. The boreholes were initiated and advanced by using hollow stem augers. Mud rotary drilling techniques were used for borehole where pressuremeter testing was performed. A 24-inch split spoon sample was typically collect at the surface, then 18-inches split spoon samples were collected at 2-1/2 foot intervals starting at a depth of 2 feet to a depth of 16 feet. Below a depth of 16 feet spilt spoon samples were collect at 5-foot intervals to the assigned termination depth. All representative soil samples were taken in general accordance with the “Standard Method for Penetration Test and Split-Barrel Sampling of Soils” (ASTM D1586) or “Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes” (ASTM D1587). After each sampling, a soil sample was retained and placed in a jar and recorded for type, color, consistency, and moisture, sealed and then transported to the laboratory for further review and testing, if required. The specific drilling method used including the depths, rig type and crew chief are included on each of the individual boring logs as it may change for each hole.

5.3 Laboratory Testing Procedures

After completion of drilling operations, all of the retained soil samples were transported to GESTRA's laboratory and visually classified by a geotechnical engineer using the Unified Soil Classification System. A chart describing the classification system used is included in Appendix I. The engineer then assigned laboratory testing to aid in classification and extract index properties of the soil layers. These tests included hand penetrometer, moisture and organic content, Atterberg limits, hydrometer, grain size analysis, percent passing the number 200 sieve (P200) and unconfined compression tests.

STANDARD OF CARE

Our exploration was limited to evaluating subsurface soil and groundwater conditions pertaining to the proposed project. GESTRA did not perform any environmental, chemical, or hydrogeologic testing as these were not part of our scope of services.

The soil borings and site sketch should not be detached from this report. Our report is not valid if used for purposes other than what is described in the report.

All OSHA regulations such as those regarding proper sloping and temporary shoring of excavations should be followed during the entire construction process.

GESTRA has presented our professional opinions in this report in the form of recommendations. Our opinions are based on our understanding of current project information and related accepted engineering practices at the time of this report. Other than this, no warranty is implied or intended.

Sincerely,
GESTRA Engineering, Inc.

Report Prepared By:



Eric Jeske, P.E.
Staff Engineer

Report Reviewed By:



Douglas Dettmers, P.E.
Senior Engineer

APPENDIX I

SITE LOCATION MAP, BOREHOLE LAYOUT PLAN, TEST BORING LOGS, AND NOMENCLATURE



Map obtained from Milwaukee County GIS



GESTRA Engineering, Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444
Fax: (414) 933-7844

Project Name & Location:
Distribution Center AR Sort FC
3025 W. Hopkins Street
Milwaukee, WI

Drawing Title:
Site Location Map

Project No.: 18051-10

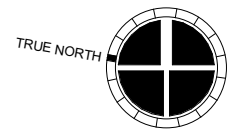
Scale: Not to Scale

Drawing No.: 1 of 1

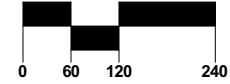
Drawn by: ESJ

Checked by: DD

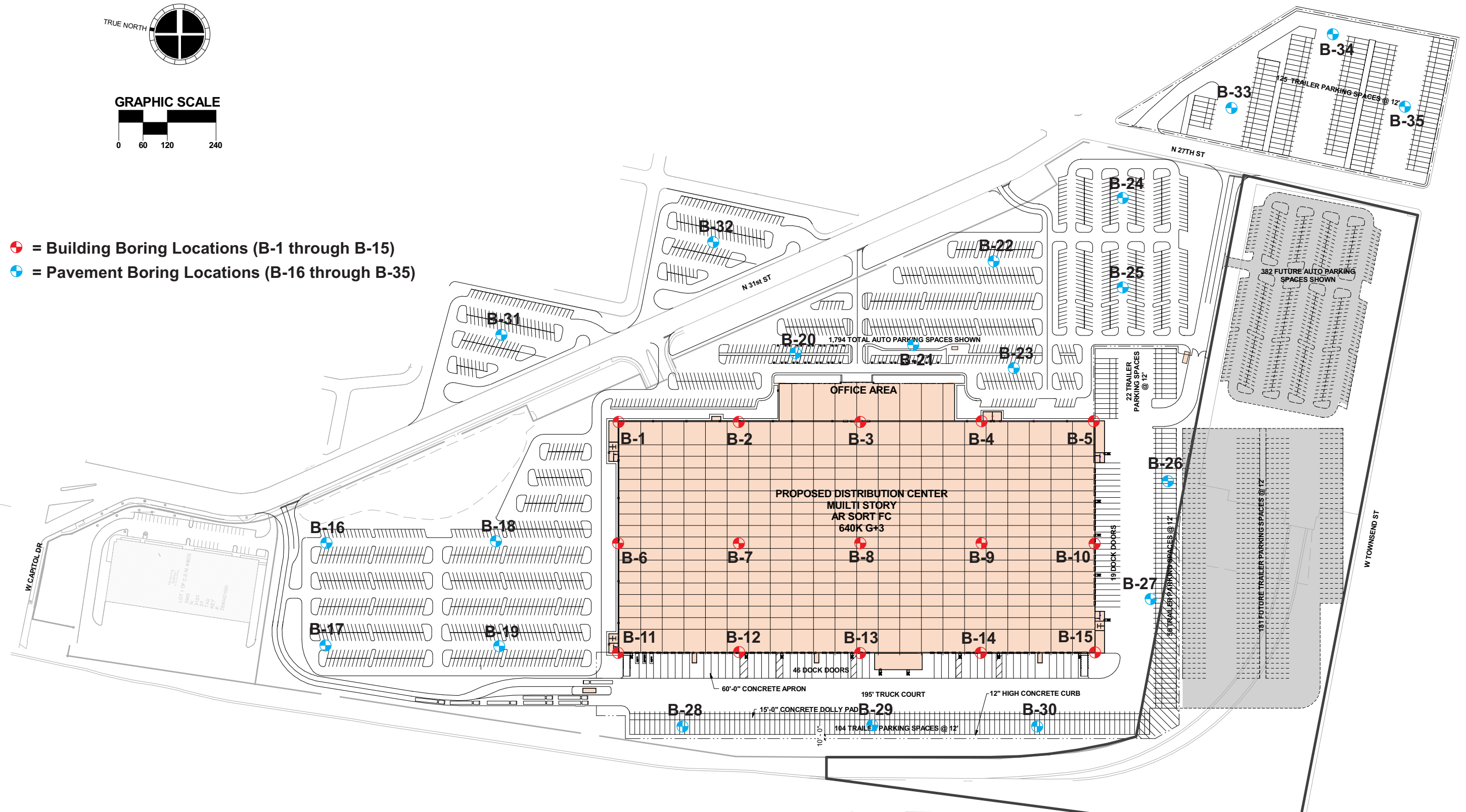
Date: March 14, 2018



GRAPHIC SCALE



- = Building Boring Locations (B-1 through B-15)
- = Pavement Boring Locations (B-16 through B-35)



GESTRA Engineering, Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444
Fax: (414) 933-7844

Project Name & Location:
Distribution Center AR Sort FC
3025 W. Hopkins Street
Milwaukee, WI

Drawing Title:
Borehole Location Map

Project No.: 18051-10

Scale: 1" = 240'

Drawing No.: 1 of 1

Drawn by: ESJ

Checked by: DD

Date: March 14, 2018



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 2

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/5/2018

BORING NUMBER

B-1

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/5/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.1 "

LAB LOG / QC

E. Jeske

LONGITUDE

0.1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	6	2 3 5 4	8		TOPSOIL (3") 0.3 (84) LEAN CLAY, brown with dark brown, moist, (FILL)							21.1	
SS - 2	10	3 2 4	6									19.2	
SS - 3	18	2 3 4	7	80.0	LEAN CLAY, gray, moist, (FILL) 3.7 (80.6) With foundry material in sample SS-3							18	
SS - 4	16	1 3 5	8	75.0	Color changed to dark gray at 7'							27.9	
SS - 5	16	2 3 5	8	10	Color changed to olive gray at 9.5'							19	
SS - 6	6	9 15 23	38		11.4 (72.9) SANDY LEAN CLAY, brown, moist, hard, trace gravel	CL						12	
SS - 7	18	8 11 12	23	15	13.5 (70.8) SANDY SILT, gray, moist, dense, trace gravel	ML						9.2	Gravel = 8.8% Sand = 34.7% P200 = 56.5%
SH - 8	13				18.1 (66.2) SILTY SAND, gray, moist, dense to very dense								Driller was only able to push tube 13" without damaging it.
SS - 9	17	43 30 50/5"	R	20						14	2	9.4	
SS - 10	18	18 20 22	42	25		SM						8.3	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 37 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 22 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

2 of 2

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/5/2018

BORING NUMBER

B-1

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/5/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 11	6	20 42 50/3"	R	30	SILTY SAND, gray, moist, dense to very dense							7	
SS - 12	16	12 40 30	70	35								7.7	
SS - 13	14	18 32 28	60	40								7.4	
SS - 14	16	29 44 50/4"	R	45								7	
SS - 15	17	40 37 50/5"	R	50								6.5	
				50.9 (33.4)	End of Boring at 50.9 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 37 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 22 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER	1 of 2
BORING NUMBER	B-2
PROJECT NUMBER	18051-10
DRILLING RIG	Diedrich D50 ATV
DRILLING METHOD	3 1/4" HSA
SURFACE ELEVATION	85.3 ft

BORING DRILLED BY	FIELD LOG	LATITUDE	
FIRM: Gestra	L. Rykoskey		
CREW CHIEF: M. Rhodes	LAB LOG / QC	LONGITUDE	
	E. Jeske		

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	1 3 4 4	7	85.0	SANDY LEAN CLAY, gray with dark brown, moist, trace gravel, (FILL)								
SS - 2	8	4 3 5	8	2 (83.3)	LEAN CLAY, gray with dark gray, moist, (FILL)					38	22	19.3	
SS - 3	10	3 4 5	9	5 80.0								22.6	
SS - 4	10	3 4 5	9	6.5 (78.8)	LEAN CLAY, black, moist, stiff, (possible buried topsoil)	CL						46	LOI = 12.2%
SS - 5	16	3 3 3	6	8.7 (76.6)	LEAN CLAY, olive gray with brown, moist, soft to stiff	CL			0.25-0.5			24.3	
SS - 6	18	3 7 8	15	10 75.0	Color changed to gray at 12'	CL			1.00			15.2	
SS - 7	0	21 29 31	60	14 (71.3)	SILTY CLAYEY SAND, gray, moist, medium dense to very dense								
SS - 8	4	10 11 13	24	15 70.0								13	
SS - 9	0	9 13 23	36	20 65.0		SC-SM							
SS - 10	10	13 12 11	23									11	
SS - 11	8	6 14 18	32	25 60.0								12.9	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 14 ft.	CAVE DEPTH AT COMPLETION: 43 ft.	WET ☐
WATER LEVEL AT COMPLETION: 32 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

2 of 2

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-2

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

L. Rykoskey

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 12	18	10 14 22	36	30 55.0	SILTY CLAYEY SAND, gray, moist, medium dense to very dense	SC-SM						8.1	Pressuremeter Test performed at 27'.
SS - 13	18	12 21 26	47	35 50.0								8.6	Pressuremeter Test performed at 35'.
SS - 14	9	22 50/3"	R	40 45.0	SILTY CLAYEY SAND, gray, moist, very dense, trace gravel	SC-SM						8	
SS - 15	14	26 46 50/2"	R	45 40.0								7.1	
SS - 16	11	30 50/5"	R	50 35.0								7	
					End of Boring at 50.4 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 14 ft.	CAVE DEPTH AT COMPLETION: 43 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 32 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-3

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

L. Rykoskey

LATITUDE

0 0 0

LAB LOG / QC

E. Jeske

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	4 3 2 3	5	85.0	ROOTMAT (4")								
SS - 2	14	3 3 3	6		LEAN CLAY, dark brown, moist, stiff	CL			1.50			25.3	
SS - 3	16	5 5 5	10	80.0	LEAN CLAY, brown mottled gray, moist, stiff to very stiff	CL			1.25			32.5	LOI = 2.4%
SS - 4	18	7 8 8	16			CL			1.50			13.1	
SS - 5	4	9 10 11	21	75.0	SILTY CLAYEY SAND WITH GRAVEL, gray, moist	SC-SM			3.50			11.5	Sample SS-5 disturbed unable to obtain Q_p
SH - 6	18					SC-SM						14.1	
SS - 7	18	9 6 5	11	70.0	LEAN CLAY, gray, moist, stiff	CL			1.00			11.1	
SS - 8	18	19 20 24	44	65.0	SILTY CLAYEY SAND, gray, moist, dense, trace gravel	SC-SM						8	
SS - 9	18	12 14 17	31	60.0								11.4	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 23 ft.	CAVE DEPTH AT COMPLETION: 27 ft.	WET ☐
WATER LEVEL AT COMPLETION: 49.5 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-3

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

L. Rykoskey

LATITUDE

0 0 0

LAB LOG / QC

E. Jeske

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	18	13 17 23	40	30 55.0	SILTY CLAYEY SAND, gray, moist, dense, trace gravel	SC-SM						8.2	
SS - 11	18	15 19 29	48	35 50.0								8.1	
SS - 12	18	24 36 48	84	40 45.0	SILTY CLAYEY SAND, gray, moist, very dense, trace gravel	SC-SM						7.9	
SS - 13	11	32 50/5"	R	45 40.0								6.7	
SS - 14	4	50/4"	R	50 35.0	End of Boring at 49.8 ft.							6.8	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 23 ft.	CAVE DEPTH AT COMPLETION: 27 ft.	WET ☐
WATER LEVEL AT COMPLETION: 49.5 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-4

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0 1 "

LAB LOG / QC

E. Jeske

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	8	2 1 1 2	2		TOPSOIL (3")								
					0.3 (84.5)								
					LEAN CLAY, brown with dark brown, moist, (FILL)							29.2	
					1.3 (83.5)								
SS - 2	16	1 1 1	2		FAT CLAY, gray with black, moist to very moist, soft to medium stiff				0.25-0.5	55	37	31.2	
					Trace roots in sample SS-2								
SS - 3	14	2 3 4	7	5	80.0	CH			0.25-0.5			25.7	
					Color changed to gray with brown mottles at 4.5'								
SS - 4	15	4 4 6	10		Wet at 7'				0.25-0.75			16.3	
					8.9 (75.9)								
SS - 5	18	6 15 22	37	10	75.0	CL			4.5+			15.6	
					Color changed to gray at 12'				4.5+			16.3	
SS - 6	18	6 11 16	27										
SH - 7	24			15	70.0								
SS - 8	18	23 24 32	56	20	65.0	SC-SM							
SS - 9	18	7 11 35	46	25	60.0							13.6	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 36 ft.	WET ☐
WATER LEVEL AT COMPLETION: 12 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-4

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0 0 0

LAB LOG / QC

E. Jeske

LONGITUDE

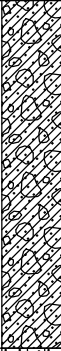
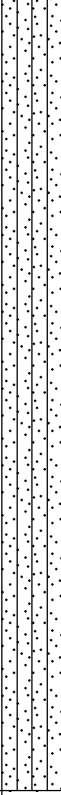
0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	18	9 16 24	40	30	55.0	SC-SM						16.8	
SS - 11	18	15 21 30	51	35	50.0	SP						15.8	
SS - 12	18	23 24 30	54	40	45.0	ML						13.1	Non-plastic
SS - 13	18	33 52 19	71	45	40.0								
SS - 14	18	15 27 26	53	50	35.0								
					51 (33.8)								
					End of Boring at 51.0 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 36 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 12 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/14/2018

BORING NUMBER

B-5

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/14/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

M. Rhodes

LATITUDE

0 1 "

LAB LOG / QC

E. Jeske

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	5	0 1 1 1	2		TOPSOIL (15"), lean clay, brown, moist								
					1.3 (83.4)								
SS - 2	18	4 5 6	11		LEAN CLAY, brown, moist, stiff to hard				1.50			23.2	
						CL						13.8	
SS - 3	18	6 14 23	37	80.0					4.5+			11.1	
					6.5 (78.2)								
SS - 4	18	7 12 13	25		LEAN CLAY, gray, moist, hard				4.5+			16.1	
SS - 5	0	7 13 15	28	75.0								11.3	Pushed stone during sampling, no recovery
						CL							
SS - 6	18	8 9 10	19						4.50			19	
SH - 7	20			70.0									
					17.8 (66.9)								
SS - 8	18	4 6 9	15	65.0	SILTY CLAYEY SAND, gray, moist, medium dense							9	Pressuremeter Test performed at 21'
						SC-SM							
					22.3 (62.4)								
					SILTY SAND, gray, wet, medium dense								
						SM							Driller notes rig chatter from 23' to 24.5'. Possible boulders and/or cobbles
SS - 9	18	7 11 21	32	60.0					4.50			8.3	
					25 (59.7)								
					SANDY SILTY CLAY, gray, moist, hard								
						CL-ML							

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 24.5 ft.	CAVE DEPTH AT COMPLETION: 35 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 29 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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191 W. Edgerton Avenue
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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/14/2018

BORING NUMBER

B-5

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/14/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

M. Rhodes

LATITUDE

0 0 00

LAB LOG / QC

E. Jeske

LONGITUDE

0 0 00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	9	39 50/3"	R	30	SANDY SILTY CLAY, gray, moist, hard	CL-ML						9.1	Driller notes rig chatter from 27.5' to 29.5'
					SILTY CLAYEY SAND, gray, wet, very dense, trace gravel	SC-SM							
SS - 11	8	29 31 30	61	35	SILTY SAND, gray, wet, very dense, trace gravel	SM							Pressuremeter Test performed at 38'.
					SILTY SAND WITH GRAVEL, gray, moist, very dense	SM							
SS - 12	3	50/3"	R	40									
SS - 13	6	41 50/2"	R	45									
SS - 14	5	48 50/1"	R	50									
					End of Boring at 50.1 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 24.5 ft.	CAVE DEPTH AT COMPLETION: 35 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 29 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/5/2018

BORING NUMBER

B-6

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/5/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	2 2 6 6	8		LEAN CLAY, brown, moist, (FILL)								
SS - 2	12	4 4 4	8		CLAYEY SAND, brown, moist, (FILL)								
SS - 3	10	6 6 17	23	5	GRAVEL WITH SILT AND SAND, gray, wet, (FILL)								
SS - 4	12	2 2 3	5		SANDY LEAN CLAY, brown, moist, medium stiff to very stiff	CL			0.5-2.0				
SS - 5	18	9 17 21	38	10	SILTY CLAYEY SAND, gray, moist, medium dense to dense								
SS - 6	18	15 20 22	42										
SS - 7	18	10 12 16	28	15									
SS - 8	18	12 17 17	34	20									
SS - 9	18	12 16 21	37	25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 4.5 ft.	CAVE DEPTH AT COMPLETION: 35 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 10 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/5/2018

BORING NUMBER

B-6

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/5/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	18	17 19 20	39	30	55.0	SC-SM						10.1	
SS - 11	5	50/5"	R	35	50.0	SC-SM						14.4	
SS - 12	17	15 12 50/5"	R	40	45.0	CL			4.5+			23.1	
SS - 13	17	48 49 50/5"	R	45	40.0	SC-SM						8.1	
SS - 14	11	24 50/5"	R	50	35.0							6.6	
					End of Boring at 50.4 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 4.5 ft.	CAVE DEPTH AT COMPLETION: 35 ft.	WET ☐
WATER LEVEL AT COMPLETION: 10 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/1/2018

BORING NUMBER

B-7

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/1/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

N. Steffen

LATITUDE

0 0 0

LAB LOG / QC

C. Anderson

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

86.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	15 23 23 23	46	85.0	SILTY SAND AND GRAVEL, dark brown, moist, with concrete pieces, (FILL)								
SS - 2	18	12 20 20	40										
SS - 3	15	5 5 5	10	80.0	LEAN CLAY WITH GRAVEL, brown and dark brown, moist, (FILL)							14.7	
SS - 4	15	4 5 6	11		Color changed to dark gray with brown at 7' Trace gravel in sample SS-4					39	19	28.8	
SS - 5	15	3 4 4	8	75.0	LEAN CLAY, brown, moist, stiff to very stiff				1.50 (1.6)			24.4	$\gamma_d = 85.8$ pcf $\gamma_T = 106.7$ pcf
SS - 6	18	5 5 6	11			CL			2.50			18	
SS - 7	0	50/0"	R	70.0	POSSIBLE COBBLES/ BOULDERS								Driller notes rig chatter at 14.5'
SS - 8	6	20 23 20	43	65.0	CLAYEY GRAVEL WITH SAND, gray, moist, dense	GC							
SS - 9	18	15 16 18	34	25	SILTY SAND WITH GRAVEL, gray, moist, medium dense to dense	SM						11.2	Gravel = 26.3% Sand = 29.3% P200 = 44.4%

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 24 ft.	CAVE DEPTH AT COMPLETION: 30 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 2 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/1/2018

BORING NUMBER

B-7

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/1/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

N. Steffen

LATITUDE

0 1 "

LAB LOG / QC

C. Anderson

LONGITUDE

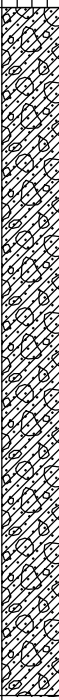
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DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

86.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10				60.0	SILTY SAND WITH GRAVEL, gray, moist, medium dense to dense	SM						9.1	Non-plastic
	18	10 13 16	29	30.0									
SS - 11				55.0	SILT, gray, wet, very dense	ML							
	15	34 50 50	100	35.0									
SS - 12				50.0	SILTY CLAYEY SAND, gray, moist, dense to very dense, trace gravel	SC-SM						7.5	
	18	15 22 32	54	40.0									
SS - 13				45.0								7.1	
	15	12 16 30	46	45.0									
SS - 14				40.0								7.2	
	15	15 24 24	48	50.0									
				35.0	End of Boring at 51.0 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 24 ft.	CAVE DEPTH AT COMPLETION: 30 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 2 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 2

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/1/2018

BORING NUMBER

B-8

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/1/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

N. Steffen

LATITUDE

0.00

LAB LOG / QC

C. Anderson

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	3 4 10 10	14	85.0	CLAYEY SAND AND GRAVEL, gray and black, very moist, with concrete pieces, (FILL)								
SS - 2	18	4 6 10	16		LEAN CLAY, olive gray, moist, very stiff, trace to with gravel	CL			2.50			17.6	
SS - 3	18	6 9 10	19	5 80.0					2.00			12.7	
SS - 4	15	4 6 8	14		LEAN CLAY, brown, moist, stiff to very stiff, trace to with gravel Wet seam at 7'				2.00			15	
SS - 5	18	5 10 14	24	10 75.0		CL			2.00			12.5	
SS - 6	18	5 6 7	13						2.00			13	
SS - 7	18	6 6 6	12	15 70.0	LEAN CLAY, gray, moist, very stiff, trace gravel	CL			2.00			11.6	
SS - 8	18	11 22 24	46	20 65.0	SILTY CLAYEY SAND, gray, moist, medium dense to dense, trace to with gravel	SC-SM						10.5	
SS - 9	6	7 9 16	25	25 60.0	Wet at 24.5'							12.4	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 38 ft.	WET ☐
WATER LEVEL AT COMPLETION: 15 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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Milwaukee, WI

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LATITUDE

0.00

LAB LOG / QC

C. Anderson

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10					SILTY CLAYEY SAND, gray, moist, medium dense to dense, trace to with gravel	SC-SM							Auger refusal at 27'. Driller offset boring 10' west, blind drilled to 27' and resumed drilling.
	5	25 35 33	68	30 55.0	SILTY CLAYEY SAND, gray, moist, dense, trace gravel	SC-SM						10.2	
					SILTY SAND, gray, wet, very dense, trace gravel	SM							
SS - 11	18	25 25 35	60	35 50.0									Gravel = 13.2% Sand = 60.8% P200 = 26.0%
SS - 12	0	50/0"	R	40 45.0	End of Boring at 40.0 ft.								Driller notes auger refusal at 40'

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 38 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 15 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

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SOIL BORING LOG

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-9

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	1 1 2 2	3		LEAN CLAY, brown, moist, (FILL)							19.3	
SS - 2	18	2 3 3	6		3 (81.3)							11.2	
				80.0	LEAN CLAY, black to bluish gray, moist, soft to stiff								
SS - 3	10	2 3 3	6	5	Wet seam at 4.5'	CL			0.5-1.0			29.7	LOI = 2.4%
SS - 4	16	0 1 1	2		8.9 (75.4)				0.25-0.5			37.6	
				75.0	LEAN CLAY, brown, moist, stiff								
SS - 5	18	4 17 20	37	10		CL			1.50			13.3	
SH - 6	10												
SS - 7	5	20 20 41	61	15	13.7 (70.6)							21.6	
				70.0	LEAN CLAY, gray, moist, very stiff to hard								
SS - 8	5	10 20 25	45	20		CL			3.50			16.7	
				65.0									
				22.2 (62.1)	SILTY CLAYEY SAND WITH GRAVEL, gray, moist, very stiff to hard	SC-SM							
SS - 9	18	27 32 41	73	25						17	5	9.2	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 4.5 ft.	CAVE DEPTH AT COMPLETION: 30 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 18 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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3/6/2018

BORING NUMBER

B-9

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

01°

LAB LOG / QC

E. Jeske

LONGITUDE

01°

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	16	21 31 37	68	55.0 30	SILTY CLAYEY SAND WITH GRAVEL, gray, moist, very stiff to hard								
SS - 11	14	14 21 29	50	50.0 35									
SS - 12	18	15 23 36	59	45.0 40		SC-SM						7.9	Gravel = 19.5% Sand = 37.1% P200 = 43.4%
SS - 13	9	31 50/3"	R	40.0 45								8.2	
SS - 14	1	50/2"	R	35.0 50	49.7 (34.6) End of Boring at 49.7 ft.							11.5	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 4.5 ft.	CAVE DEPTH AT COMPLETION: 30 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 18 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER	1 of 2
BORING NUMBER	B-10
PROJECT NUMBER	18051-10
DRILLING RIG	Diedrich D50 ATV
DRILLING METHOD	3 1/4" HSA
SURFACE ELEVATION	84.8 ft

BORING DRILLED BY	FIELD LOG	LATITUDE	DRILLING METHOD
FIRM: Gestra	L. Rykoskey	0 1 "	3 1/4" HSA
CREW CHIEF: S. Gonyer	LAB LOG / QC	LONGITUDE	SURFACE ELEVATION
	E. Jeske	0 1 "	84.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _s) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	16	3 3 4 3	7		TOPSOIL (7") 0.6 (84.2)								
SS - 2	10	3 4 3	7		LEAN CLAY, brown, moist, (FILL)							18.5	
SS - 3	12	2 2 3	5	80.0								24.7	
SS - 4	18	3 4 6	10	75.0	LEAN CLAY, brown, moist, very stiff to hard Color changed to gray at 8'	CL			3.50			18.6	
SS - 5	18	6 7 8	15	70.0					3.5-4.0			16.3	
SS - 6	6	6 8 10	18		SAND WITH GRAVEL, gray, wet, medium dense	SP							Driller notes shelly tube was attempted to be pushed; soil too hard
SS - 7	18	6 14 12	26		LEAN CLAY, gray, moist, very stiff	CL						24.5	Sample SS-7A
SS - 8	9				SILT, gray, wet, medium dense, with sand seams	ML			2.50	18	2	18.5	Sample SS-7B
SS - 9	18	19 21 30	51	65.0	SILTY CLAYEY SAND, gray, moist, trace gravel	SC-SM						9.6	
SS - 10	18	22 29 33	62	60.0	SILTY SAND WITH GRAVEL, gray, moist, dense	SM						6	Gravel = 16.2% Sand = 36.6% P200 = 47.2%

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 12 ft.	CAVE DEPTH AT COMPLETION: 29 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 17 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/7/2018

BORING NUMBER

B-10

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/7/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{sp}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 11					SILTY SAND WITH GRAVEL, gray, moist, dense								
	18	25 31 39	70	30 55.0		SM						10.8	
SS - 12					SANDY SILT, gray, wet, very dense, trace gravel								
	18	36 32 50/5"	R	35 50.0		ML							
SS - 13													
	15	14 44 50/3"	R	40 45.0									
SS - 14					SILTY CLAYEY SAND, gray, moist, hard, trace gravel								
	18	30 39 40	79	45 40.0		SC-SM						10.2	
SS - 15													
	18	19 24 35	59	50 35.0								9.1	
					End of Boring at 51.0 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 12 ft.	CAVE DEPTH AT COMPLETION: 29 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 17 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/14/2018

BORING NUMBER

B-11

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/14/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

M. Rhodes

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

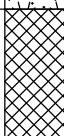
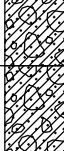
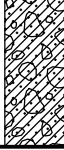
0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments					
SS - 1	5	0 0 1 1	1	85.0	TOPSOIL (18"), lean clay, brown, moist				4.5+			17.2	Sample SS-3 disturbed unable to obtain Qp					
				1.5 (84.3)	LEAN CLAY, gray, moist, (FILL)													
SS - 2	18	4 5 5	10														19	
SS - 3	15	4 5 6	11	5	SANDY LEAN CLAY, brown, moist, very stiff to hard												13	
				80.0														
SS - 4	18	5 10 25	35			CL-ML											13.1	
SS - 5	18	10 16 21	37	10	Color changed to gray at 9.5'												13.5	
				75.0														
SS - 6	18	6 14 16	30		SILTY CLAYEY SAND, gray, moist, medium dense to dense						8.7							
SS - 7	0	10 16 23	39	15		SC-SM					15.1	Pushed stone during sampling, no recovery						
				70.0														
SS - 8	18	4 7 9	16	20							12.4							
				65.0														
SH - 9	8			▽	SILTY CLAYEY SAND, gray, moist, dense, trace to with gravel													
				▽		SC-SM												
SS - 10	18	12 14 25	39	25 60.0							8.6							

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 22 ft.	CAVE DEPTH AT COMPLETION: 31 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 24 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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3/14/2018

BORING NUMBER

B-11

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/14/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

M. Rhodes

LATITUDE

0 0 00

LAB LOG / QC

E. Jeske

LONGITUDE

0 0 00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 11	18	16 19 23	42	30	SILTY CLAYEY SAND, gray, moist, dense, trace to with gravel	SC-SM						8.7	
				55.0									
SS - 12	18	9 13 35	48	35	LEAN CLAY, gray, moist, very stiff	CL			3.25			18.6	Pressuremeter Test performed at 34'
				50.0									
SS - 13	18	12 12 19	31	40	SILTY CLAYEY SAND, gray, moist, dense, trace gravel	SC-SM						11.9	
				45.0									
SS - 14	4	50/5"		45	SILTY SAND, gray, moist, very dense, trace gravel	SM			R				
				40.0									
SS - 15	4	50/4"		50	End of Boring at 49.8 ft.				R				
				35.0									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 22 ft.	CAVE DEPTH AT COMPLETION: 31 ft.	WET ☐
WATER LEVEL AT COMPLETION: 24 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/8/2018

BORING NUMBER

B-12

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/8/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

J. Kruse

LATITUDE

0 1 "

LAB LOG / QC

C. Anderson

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	6	8 19 11	30		SILTY SAND WITH GRAVEL, gray and brown, moist, with concrete pieces, (FILL) 1.3 (83.9)								
SS - 2	10	29 14 11	25		SANDY LEAN CLAY WITH GRAVEL, brown, moist, (FILL) 3.7 (81.5)							11.7	
SS - 3	12	6 6 9	15	5 80.0	LEAN CLAY, brown, moist, stiff to very stiff, trace gravel				1.75			13.3	
SS - 4	14	6 5 9	14			CL			1.00			13.6	
SS - 5	16	3 6 7	13	10 75.0	LEAN CLAY, gray, moist, very stiff to hard, trace gravel 10.5 (74.7)				2.00			12.7	
SS - 6	14	3 12 14	26			CL			2.50			12.3	
SS - 7	10	6 10 12	22	15 70.0					4.5+			10.7	
SS - 8	4	10 31 28	59	20 65.0	CLAYEY SAND WITH GRAVEL, gray, moist, very dense 17.5 (67.7)								
SS - 9	14	7 12 18	30	25 60.0	SILTY CLAYEY SAND, gray, moist, medium dense to dense, trace gravel 23 (62.2)	SC-SM						9.7	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 43 ft.	CAVE DEPTH AT COMPLETION: 48 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 45 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/8/2018

BORING NUMBER

B-12

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/8/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

J. Kruse

LATITUDE

0 0 0

LAB LOG / QC

C. Anderson

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	12	8 8 14	22	30 55.0	SILTY CLAYEY SAND, gray, moist, medium dense to dense, trace gravel	SC-SM						8.4	
SS - 11	16	22 34 35	69	35 50.0	SILTY CLAYEY SAND, gray, moist, very dense, trace gravel	SC-SM						10.2	
SS - 12	10	19 30 36	66	40 45.0		SC-SM						7.1	
SS - 13	8	25 45 50/4"	R	45 40.0	Wet at 43'							8.6	
SS - 14	8	20 50/5"	R	50 35.0	End of Boring at 50.4 ft.							8.1	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 43 ft.	CAVE DEPTH AT COMPLETION: 48 ft.	WET ☐
WATER LEVEL AT COMPLETION: 45 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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191 W. Edgerton Avenue
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Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 2

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/8/2018

BORING NUMBER

B-13

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/8/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

J. Krase

LATITUDE

0 0 0

LAB LOG / QC

C. Anderson

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.5 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	4	2 7 10	17	85.0	CLAYEY SAND WITH GRAVEL, dark brown with gray and brown, moist, (FILL)								
SS - 2	8	8 14 12	26		Concrete pieces in sample SS-2							17.7	
SS - 3	2	5 5 5	10	80.0								14.2	P200 = 33.4%
SS - 4	0	4 13 20	33										
SS - 5	4	13 13 15	28	75.0								16.5	
SS - 6	14	5 9 11	20						4.5+			7.9	
SS - 7	4	8 8 10	18	70.0					4.5+			10.6	
SS - 8	12	5 25 20	45	65.0					3.00			11.4	
SS - 9	14	4 23 25	48	60.0					3.50			13.7	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 30 ft.	CAVE DEPTH AT COMPLETION: 44 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 35 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



PAGE NUMBER

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DATE DRILLING STARTED	3/8/2018
DATE DRILLING ENDED	3/8/2018

BORING NUMBER	B-13
PROJECT NUMBER	18051-10
DRILLING RIG	Diedrich D50 ATV

FIELD LOG	J. Krase
LAB LOG / QC	C. Anderson

LATITUDE	0 1 11
LONGITUDE	0 1 11

DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	85.5 ft

WATER & CAVE-IN OBSERVATION DATA				
	WATER ENCOUNTERED DURING DRILLING: 30 ft.		CAVE DEPTH AT COMPLETION: 44 ft.	WET ☐ DRY ☐
	WATER LEVEL AT COMPLETION: 35 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
	WATER LEVEL AFTER 0 HOURS: NMR			
NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.				



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/13/2018

BORING NUMBER

B-14

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/13/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

J. Krase

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 3 5 6	8		TOPSOIL (8")								
					0.7 (83.6)								
					SAND, brown, moist, (FILL)								
					1.5 (82.8)								
SS - 2	14	3 4 3	7		SAND, black, wet, with organics, possible foundry sand, (FILL)							47.7	
					3.8 (80.5)								
				80.0	ORGANIC CLAY, dark gray, moist, stiff								
SS - 3	12	1 2 4	6			OH			1.50			40.7	
					6.3 (78)								
					LEAN CLAY, gray with brown, moist, medium stiff								
SS - 4	6	1 2 3	5			CL			0.50			38.2	
					8.5 (75.8)								
				75.0	LEAN CLAY, brown, moist, very stiff								
SS - 5	14	2 7 9	16			CL			3.00			13.5	
					11.3 (73)								
					SANDY LEAN CLAY, gray, moist, hard, trace gravel								
SS - 6	16	7 14 21	35						4.50			11.2	
				70.0									
SS - 7	6	9 23 25	48									12.6	Sample SS-7 disturbed unable to obtain Q _p
						CL							
				65.0									
SS - 8	3	10 13 11	24									11.9	Sample SS-8 disturbed unable to obtain Q _p
				20									
				60.0									
SS - 9	14	13 22 21	43									10.8	
					22.1 (62.2)								
					SILTY CLAYEY SAND WITH GRAVEL, gray, moist, dense to very dense	SC-SM							

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 3 ft.	CAVE DEPTH AT COMPLETION: 48 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 45 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/13/2018

BORING NUMBER

B-14

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/13/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

J. Kruse

LATITUDE

0 0 0

LAB LOG / QC

E. Jeske

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	14	20 20 22	42	55.0 30	SILTY CLAYEY SAND WITH GRAVEL, gray, moist, dense to very dense								
SS - 11	8	19 22 22	44	50.0 35		SC-SM						13	
SS - 12	2	27 25 27	52	45.0 40								10.1	
SS - 13	6	22 26 28	54	42.1 (42.2) 40.0 45	SILTY SAND, gray, wet, dense to very dense							11.6	
SS - 14	6	9 13 34	47	35.0 50		SM							
					End of Boring at 51.0 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 3 ft.	CAVE DEPTH AT COMPLETION: 48 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 45 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

1 of 2

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/7/2018

BORING NUMBER

B-15

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/7/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0.1"

LAB LOG / QC

E. Jeske

LONGITUDE

0.1"

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

83.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	3 5 4 4	9		TOPSOIL (6")								
SS - 2	16	7 9 9	18	80.0	SILTY SAND WITH GRAVEL, dark gray to gray, moist, with olive gray to gray clay seams, with foundry sand, (FILL) Tar piece in sample SS-2								
SS - 3	4	8 10 12	22	5	Concrete pieces in sample SS-3								
SS - 4	18	6 11 16	27	75.0	LEAN CLAY, brown, moist, very stiff to hard				4.5+			14.4	
SS - 5	18	6 10 13	23	10	Color changed to gray at 8.5'				4.5+			16.1	
SH - 6	24			70.0		CL							
SS - 7	18	5 6 7	13	15					2.00			19.3	
SS - 8	18	19 23 47	70	20	SILTY CLAYEY SAND WITH GRAVEL, gray, moist, very dense	SC-SM						7.7	Gravel = 15.5% Sand = 38.0% P200 = 46.5%
SS - 9	18	26 30 31	61	25								6.9	

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 19.5 ft.	CAVE DEPTH AT COMPLETION: 37 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 18 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/7/2018

BORING NUMBER

B-15

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/7/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Diedrich D50 ATV

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: S. Gonyer

FIELD LOG

L. Rykoskey

LATITUDE

0 0 0

LAB LOG / QC

E. Jeske

LONGITUDE

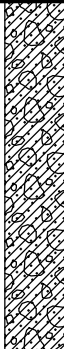
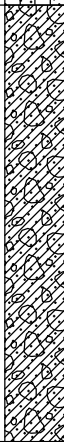
0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

83.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	18	28 30 41	71	55.0	SILTY CLAYEY SAND WITH GRAVEL, gray, moist, very dense	SC-SM				17	6	7.7	
				30									
SS - 11	15	32 46 50/3"	R	50.0	SANDY SILT, gray, moist, very dense, trace gravel	ML						11.1	
				35									
SS - 12	10	42 50/4"	R	45.0								11.6	
				40									
SS - 13	18	22 46 42	88	40.0	SILTY CLAYEY SAND, gray, moist, very dense, trace gravel	SC-SM						8.9	
				45									
SS - 14	18	21 31 40	71	35.0								9.4	
				50									
					51 (32.8)								
					End of Boring at 51.0 ft.								

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 19.5 ft.	CAVE DEPTH AT COMPLETION: 37 ft.	WET ☐
WATER LEVEL AT COMPLETION: 18 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-16

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0 0 0

LAB LOG / QC

C. Anderson

LONGITUDE

0 0 0

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

75.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{sp}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	2 2 3 3	5		TOPSOIL (12")								
SS - 2	14	6 5 5	10		LEAN CLAY, brown to dark gray, moist, (FILL)							18.4	
SS - 3	18	3 4 4	8	70.0	SILTY SAND, brown, moist, loose, (driller observation)	SM						23.5	
SS - 4	18	6 5 7	12		LEAN CLAY, brown, moist, very stiff to hard	CL			4.00			22.9	
SS - 5	18	4 6 8	14	65.0					4.5+			22	
				10					3.50			23.5	
					End of Boring at 11.0 ft.								
				15									
				20									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 8.5 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER	1 of 1
BORING NUMBER	B-17
PROJECT NUMBER	18051-10
DRILLING RIG	CME 75 (International)
DRILLING METHOD	3 1/4" HSA
SURFACE ELEVATION	76.1 ft

PROJECT NAME	Distribution Center AR Sort FC	DATE DRILLING STARTED	2/28/2018
PROJECT LOCATION	Milwaukee, WI	DATE DRILLING ENDED	2/28/2018

BORING DRILLED BY	FIELD LOG	LATITUDE	DRILLING METHOD
FIRM: Gestra	N. Steffen	° ' "	3 1/4" HSA
CREW CHIEF: M. Rhodes	LAB LOG / QC	LONGITUDE	SURFACE ELEVATION
	C. Anderson	° ' "	76.1 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	16	12 15 15	30	75.0	CONCRETE (2")								
SS - 2	18	15 38 15	53		BASE COURSE (6")								
SS - 3	15	2 2 2	4	5	SAND WITH GRAVEL, brown, moist, (FILL) Concrete pieces in sample SS-2, Color changed to gray								
SS - 4	18	5 5 7	12	70.0	LEAN CLAY, dark brown and black, moist, with organics and possible foundry sand, (FILL)							87.4	LOI = 19.6%
SS - 5	18	8 10 14	24	10	LEAN CLAY, brown, moist, hard	CL			4.00			32.3	
				65.0					4.5+			21.4	
					End of Boring at 11.0 ft.								
				15									
				60.0									
				20									
				55.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 7 ft.	WET ☐
WATER LEVEL AT COMPLETION: 7 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-18

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0 1 "

LAB LOG / QC

C. Anderson

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

77.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 2 2 5	4		LEAN CLAY, brown, moist, (FILL)								
SS - 2	16	6 5 9	14	75.0	LEAN CLAY WITH SAND, dark brown with brown, moist, trace gravel, (FILL)							20.7	
SS - 3	6	4 3 4	7	5	With sand and gravel in sample SS-3							18.3	
SS - 4	2	50/3"	R	70.0	CLAYEY SAND WITH GRAVEL, black, moist, very dense	SC						20.7	
					End of Boring at 7.3 ft.								Auger refusal at 9' due to unknown obstruction.
				10									
				65.0									
				15									
				60.0									
				20									
				55.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 9 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-19

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

M. Rhodes

LATITUDE

0.11

LAB LOG / QC

E. Jeske

LONGITUDE

0.11

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	9 12 10 10	22		GRAVEL SURFACE (8")								
					0.7 (83.6)								
SS - 2	15	4 5 7	12		LEAN CLAY, brown, moist, (FILL)							9.9	
					2 (82.3)								
SS - 3	10	6 14 8	22	80.0	SANDY LEAN CLAY, brown, moist, (FILL)							18.7	
					3.9 (80.4)								
SS - 4	12	4 4 4	8	75.0	GRAVEL WITH SAND, gray, moist, with brown clay seams, (FILL)							13.2	
					6.2 (78.1)								
SS - 5	12	4 3 4	7	70.0	LEAN CLAY, brown, moist, (FILL)							27.2	
					11 (73.3)								
					End of Boring at 11.0 ft.								
				65.0									
				60.0									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 6 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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3-20

18051-10

Geoprobe

3 1/4" HSA

84 ft

FIRM: Gestra
CREW CHIEF: M. Panfil

M. Schmeling

C. Anderson

○ | ||

○ | ||

WATER & CAVE-IN OBSERVATION DATA				
	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: 4.5 ft.	WET ☐ DRY ☐
	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-21

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.5 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	17	5 7 8 8	15	85.0	SILTY SAND WITH GRAVEL, black and brown, moist, possible foundry material, (FILL)								
SS - 2	9	5 4 5	9										
SS - 3	16	2 2 3	5	80.0	LEAN CLAY, brown with gray mottles, moist, medium stiff	CL			0.75			17	
SS - 4	18	4 3 3	6						0.50			12.6	
SS - 5	18	6 6 13	19	75.0	SANDY SILTY CLAY, brown, moist, stiff	CL-ML			2.00			12.5	
					End of Boring at 11.0 ft.								
				15									
				70.0									
				20									
				65.0									
				25									
				60.0									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 9.5 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-22

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

85.5 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 2 2 4	4	85.0	TOPSOIL (6")								
SS - 2	18	3 5 10	15		LEAN CLAY, dark brown and brown, moist, (FILL) LEAN CLAY, brown with gray mottles, moist, hard	CL			4.50			29.5	
SS - 3	18	6 7 11	18	80.0	SILT, brown, moist, medium dense	ML						12	
SS - 4	18	4 5 7	12									12.8	
SS - 5	18	10 12 15	27	75.0	LEAN CLAY, gray, moist, hard	CL			4.50			11.9	
					End of Boring at 11.0 ft.								
				15									
				20									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 9.5 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-23

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0.00

LAB LOG / QC

C. Anderson

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

84.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	1 2 2 3	4		TOPSOIL (6")								
					0.5 (84.1)								
					LEAN CLAY, brown with dark brown, moist, (FILL)							13.6	
SS - 2	18	2 2 3	5		2 (82.6)								
					LEAN CLAY, dark gray to dark brown, moist, stiff	CL			1.50			40.4	
SS - 3	18	2 2 2	4	80.0	4 (80.6)								
					LEAN CLAY, light brown, moist, stiff to very stiff				1.50			18.8	
SS - 4	18	5 10 11	21	75.0	Color changed to brown at 7"	CL			3.50			17.6	
SS - 5	18	6 7 11	18	10	11 (73.6)				3.50			17.2	
					End of Boring at 11.0 ft.								
				70.0									
				65.0									
				60.0									

WATER & CAVE-IN OBSERVATION DATA

☒	WATER ENCOUNTERED DURING DRILLING: NE ft.	☒	CAVE DEPTH AT COMPLETION: 9 ft.	WET ☐ DRY ☐
☒	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
☒	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/9/2018

BORING NUMBER

B-24

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/9/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0.1"

LAB LOG / QC

E. Jeske

LONGITUDE

0.1"

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

86.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	6 6 4 4	10	85.0	TOPSOIL (8") 0.7 (86.2)								
SS - 2	18	3 3 5	8		LEAN CLAY, dark brown, moist, very stiff, with organics 3 (83.9)	CL			3.50			22.8	Sample SS-2B
					LEAN CLAY, gray with brown mottles, moist, very stiff 4 (82.9)	CL			2.25			24.1	
SS - 3	18	6 5 8	13	5	LEAN CLAY, brown mottled gray, moist, stiff to hard				4.25			21.3	
				80.0									
SS - 4	18	4 5 7	12		Color changed to brown at 7"	CL			3.00			24.1	
SS - 5	18	3 4 5	9	10	Color changed to gray at 9.5"				1.00			26	
					11 (75.9)								
				75.0	End of Boring at 11.0 ft.								
				15									
				70.0									
				20									
				65.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

☒	WATER ENCOUNTERED DURING DRILLING: NE ft.	☒	CAVE DEPTH AT COMPLETION: 8.5 ft.	WET ☐ DRY ☐
☒	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
☒	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER	1 of 1
BORING NUMBER	B-25
PROJECT NUMBER	18051-10
DRILLING RIG	CME 75 (International)
DRILLING METHOD	3 1/4" HSA
SURFACE ELEVATION	87.1 ft

BORING DRILLED BY	FIELD LOG	LATITUDE	DRILLING METHOD
FIRM: Gestra	N. Steffen	0 1 "	3 1/4" HSA
CREW CHIEF: M. Rhodes	LAB LOG / QC	LONGITUDE	SURFACE ELEVATION
	C. Anderson	0 1 "	87.1 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	9 9 9 9	18		TOPSOIL (10")								
					0.8 (86.3)								
SS - 2	18	8 6 5	11	85.0	LEAN CLAY, dark brown, moist, trace gravel, (FILL)							22.9	
					2 (85.1)							24.3	
SS - 3	15	5 4 5	9	5	LEAN CLAY, brown and gray, moist, (FILL)								
					4 (83.1)								
					LEAN CLAY, gray and brown mottled, very moist, very stiff	CL			2.00			29.8	
SS - 4	18	5 6 10	16	80.0	SILT, light brown, moist, medium dense	ML						14.2	
					6.5 (80.6)								
SS - 5	18	5 13 10	23	10	LEAN CLAY, brown, moist, very stiff	CL			2.00			14	
					9 (78.1)								
					11 (76.1)								
					End of Boring at 11.0 ft.								
				75.0									
				15									
				70.0									
				20									
				65.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 9 ft.	WET ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



PAGE NUMBER

DATE DRILLING STARTED	2/28/2018
DATE DRILLING ENDED	2/28/2018

BORING NUMBER	B-26
PROJECT NUMBER	18051-10
DRILLING RIG	CME 75 (International)

FIELD LOG	N. Steffen
LAB LOG / QC	C. Anderson

LATITUDE	0 1 11
LONGITUDE	0 1 11

DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	87.4 ft

WATER & CAVE-IN OBSERVATION DATA				
	WATER ENCOUNTERED DURING DRILLING: 7 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
	WATER LEVEL AT COMPLETION: 4 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
	WATER LEVEL AFTER 0 HOURS: NMR			
NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.				



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SOIL BORING LOG

PAGE NUMBER	1 of 1
BORING NUMBER	B-27
PROJECT NUMBER	18051-10
DRILLING RIG	CME 75 (International)
DRILLING METHOD	3 1/4" HSA
SURFACE ELEVATION	86.4 ft

BORING DRILLED BY	FIELD LOG	LATITUDE	
FIRM: Gestra	N. Steffen		
CREW CHIEF: M. Rhodes	LAB LOG / QC	LONGITUDE	
	C. Anderson		

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	24	16 16 8 4	24	85.0	SAND WITH GRAVEL, gray, moist to very moist, (FILL)								
SS - 2	18	3 4 3	7		1 (85.4) LEAN CLAY WITH SAND, brown and dark brown, moist, trace gravel, (FILL)							21.9	Sample SS-1B
SS - 3	18	2 2 3	5	5	4 (82.4) LEAN CLAY, brown and gray, moist, (FILL)							17.8	
SS - 4	15	3 3 3	6	80.0								17.6	
SS - 5	3	50/3"	R	10	9.8 (76.6) End of Boring at 9.8 ft.							19	
				75.0								18	Driller notes rig chatter at 9.5'
				15									
				70.0									
				20									
				65.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 7 ft.	WET ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		WET ☐
		DRY ☐

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-28

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0 1 "

LAB LOG / QC

C. Anderson

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

81.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{sp}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	1 2 6 6	8	80.0	TOPSOIL (10") 0.8 (80.5)								
SS - 2	5	12 12 15	27		LEAN CLAY WITH SAND, light brown, moist, with rock pieces, (FILL) 1.6 (79.7)							12.5	
					LEAN CLAY WITH SAND, brownish gray, very moist, with rock pieces, (FILL) 3.5 (77.8)							23.4	
SS - 3	18	7 10 8	18	5	LEAN CLAY WITH SAND, brown, moist, very stiff 5.8 (75.5)	CL			3.50			13.1	
SS - 4	18	23 12 19	31		LEAN CLAY, gray, moist, hard, trace to with gravel	CL			4.5+			12.6	
SS - 5	18	7 9 11	20	10	11 (70.3)				4.50			12.3	
				70.0	End of Boring at 11.0 ft.								
				15									
				65.0									
				20									
				60.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

☒	WATER ENCOUNTERED DURING DRILLING: NE ft.	☒	CAVE DEPTH AT COMPLETION: 9 ft.	WET ☐ DRY ☐
☒	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
☒	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-29

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

Geoprobe

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Panfil

FIELD LOG

M. Schmeling

LATITUDE

0 1 "

LAB LOG / QC

C. Anderson

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

82.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 4 6 5	10		TOPSOIL (10")								
SS - 2	5	7 5 8	13	80.0	SAND WITH GRAVEL, dark brown and brown, moist, (FILL) Concrete pieces in sample SS-2								
SS - 3	6	3 7 5	12	5	LEAN CLAY, light brown with gray, moist, (FILL)							14.1	
SS - 4	18	3 4 6	10	75.0	LEAN CLAY, light brown, wet, stiff	CL			1.50			13	
SS - 5	18	8 8 9	17	10	LEAN CLAY, gray, wet, very stiff	CL			2.50			12	
					End of Boring at 11.0 ft.								
				70.0									
				15									
				65.0									
				20									
				60.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 9.5 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 9.5 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

2/28/2018

BORING NUMBER

B-30

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

2/28/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (International)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: M. Rhodes

FIELD LOG

N. Steffen

LATITUDE

0.00

LAB LOG / QC

C. Anderson

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

83.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	14	3 5 5	10		TOPSOIL (10")								
SS - 2	18	5 4 3	7	80.0	GRAVELLY SAND, black, very moist to wet, possible foundry material, (FILL) Wet at 2'								
SS - 3	4	2 3 3	6	5	SANDY LEAN CLAY, black and gray, moist, trace organics, (FILL)								
SS - 4	15	4 5 5	10	75.0	LEAN CLAY, brown with gray, moist, stiff	CL			1.50			23.4	LOI = 2.3%
SS - 5	18	10 14 16	30	10	LEAN CLAY, brown, moist, hard, trace gravel	CL			4.5+			25.4	
					11 (72.8)							12.6	
					End of Boring at 11.0 ft.								
				70.0									
				15									
				65.0									
				20									
				60.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 2 ft.	CAVE DEPTH AT COMPLETION: 8 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 7 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-31

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

M. Rhodes

LATITUDE

0.1"

LAB LOG / QC

E. Jeske

LONGITUDE

0.1"

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

77.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _{tip}) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	15	4 5 3 7	8		TOPSOIL (10")								
					0.8 (76.5)								
SS - 2	18	2 3 6	9	75.0	LEAN CLAY, dark brown, moist, (FILL)					42	25	19.9	Boring was offset 4' west of the staked location.
												10.1	
SS - 3				5	LEAN CLAY, brown, moist, very stiff to hard								
	12	4 5 4	9		4 (73.3)				3.50			19.5	
SS - 4	18	4 8 15	23	70.0		CL				4.5+		19.3	
SS - 5	18	6 8 12	20	10						4.00		19.1	
					11 (66.3)								
					End of Boring at 11.0 ft.								
				65.0									
				15									
				60.0									
				20									
				55.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

☒	WATER ENCOUNTERED DURING DRILLING: NE ft.	☒	CAVE DEPTH AT COMPLETION: 7 ft.	WET ☐ DRY ☐
☒	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
☒	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

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PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-32

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

M. Rhodes

LATITUDE

0 1 "

LAB LOG / QC

E. Jeske

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

82.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	5	7 5 3	8		ASPHALT (6 1/2")								
SS - 2	18	4 6 12	18	80.0	BASE COURSE (6")								
SS - 3	18	3 5 7	12	5	SAND, black and gray, moist, possible foundry material, (FILL)				4.50	39	23	18.1	
SS - 4	18	4 5 7	12	75.0	LEAN CLAY, brown, moist, hard	CL			4.0-4.5			19.5	
SS - 5	18	5 10 18	28	10					4.5+			13.1	
									4.5+			16.7	
					End of Boring at 11.0 ft.								
				70.0									
				15									
				65.0									
				20									
				60.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 7 ft.	CAVE DEPTH AT COMPLETION: 9 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: 6 ft.	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



Gestra Engineering Inc.
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-33

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

M. Rhodes

LATITUDE

0 1 "

LAB LOG / QC

E. Jeske

LONGITUDE

0 1 "

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

87.2 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	5	2 1 1	2		TOPSOIL (6")								
					CONCRETE (4")								
SS - 2	10	2 3 2	5	85.0	ASPHALT (2")								
					SILTY SAND, gray, wet, (FILL)	CL			0.50			25.3	
					LEAN CLAY, bluish gray mottled brown, moist, medium stiff								
SS - 3	15	1 1 3	4	5	LEAN CLAY, brown with gray, moist to very moist, medium stiff	CL			0.50			22.2	
SS - 4	8	8 3 7	10	80.0	With sand and gravel in sample SS-4							16	Sample SS-4 disturbed unable to obtain Q _p
					LEAN CLAY, gray, moist, stiff	CL							
SS - 5	18	3 4 5	9	10		CL			1.25			19.2	Sample SS-5 disturbed unable to obtain Q _p
					End of Boring at 11.0 ft.								
				75.0									
				15									
				70.0									
				20									
				65.0									
				25									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 8 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-34

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

M. Rhodes

LATITUDE

0.00

LAB LOG / QC

E. Jeske

LONGITUDE

0.00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

89.7 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	12	2 3 5	8		ASPHALT (2") 0.2 (89.5)	CL							
SS - 2	4	3 3 5	8		LEAN CLAY, black to dark gray, moist, (possible buried topsoil) 1.6 (88.1)	CL			2.00			24.3	
SS - 3				85.0	LEAN CLAY, brown mottled gray, moist, very stiff	CL			3.50			26.2	
SS - 4	18	5 7 7	14						3.50			17.1	
SS - 5	18	7 5 6	11	80.0	LEAN CLAY, gray, moist to very moist, medium stiff to stiff 6.5 (83.2)	CL			1.00			13.4	
	18	2 2 3	5	10					0.50			11.2	
					11 (78.7)								
					End of Boring at 11.0 ft.								
				75.0									
				70.0									
				65.0									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 9 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.



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SOIL BORING LOG

PAGE NUMBER

1 of 1

PROJECT NAME

Distribution Center AR Sort FC

DATE DRILLING STARTED

3/6/2018

BORING NUMBER

B-35

PROJECT LOCATION

Milwaukee, WI

DATE DRILLING ENDED

3/6/2018

PROJECT NUMBER

18051-10

DRILLING RIG

CME 75 (HT)

BORING DRILLED BY

FIRM: Gestra
CREW CHIEF: A. Woerpel

FIELD LOG

M. Rhodes

LATITUDE

0 0 00

LAB LOG / QC

E. Jeske

LONGITUDE

0 0 00

DRILLING METHOD

3 1/4" HSA

SURFACE ELEVATION

91 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q _u or Q _p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	5	10 8 5 4	13	90.0	GRAVEL SURFACE (18")								Boring was offset 3' north and 1' west of the staked location.
SS - 2	15	6 4 10	14		1.5 (89.5) LEAN CLAY, dark gray with brown, moist, (FILL)							21.7	
SS - 3					2 (89) SAND WITH GRAVEL, gray, moist, with clay seams, (FILL)							19.9	Sample SS-2B
SS - 3					2.8 (88.2) LEAN CLAY, brown, moist, (FILL)								
SS - 3	18	4 5 9	14	5 85.0	3.8 (87.2) LEAN CLAY, brown mottled gray, moist, hard	CL			4.5+			18.4	
SS - 4					6.5 (84.5) SILTY CLAY, brown, moist, very stiff	CL-ML							
SS - 4	18	4 9 7	16		9 (82) LEAN CLAY WITH SAND, gray, moist to very moist, stiff	CL						13.5	Sample SS-4 disturbed unable to obtain Qp
SS - 5	6	5 5 5	10	10 80.0	11 (80) End of Boring at 11.0 ft.				1.75			12.6	
				15									
				75.0									
				20									
				70.0									
				25									
				65.0									

WATER & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NE ft.	CAVE DEPTH AT COMPLETION: 8 ft.	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NE	CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOILS CLASSIFICATION FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 - 83

(Based on Unified Soil Classification System)

SOIL ENGINEERING

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification ^B			
				Group Symble	Group Name		
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels	Less	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW Well graded gravel ^F		
		Less than 5% fines ^C		$Cu < 4$ and/or $1 > Cc > 3^E$	GP Poorly graded gravel ^F		
		Gravels with Fines		Fines Classify as ML or MH	GM Silty gravel ^{F,G,H}		
		more than 12% fines ^C		Fines classify as CL or CH	GC Clayey gravel ^{F,G,H}		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean sandss		$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW Well graded sand ^I		
		Less than 5% fines ^D		$Cu < 6$ and/or $1 > Cc > 3^E$	SP Poorly graded sand ^I		
		Sands with Fines		Fines Classify as ML or MH	SM Silty sand ^{G,H,I}		
		more than 12% fines ^D		Fines classify as CL or CH	SC Clayey sand ^{G,H,I}		
	Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	inorganic	PI >7 and plots on or above " A " line	CL	Lean clay ^{K,L,M}	
				PI<4 or plots below " A " line	ML	Silt ^{K,L,M}	
			organic	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
				Liquid limit - not dried		Organic Silt ^{K,L,M,O}	
Silts and Clays Liquid Limit 50 or more			inorganic	PI plots on or above " A " line	CH	Fat clay ^{K,L,M}	
				PI plots below " A " line	MH	Elastic silt ^{K,L,M}	
		Organic	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}	
			Liquid limit - not dried		Organic Silt ^{K,L,M,Q}		
Highly organic Soils				PT	Peat		
Fibric Peat > 67% Fibers				sapric	Peat < 33% Fibers		

^A Based on the material passing the 3-in (75- mm)sieve

^B If field sample contained cobbles or boulders, or both. add with cobbles or boulders, or both to group name

^C Gravels with 5 to 12 % fines require dual symbols:
GW - GM well-graded gravel with silt
GW - GC well-graded gravel with clay
GP - GM poorly-graded gravel with Silt
GP - GC poorly-graded gravel with clay

^D Sands with 5 to 12 % fines require dual symbols:
SW - SM well-graded sand with silt
SW - SC well-graded sand with clay
SP - SM poorly-graded sand with Silt
SP - SC poorly-graded sand with clay

^E

$$Cu = \frac{D_{60}}{D_{10}} \qquad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name

^G If fines classify as CL-ML, use dual symbol GC-GM. or SC-SM

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in hatched area, soil is a CL_ML silty clay

If soil contains 15 to 29% plus No. 200, add, "with sand" or " with gravel", whichever is predominant

^L If soil contains $\geq 30\%$ plus No.200, predominantly sand, add "sandy" to the group name

^M If soil contains $\geq 30\%$ plus No.200, predominantly gravel add "gravelly" to the group name

^N PI ≥ 4 and plots on or above "A" Line

^O PI < 4 or plots below "A" Line

^P PI plots on or above "A" Line

^Q PI plots below "A" Line

SIEVE ANALYSIS

$Cu = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200$

$C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = \frac{(2.5)^2}{15 \times 0.075} = 5.6$

For classification of fine grained soils and fine-grained fraction of coarse - grained Soils.

Equation of "A" - Line
Horizontal at PI = 4 to LL=25.5 then PI = 0.73 (LL-20)

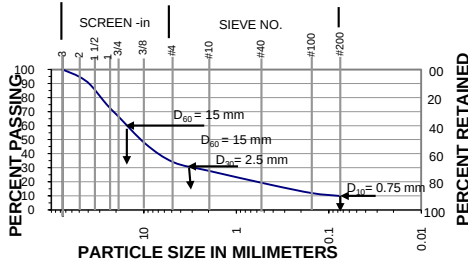
Equation of "U" - Line
Vertical at LL = 16 to PI=7 then PI = 0.9 (LL-8)

- ^A Based on the material passing the 3-in (75- mm) sieve
- ^B If field sample contained cobbles or boulders, or both, add with cobbles or boulders, or both to group name
- ^C Gravels with 5 to 12 % fines require dual symbols:
GW - GM well-graded gravel with silt
GW - GC well-graded gravel with clay
GP - GM poorly-graded gravel with Silt
GP - GC poorly-graded gravel with clay
- ^D Sands with 5 to 12 % fines require dual symbols:
SW - SM well-graded sand with silt
SW - SC well-graded sand with clay
SP - SM poorly-graded sand with Silt
SP - SC poorly-graded sand with clay

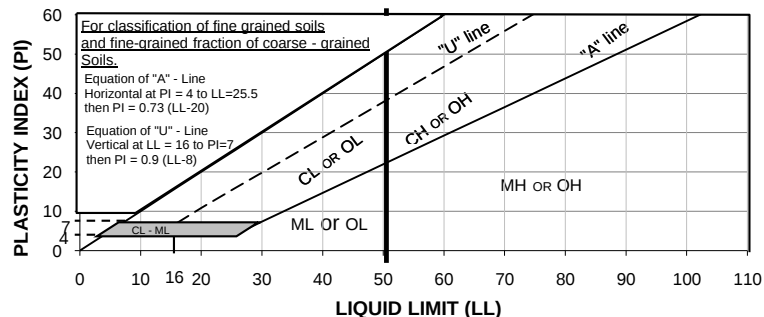
- ^E $Cu = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
- ^F If soil contains $\geq 15\%$ sand, add "with sand" to group name
- ^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM
- ^H If fines are organic, add "with organic fines" to group name.
- ^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

- ^J If Atterberg limits plot in hatched area, soil is a CL-ML silty clay
If soil contains 15 to 29% plus No. 200, add, "with sand" or "with gravel", whichever is predominant
- ^L If soil contains $\geq 30\%$ plus No.200, predominantly sand, add "sandy" to the group name
- ^M If soil contains $\geq 30\%$ plus No.200, predominantly gravel add "gravelly" to the group name
- ^N PI ≥ 4 and plots on or above "A" Line
- ^O PI < 4 or plots below "A" Line
- ^P PI plots on or above "A" Line
- ^Q PI plots below "A" Line

SIEVE ANALYSIS



$$Cu = \frac{D_{60}}{D_{10}} = \frac{15}{0.75} = 200 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = \frac{(2.5)^2}{15 \times 0.75} = 5.6$$



GENERAL NOTES						
DRILLING AND SAMPLING SYMBOLS				TEST SYMBOLS		
SYMBOL	DEFINITION			SYMBOL	DEFINITION	
HSA	Hollow Stem Auger			MC	Moisture Content - % of Dry Wt. – ASTM D 2216	
RWB	Rotary Wash Boring (Mud Drilling)			OC	Organic Content - % of Dry Wt. – ASTM D 2974	
_FA	4", 6" or 10" Diameter Flight Auger			DD	Dry Density – Pounds Per Cubic Foot	
_HA	2", 4" or 6" Hand Auger			LL, PL	Liquid and Plastic Limit – ASTM D 4318	
_DC	2 1/2", 4", 5" or 6" Steel Drive Casing					
_RC	Size A, B, or N Rotary Casing					
PD	Pipe Drill or Cleanout Tube					
CS	Continuous Split Spoon Sampling					
DM	Drill Mud					
JW	Jetting Water					
SS	2" O.D. Split Spoon Sample					
_L	2 1/2" or 3 1/2" O.D. SB Liner Sample					
ST	3" Thin Walled Tube Sample (Shelby Tube)					
3TP	3" Thin Walled Tube (Pitcher Sampler)					
_TO	2" or 3" Thin Walled Tube (Osterberg Sampler)					
W	Wash Sample					
B	Bag Sample					
P	Test Pit Sample					
_Q	BQ, NQ, or PQ Wireline System					
_X	AX, BX, or NX Double Tube Barrel					
CR	Core Recovery – Percent					
NSR	No Sample Recovered, classification based on action of drilling, equipment and/or material noted in drilling fluid or on sampling bit.					
NMR	No Measurement Recorded, primarily due to presence of drilling or coring fluid.					
▽	Water Level Symbol					
				Qu	Unconfined Comp. Strength-psf – ASTM D 2166	
				Qp	Penetrometer Reading – Tons/Square Foot	
				Ts	Torvane Reading – Tons/Square Foot	
				G	Specific Gravity – ASTM D 854	
				SL	Shrinkage Limits – ASTM D 427	
				OC	Organic Content – Combustion Method	
				SP	Swell Pressure - Tons/Square Foot	
				PS	Percent Swell	
				FS	Free Swell – Percent	
				pH	Hydrogen Ion Content. Meter Method	
				SC	Sulfate Content – Parts/ Million, same as mg/L	
				CC	Chloride Content - Parts/ Million, same as mg/L	
				C*	One Dimensional Consolidation – ASTM D 2453	
				Qc*	Triaxial Compression	
				D.S.*	Direct Shear – ASTM D 3080	
				K*	Coefficient of Permeability – cm/sec	
				D*	Dispersion test	
				DH*	Double Hydrometer – ASTM D 4221	
				MA*	Particle Size Analysis – ASTM D 422	
				R	Laboratory Receptivity, in ohm – cm – ASTM G 57	
				E*	Pressuremeter Deformation Modulus – TSF	
				PM*	Pressuremeter Test	
				VS*	Field Vane Shear – ASTM D 2573	
				IR*	Infiltrometer Test – ASTM D 3385	
				RQD	Rock Quality Designation – Percent	
*See attached data sheet or graph						
WATER LEVEL						
Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels may be considered reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for test borings, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.						
DESCRIPTIVE TERMINOLOGY						
DENSITY TERM	"N" VALUE	CONSISTENCY TERM	Unconfined Compressive Strength, (tsf)	"N" VALUE	Lamination	Up to 1/2" thick stratum
Very Loose	0-4				Layer	1/2" to 6" thick stratum
Loose	4-10	Very Soft	<0.25	0-2	Lens	1/2" to 6" discontinuous stratum
Medium Dense	10-30	Soft	0.25 - 0.49	2-4	Varved	Alternating laminations
Dense	30-50	Medium Stiff	0.5 - 0.99	4-8	Dry	Powdery, no noticeable water
Very Dense	Over 50	Stiff	1.0 - 1.99	8-16	Moist	Below saturation
		Very Stiff	2.0 - 3.99	16-30	Wet	Saturated, above liquid limit
		Hard	4.0+	Over 30	Water bearing	Pervious soil below water
Standard "N" Penetration: Blows per Foot of a 140 Pound Hammer Falling 30 inches on a 2 inch OD Split Barrel Sampler						
RELATIVE GRAVEL PROPORTIONS				RELATIVE SIZES		
CONDITION	TERM	RANGE		Boulder	Over 12"	
Coarse Grained Soils	trace of gravel	2-14%		Cobble	3" - 12"	
	with gravel	15-49%		Gravel		
Fine Grained Soils				Coarse	3/4" - 3"	
15-29% + No. 200	trace of gravel	2-14%		Fine	#4 – 3/4"	
15-29% + No. 200	with gravel	15-29%		Sand		
				Coarse	#4 - #10	
30% + No. 200	trace of gravel	2-14%		Medium	#10 - #40	
30% + No. 200	with gravel	15-24%		Fine	#40- #200	
30% + No. 200	gravelly	25-49%		Silt & Clay	- # 200, Based on Plasticity	

APPENDIX II

SUMMARY OF LABORATORY TEST AND PRESSUREMETER TEST RESULTS



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 6, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1
Sample Number	1	2	3	4	5	6	7	9	
Cup Number	Y9	T6	J41	P9	V4	Y10	M9	T3	
Weight of Cup (g)	25.32	23.50	24.90	23.74	23.91	24.88	26.90	24.68	
Weight of Wet Soil and Cup (g)	45.33	44.08	46.30	44.93	45.07	46.19	48.23	45.31	
Weight of Dry Soil and Cup (g)	41.84	40.77	43.04	40.31	41.69	43.91	46.43	43.53	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	21.1	19.2	18.0	27.9	19.0	12.0	9.2	9.4	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1
Sample Number	10	11	12	13	14	15			
Cup Number	A1	M5	Y8	P5	P6	T4A			
Weight of Cup (g)	25.87	24.64	26.05	26.98	27.40	24.18			
Weight of Wet Soil and Cup (g)	47.29	45.97	46.82	47.47	47.97	44.50			
Weight of Dry Soil and Cup (g)	45.65	44.58	45.34	46.05	46.62	43.26			
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	8.3	7.0	7.7	7.4	7.0	6.5			
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Performed by K. Starr Reviewed by C. Anderson



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 12, 2018
Project Number: 18051-10 Report To: Hillwood
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2
Sample Number	1	2	3	4	5	6	8	10			
Cup Number	A10	Y91	T8	PC 710	P3	Y9	R1	Y21			
Weight of Cup (g)	25.20	26.22	24.03	47.66	23.42	25.32	25.44	24.62			
Weight of Wet Soil and Cup (g)	45.60	48.41	44.44	97.89	43.83	49.52	46.98	47.49			
Weight of Dry Soil and Cup (g)	41.70	44.82	40.68	82.07	39.84	46.32	44.50	45.22			
Weight of Soil and Cup After Burn (g)				77.88							
Weight of Sample for Density (lbs)											
Diameter (in)											
Length(in)											
Moisture Content (%)	23.6	19.3	22.6	46.0	24.3	15.2	13.0	11.0			
Organic Content (%)				12.2							
Wet Density (pcf)											
Dry Density (pcf)											

Boring Number	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2	B-2
Sample Number	11	12	13	14	15	16					
Cup Number	Y10	Y5	A1	A8	B7	B9					
Weight of Cup (g)	24.89	20.53	25.88	22.93	27.28	23.36					
Weight of Wet Soil and Cup (g)	47.06	42.02	46.78	46.97	50.17	44.03					
Weight of Dry Soil and Cup (g)	44.52	40.41	45.13	45.18	48.66	42.68					
Weight of Soil and Cup After Burn (g)											
Weight of Sample for Density (lbs)											
Diameter (in)											
Length(in)											
Moisture Content (%)	12.9	8.1	8.6	8.0	7.1	7.0					
Organic Content (%)											
Wet Density (pcf)											
Dry Density (pcf)											

Performed by K. Starr Reviewed by E. Jeske, PE



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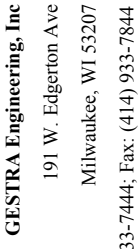
**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 12, 2018
Project Number: 18051-10 Report To: Hillwood
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-3	B-3	B-3	B-3	B-3	B-3	B-3	B-3	B-3
Sample Number	1	2	3	4	5	6	7	8	
Cup Number	Y4	Q7	P3	B7	P9	P5	Q9	Y21	
Weight of Cup (g)	25.76	24.32	23.41	27.28	23.76	26.98	25.17	24.61	
Weight of Wet Soil and Cup (g)	46.42	45.89	43.86	47.81	44.63	59.09	47.45	47.27	
Weight of Dry Soil and Cup (g)	42.25	40.60	41.49	45.69	42.05	55.71	45.22	45.59	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	25.3	32.5	13.1	11.5	14.1	11.8	11.1	8.0	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-3	B-3	B-3	B-3	B-3	B-3	B-3	B-3	B-3
Sample Number	9	10	11	12	13	14			
Cup Number	P1	A8	T8	P4	M8	Q8			
Weight of Cup (g)	24.46	22.95	24.03	25.61	23.87	25.12			
Weight of Wet Soil and Cup (g)	49.53	45.78	46.94	46.80	44.55	49.15			
Weight of Dry Soil and Cup (g)	46.97	44.05	45.23	45.18	43.26	47.63			
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	11.4	8.2	8.1	8.3	6.7	6.8			
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Performed by K. Starr Reviewed by E. Jeske, PE



Laboratory Test Results of

Distribution Center AR Sort FC

18051-10

Milwaukee, WI

D2216, D 2974

Boring Number	B-4	B-4	B-4	B-4	B-4	B-4	B-4	B-4	B-4
Sample Number	1	2	3	4	5	6	9	10	
Cup Number	A-6	PC-703	M-6	P-7	A-9	B-2	A-7	Q-5	
Weight of Cup (g)	23.99	50.45	24.01	27.76	24.41	25.62	25.11	24.37	
Weight of Wet Soil and Cup (g)	46.40	104.08	44.03	52.48	45.25	48.50	56.43	50.54	
Weight of Dry Soil and Cup (g)	41.33	91.33	39.94	49.01	42.43	45.30	52.67	46.77	
Weight of Soil and Cup After Burn (g)		90.35							
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	29.2	31.2	25.7	16.3	15.6	16.3	13.6	16.8	
Organic Content (%)		2.4							
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number		B-4	B-4						
Sample Number		11A	12						
Cup Number		B-6	P-9						
Weight of Cup (g)		23.35	23.68						
Weight of Wet Soil and Cup (g)		50.93	44.01						
Weight of Dry Soil and Cup (g)		47.16	41.66						
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)		15.8	13.1						
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

C. Anderson

Reviewed by E. Jeske, PE



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name:	Distribution Center AR Sort FC	Date:	March 12, 2018
Project Number:	18051-10	Report To:	Hillwood
Project Location:	Milwaukee, WI		
ASTM Designation:	D2216, D 2974		

Boring Number	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5
Sample Number	1	2	3	4	5	6	8	9B	
Cup Number	Y9	Y5	B10	V1	M9	Q1	Y1	Z34	
Weight of Cup (g)	25.32	20.52	24.43	24.30	26.89	29.02	23.83	24.82	
Weight of Wet Soil and Cup (g)	47.24	41.57	45.68	45.81	44.75	52.37	44.56	45.51	
Weight of Dry Soil and Cup (g)	43.11	39.01	43.56	42.82	42.94	48.64	42.85	43.93	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	23.2	13.8	11.1	16.1	11.3	19.0	9.0	8.3	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5
Sample Number	10	14							
Cup Number	V2B	T9							
Weight of Cup (g)	24.83	23.37							
Weight of Wet Soil and Cup (g)	45.86	47.73							
Weight of Dry Soil and Cup (g)	44.11	46.71							
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	9.1	4.4							
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Performed by	K. Starr	Reviewed by	E. Jeske, PE
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GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 6, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-6	B-6	B-6	B-6	B-6	B-6	B-6	B-6	B-6	B-6
Sample Number	1	2	4	5	6	7	8	9		
Cup Number	U7	Q7	B7	B1	P10	V1	A6	Q9		
Weight of Cup (g)	25.69	24.32	27.27	26.65	24.03	24.28	23.98	25.16		
Weight of Wet Soil and Cup (g)	46.60	44.63	48.98	47.78	44.39	44.47	44.41	45.15		
Weight of Dry Soil and Cup (g)	43.70	41.89	44.61	44.27	42.82	42.48	42.82	42.61		
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	16.1	15.6	25.2	19.9	8.4	10.9	8.4	14.6		
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Boring Number	B-6	B-6	B-6	B-6	B-6	B-6	B-6	B-6	B-6	B-6
Sample Number	10	11	12	13	14					
Cup Number	Q3	P8	Q6	M3	B5					
Weight of Cup (g)	26.68	26.51	23.98	26.31	26.19					
Weight of Wet Soil and Cup (g)	51.61	49.27	46.38	47.19	46.67					
Weight of Dry Soil and Cup (g)	49.32	46.40	42.17	45.62	45.40					
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	10.1	14.4	23.1	8.1	6.6					
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Performed by K. Starr Reviewed by C. Anderson



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 2, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7
Sample Number	3	4	5	6	9	10	12	13				
Cup Number	Y5	A9	Y3	A10	V8	Y6	Y21	M1				
Weight of Cup (g)	20.53	24.40	26.35	25.20	23.31	26.53	24.61	25.46				
Weight of Wet Soil and Cup (g)	42.96	44.46	47.43	47.75	44.96	48.44	47.37	46.89				
Weight of Dry Soil and Cup (g)	40.08	39.98	43.29	44.31	42.78	46.62	45.78	45.47				
Weight of Soil and Cup After Burn (g)												
Weight of Sample for Density (lbs)			0.298									
Diameter (in)			1.458									
Length(in)			2.889									
Moisture Content (%)	14.7	28.8	24.4	18.0	11.2	9.1	7.5	7.1				
Organic Content (%)												
Wet Density (pcf)			106.7									
Dry Density (pcf)			85.8									

Boring Number	B-7											
Sample Number	14											
Cup Number	Q11											
Weight of Cup (g)	24.84											
Weight of Wet Soil and Cup (g)	45.37											
Weight of Dry Soil and Cup (g)	44.00											
Weight of Soil and Cup After Burn (g)												
Weight of Sample for Density (lbs)												
Diameter (in)												
Length(in)												
Moisture Content (%)	7.2											
Organic Content (%)												
Wet Density (pcf)												
Dry Density (pcf)												

Performed by K. Starr Reviewed by C. Anderson



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 2, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-8	B-8	B-8	B-8	B-8	B-8	B-8	B-8	B-8
Sample Number	2	3	4	5	6	7	8	9	
Cup Number	P9	J41	T6	Y91	P4	B2	B8	Y9	
Weight of Cup (g)	23.75	24.91	23.50	26.21	25.61	25.60	26.69	25.31	
Weight of Wet Soil and Cup (g)	46.58	47.74	44.28	46.72	46.32	47.86	46.75	46.05	
Weight of Dry Soil and Cup (g)	43.16	45.17	41.57	44.44	43.93	45.55	44.84	43.76	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	17.6	12.7	15.0	12.5	13.0	11.6	10.5	12.4	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-8								
Sample Number	10								
Cup Number	Q4								
Weight of Cup (g)	23.96								
Weight of Wet Soil and Cup (g)	47.55								
Weight of Dry Soil and Cup (g)	45.37								
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	10.2								
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Performed by K. Starr Reviewed by C. Anderson



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
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Project Name: Distribution Center AR Sort FC Date: March 8, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-9	B-9	B-9	B-9	B-9	B-9	B-9	B-9	B-9
Sample Number	1	2	3	4	5	7	8	9	
Cup Number	Q-2	Y-6	M-1	A-4	T-10	B-3A	Q-10	A-1	
Weight of Cup (g)	24.24	26.54	47.91	25.38	25.29	23.96	26.00	25.90	
Weight of Wet Soil and Cup (g)	48.38	55.17	98.63	47.79	46.86	53.41	55.79	46.64	
Weight of Dry Soil and Cup (g)	44.48	52.28	87.02	41.67	44.32	48.18	51.52	44.89	
Weight of Soil and Cup After Burn (g)			86.2						
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	19.3	11.2	29.7	37.6	13.3	21.6	16.7	9.2	
Organic Content (%)			2.1						
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-9	B-9	B-9	B-9	B-9	B-9	B-9	B-9	B-9
Sample Number	11	12	14						
Cup Number	T-3	V-5	M-5						
Weight of Cup (g)	24.69	22.37	24.65						
Weight of Wet Soil and Cup (g)	44.95	42.93	48.12						
Weight of Dry Soil and Cup (g)	43.47	41.38	45.69						
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	7.9	8.2	11.5						
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Performed by C. Anderson Reviewed by E. Jeske, PE



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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
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Project Name: Distribution Center AR Sort FC Date: March 8, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-10	B-10	B-10	B-10	B-10	B-10	B-10	B-10	B-10	B-10	B-10
Sample Number	1	2	3	4	5	7	7A	8			
Cup Number	Y-4	B-7	Y-7	B-1	T-4A	Y-9	Y-10	M7			
Weight of Cup (g)	25.76	27.29	27.21	26.65	24.19	25.32	24.89	23.01			
Weight of Wet Soil and Cup (g)	49.55	49.17	54.05	47.28	48.02	47.70	53.23	44.09			
Weight of Dry Soil and Cup (g)	45.83	45.59	48.73	44.04	44.68	43.29	48.80	42.04			
Weight of Soil and Cup After Burn (g)											
Weight of Sample for Density (lbs)											
Diameter (in)											
Length(in)											
Moisture Content (%)	18.5	19.6	24.7	18.6	16.3	24.5	18.5	10.8			
Organic Content (%)											
Wet Density (pcf)											
Dry Density (pcf)											

Boring Number	B-10	B-10	B-10	B-10	B-10	B-10	B-10				
Sample Number	9	10	11	14	15						
Cup Number	B-9	8X	R-1	P-3	B-5						
Weight of Cup (g)	23.37	26.80	25.43	23.41	26.19						
Weight of Wet Soil and Cup (g)	55.96	48.07	50.90	47.59	52.87						
Weight of Dry Soil and Cup (g)	53.10	46.87	48.41	45.36	50.64						
Weight of Soil and Cup After Burn (g)											
Weight of Sample for Density (lbs)											
Diameter (in)											
Length(in)											
Moisture Content (%)	9.6	6.0	10.8	10.2	9.1						
Organic Content (%)											
Wet Density (pcf)											
Dry Density (pcf)											

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Milwaukee, WI 53207
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**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 12, 2018
Project Number: 18051-10 Report To: Hillwood
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-11	B-11	B-11	B-11	B-11	B-11	B-11	B-11	B-11
Sample Number	1	2	3	4	5	6	7	8	
Cup Number	B8	P5	M3	Q6	Y2	Y3	T3	B9	
Weight of Cup (g)	26.70	26.98	26.31	23.99	25.18	26.36	24.68	23.36	
Weight of Wet Soil and Cup (g)	49.17	47.56	49.35	44.40	47.93	48.07	40.98	44.69	
Weight of Dry Soil and Cup (g)	45.87	44.27	46.70	42.03	45.23	46.34	38.84	42.34	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	17.2	19.0	13.0	13.1	13.5	8.7	15.1	12.4	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-11	B-11	B-11	B-11	B-11	B-11	B-11	B-11	B-11
Sample Number	9	10	11	12	13				
Cup Number	V7	T10	A5	A10	Y13				
Weight of Cup (g)	25.69	26.57	26.84	25.20	24.59				
Weight of Wet Soil and Cup (g)	47.38	50.53	47.03	46.98	45.92				
Weight of Dry Soil and Cup (g)	45.32	48.64	45.42	43.56	43.65				
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	10.5	8.6	8.7	18.6	11.9				
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

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Project Name: Distribution Center AR Sort FC Date: March 8, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12
Sample Number	2	3	4	5	6	7	8	9		
Cup Number	J-4	Y-8	V-6	P-6	P-10	A-1	A-8	M-9		
Weight of Cup (g)	24.91	26.06	24.83	27.40	24.05	25.88	22.94	26.89		
Weight of Wet Soil and Cup (g)	48.84	48.58	47.04	51.14	47.07	48.94	48.18	47.73		
Weight of Dry Soil and Cup (g)	46.34	45.94	44.38	48.46	44.54	46.71	46.60	45.89		
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	11.7	13.3	13.6	12.7	12.3	10.7	6.7	9.7		
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Boring Number	B-12	B-12	B-12	B-12	B-12	B-12	B-12			
Sample Number	10	11	12	13	14					
Cup Number	P-5	V-2B	V-1	Q-6	Y-1					
Weight of Cup (g)	26.98	24.84	24.29	24.00	23.83					
Weight of Wet Soil and Cup (g)	52.78	53.57	45.46	51.34	46.26					
Weight of Dry Soil and Cup (g)	50.77	50.91	44.05	49.18	44.58					
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	8.4	10.2	7.1	8.6	8.1					
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

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Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
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Project Name: Distribution Center AR Sort FC Date: March 8, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-13	B-13	B-13	B-13	B-13	B-13	B-13	B-13	B-13
Sample Number	2	3	5	6	7	8	9	10	
Cup Number	T-10	T-9	T-5	M-3	B-10	Q-1	B-8	Q-11	
Weight of Cup (g)	26.59	23.38	25.91	26.32	24.43	29.02	26.71	24.84	
Weight of Wet Soil and Cup (g)	47.70	46.72	48.78	49.05	46.34	52.04	50.98	46.28	
Weight of Dry Soil and Cup (g)	44.53	43.81	45.54	47.39	44.24	49.69	48.05	44.17	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	17.7	14.2	16.5	7.9	10.6	11.4	13.7	10.9	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-13	B-13	B-13	B-13	B-13	B-13	B-13	B-13	B-13
Sample Number	11	12	13	13	13	13	13	13	13
Cup Number	T-2	T-7	Q-4	Q-4	Q-4	Q-4	Q-4	Q-4	Q-4
Weight of Cup (g)	25.69	23.41	23.97	23.97	23.97	23.97	23.97	23.97	23.97
Weight of Wet Soil and Cup (g)	48.21	45.72	46.06	46.06	46.06	46.06	46.06	46.06	46.06
Weight of Dry Soil and Cup (g)	46.17	43.77	43.99	43.99	43.99	43.99	43.99	43.99	43.99
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)	0.363								
Diameter (in)	1.512								
Length(in)	2.823								
Moisture Content (%)	10.0	9.6	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Organic Content (%)									
Wet Density (pcf)	123.7								
Dry Density (pcf)	112.5								

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GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name:	Distribution Center AR Sort FC	Date:	March 12, 2018
Project Number:	18051-10	Report To:	Hillwood
Project Location:	Milwaukee, WI		
ASTM Designation:	D2216, D 2974		

Boring Number	B-14	B-14	B-14	B-14	B-14	B-14	B-14	B-14	B-14
Sample Number	2	3	4	5	6	7	8	9	
Cup Number	V3	T4A	B5	Q2	A7	A2	Y7	M4	
Weight of Cup (g)	24.60	24.19	26.19	24.23	25.11	24.11	27.21	27.71	
Weight of Wet Soil and Cup (g)	44.90	45.47	48.20	46.31	45.73	45.78	47.90	48.76	
Weight of Dry Soil and Cup (g)	37.34	39.31	42.12	43.68	43.65	43.36	45.70	46.71	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	59.3	40.7	38.2	13.5	11.2	12.6	11.9	10.8	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Boring Number	B-14	B-14	B-14	B-14	B-14	B-14	B-14	B-14	B-14
Sample Number	10	11	12						
Cup Number	Q10	M10	V6						
Weight of Cup (g)	26.00	24.13	24.83						
Weight of Wet Soil and Cup (g)	47.23	44.97	46.92						
Weight of Dry Soil and Cup (g)	44.79	43.06	44.63						
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	13.0	10.1	11.6						
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Performed by	K. Starr	Reviewed by	E. Jeske, PE
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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

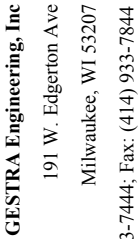
**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 8, 2018
Project Number: 18051-10 Report To: Hillwood Development Company, LLC
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-15	B-15	B-15	B-15	B-15	B-15	B-15	B-15	B-15	B-15
Sample Number	4	5	7	8	9	10	11	12		
Cup Number	V-3	P-21	V-4	M-2	A-2	Y-5	Y-21	V-7		
Weight of Cup (g)	24.59	26.34	23.90	26.95	24.13	20.53	24.62	25.69		
Weight of Wet Soil and Cup (g)	45.48	48.29	46.69	53.09	46.02	41.95	51.15	51.17		
Weight of Dry Soil and Cup (g)	42.85	45.25	43.01	51.21	44.60	40.42	48.50	48.52		
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	14.4	16.1	19.3	7.7	6.9	7.7	11.1	11.6		
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Boring Number	B-15	B-15	B-15	B-15	B-15	B-15	B-15	B-15	B-15	B-15
Sample Number	13	14								
Cup Number	P-8	T-6								
Weight of Cup (g)	26.52	23.51								
Weight of Wet Soil and Cup (g)	47.97	44.64								
Weight of Dry Soil and Cup (g)	46.22	42.82								
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	8.9	9.4								
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Performed by C. Anderson Reviewed by E. Jeske, PE



Laboratory Test Results of

Date: March 2, 2018
Report To: Hillwood Development

[illegible]

Boring Number	B-18	B-18	B-18	B-18	B-19	B-19	B-19	B-19	B-19
Sample Number	1	2	3	1	2	4	5	1B	
Cup Number	P10	A4	A1	Z34	V1	Q11	Q4	P5	
Weight of Cup (g)	24.04	25.38	25.88	24.83	24.29	24.85	23.96	26.98	
Weight of Wet Soil and Cup (g)	44.62	45.76	47.03	48.08	44.31	44.95	44.36	50.68	
Weight of Dry Soil and Cup (g)	41.09	42.61	43.40	45.98	41.16	42.60	40.00	46.50	
Weight of Soil and Cup After Burn (g)									
Weight of Sample for Density (lbs)									
Diameter (in)									
Length(in)									
Moisture Content (%)	20.7	18.3	20.7	9.9	18.7	13.2	27.2	21.4	
Organic Content (%)									
Wet Density (pcf)									
Dry Density (pcf)									

Reviewed by C. Anderson



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name:	Distribution Center AR Sort FC	Date:	March 12, 2018
Project Number:	18051-10	Report To:	Hillwood Development
Project Location:	Milwaukee, WI		
ASTM Designation:	D2216, D 2974		

Boring Number	B-20	B-20	B-20	B-20	B-20	B-21	B-21	B-21	B-21	B-21	B-22
Sample Number	2	3	4	5		3	4	5			1
Cup Number	Q1	M9	T5	M3		A9	P6	B6			M1
Weight of Cup (g)	29.01	26.89	25.90	26.29		24.40	27.39	23.35			25.47
Weight of Wet Soil and Cup (g)	51.78	47.27	47.34	48.00		45.65	47.70	44.62			46.48
Weight of Dry Soil and Cup (g)	47.98	43.04	41.89	42.38		42.57	45.43	42.25			41.69
Weight of Soil and Cup After Burn (g)											
Weight of Sample for Density (lbs)											
Diameter (in)											
Length(in)											
Moisture Content (%)	20.0	26.2	34.1	34.9		17.0	12.6	12.5			29.5
Organic Content (%)											
Wet Density (pcf)											
Dry Density (pcf)											

Boring Number	B-22	B-22	B-22	B-22	B-22	B-23	B-23	B-23	B-23	B-23	B-23
Sample Number	2	3	4	5		1	2	3			4
Cup Number	T2	M2	B1	A6		T6	Q5	J41			M5
Weight of Cup (g)	26.42	26.94	26.64	23.97		23.50	24.35	24.90			24.65
Weight of Wet Soil and Cup (g)	48.26	49.91	47.11	45.08		44.34	45.15	45.04			48.67
Weight of Dry Soil and Cup (g)	44.47	47.45	44.78	42.84		41.85	39.16	41.85			45.08
Weight of Soil and Cup After Burn (g)											
Weight of Sample for Density (lbs)											
Diameter (in)											
Length(in)											
Moisture Content (%)	21.0	12.0	12.8	11.9		13.6	40.4	18.8			17.6
Organic Content (%)											
Wet Density (pcf)											
Dry Density (pcf)											

Performed by	K. Starr	Reviewed by	E. Jeske, PE
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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

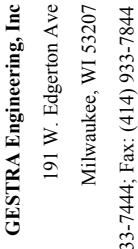
**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name:	Distribution Center AR Sort FC	Date:	March 12, 2018
Project Number:	18051-10	Report To:	Hillwood Development
Project Location:	Milwaukee, WI		
ASTM Designation:	D2216, D 2974		

Boring Number	B-23	B-24	B-24	B-24	B-24	B-24	B-24	B-25	B-25	B-25
Sample Number	5	1	2	3	4	5	6	1	2	3
Cup Number	Y8	Y6	V5	B2	V4	V7		T3	M7	
Weight of Cup (g)	26.05	26.54	22.37	25.61	23.90	25.69		24.68	23.00	
Weight of Wet Soil and Cup (g)	47.41	48.05	42.66	48.37	45.26	48.86		45.20	43.65	
Weight of Dry Soil and Cup (g)	44.28	44.06	38.72	44.37	41.11	44.08		41.38	39.61	
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	17.2	22.8	24.1	21.3	24.1	26.0		22.9	24.3	
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Boring Number	B-25	B-25	B-25	B-25	B-26	B-27	B-27	B-27	B-27	B-27
Sample Number	3	4	5	5	5	1B	2	3	4	4
Cup Number	M5	M10	M2	M2	Q12	Y2	A1	A31	T9	
Weight of Cup (g)	24.66	24.14	26.95	26.78	26.78	25.18	25.89	22.36	23.38	
Weight of Wet Soil and Cup (g)	45.42	45.93	47.55	47.11	47.11	47.93	46.17	43.97	45.69	
Weight of Dry Soil and Cup (g)	40.66	43.22	45.02	43.81	43.81	43.85	43.11	40.74	42.13	
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	29.8	14.2	14.0	19.4	19.4	21.9	17.8	17.6	19.0	
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Performed by	K. Starr	Reviewed by	E. Jeske, PE
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Laboratory Test Results of

Distribution Center AR Sort FC

18051-10

Milwaukee, WI

D2216, D 2974

Boring Number	B-27	B-28	B-28	B-28	B-28	B-28	B-29	B-29
Sample Number	5	1	2	3	4	5	3	4
Cup Number	Q8	P21	V8	A31	Q12	M7	Q3	Y10
Weight of Cup (g)	25.12	26.34	23.32	22.33	26.78	23.00	26.68	24.89
Weight of Wet Soil and Cup (g)	47.00	46.82	43.60	43.45	47.58	45.52	47.99	44.92
Weight of Dry Soil and Cup (g)	43.67	44.54	39.75	41.01	45.25	43.06	45.36	42.61
Weight of Soil and Cup After Burn (g)								
Weight of Sample for Density (lbs)								
Diameter (in)								
Length(in)								
Moisture Content (%)	18.0	12.5	23.4	13.1	12.6	12.3	14.1	13.0
Organic Content (%)								
Wet Density (pcf)								
Dry Density (pcf)								

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K. Starr

Reviewed by C. Anderson



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name:	Distribution Center AR Sort FC	Date:	March 12, 2018
Project Number:	18051-10	Report To:	Hillwood Development
Project Location:	Milwaukee, WI		
ASTM Designation:	D2216, D 2974		

Boring Number	B-31	B-32	B-32	B-32	B-32	B-32	B-32	B-33	B-33	B-33
Sample Number	5	2	3	4	5			2	3	4
Cup Number	B8	T7	T10	Y3	Y2			P4	Q12	M7
Weight of Cup (g)	26.70	23.41	26.59	26.36	25.18			25.61	26.77	23.01
Weight of Wet Soil and Cup (g)	48.17	40.14	47.08	48.31	46.60			47.84	47.44	45.15
Weight of Dry Soil and Cup (g)	44.72	37.57	43.73	45.76	43.53			43.35	43.68	42.10
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	19.1	18.1	19.5	13.1	16.7			25.3	22.2	16.0
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Boring Number	B-33	B-34	B-34	B-34	B-34	B-34	B-34	B-34	B-35	B-35
Sample Number	5	1	2	3	4			5	1	2B
Cup Number	M10	M8	P1	P9	A5			V8	Q9	Q7
Weight of Cup (g)	24.13	23.87	24.49	23.76	26.82			23.31	25.17	24.32
Weight of Wet Soil and Cup (g)	47.02	44.20	44.95	43.85	48.08			44.35	45.70	45.27
Weight of Dry Soil and Cup (g)	43.34	40.22	40.70	40.91	45.57			42.23	42.04	41.79
Weight of Soil and Cup After Burn (g)										
Weight of Sample for Density (lbs)										
Diameter (in)										
Length(in)										
Moisture Content (%)	19.2	24.3	26.2	17.1	13.4			11.2	21.7	19.9
Organic Content (%)										
Wet Density (pcf)										
Dry Density (pcf)										

Performed by	K. Starr	Reviewed by	E. Jeske, PE
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GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil**

Project Name: Distribution Center AR Sort FC Date: March 12, 2018
Project Number: 18051-10 Report To: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D2216, D 2974

Boring Number	B-35	B-35	B-35				
Sample Number	3	4	5				
Cup Number	Q8	A31	Q3				
Weight of Cup (g)	25.13	22.36	26.67				
Weight of Wet Soil and Cup (g)	46.60	43.29	47.33				
Weight of Dry Soil and Cup (g)	43.27	40.80	45.02				
Weight of Soil and Cup After Burn (g)							
Weight of Sample for Density (lbs)							
Diameter (in)							
Length(in)							
Moisture Content (%)	18.4	13.5	12.6				
Organic Content (%)							
Wet Density (pcf)							
Dry Density (pcf)							

Boring Number							
Sample Number							
Cup Number							
Weight of Cup (g)							
Weight of Wet Soil and Cup (g)							
Weight of Dry Soil and Cup (g)							
Weight of Soil and Cup After Burn (g)							
Weight of Sample for Density (lbs)							
Diameter (in)							
Length(in)							
Moisture Content (%)							
Organic Content (%)							
Wet Density (pcf)							
Dry Density (pcf)							

Performed by K. Starr Reviewed by E. Jeske, PE



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-1
Sample Number 9
Depth of Sample 19.5'-21'

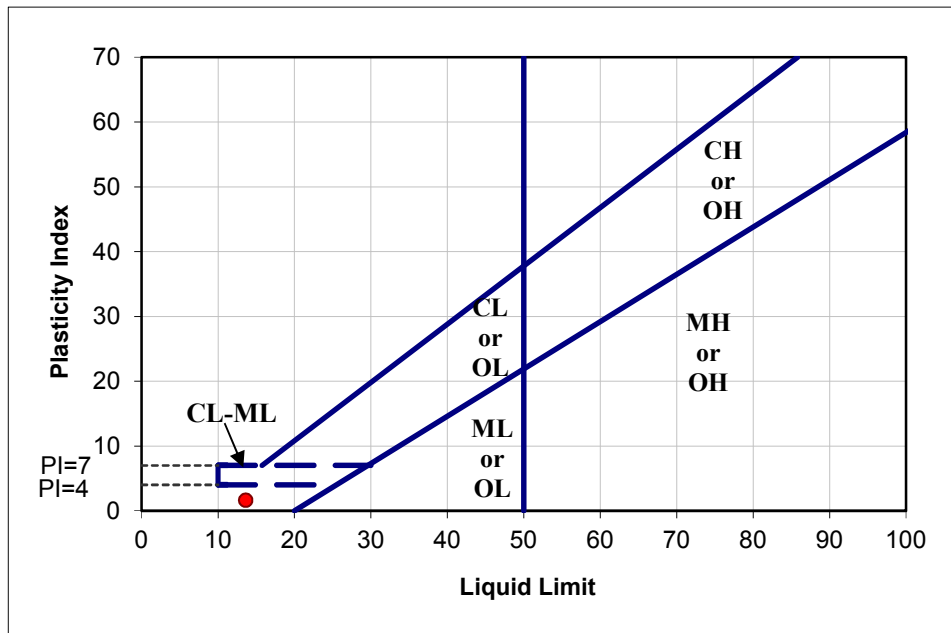
Determination of Liquid Limit

Cup Number	D21	L14	D9
Weight of Cup (g)	14.45	14.30	14.21
Weight of Wet Soil and Cup (g)	35.05	34.34	37.92
Weight of Dry Soil and Cup (g)	32.70	31.92	34.93
Moisture Content (%)	12.9	13.7	14.4
Blow Counts	35	23	15

Determination of Plastic Limit

Cup Number	L14	D4
Weight of Cup (g)	7.28	7.32
Weight of Wet Soil and Cup (g)	14.00	13.79
Weight of Dry Soil and Cup (g)	13.30	13.11
Moisture Content (%)	11.6	11.7

Compilation of Test Results



Liquid Limit	<u>14</u>
Plastic Limit	<u>12</u>
Plasticity Index	<u>2</u>
USCS Symbol	<u>ML</u>

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.

Geotechnical-Structural-Pavement-Construction Material



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 15, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-2
Sample Number 2
Depth of Sample 2'-3.5'

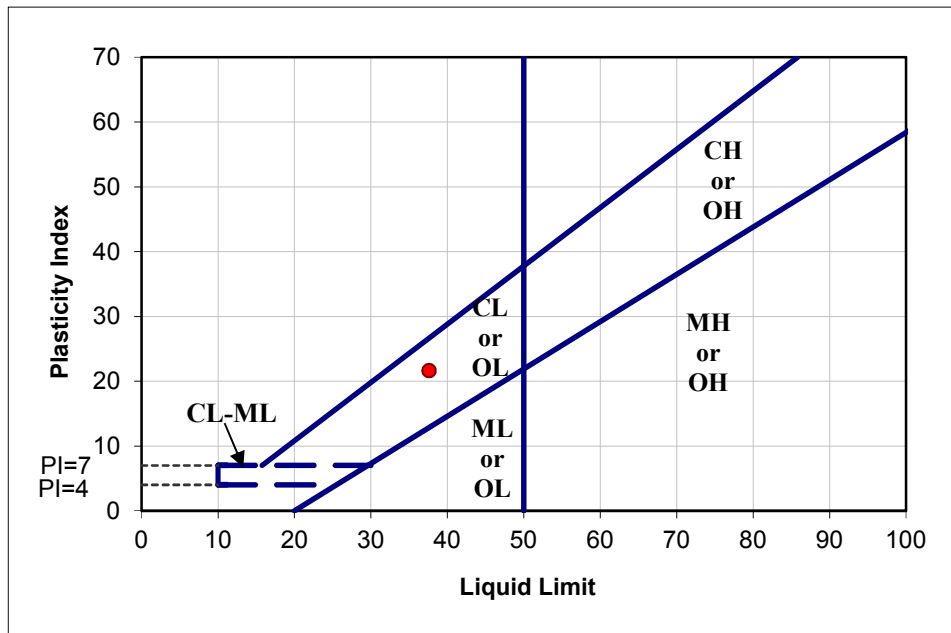
Determination of Liquid Limit

Cup Number	D16	D19	D23
Weight of Cup (g)	14.64	14.41	14.49
Weight of Wet Soil and Cup (g)	33.58	34.32	36.23
Weight of Dry Soil and Cup (g)	28.63	28.76	30.09
Moisture Content (%)	35.4	38.7	39.4
Blow Counts	32	22	19

Determination of Plastic Limit

Cup Number	L15	B34
Weight of Cup (g)	7.19	7.25
Weight of Wet Soil and Cup (g)	13.65	13.68
Weight of Dry Soil and Cup (g)	12.75	12.81
Moisture Content (%)	16.2	15.6

Compilation of Test Results



Liquid Limit 38
Plastic Limit 16
Plasticity Index 22
USCS Symbol CL

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 15, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-4
Sample Number 2
Depth of Sample 2'-3.5

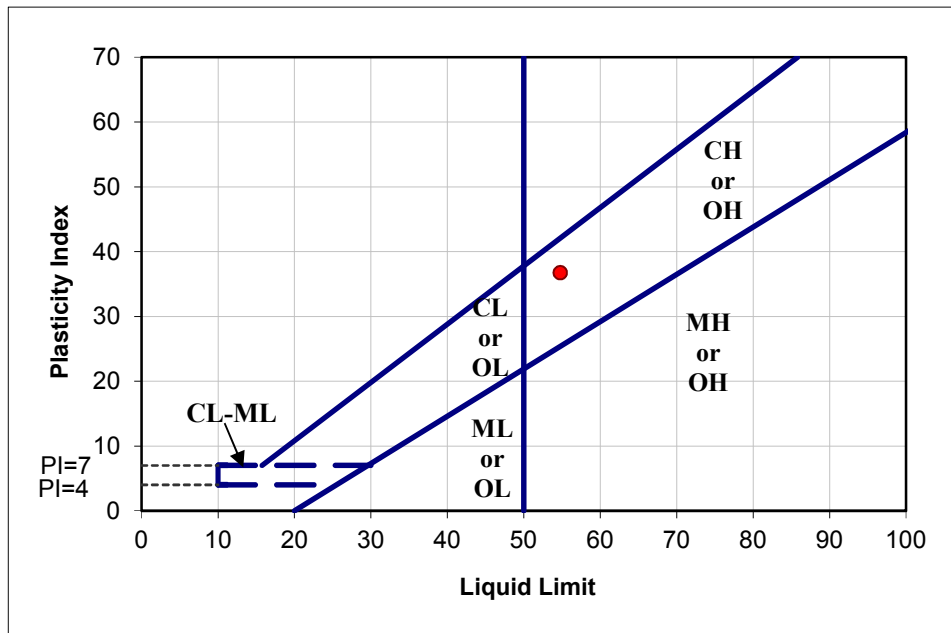
Determination of Liquid Limit

Cup Number	D16	L5	D9
Weight of Cup (g)	14.65	14.54	14.21
Weight of Wet Soil and Cup (g)	33.54	33.97	37.87
Weight of Dry Soil and Cup (g)	27.00	27.08	29.28
Moisture Content (%)	53.0	54.9	57.0
Blow Counts	35	22	15

Determination of Plastic Limit

Cup Number	L13	L20
Weight of Cup (g)	7.17	7.27
Weight of Wet Soil and Cup (g)	13.80	13.27
Weight of Dry Soil and Cup (g)	12.81	12.35
Moisture Content (%)	17.6	18.1

Compilation of Test Results



Liquid Limit	<u>55</u>
Plastic Limit	<u>18</u>
Plasticity Index	<u>37</u>
USCS Symbol	<u>CH</u>

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-4
Sample Number 12
Depth of Sample 39.5'-41'

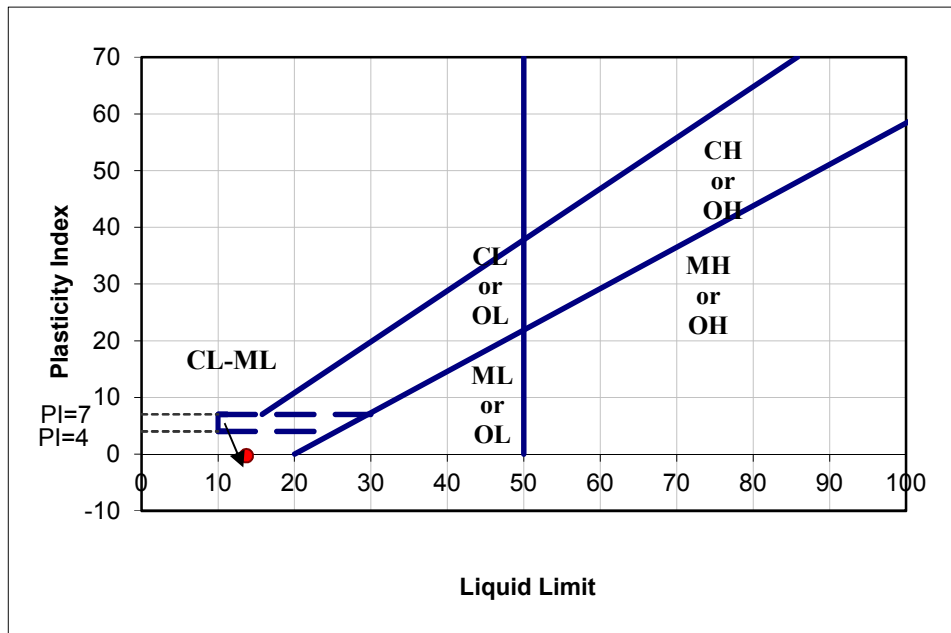
Determination of Liquid Limit

Cup Number	D16	D4	L5
Weight of Cup (g)	14.66	14.48	14.54
Weight of Wet Soil and Cup (g)	38.54	36.85	35.79
Weight of Dry Soil and Cup (g)	35.83	34.15	33.08
Moisture Content (%)	12.8	13.7	14.6
Blow Counts	33	26	16

Determination of Plastic Limit

Cup Number	L6	D22
Weight of Cup (g)	7.19	7.32
Weight of Wet Soil and Cup (g)	14.07	14.98
Weight of Dry Soil and Cup (g)	13.20	14.04
Moisture Content (%)	14.5	14.0

Compilation of Test Results



Liquid Limit	<u>14</u>
Plastic Limit	<u>14</u>
Plasticity Index	<u>0</u>
USCS Symbol	<u>ML</u>

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-6
Sample Number 8
Depth of Sample 19.5'-21'

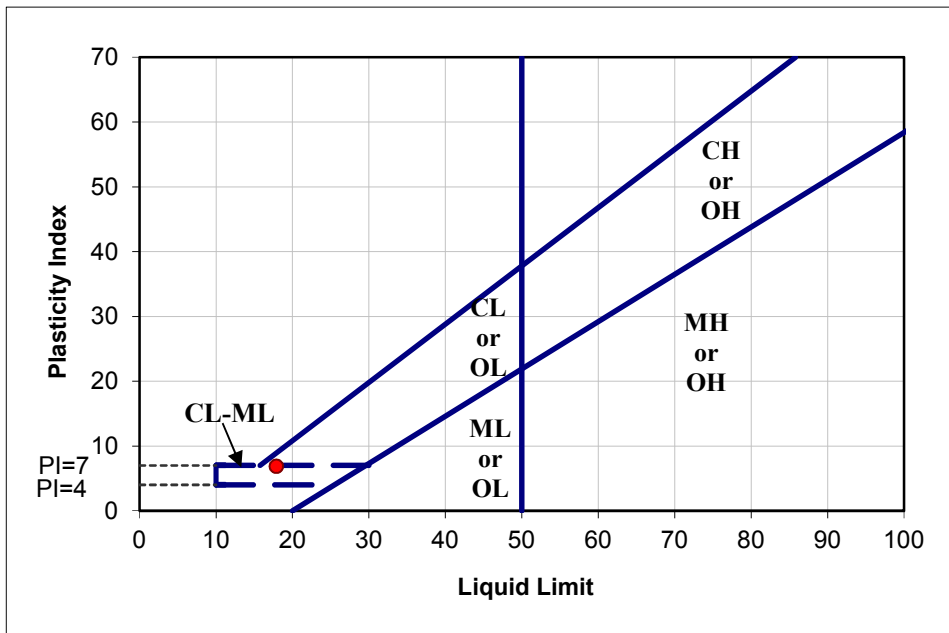
Determination of Liquid Limit

Cup Number	L20	L8	B2
Weight of Cup (g)	14.42	14.58	14.33
Weight of Wet Soil and Cup (g)	36.44	36.27	36.81
Weight of Dry Soil and Cup (g)	33.21	32.97	33.22
Moisture Content (%)	17.2	17.9	19.0
Blow Counts	30	25	16

Determination of Plastic Limit

Cup Number	B8	D23
Weight of Cup (g)	7.23	7.28
Weight of Wet Soil and Cup (g)	13.85	13.60
Weight of Dry Soil and Cup (g)	13.16	12.96
Moisture Content (%)	11.6	11.3

Compilation of Test Results



Liquid Limit	<u>18</u>
Plastic Limit	<u>11</u>
Plasticity Index	<u>7</u>
USCS Symbol	<u>CL-ML</u>

Performed by: B. BillsReviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 15, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-7
Sample Number 4
Depth of Sample 7'-8.5'

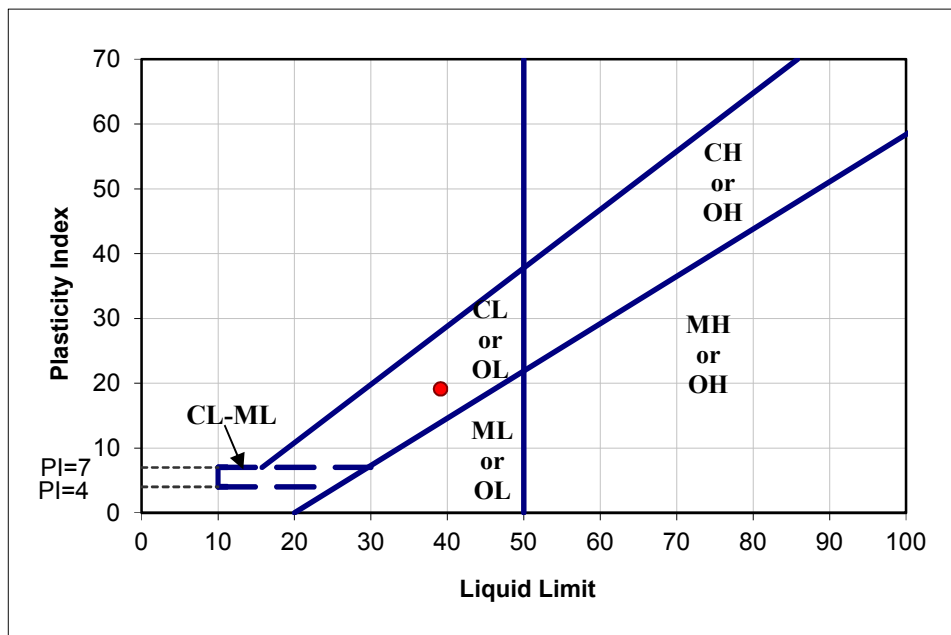
Determination of Liquid Limit

Cup Number	D25	L6	L8
Weight of Cup (g)	14.23	14.26	14.58
Weight of Wet Soil and Cup (g)	33.79	37.78	36.43
Weight of Dry Soil and Cup (g)	28.44	31.22	30.09
Moisture Content (%)	37.6	38.7	40.9
Blow Counts	35	25	16

Determination of Plastic Limit

Cup Number	B34	L3
Weight of Cup (g)	7.26	7.28
Weight of Wet Soil and Cup (g)	13.68	13.70
Weight of Dry Soil and Cup (g)	12.62	12.66
Moisture Content (%)	19.8	19.3

Compilation of Test Results



Liquid Limit	<u>39</u>
Plastic Limit	<u>20</u>
Plasticity Index	<u>19</u>
USCS Symbol	<u>CL</u>

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.

Geotechnical-Structural-Pavement-Construction Material



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-9
Sample Number 9
Depth of Sample 24.5'-26'

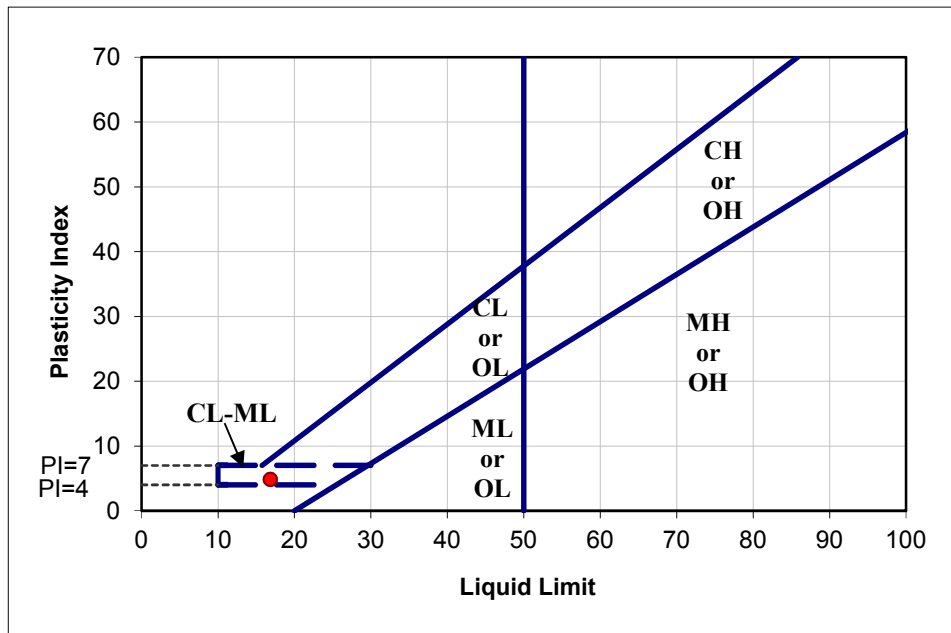
Determination of Liquid Limit

Cup Number	D3	L18	D25
Weight of Cup (g)	14.39	14.57	14.25
Weight of Wet Soil and Cup (g)	35.75	34.71	36.44
Weight of Dry Soil and Cup (g)	32.81	31.81	33.06
Moisture Content (%)	16.0	16.8	18.0
Blow Counts	35	23	15

Determination of Plastic Limit

Cup Number	D24	G7
Weight of Cup (g)	7.25	7.21
Weight of Wet Soil and Cup (g)	13.34	13.90
Weight of Dry Soil and Cup (g)	12.71	13.21
Moisture Content (%)	11.5	11.5

Compilation of Test Results



Liquid Limit 17
Plastic Limit 12
Plasticity Index 5
USCS Symbol CL-ML

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 10, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-10
Sample Number 7B
Depth of Sample 15.5'-16'

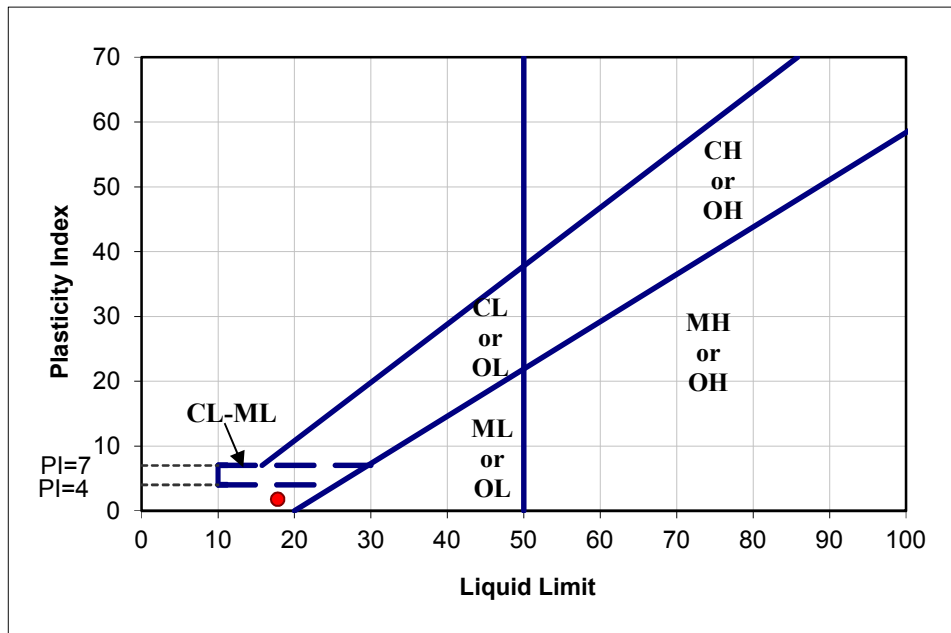
Determination of Liquid Limit

Cup Number	L6	L5	D17
Weight of Cup (g)	14.32	14.60	14.64
Weight of Wet Soil and Cup (g)	37.60	36.92	34.48
Weight of Dry Soil and Cup (g)	34.22	33.56	31.38
Moisture Content (%)	17.0	17.7	18.5
Blow Counts	35	25	17

Determination of Plastic Limit

Cup Number	D30	D19
Weight of Cup (g)	7.24	7.23
Weight of Wet Soil and Cup (g)	15.15	13.80
Weight of Dry Soil and Cup (g)	14.05	12.86
Moisture Content (%)	16.2	16.7

Compilation of Test Results



Liquid Limit	<u>18</u>
Plastic Limit	<u>16</u>
Plasticity Index	<u>2</u>
USCS Symbol	<u>ML</u>

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-15
Sample Number 10
Depth of Sample 29.5'-31'

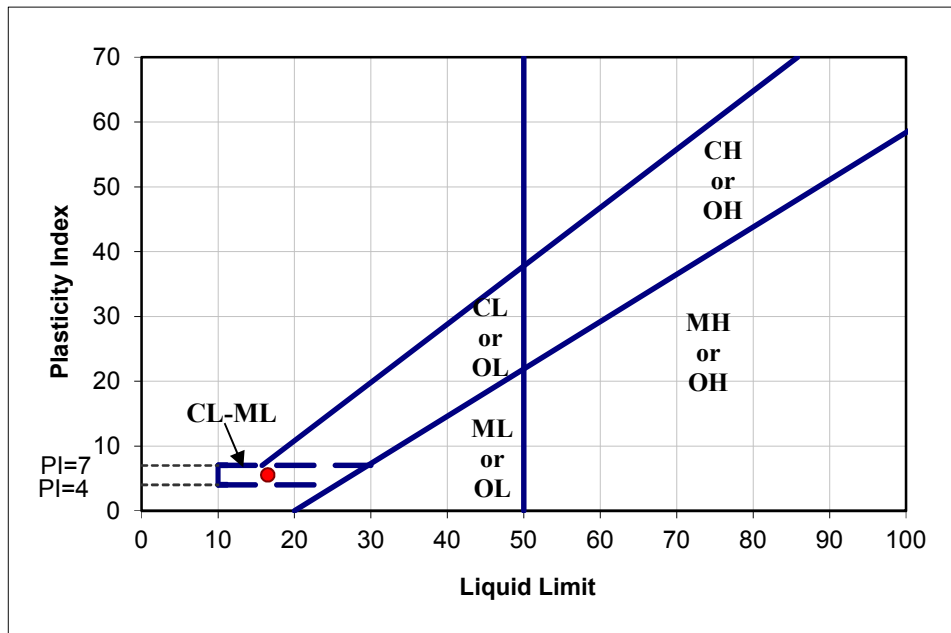
Determination of Liquid Limit

Cup Number	D19	D24	D28
Weight of Cup (g)	14.41	14.28	14.57
Weight of Wet Soil and Cup (g)	35.32	36.85	34.66
Weight of Dry Soil and Cup (g)	32.45	33.64	31.70
Moisture Content (%)	15.9	16.6	17.3
Blow Counts	33	24	15

Determination of Plastic Limit

Cup Number	L12	L15
Weight of Cup (g)	7.23	7.20
Weight of Wet Soil and Cup (g)	13.82	13.40
Weight of Dry Soil and Cup (g)	13.19	12.78
Moisture Content (%)	10.6	11.1

Compilation of Test Results



Liquid Limit	<u>17</u>
Plastic Limit	<u>11</u>
Plasticity Index	<u>6</u>
USCS Symbol	<u>CL-ML</u>

Performed by: B. BillsReviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-31
Sample Number 1
Depth of Sample 0-2'

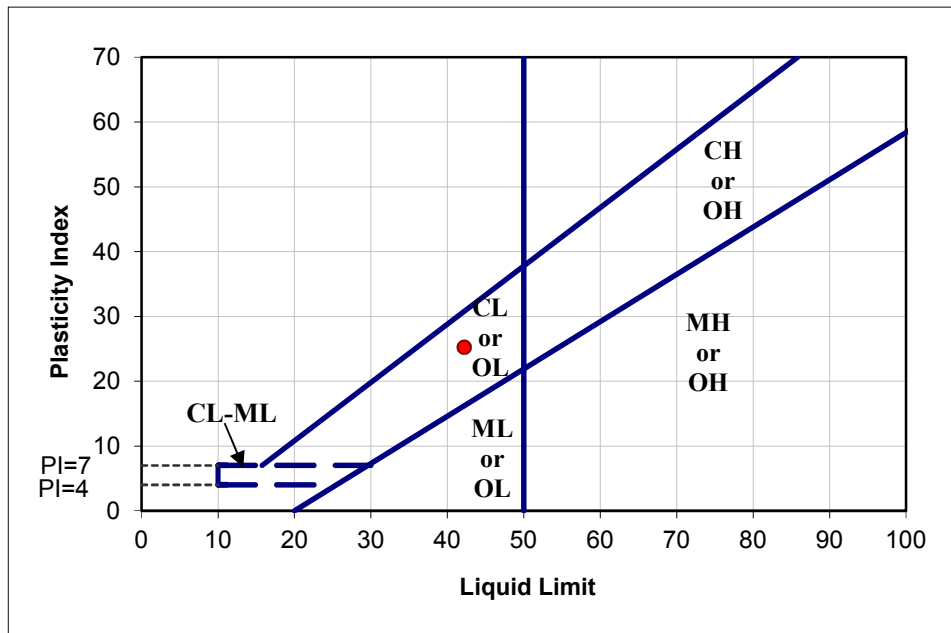
Determination of Liquid Limit

Cup Number	D23	D7	B32
Weight of Cup (g)	14.49	14.32	14.33
Weight of Wet Soil and Cup (g)	34.66	32.11	33.73
Weight of Dry Soil and Cup (g)	28.74	26.79	27.78
Moisture Content (%)	41.5	42.7	44.2
Blow Counts	28	23	16

Determination of Plastic Limit

Cup Number	B19	D9
Weight of Cup (g)	7.12	7.33
Weight of Wet Soil and Cup (g)	13.29	13.54
Weight of Dry Soil and Cup (g)	12.39	12.64
Moisture Content (%)	17.1	16.9

Compilation of Test Results



Liquid Limit	<u>42</u>
Plastic Limit	<u>17</u>
Plasticity Index	<u>25</u>
USCS Symbol	<u>CL</u>

Performed by: B. BillsReviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



Laboratory Test Results of Atterberg Limits of Soil

Project Name: Distribution Center AR Sort FC Date: March 9, 2018
Project Number: 18051-10 Client: Hillwood Development
Project Location: Milwaukee, WI
ASTM Designation: D4318

Sample Information

Type of Sample Split Spoon
Boring Number B-32
Sample Number 2
Depth of Sample 2'-3.5'

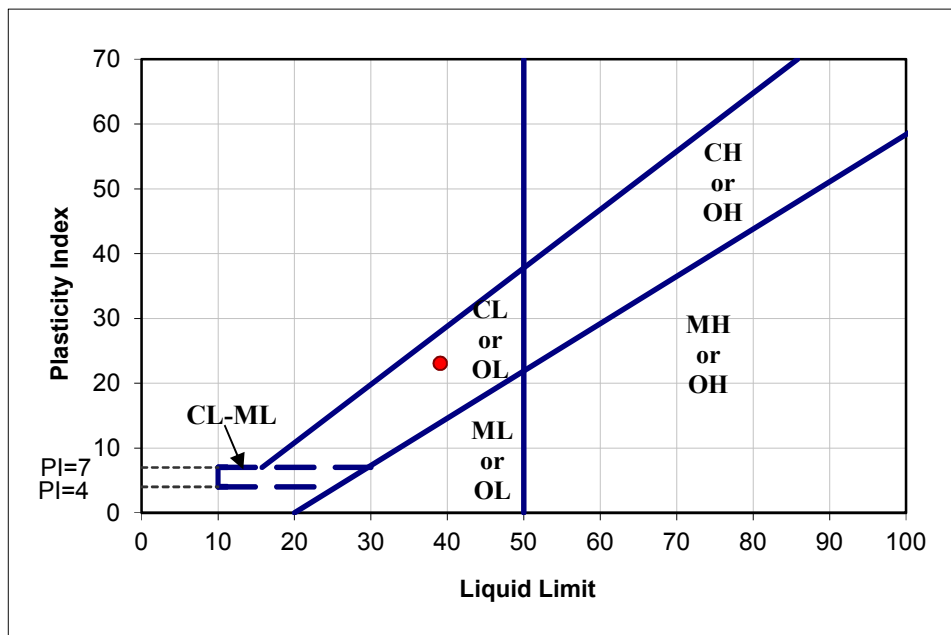
Determination of Liquid Limit

Cup Number	D10	L13	L7
Weight of Cup (g)	14.83	14.45	14.47
Weight of Wet Soil and Cup (g)	34.68	34.91	34.92
Weight of Dry Soil and Cup (g)	29.21	29.13	29.04
Moisture Content (%)	38.0	39.4	40.4
Blow Counts	30	23	19

Determination of Plastic Limit

Cup Number	D15	B31
Weight of Cup (g)	7.25	7.31
Weight of Wet Soil and Cup (g)	13.70	13.58
Weight of Dry Soil and Cup (g)	12.80	12.68
Moisture Content (%)	16.2	16.8

Compilation of Test Results



Liquid Limit	<u>39</u>
Plastic Limit	<u>16</u>
Plasticity Index	<u>23</u>
USCS Symbol	<u>CL</u>

Performed by: B. Bills

Reviewed By: E. Jeske, PE

GESTRA Engineering, Inc.



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis & Hydrometer of Soil or Aggregate

Project Name: Distribution Center AR Sort FC
Project Number: 18051-10
Project Location: Milwaukee, WI
ASTM Designation: D422

Date: March 9, 2018
Reported To: Hillwood Development

Sample Information

Type of Sample: Split Spoon Sample Number: 7
Boring Number: B-1 Depth of Sample: 14.5'-16

Mechanical Analysis Data

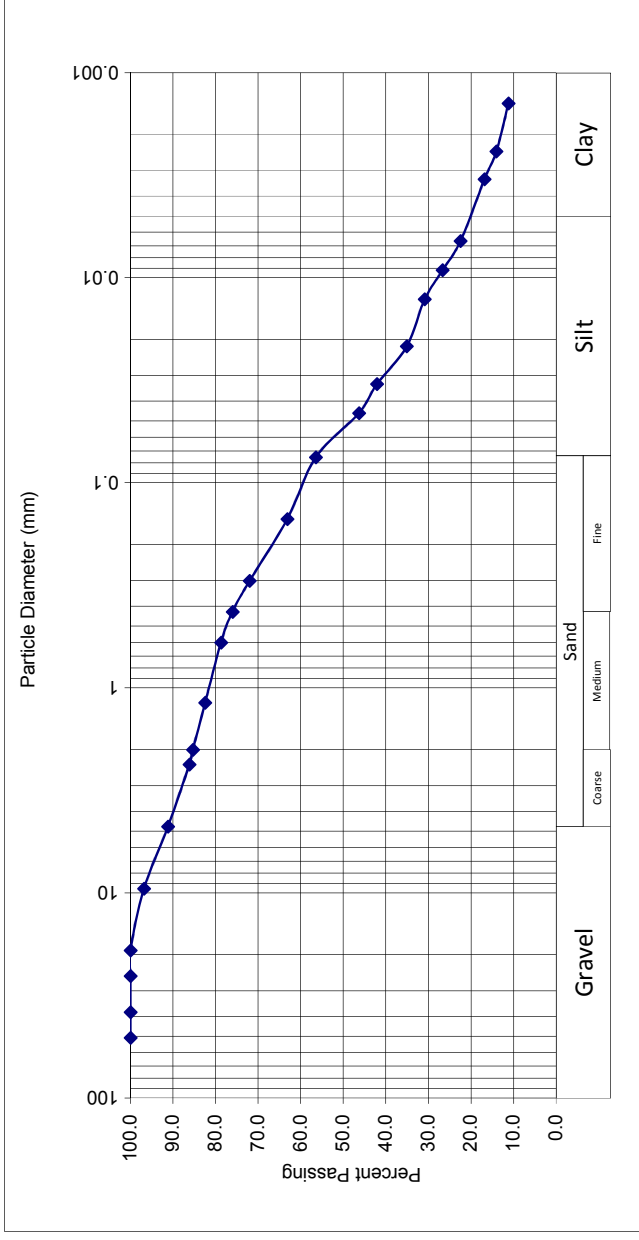
Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	100
3/8 in.	9.525	96.8
#4	4.750	91.2
#8	2.360	86.1
#10	2.000	85.3
#16	1.180	82.4
#30	0.600	78.7
#40	0.425	76.0
#50	0.300	72.0
#100	0.150	63.1
#200	0.075	56.4

Remarks: Gravel 8.8 % Sand 34.7 %

Fines 56.5 %

Performed by: K. Starr

Reviewed by: E. Jeske, PE



Graph of size distribution based on AASHTO Classification



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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis & Hydrometer of Soil or Aggregate

Project Name: Distribution Center AR Sort FC
Project Number: 18051-10
Project Location: Milwaukee, WI
ASTM Designation: **D422**

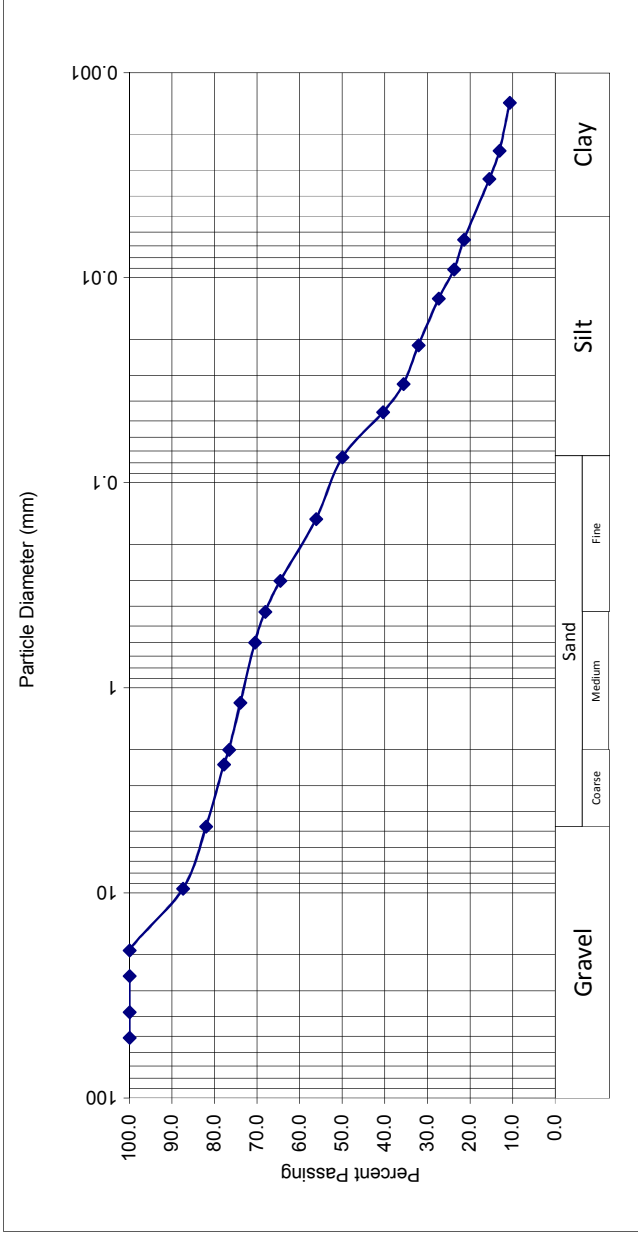
Date: March 9, 2018
Reported To: Hillwood Development

Sample Information

Type of Sample: Split Spoon Sample Number: 6
Boring Number: B-6 Depth of Sample: 12'-13.5'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	100
3/8 in.	9.525	87.4
#4	4.750	82.0
#8	2.360	77.8
#10	2.000	76.6
#16	1.180	73.9
#30	0.600	70.5
#40	0.425	68.1
#50	0.300	64.6
#100	0.150	56.2
#200	0.075	50.0





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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis & Hydrometer of Soil or Aggregate

Project Name: Distribution Center AR Sort FC
Project Number: 18051-10
Project Location: Milwaukee, WI
ASTM Designation: **D422**

Date: March 9, 2018
Reported To: Hillwood Development

Sample Information

Type of Sample: Split Spoon Sample Number: 9
Boring Number: B-7 Depth of Sample: 24.5'-26'

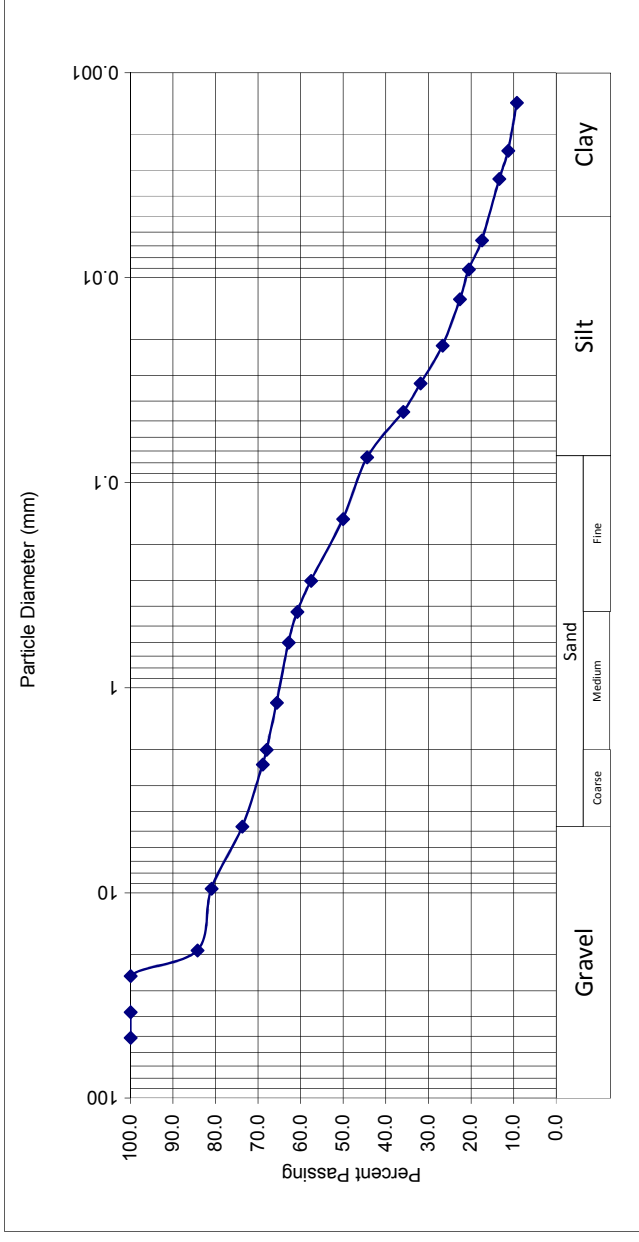
Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	84
3/8 in.	9.525	81.0
#4	4.750	73.7
#8	2.360	69.0
#10	2.000	68.0
#16	1.180	65.7
#30	0.600	62.9
#40	0.425	60.8
#50	0.300	57.6
#100	0.150	50.1
#200	0.075	44.4

Remarks: Gravel 26.3 % Sand 29.3 %
Fines 44.4 %

Performed by: K. Starr

Reviewed by: E. Jeske, PE



Graph of size distribution based on AASHTO Classification



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

Project Name: Distribution Center AR Sort FC
Project Number: 18051-10
Project Location: Milwaukee, WI
ASTM Designation: **C136, D422**

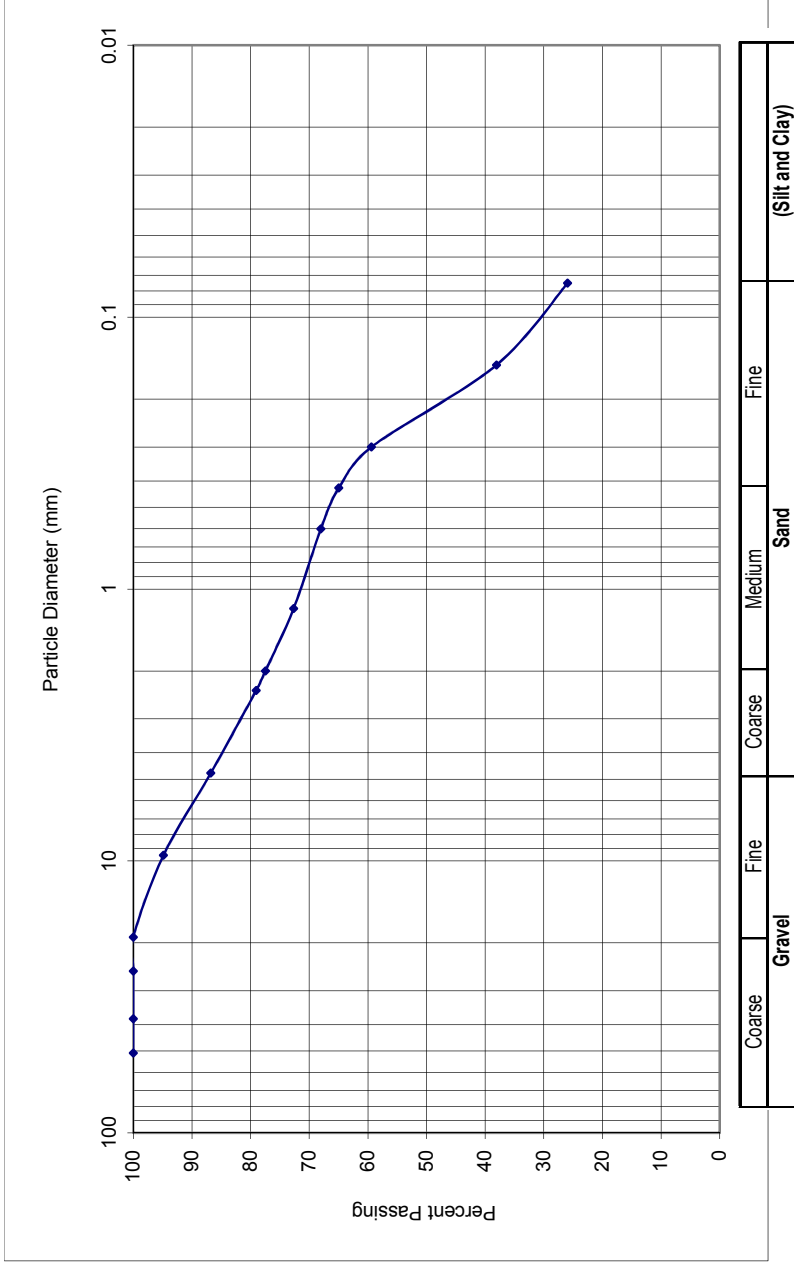
Date: March 12, 2018
Reported To: Hillwood Development

Sample Information

Type of Sample: Split Spoon Sample Number: 11
Boring Number: B-8 Depth of Sample: 34.5'-36'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	94.9
#4	4.75	86.8
#8	2.36	79.1
#10	2	77.5
#16	1.18	72.7
#30	0.6	68.0
#40	0.425	65.0
#50	0.3	59.4
#100	0.15	38.1
#200	0.075	26.0



Remarks: Gravel 13.2 % Sand 60.8 %
Passing #200 Sieve (Silt & Clay) 26.0 %

Performed by: K. Starr

Reviewed by: E. Jeske, PE

GESTRA Engineering, Inc.



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

Project Name: Distribution Center AR Sort FC
Project Number: 18051-10
Project Location: Milwaukee, WI
ASTM Designation: C136, D422

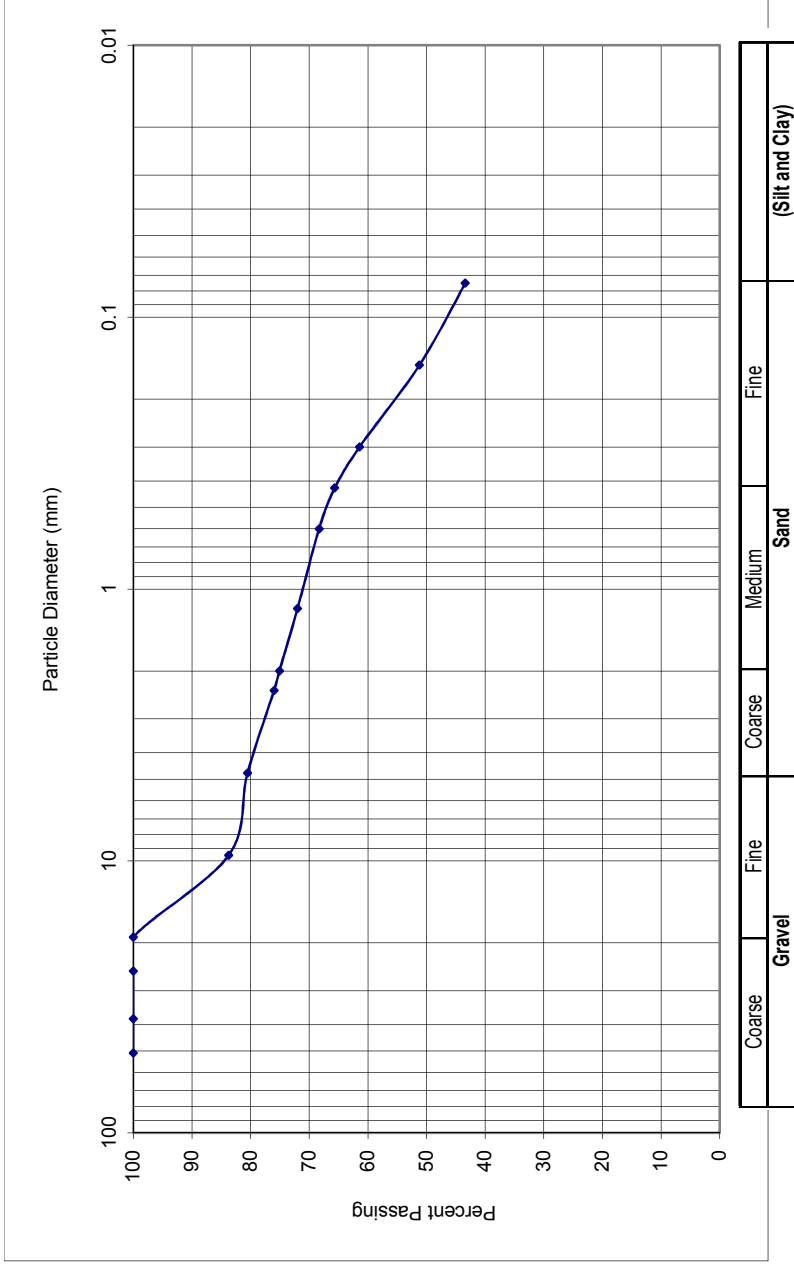
Date: March 12, 2018
Reported To: Hillwood Development

Sample Information

Type of Sample: Split Spoon Sample Number: 11
Boring Number: B-9 Depth of Sample: 34.5'-36'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	83.7
#4	4.75	80.5
#8	2.36	76.0
#10	2	75.1
#16	1.18	72.0
#30	0.6	68.3
#40	0.425	65.7
#50	0.3	61.4
#100	0.15	51.2
#200	0.075	43.4



Remarks: Gravel 19.5 % Sand 37.1 %
Passing #200 Sieve (Silt & Clay) 43.4 %

Performed by: K. Starr

Reviewed by: E. Jeske, PE

GESTRA Engineering, Inc.



GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Mechanical Analysis & Hydrometer of Soil or Aggregate**

Project Name:	Distribution Center AR Sort FC	Date:	March 12, 2018
Project Number:	18051-10	Reported To:	Hillwood Development
Project Location:	Milwaukee, WI		
ASTM Designation:	D422		

Sample Information

Type of Sample:	Split Spoon	Sample Number:	10
Boring Number:	B-10	Depth of Sample:	29.5'-31'

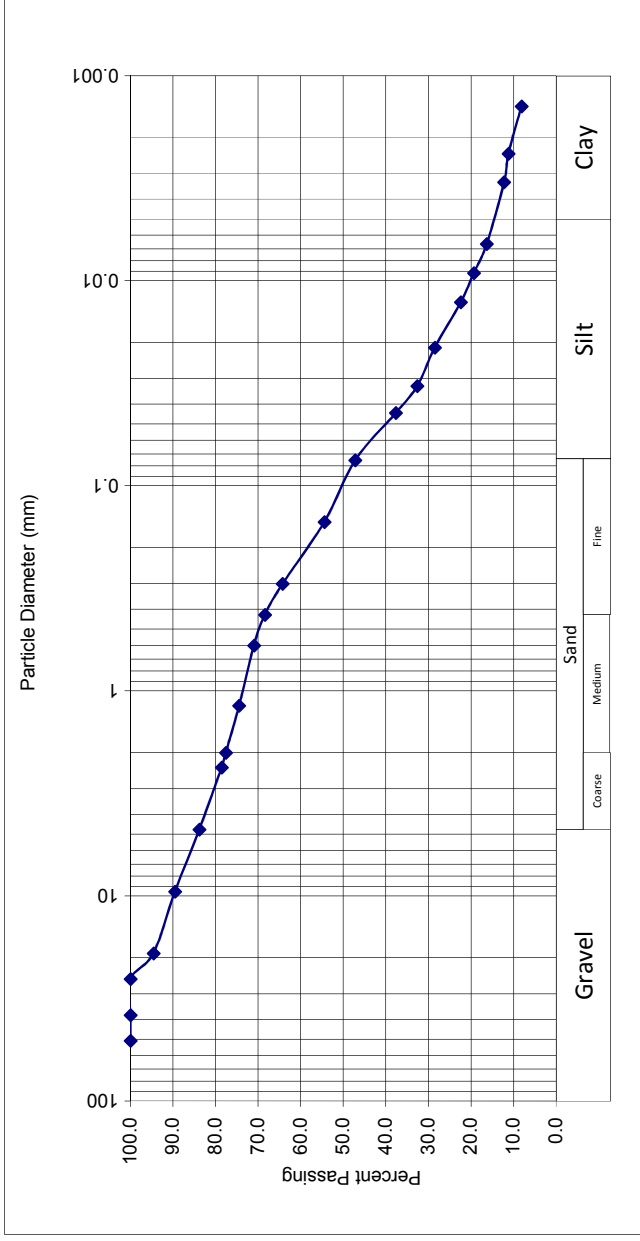
Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	95
3/8 in.	9.525	89.5
#4	4.750	83.8
#8	2.360	78.6
#10	2.000	77.6
#16	1.180	74.5
#30	0.600	71.0
#40	0.425	68.4
#50	0.300	64.3
#100	0.150	54.4
#200	0.075	47.2

Remarks: Gravel 16.2 % Sand 36.6 %
Fines 47.2 %

Performed by: K. Starr

Reviewed by: E. Jeske, PE



Graph of size distribution based on AASHTO Classification



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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

Project Name: Distribution Center AR Sort FC
Project Number: 18051-10
Project Location: Milwaukee, WI
ASTM Designation: C136, D422

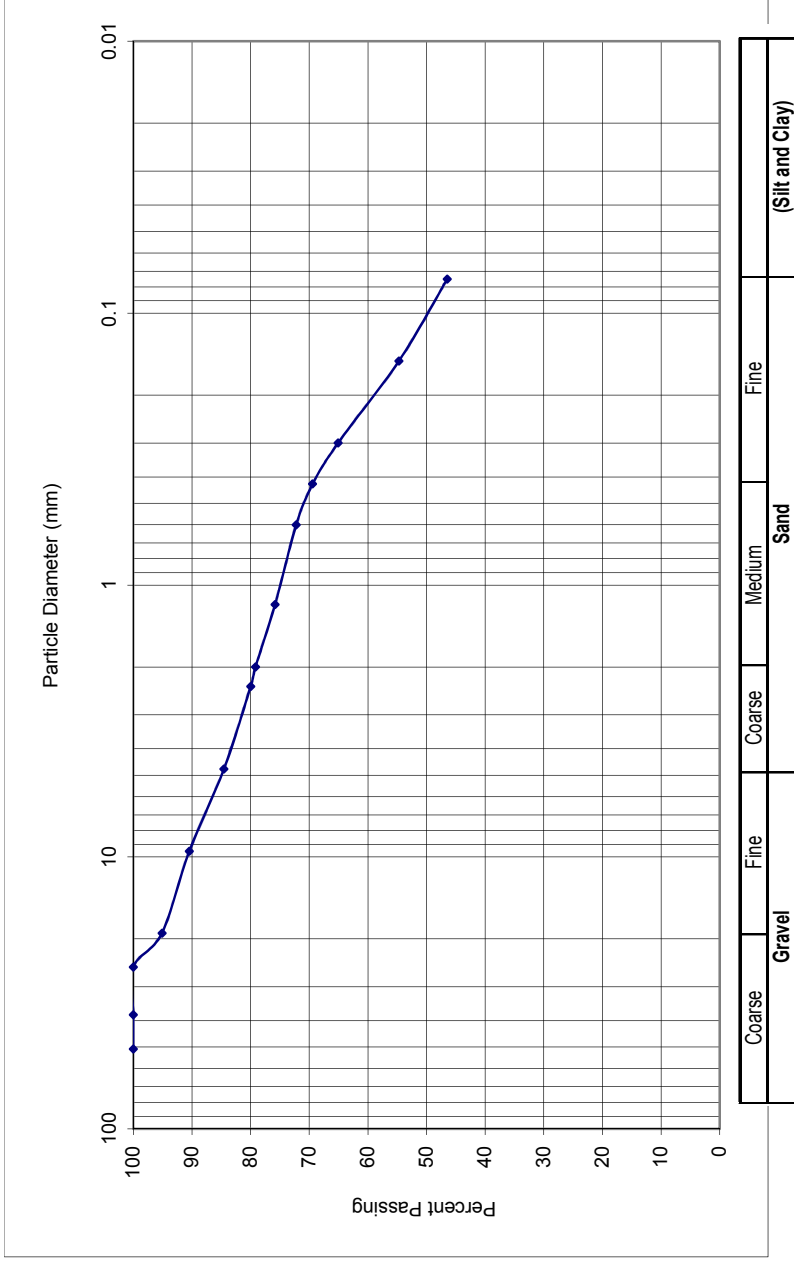
Date: March 12, 2018
Reported To: Hillwood Development

Sample Information

Type of Sample: Split Spoon Sample Number: 8
Boring Number: B-15 Depth of Sample: 19.5'-21'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	95.1
3/8	9.525	90.5
#4	4.75	84.5
#8	2.36	80.0
#10	2	79.2
#16	1.18	75.8
#30	0.6	72.2
#40	0.425	69.4
#50	0.3	65.1
#100	0.15	54.7
#200	0.075	46.5



Remarks: Gravel 15.5 % Sand 38.0 %
Passing #200 Sieve (Silt & Clay) 46.5 %

Performed by: K. Starr

Reviewed by: E. Jeske, PE

GESTRA Engineering, Inc.

Laboratory Test Results of Unconfined Compressive Strength of Soil

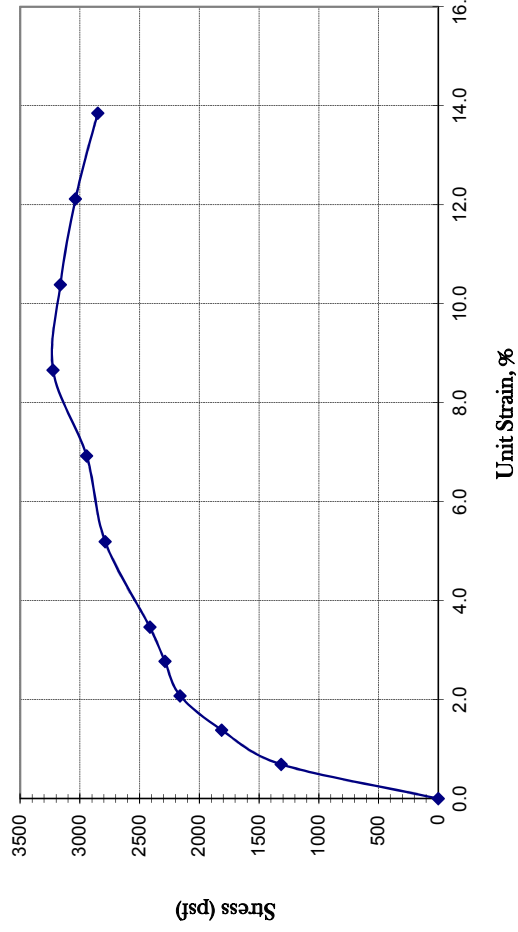
Project Name:	Distribution Center AR Sort FC	Date:	March 9, 2018
Project Number:	18051-10	Report To:	Hillwood Development
Project Location:	Milwaukee, WI		Due Calibration: 06/2018
ASTM Designation:	D2166		Form Updated on 7/1/2016

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	1314
40	1813
60	2160
80	2288
100	2413
150	2788
200	2943
250	3224
300	3163
350	3037
400	2851

Sample Information

Boring no.:	B-7	Diameter (in)	1.46
Sample no.:	5	Area (sq. in.):	1.67
Depth of Soil:	9.5'-11'	Height: (in.):	2.89
Description of Soil:	LEAN CLAY, brown, moist		
Strain Rate (in/min):	0.042		



Remarks

UC Strength, Q_u (tsf)	1.61
Wet Density (pcf)	106.8
Dry Density (pcf)	85.8
Moisture Content (%)	24.4

Performed By: K. Starr	Reviewed By: E. Jeske, PE
	GESTRA Engineering, Inc.

Laboratory Test Results of Unconfined Compressive Strength of Soil

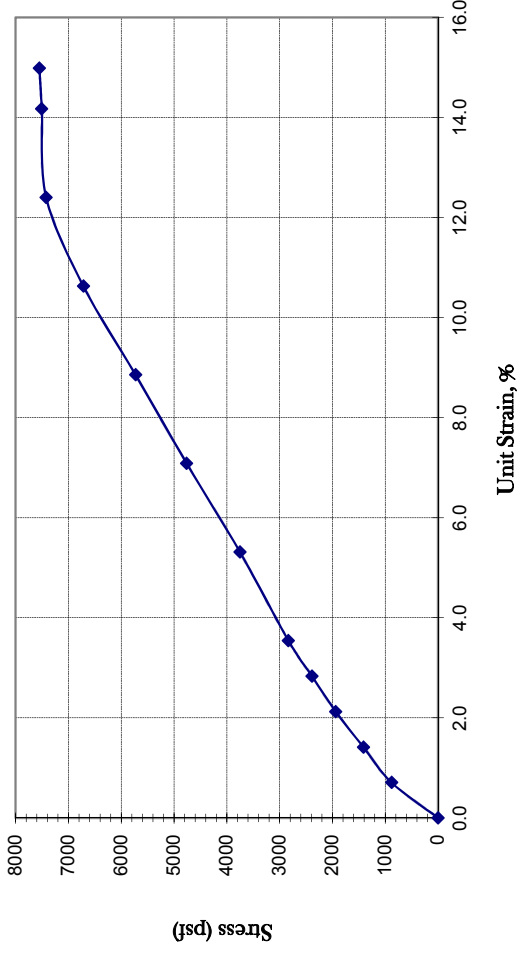
Project Name: <u>Distribution Center AR Sort FC</u>	Date: <u>March 9, 2018</u>
Project Number: <u>18051-10</u>	Report To: <u>Hillwood Development</u>
Project Location: <u>Milwaukee, WI</u>	Due Calibration: <u>06/2018</u>
ASTM Designation: <u>D2166</u>	Form Updated on <u>7/1/2016</u>

Test Data

Deformation dial reading (0.001 in.)	Sample stress (psf)
0	0
20	882
40	1414
60	1939
80	2389
100	2833
150	3751
200	4760
250	5728
300	6715
350	7420
400	7504
423	7549

Sample Information

Boring no.:	B-13	Diameter (in)	1.51
Sample no.:	11	Area (sq. in.):	1.80
Depth of Soil:	34.5'-36'	Height: (in.):	2.82
Description of Soil:	LEAN CLAY WITH SAND, gray, moist		
Strain Rate (in/min):	0.042		



Remarks

UC Strength, Q_u (tsf)	3.77
Wet Density (pcf)	123.5
Dry Density (pcf)	112.3
Moisture Content (%)	10.0

Performed By: <u>K. Starr</u>	Reviewed By: <u>E. Jeske, PE</u>
	GESTRA Engineering, Inc.



GESTRA Engineering, Inc.
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

**Laboratory Test Results of
Amount of Soil finer than #200 Sieve**

Project Name:	Distribution Center AR Sort FC	Date:	March 19, 2018
Project Number:	18051-10	Report To:	Hillwood Development
Project Location:	Milwaukee, WI		
ASTM Designation:	D1140		

Boring Number	B-6	B-13
Sample Number	2	3
Soak Time (to the nearest 10 min.)		
Weight of Pan (g)	136.7	120.7
Weight of Wet Soil and Pan (g)	349.3	190.5
Weight of Wet Soil (g)	212.6	69.8
Weight of Dry Soil and Pan (g)	324.6	182.9
Weight of Dry Soil (g)	187.9	62.2
Weight of Soil and Pan after Wash (g)	272.1	162.1
Weight of Soil after Wash (g)	135.4	41.4
Percentage of Material Passing #200 (%)	27.9	33.4

Performed by

Kim Starr

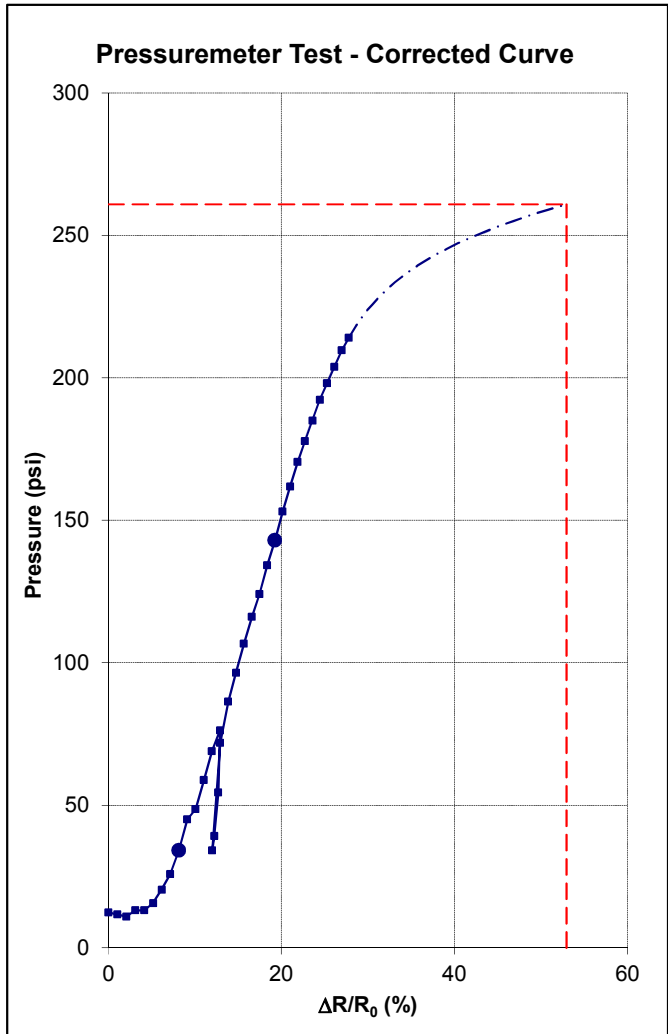
Reviewed by E. Jeske, PE
Geotechnical-Structural-Pavement-Construction Material

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sorft FC	Use of a slotted casing:	No
Borehole name:	B-2	Test depth:	27.00 ft
Test date: (mm/dd/yyyy)	03/21/2018	Manometer height above ground:	1.64 ft
Test number:	1	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

Raw Readings		Corrected Readings		
Pressure psi	Volume in ³	Pressure psi	Volume in ³	$\Delta R/R_0$ %
0	0.0	12	0.0	0.00
1	2.4	12	2.4	1.06
3	4.9	11	4.9	2.10
6	7.3	13	7.3	3.14
7	9.8	13	9.7	4.16
9	12.2	16	12.2	5.18
15	14.6	20	14.6	6.18
20	17.1	26	17.0	7.17
29	19.5	34	19.4	8.15
41	22.0	45	21.8	9.11
45	24.4	49	24.3	10.08
55	26.9	59	26.7	11.03
65	29.3	69	29.1	11.97
73	31.7	76	31.5	12.91
51	31.1	54	31.0	12.70
36	29.9	39	29.8	12.25
30	29.3	34	29.2	12.01
68	31.7	72	31.5	12.92
83	34.2	86	33.9	13.84
93	36.6	97	36.3	14.76
103	39.1	107	38.7	15.67
113	41.5	116	41.1	16.58
122	43.9	124	43.6	17.48
132	46.4	134	46.0	18.37
141	48.8	143	48.4	19.25
151	51.3	153	50.8	20.13
160	53.7	162	53.2	21.00
168	56.1	171	55.6	21.87
175	58.6	178	58.0	22.73
183	61.0	185	60.5	23.59
190	63.5	192	62.9	24.44
196	65.9	198	65.3	25.29
202	68.3	204	67.7	26.13
207	70.8	210	70.1	26.96
212	73.2	214	72.6	27.80

Remarks



Test Results	
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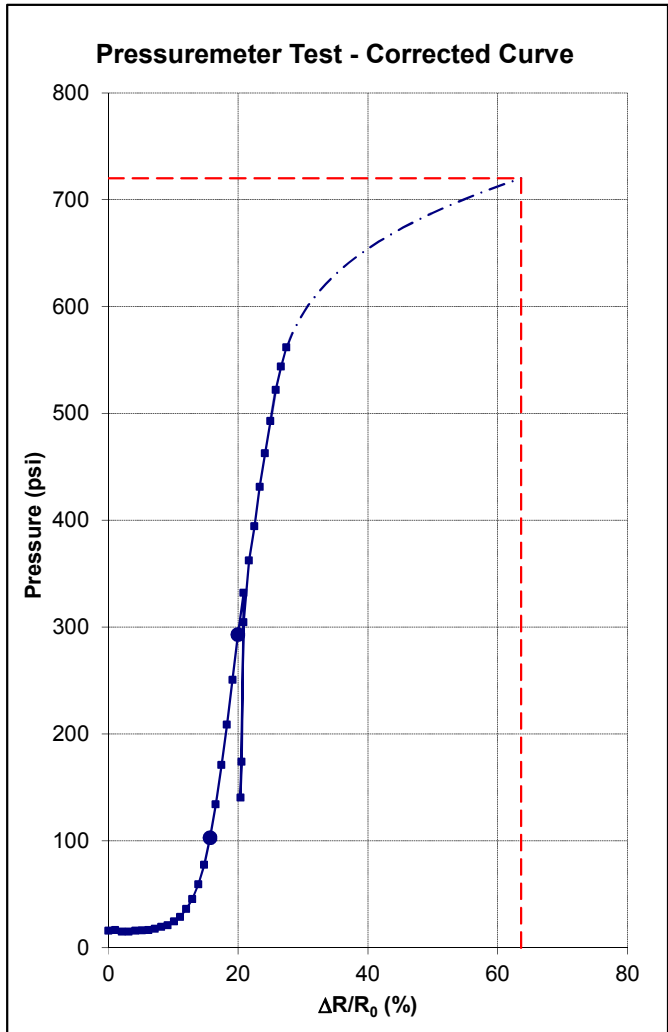
Pressiometer modulus E:	1,485 psi
Ultimate pressure P_L :	261 psi
Ratio E / P_L :	5.69
Yield pressure P_F :	143 psi
Ratio P_L / P_F :	1.83

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sort FC	Use of a slotted casing:	No
Borehole name:	B-2	Test depth:	35.00 ft
Test date: (mm/dd/yyyy)	03/21/2018	Manometer height above ground:	1.64 ft
Test number:	2	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

Raw Readings		Corrected Readings		
Pressure psi	Volume in ³	Pressure psi	Volume in ³	$\Delta R/R_0$ %
0	0.0	16	0.0	0.00
3	2.4	17	2.4	1.06
4	4.9	15	4.9	2.10
4	7.3	15	7.3	3.14
6	9.8	16	9.7	4.16
7	12.2	16	12.2	5.18
7	14.6	17	14.6	6.19
9	17.1	18	17.1	7.18
11	19.5	20	19.5	8.17
13	22.0	21	21.9	9.15
17	24.4	25	24.4	10.11
22	26.9	29	26.8	11.07
29	29.3	36	29.2	12.02
38	31.7	46	31.6	12.95
52	34.2	59	34.0	13.87
70	36.6	78	36.4	14.78
96	39.1	103	38.8	15.68
128	41.5	134	41.1	16.56
165	43.9	171	43.4	17.43
203	46.4	209	45.7	18.29
245	48.8	251	48.1	19.13
287	51.3	293	50.4	19.98
326	53.7	332	52.7	20.82
168	52.5	174	52.0	20.55
135	51.9	141	51.5	20.37
299	53.7	305	52.8	20.85
357	56.1	363	55.0	21.66
389	58.6	394	57.4	22.50
426	61.0	431	59.7	23.33
457	63.5	463	62.0	24.15
487	65.9	493	64.4	24.97
516	68.3	522	66.7	25.79
538	70.8	544	69.1	26.61
556	73.2	562	71.5	27.43

Remarks	



Test Results	
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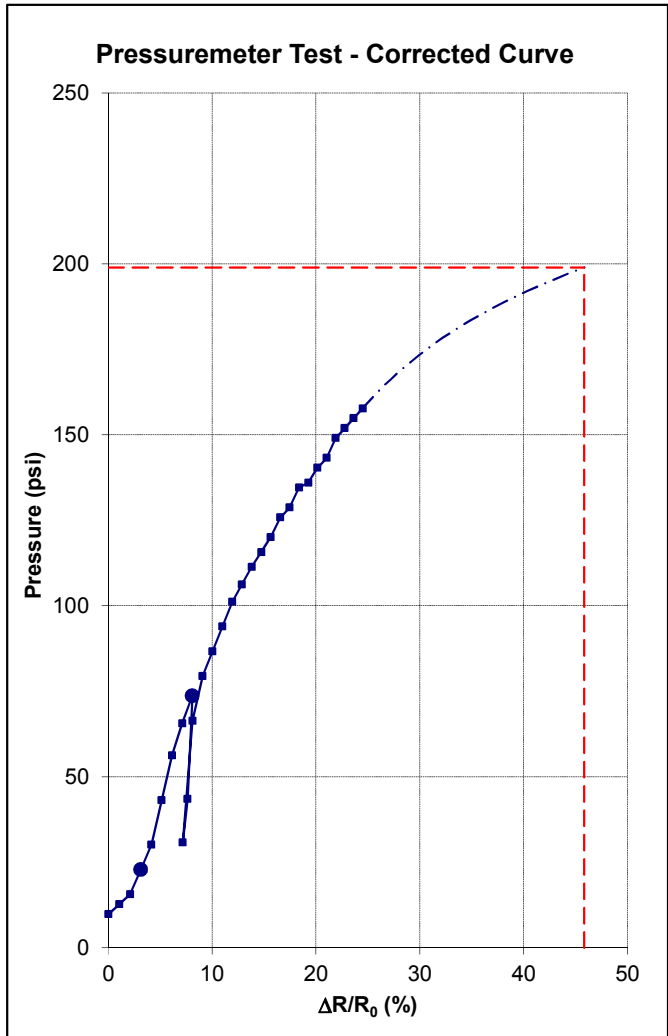
Pressiometer modulus E:	6,928 psi
Ultimate pressure P_L :	720 psi
Ratio E / P_L :	9.62
Yield pressure P_F :	293 psi
Ratio P_L / P_F :	2.46

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sort FC	Use of a slotted casing:	No
Borehole name:	B-5	Test depth:	21.00 ft
Test date: (mm/dd/yyyy)	03/15/2018	Manometer height above ground:	1.64 ft
Test number:	1	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

[illegible]

Remarks



Test Results	
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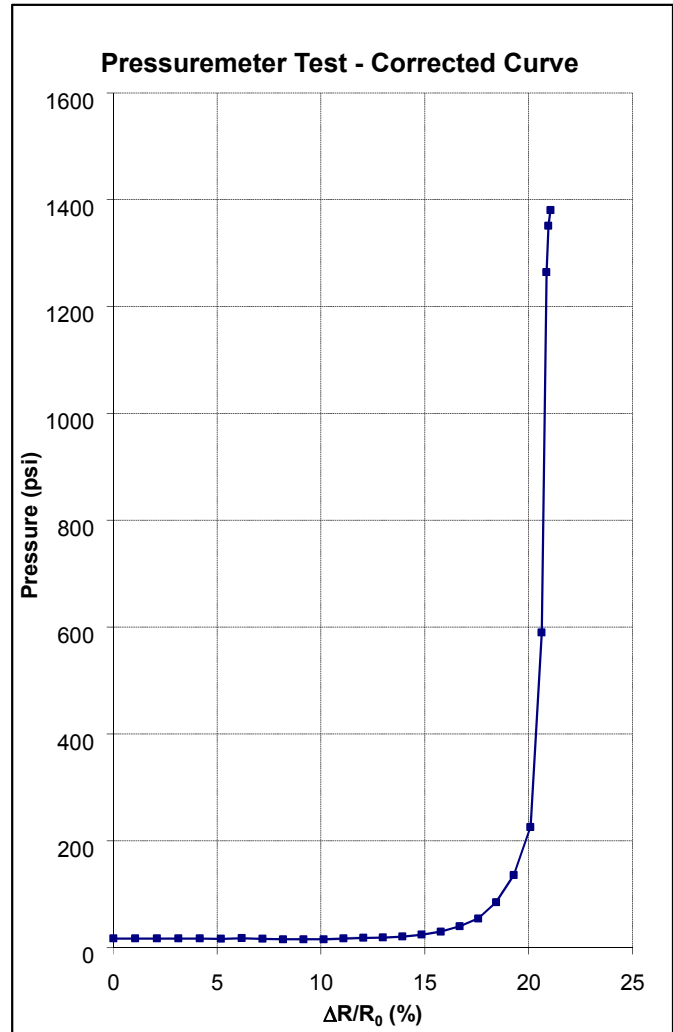
Pressiometer modulus E:	1,435 psi
Ultimate pressure P_L :	199 psi
Ratio E / P_L :	7.21
Yield pressure P_F :	74 psi
Ratio P_L / P_F :	2.70

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sort FC	Use of a slotted casing:	No
Borehole name:	B-5	Test depth:	38.00 ft
Test date: (mm/dd/yyyy)	03/15/2018	Manometer height above ground:	1.64 ft
Test number:	2	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

[illegible]

Remarks	



Test Results

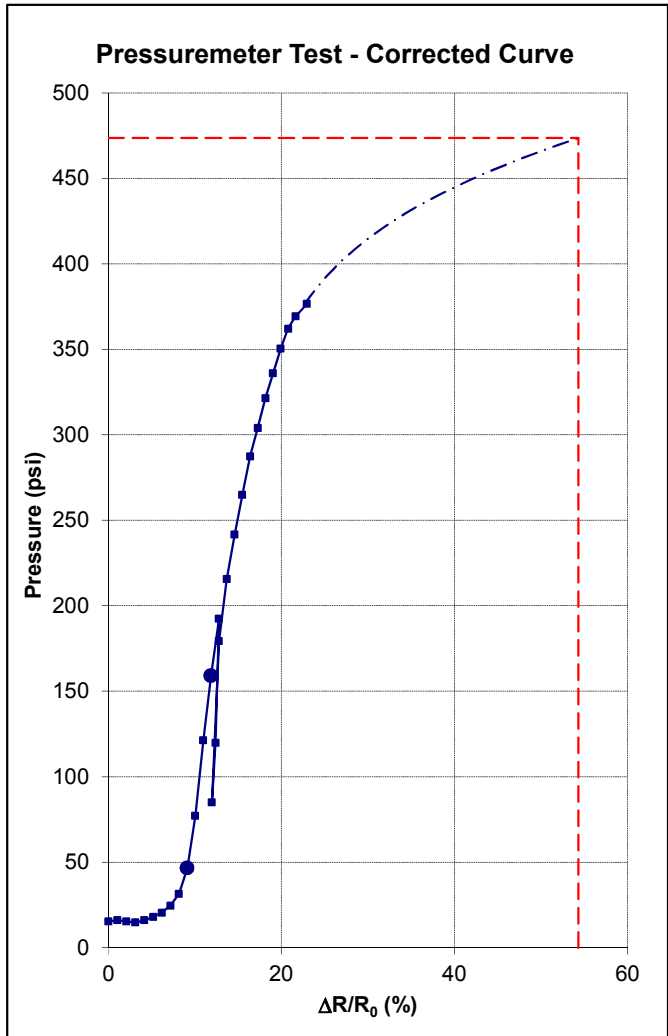
Pressiometer modulus E:	n.a.
Ultimate pressure P_L :	n.a.
Ratio E / P_L :	n.a.
Yield pressure P_F :	n.a.
Ratio P_L / P_F :	n.a.

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sort FC	Use of a slotted casing:	No
Borehole name:	B-11	Test depth:	34.00 ft
Test date: (mm/dd/yyyy)	03/19/2018	Manometer height above ground:	1.64 ft
Test number:	2	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

[illegible]

Remarks



Test Results	
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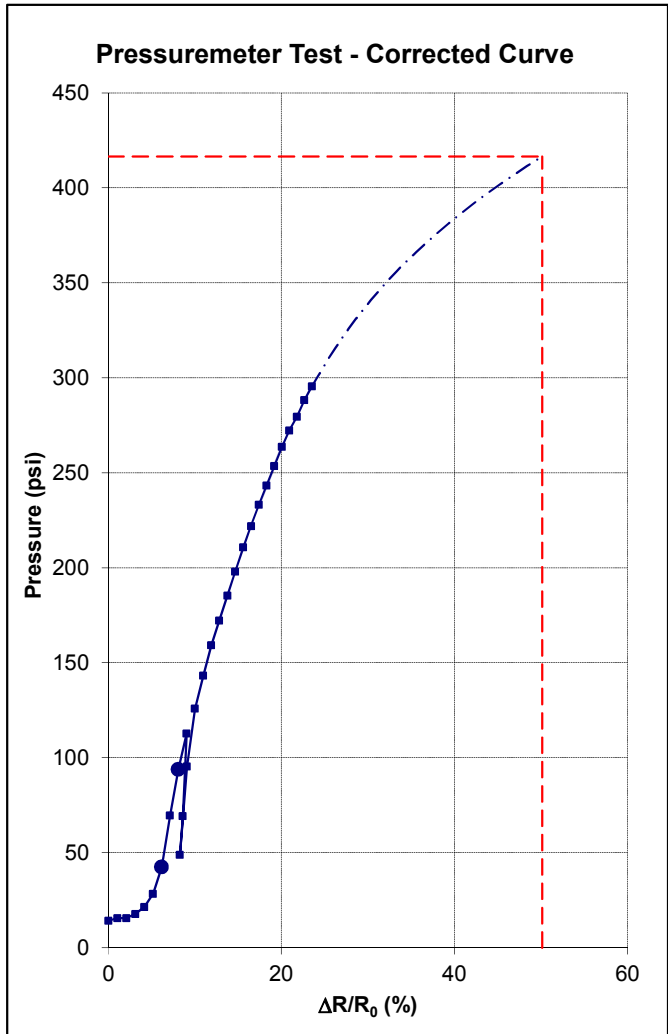
Pressiometer modulus E:	6,001 psi
Ultimate pressure P_L :	474 psi
Ratio E / P_L :	12.67
Yield pressure P_F :	159 psi
Ratio P_L / P_F :	2.98

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sort FC	Use of a slotted casing:	No
Borehole name:	B-13	Test depth:	31.00 ft
Test date: (mm/dd/yyyy)	03/16/2018	Manometer height above ground:	1.64 ft
Test number:	1	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

[illegible]

Remarks



Test Results	
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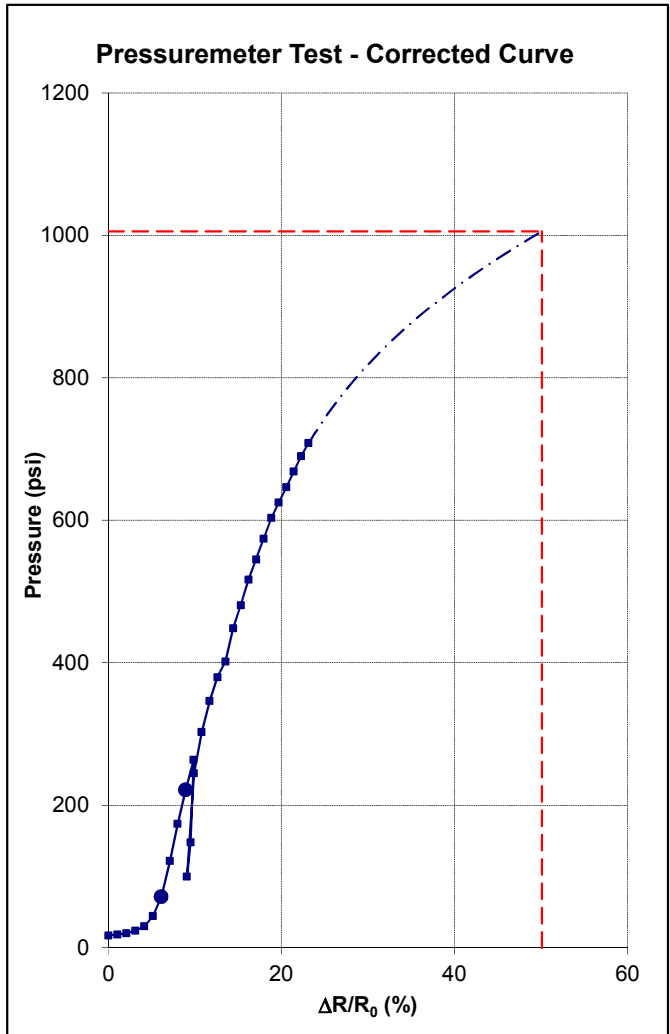
Pressiometer modulus E:	3,799 psi
Ultimate pressure P_L :	417 psi
Ratio E / P_L :	9.12
Yield pressure P_F :	94 psi
Ratio P_L / P_F :	4.43

	TEXAM Pressuremeter Test
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Project name:	Distribution Center AR Sort FC	Use of a slotted casing:	No
Borehole name:	B-13	Test depth:	38.00 ft
Test date: (mm/dd/yyyy)	03/16/2018	Manometer height above ground:	1.64 ft
Test number:	2	Poisson's coefficient:	0.33
Probe size:	N	Fluid density:	1.000

[illegible]

Remarks



Test Results

Pressiometer modulus E: **7,650 psi**

Ultimate pressure P_L : **1,006 psi**

Ratio E / P_L: 7.61

Yield pressure P_F : 222 psi

Ratio P_L / P_F : 4.54

APPENDIX III

2018 SHALLOW GROUNDWATER FLOW MAP

Legend

- Monitoring Well with Water Level (1/28/18)
- Monitoring Well FlowLine
- Monitoring Well GW Contours (1/28/18) Inferred are dashed
- Property Lots
- Approximate Area Locations (Current)
- Greenway
- Storm Water Basin

NOTES:
1. Wells that were not measured are not shown (i.e. damaged, etc.).
2. Elevations are based on the Mean Sea Level Datum. Horizontal Datum is based on the Wisconsin State Plane South (NAD1983).



1 inch = 225 feet



CURRENT ENVIRONMENTAL CONDITIONS
(Shallow-1/28/18)

REDEVELOPMENT AUTHORITY OF THE CITY OF MILWAUKEE
CENTURY CITY PROPERTY
MILWAUKEE, WISCONSIN

