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September 6, 2005

TTL Project No. 20187.01

Mr. Dennis Hatau
Meijer, Inc.
2929 Walker Avenue, N.W.
Grand Rapids, Michigan 49544-9428

Geotechnical Subsurface Investigation
Proposed Meijer Store
New Baltimore, Michigan

Dear Mr. Hatau:

Following is the report of our geotechnical subsurface investigation at the site of the referenced project. This study was authorized by supplemental contract, dated July 27, 2005, that authorized the work to be performed in accordance with TTL Proposal No. P20187.01, dated June 14, 2005. This report contains the results of our study, our engineering interpretation of the results with respect to the project characteristics, and our recommendations for building foundation, floor slab, underground storage tanks, and pavement design and construction.

Soil samples collected during this investigation will be stored at our laboratory for 90 days from the date of this report. The samples will be discarded after this time unless you request that they be saved or delivered to you.

Should you have any questions regarding this report or require additional information, please contact our office.

Sincerely,

TTL Associates, Inc.

Timothy C. Noyes, P.E.
Geotechnical Engineer

Jeffrey S. Elliott, P.E.
Vice President

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GEOTECHNICAL SUBSURFACE INVESTIGATION
PROPOSED MEIJER STORE
NEW BALTIMORE, MICHIGAN

FOR

MEIJER, INC.
2929 WALKER AVENUE, N.W.
GRAND RAPIDS, MICHIGAN

SUBMITTED

SEPTEMBER 6, 2005
TTL PROJECT NO. 20187.01

TTL ASSOCIATES, INC.
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1.0 INTRODUCTION

This geotechnical subsurface investigation report has been prepared for the proposed Meijer Store which is to be located at the northeast intersection of I-94 and 26 Mile Road in New Baltimore, Michigan. This report summarizes our understanding of the proposed construction, describes the investigative and testing procedures, presents the findings, discusses our evaluations and conclusions, and provides our design and construction recommendations for foundations, floor slabs, detention ponds, underground storage tanks (USTs), and pavements.

This study was authorized by supplemental contract, dated July 27, 2005, that authorized the work to be performed in accordance with TTL Proposal No. P20187.01, dated June 14, 2005.

The purpose of this investigation was to evaluate the subsurface conditions at this site to provide foundation and pavement design and construction recommendations for the proposed project. To accomplish this, nineteen soil test borings, field and laboratory soil testing, a geotechnical engineering evaluation of the test results, and a review of available geologic and soils data for the project area were performed.

This report includes:

- A description of the subsurface soil and groundwater conditions encountered at the boring locations.
- Recommendations for the design of the building foundations, floor slabs, USTs, and pavements.
- Recommendations concerning soil and groundwater related construction procedures such as site preparation, earthwork, foundation construction, and related field testing and review.

An environmental assessment of subsurface materials for potentially hazardous substances in the soil or groundwater at this site was not performed as part of this investigation.

2.0 INVESTIGATIVE PROCEDURES

Drilling operations were started on August 2, 2005, and were completed August 4, 2005. The boring locations and depths were designated by the primary design consultant, SSOE, Inc. (SSOE Job No. 05-5086-03 Plan Drawing SB-1, date 06/09/05). Boring locations were established in the field by SSOE. Borings B-19, B-20 and B-24 had to be moved from their original proposed locations due to obstructions. The approximate locations of the borings, as located by SSOE, are presented on the Test Boring Location Plan (Plate 1.0).

The soil test borings were drilled with a truck-mounted rotary drilling rig utilizing 3¼-inch diameter hollow-stem augers. The soil test borings were extended to the boring termination depths of 10, 20 and 30 feet below the existing grades. Soil samples were collected at 2½-foot intervals to a depth of 10 feet, and at 5-foot intervals thereafter to boring termination utilizing split-spoon samplers.

Split-spoon (SS) samples were obtained by the Standard Penetration Test (SPT) Method (ASTM D 1586), which consists of driving a 2-inch outside diameter split-spoon sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler is driven in three successive 6-inch increments, with the number of blows per increment being recorded. The sum of the number of blows required to advance the sampler the last 2 six inch increments is termed the Standard Penetration Resistance (N-value) and is presented on the Logs of Test Borings. The split-spoon samples were sealed in jars and transported to our laboratory for further classification and testing.

Soil conditions encountered in the test borings are presented in the Logs of Test Borings, along with information related to sample data, Standard Penetration Test results, water conditions observed in the borings, and laboratory test data. It should be noted that these logs have been prepared based on laboratory classification and testing as well as on field logs of the soils encountered.

Laboratory testing was performed on the soil samples obtained from the borings drilled for this investigation. All of the samples were visually classified in accordance with the Unified Soil Classification System (ASTM D 2488) and tested for natural moisture content (ASTM D 2216). In addition, selected intact cohesive split-spoon samples and each of the Shelby tube samples were tested in our laboratory for unconfined compressive strength (ASTM D 2166) and unit weight/natural dry density determinations (ASTM D 2937). Selected split-spoon samples were also tested for unconfined compressive strength utilizing a calibrated hand penetrometer. Additionally, Atterberg limits tests (ASTM D 4318) and particle size analyses (ASTM D 422) were performed on selected samples from Borings B-6 (SS-1) and B-24 (SS-2). The results of these tests are presented on the Logs of Test Borings, Tabulation of Test Data, and a graphical presentation of the particle size analyses are provided on the Soil Classification Data sheets.

Experience indicates that actual subsoil conditions at a site could vary from those generalized based on test borings made at specific locations. Therefore, it is essential that a geotechnical engineer be retained to provide soil engineering services during the site preparation, excavation, and foundation phases of the proposed project. This is to observe and verify compliance with the design concepts, specifications, and recommendations, and to allow design changes in the event subsurface conditions differ from those anticipated prior to the start of construction.

3.0 PROPOSED CONSTRUCTION

Based upon the information provided, it is our understanding that the proposed project consists of construction of a new Meijer facility on the northeast corner of I-94 and 26 Mile Road in New Baltimore, Michigan. The development will include the construction of an approximately 210,000 square foot store and an approximately 2,650 square foot gas station/convenience store, with detached car wash and pump island with canopy. Additionally, pertinent structures and site development will include parking areas, loading docks, an access drive, underground fuel tanks, and detention ponds.

Based on our previous work on Meijer projects, and Meijer's "Guidelines for Soil and Foundation Investigation Reports, Revised May 13, 2004", we anticipate that the Meijer Store and gas station/convenience store will be single story, slab-on-grade structures. It is anticipated that the maximum column load for the main store will be approximately 40 kips, and the wall loads will not exceed 3 kips per lineal foot (klf). Structural loading for the gas station/convenience store convenience store are generally light, with wall loads not exceeding 2.2 kips per lineal foot. Structural loads associated with the pump island and canopy are generally light in magnitude, with column loads not exceeding 15 kips.

The proposed pavements are to consist of standard and heavy-duty and pavement areas. The standard duty pavements are to be at the parking areas and the heavy-duty pavements will be at the entrance drives and delivery routes for truck traffic. The pavement design criteria, based on the data provided by Meijer, is to be 27,000, 18-kip Equivalent Single Axle Loads (ESALs) for light duty pavement and 175,000 ESALs for heavy duty pavements. We understand that this pavement criteria is based upon a 20-year design life.

4.0 GENERAL SITE AND SUBSURFACE CONDITIONS

4.1 General Site Conditions

At the time of this investigation, the was an undeveloped, partially wooded parcel of land located in the northeast quadrant of the intersection of I-94 and 26 Mile Road in Lenox Township, Macomb County, Michigan.

Furnished topographic data indicates that the site is relatively level.

Surface materials encountered at the boring locations consisted of topsoil. The topsoil typically ranged in depth from 3 to 6 inches.

4.2 General Soil Conditions

Based on the results of our field and laboratory tests, the encountered subsurface profile was found to have a variable stratigraphy, consisting of both native cohesive and granular soils to the boring termination depths of 10, 20 and 30 feet below existing surface elevation.

In Borings B-1 through B-3, B-6 and B-7, cohesive soils were encountered underlying the topsoil to boring termination. In Borings B-12, B-14, B-17 through B-19, B-23 and B-24, granular soils were encountered underlying the topsoil to boring termination. In Borings B-13 and B-25, the granular and cohesive soils were intermixed. In the remaining borings, cohesive soils were generally encountered underlying the topsoil to depths of 9 to 14 feet.

The cohesive soils consisted of stiff to very hard clay (CL), silty clay (CL/ML), and silt (ML). SPT N-values in these cohesive soils ranged from 9 to 57 blows per foot (bpf), with unconfined compressive strengths ranging from 3,960 to 11,680 pounds per square foot (psf). The natural moisture content of these clays and silts generally ranged from approximately 13 to 26 percent.

The granular soils consisted of loose to very dense poorly graded sand (SP) and silty sand (SM). SPT N-values in these sandy soils ranged from 5 to 87 blows per foot (bpf), with split spoon refusal (SSR, more than 50 blows with less than six inches of advancement) being encountered in Borings B-4, B-5, B-9 and B-10 at depths between 15 and 20 feet. The natural moisture content of these sands generally ranged from approximately 4 to 25 percent.

The stratigraphy encountered in each of the test borings is presented on the Logs of Test Borings.

The following table summarizes the results of the particle size analysis and Atterberg Limits data:

Boring No.	Sample Type and Depth (Feet)	In-situ Moisture Content (%)	In-situ Dry Density (pcf)	Liquid Limit (LL)	Plastic Limit (PL)	AASHTO Classification (G.I.)
B-6	SS-1 (1.-2.5)	20.7	99.9	56	27	A-7-6 (19)
B-24	SS-2 (3.5-5)	7.9	---	NP	NP	A-3 (2)

4.3 Groundwater Conditions

Groundwater was encountered during drilling operations in 18 of the boreholes at depths ranging from 2.5 to 14.6 feet below existing grade. Upon completion of drilling operations, groundwater was encountered in 17 of the boreholes at depths ranging from 5.0 to 22.0 feet. The groundwater depths recorded during and at completion of drilling are summarized in the following table:

Boring Number	**Approximate Depth of Groundwater (feet)**	
	Encountered During Drilling	**At Completion of Drilling**
B-1	-	-
B-2	-	-
B-3	-	-
B-4	14.0	14.0
B-5	15.0	17.0
B-6	-	-
B-7	15.0	16.0
B-8	14.6	17.0
B-9	10.0	15.0
B-10	9.0	11.0
B-11	9.0	7.0
B-12	6.5	15.0
B-13	4.0	11.0
B-14	2.5	11.0
B-15	5.0	13.0
B-16	-	-
B-17	5.0	5.0
B-18	-	-
B-19	5.0	7.0
B-20	6.5	14.5
B-21	13.5	22.0
B-22	6.0	16.5
B-23	-	-
B-24	9.0	-
B-25	7.0	9.0

It should be noted that the borings were drilled and backfilled within the same day. As such, stabilized water levels may not have occurred over this limited time period. Instrumentation was not installed to observe long-term groundwater levels.

Based on the groundwater and soil characteristics and coloration encountered in the borings, it is our opinion that the long-term groundwater table will generally be encountered at a depth of approximately 8 feet or greater below existing grade. However, groundwater levels tend to fluctuate with seasonal and climatic influences. In particular, during periods of above-normal precipitation or heavy surface infiltration, apparent groundwater levels or saturated conditions may occur at shallower depths for a short duration of time.

It should be noted that the subsurface profile consists of both cohesive and granular soils. Therefore, open cut or sloped excavations below the groundwater table may experience "weeping" or minor seepage. The likelihood of these seepage conditions can be expected to increase during seasonally wet periods.

5.0 DESIGN RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction and on the data obtained during this field investigation and our previous investigation. The soil conditions encountered in this investigation were typically consistent with those encountered in our previous investigation. As such, the following design and construction recommendations are consistent with those presented in our previous report. If the project information or location as outlined is incorrect or should change significantly, a review of these recommendations should be made by TTL. These recommendations are subject to satisfactory completion of the recommended site and subgrade preparation and fill placement operations described in Section 6.0, "Construction Recommendations."

5.1 Foundations

We understand that it is Meijer's practice to design foundation bearing depths at consistent elevations for both interior and exterior footings, generally at the nominal frost protection depth.

Based on the results of our field and laboratory tests, the footings for the proposed structures will bear in stiff to very hard cohesive soils and loose to very dense sands. Shallow foundations bearing in at least stiff cohesive soils or dense granular soils or on engineered fill materials compacted to 95 percent of their maximum dry density as determined by a Modified Proctor (ASTM D 1557), may be designed utilizing a net allowable bearing pressure of 3,000 pounds per square foot (psf) for strip (wall) footings and square (column) footings. Shallow foundations bearing on the very stiff to hard clay soils or very dense sands may be designed for a net allowable bearing pressure of 6,000 psf for strip (wall) and square (column) footings, based on a confirmation of field unconfined compressive strengths of at least 6,000 psf. In using net allowable soil pressures, the weight of footings, backfill over the footings, or floor slabs need not be included in the structural loads for dimensioning footings.

Loose sands were encountered in the soil borings near the proposed bearing elevations. In addition, it is not uncommon for these sands to be disturbed during footing excavation. If the sands at the footing bearing elevation are loose, they should be re-compacted in-place to at least medium dense compactness using a hoe pac or similar equipment. If the 6,000 psf bearing is desired, the sands should be re-compacted to very dense compactness. If unsuitable soils or soils that cannot be modified in-place are encountered during footing excavations, they should be removed and replaced with a well-compacted dense graded aggregate such as a MDOT 21AA type material. In addition the excavation should be widened 1 foot for every 2 feet of depth and centered along the footing. A low strength cementitious material, or " flowable fill" with a minimum unconfined compressive strength of 300 pounds per square inch (psi) could also be used to backfill the over-excavation.

At this site, due to the variable soil conditions encountered in the borings, we strongly recommend that a TTL geotechnical engineer be retained to perform a detailed footing and excavation inspection prior to the placement of reinforcement steel and/or concrete. The purpose of such an inspection is to verify that the exposed soil conditions are consistent with both the subsurface conditions encountered in the test borings and the design recommendations in this report. If the results of calibrated hand penetrometer, Housel penetration hammer, or other strength tests indicate that the exposed soil conditions are less favorable than those noted by this study, it may be necessary to over-excavate the unacceptable materials or to modify them in-place.

Utilizing the above bearing pressures and proper foundation inspection, the total and differential settlements associated with the proposed structures should be within tolerable limits. The total settlements associated with each structure should not exceed 1 inch, and the differential settlements should not exceed ½ inch.

The width of strip footings should not be less than 18 inches and the minimum dimension for column footings should be 30 inches, regardless of the resulting soil bearing pressure. All exterior footings and footings in unheated areas should be constructed at a minimum depth of 3½ feet below exposed finished grades.

5.2 Floor Slab Design

Based on the anticipated floor loads, it is recommended all concrete floor slabs be "floating," that is, fully ground supported and not structurally connected to walls or foundations. This is to minimize the possibility of cracking and displacement of the floor slabs because of differential movements between the slab and the foundation. Such movements could be detrimental to the slabs if they were rigidly connected to the foundations. There may be certain areas where it will be difficult, or impractical, to make the slab floating. In such areas, it may be necessary to increase the slab thickness and add reinforcement to prevent the foundation from cracking the slab and settling independently. Additionally, we recommend that control joints and saw cuts be placed in accordance with ACI standards of practice to further aid in proper functioning of the floor slab.

For the untreated native subgrade soils that have been proof rolled and inspected in accordance with the recommendations provided in Sections 6.1 and 6.2 of this report, a modulus of subgrade reaction (k) of 100 pounds per cubic inch (pci) may be used for floor slab design. We recommend that the upper 12 inches of the existing subgrade materials be compacted to a minimum of 95 percent of their maximum dry density as determined by ASTM D 1557 (Modified Proctor), or confirmed as stable by proof rolling. We further recommend that the floor slab be supported on a minimum 6-inch layer of compacted aggregate similar to an MDOT 21AA gradation to help distribute concentrated loads and provide more uniform subgrade support beneath the slab. If a minimum of 6 inches of aggregate is used, the effective modulus of subgrade reaction may be taken as 120 pci.

5.3 Pavement Design

5.3.1 Subgrade Soils

Test borings were completed at the entry areas, parking areas, and internal truck delivery routes. The subgrades that would result upon the satisfactory completion of the site preparation and proof rolling activities outlined in Section 6.0 of this report are considered marginally acceptable for the support of pavements. The results of the particle size analyses and Atterberg limit tests performed on selected samples from these areas indicates the near-surface soils for subgrade support of pavements may be classified as Type A-3 (sand) and Type A-7-6 (clay) soils, in accordance with the American Association of State Highway and Transportation Officials (AASHTO) system of soil classification. Soils of the A-7-6 type are considered very poor as subgrade materials due to the high percentage of fines that make them susceptible to moisture and frost heave. Thus, these soils will dictate pavement design.

The natural moisture contents of the samples within the upper 3 to 5 feet generally ranged from approximately 4 to 24 percent. These values range from somewhat below to significantly above the anticipated optimum moisture contents for the site soils. Therefore, it appears that some remedial action may be required to adjust the moisture contents of the existing materials to achieve proper compaction of the subgrade soils, although extensive areas of remediation are not anticipated unless construction is performed during a particularly wet seasonal period.

Should construction be performed during a seasonally wet period, lowering the moisture content by scarification and aeration (discing and exposure to sun and wind) may not be feasible. Exposure of the on-site clay soils to very moist to wet conditions will result in "pumping" under the operation of heavy equipment, resulting in deep rutting and perhaps rendering the operation of grading and paving equipment difficult or impossible.

Should project time constraints prohibit the natural drying and remediation of the near-surface native soils, modification of the subgrade may be achieved by undercutting and replacing unsuitable subgrade soils with dry granular subbase (possibly in combination with a geotextile fabric or geogrid reinforcement fabric), mixing stone into the subgrade, or treating the subgrade with lime or cement. The method of subgrade modification should be determined at the time of construction. (See Section 6.1, "Construction Recommendations - Site and Subgrade Preparation.")

5.3.2 Flexible Pavements (Asphalt)

Based on the index properties of the on-site subgrade soils, previous work done on this project, and our experience with similar soils, we recommend that a subgrade CBR value of 3 percent be used for design of flexible pavements at the site. This CBR value is based on a subgrade verified as stable through proof rolling in accordance with Section 6.0 of this report.

This CBR value is based on a subgrade verified as stable after proof rolling or placement of fill from the on-site excavations compacted to at least 95 percent of the Modified Proctor maximum dry density as determined by ASTM D 1557 specifications. For specific site preparation recommendations in the parking and drive areas, refer to Section 6.1 "Construction Recommendations - Site and Subgrade Preparation." If it is desired to utilize a higher CBR value for the heavy-duty pavements, it would be necessary to utilize a clean granular fill to raise existing grades or to undercut the cohesive soils at the heavy duty pavement areas and replace them with the granular soils.

The following design criteria were used to determine pavement thickness:

1	Pavement Reliability	85%
2	Overall Standard Deviation	0.35
3	Resilience Modulus (M_r = CBR x 1200)	3,600
4	PSI Loss	2.0
5	Layer Coefficient, Asphalt Surface and Binder Course	0.36
6	Layer Coefficient, Aggregate Base Course	0.14

We have evaluated the pavement design based on the provided traffic volumes and the resulting design ESALs and structural numbers (SN) identified on the following table for a 20-year design life. The Structural Number (SN) values calculated for the pavements were determined using the criteria listed above and AASHTO design methods for traffic loading.

The existing subgrades, modified where necessary as outlined above, are considered suitable for the support of the following pavement design:

Pavement Design – Asphalt		
	Light Duty	**Heavy Duty**
MDOT Item 13A Asphalt	1.5”	1.5"
MDOT Item 3C Asphalt	1.5”	2.5"
MDOT Item 21A Stone Base	9.0”	12.0"
Required Structural No. (SN)	2.31	3.11
Geotextile separation fabric	As required by subgrade conditions	Recommended in drive lanes
Subgrade compacted to 95% Modified Proctor to a minimum depth of 12 inches, or verified to be stable by proof rolling		

We recommend that a separation fabric consisting of a non-woven geotextile be placed between the compacted subgrade and the MDOT 21A stone subbase in the drive lane (heavy duty) areas that will experience high truck traffic loadings. The non-woven geotextile would inhibit the pumping of fine particles into the proposed granular subbase, or vise versa, and prolong its drainage characteristics over the design life of the proposed pavement. The non-woven geotextile used to separate the granular subbase and the cohesive subgrade should be similar to Contech C-60NW and should meet AASHTO-AGC-ARTBA Task Force 25 specifications for medium survivability separation geotextiles.

It is recommended that proof-rolling/compaction, placement of aggregate base, and placement of asphalt is performed within as short a time period as possible. Exposure of the aggregate base to rain, snow, or freezing conditions may lead to deterioration of the subgrade and/or base due to excessive moisture conditions and to difficulties in achieving the required compaction.

The pavement and subgrade preparation procedures outlined in this report should result in a reasonably workable and satisfactory pavement. However, it should be recognized that all flexible pavements need repairs or overlays from time to time as a result of progressive yielding under repeated traffic loads for a prolonged period of time, as well as exposure to freeze-thaw conditions.

5.3.3 Rigid Pavements (Concrete)

For the native, properly prepared, untreated subgrade soils, a modulus of subgrade reaction (k) of 100 pounds per cubic inch (pci) may be used for rigid pavement design. A concrete pavement section is recommended in the loading-unloading areas, site exit and entrance aprons, and trash enclosure areas (including the area where the truck is parked at the time the trash is being loaded onto the truck). This section should consist of a minimum of 6 inches of reinforced, air-entrained concrete underlain by a minimum of 8 inches of a dense-graded granular base. The concrete should have a minimum compressive strength of 3,500 psi and meet the general requirements of rigid concrete as outlined in MDOT Division 6 Standard Specifications for Construction. The pavement section should be supported on subgrade compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557 (Modified Proctor) or verified as stable through proof-rolling.

5.3.4 Pavement Drainage

Based on the poorly-drained nature of the cohesive subgrade soils, it is anticipated that surface water infiltration may collect in the granular pavement subbase course. Without adequate drainage, water will remain in the base for extended periods of time, creating localized, wet, soft pockets. The presence of these pockets will increase the likelihood that pavement failures (cracking, potholes, etc.) will develop. Drainage features may include grading the subgrade surface to slope downward to the outside edge of pavement and/or providing longitudinal edge drains connected to storm sewers or other outlets. A system of " finger drains" should also be installed near any catch basins within the pavement areas to collect surface water, and thus reduce the possibility of freeze-thaw effects on the pavement.

5.4 Groundwater Control

As previously discussed, groundwater was encountered during drilling operations in 18 of the boreholes at depths ranging from 2.5 to 14.6 feet below existing grade. Upon completion of drilling operations, groundwater was encountered in 17 of the boreholes at depths ranging from 5.0 to 22.0 feet. Based on soil characteristics and coloration in the borings, it is our opinion that the "normal" groundwater table can generally be expected at a depth of 8 feet or greater below the existing ground surface. As such, groundwater seepage into " short-term" construction excavations is not anticipated to be a major concern. If construction does not occur during a particularly wet period, adequate control of groundwater seepage, perched water conditions, and surface run-off into excavations should be achievable by minor dewatering systems, such as pumping from prepared sumps.

As previously discussed, depending on seasonal conditions at the time of construction, near-surface seasonal high groundwater conditions could be encountered at this site, creating unstable subgrades for foundations, floor slabs, and pavements. Additional measures to control surface run-off and perched water are discussed in Section 6.1, "Site and Subgrade Preparation."

5.5 Excavations and Slopes

The sides of temporary excavations for building foundations, utility installations, and other construction should be adequately sloped to provide stable sides and safe working conditions. Otherwise, the excavation must be properly braced against lateral movements. In any case, applicable OSHA safety standards must be followed.

Based on the test borings and laboratory test results, the cohesive soils encountered in the borings may be generally classified as OSHA Type A and Type C soils. By definition, OSHA Type A soils are cohesive soils with unconfined compressive strengths of 1.5 or greater tons per square foot (tsf), and Type C soils are granular soils. In general, most excavations in the upper 5 feet of profile are expected to meet Type A criteria. Temporary slopes in areas of Type A materials must be constructed no steeper than 0.75H:1V. Temporary slopes in areas of Type C materials must be constructed no steeper than 1.5 Horizontal to 1.0 Vertical (1.5H:1V). In all cases, flatter slopes may be required if lower-strength soils or adverse seepage conditions are encountered.

For permanent excavations and slopes, the grades should be no steeper than 3H:1V without further geotechnical review of the grading plan.

5.6 Underground Storage Tanks

Borings B-21 and B-22 were drilled within the general area of the underground storage tanks (USTs). The subsoils generally consisted of very dense silty sand (SM) at the anticipated tank invert depths of 10 to 15 feet below exiting grade. The subsoils encountered at these depths are considered suitable for the support of USTs. We recommend that the proposed USTs be supported on firm granular bedding material extending a minimum of 12 inches below the bottom of the proposed USTs or in accordance with tank installation specifications for very dense sands. If particularly wet conditions are encountered at the time of excavation, additional stone may be required.

5.7 Loading Dock Walls

Foundations for loading dock walls bearing at depths discussed in Section 5.1 of this report may be designed for the corresponding net allowable soil bearing pressures at the design depths. For below-grade walls that are restrained from rotation and are considered rigid and non-yielding, lateral earth pressures should be assumed for at-rest conditions. An at-rest lateral earth pressure coefficient (k_o) of 0.5 should be used in determining the lateral pressure acting on the walls, along with a soil unit weight of 130 pounds per cubic foot (pcf). For retaining structures or below-grade walls that are not restrained at the top of the wall, an active lateral earth pressure coefficient (k_a) of 0.33 may be used for design. Alternately, equivalent fluid weights of 65 pcf and 45 pcf may be used for at-rest and active case designs, respectively.

Backfill behind below-grade walls should consist of clean, granular material with less than 8 percent finer than the No. 200 sieve. Aggregate conforming to the gradation requirements for MDOT 6A aggregate (3/4" - #4 stone) is one example of an acceptable material. We do not recommend the use of MDOT 21AA or 22A, since both allow a higher percentage of fines. The thickness of the backfill zone should be at least 24 inches behind the wall at the base.

We recommend that a foundation drain be placed at the footing level around the perimeter to prevent water build-up behind the below-grade walls. The foundation drain should be designed to prevent clogging from silt and clay-size particles that may infiltrate the stone. It would be beneficial to "wrap" the backfill in a geotextile separation fabric to provide further migration of silts and clays.

5.8 Detention Ponds

While no proposed detention ponds are shown on the boring location drawing, it is our understanding that they may be included in the final site plan. Based on our pervious experience, we anticipate that a detention pond would be excavated to approximately 5 feet below existing grade. Based on the results of the field and laboratory tests, the stiff lean clay (CL) subsoils are expected to have a low permeability that is favorable for detention pond design. If a pond is planned in an area with silty sand (SM) subsoils, it is recommended that the pond be lined with approximately two feet of compacted clay.

It is recommended that permanent pond slopes be constructed no steeper than 3.0 horizontal to 1.0 vertical (3H:1V). All slopes should have erosion protection, such as riprap, man-made materials, and/or topsoil. Seeding of the exterior slopes should be completed as soon as possible after construction is complete. All fill should be placed and compacted as outlined in Section 6.0, "Construction Recommendations."

6.0 CONSTRUCTION RECOMMENDATIONS

6.1 Site and Subgrade Preparation

Prior to proceeding with construction operations, all vegetation, root systems, and other deleterious non-soil materials should be stripped from the proposed construction area and disposed of off-site. Suitable topsoil stripped from the building and pavement areas may be stockpiled for later use in landscaped areas.

It should be noted that topsoil thicknesses referenced in the borings may vary across the site. Typically, soils with more than 3 percent organics are not recommended for use in engineered fills. Close inspection of stripping operations by a TTL engineer or qualified representative at the time of stripping operations is recommended to identify the actual amount of required stripping. Depending on encountered conditions, including both organic content and soil moisture content, it may be feasible to utilize "marginal" materials in the topsoil-subsoil transition zone in non-critical fill areas such as parking areas.

Upon completion of the stripping and clearing, the areas intended to support new fill, pavements, floor slabs, and foundations should be carefully inspected by a geotechnical engineer. At that time, the engineer may require proof rolling of the cohesive subgrade soils utilizing a 20- to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. The vehicle should make a sufficient number of passes, in two perpendicular directions, covering the proposed development area, to locate any soft, weak, or excessively wet soils that may be present at the time of construction.

Proof-rolling/compaction of the granular subgrade soils should be completed using a vibratory smooth drum roller. The roller should make a minimum of two passes covering the proposed development area, with additional passes as necessary to achieve required compaction and/or subgrade stabilization. The purpose of the vibratory compaction is to densify zones of loose sand that are encountered in the upper portion of the soil profile, thereby improving bearing capacity, providing more uniform subgrade support, and reducing post-construction settlement. We recommend a roller with a minimum dead weight on the drums of 8 tons, vibrating at 30 Hz or greater, and travelling at speeds not exceeding approximately 4 feet per second (about 3 miles per hour). These operational criteria should provide sufficient dynamic compaction energy to alleviate loose soil conditions within the zone of floor slab and pavement subgrade support.

Any unsuitable materials observed during the inspection and proof-rolling operations should be undercut and replaced with compacted fill, or stabilized in place utilizing conventional remedial measures. Once the site has been proof rolled, inspected, and stabilized, the proof-rolled area should not be allowed to remain exposed to wet conditions. It should be noted that during periods of wet weather, the cohesive soils that will be exposed at design subgrades will tend to pond water for short periods of time, with the potential to deteriorate the prepared subgrade. Additionally, we recommend that the fill areas be constantly sloped for positive gravity drainage to avoid ponded water on fills, and that fill areas be sealed at the end of each day by smooth-drum rolling when there is a threat of precipitation.

The results of the proof-rolling and inspection operations will be partially dependent on construction operations, the moisture content of the soil, and the weather conditions prevalent at the time. If pumping or rutting is encountered and difficulty is experienced in the operation of construction equipment, TTL should be notified to determine which method of subgrade modification may be best suited for the conditions encountered. At that time, we may recommend that a small test area be used to determine the necessary depth of undercutting and stone replacement to achieve a stable subgrade condition.

Due to the presence of the predominantly clay subgrade soils and the potential for seasonal high water table conditions (perched or ponded), it is our opinion that completion of the excavation and site work activities will likely require care and diligence by the contractor to avoid loss of subgrade strength and to minimize undercut areas. We recommend that stormwater drains be installed as early in the project as the construction schedule will allow, even before the start of general site grading and fill placement, if possible. Free-draining granular material should be used to backfill the stormwater pipe trenches so that these locations act as a " French Drain" to help control potential perched water zones. In addition, if localized areas of perched water or saturated conditions are identified, perforated corrugated polyethylene drain pipe (commonly referred to as drain tile) can be installed to help drain these areas, using the stormwater drain system as a gravity discharge zone.

6.2 Fill

Material used for engineered fill or backfill required to achieve design grades must be free of debris, organic matter, excessive moisture, and rock or stone fragments larger than 3 inches in diameter. As previously discussed, it is our understanding that the site soils excavated from the detention pond area will be utilized as engineered fill materials. The native soils are identified as predominantly lean clays. Fills of this type are sensitive to moisture content and potentially adverse effects to structures and pavements should be expected if close quality control is not maintained at the time of placement and compaction of these soils.

Based on the results of the Atterberg limits, and moisture content tests, the lean clays identified at the site have in-situ moisture contents that generally range from slightly below to significantly above optimum. To minimize the adverse effects of compaction of the clays too wet or too dry of optimum, we recommend that the site clays be placed within a range of –2 to +2 percent of the optimum moisture content as determined by Modified Proctor testing in building pad and parking lot areas. Based on the typical range of natural moisture contents encountered in the upper profile soils during this investigation, the on-site soils expected to be used as engineered fill were found to range from approximately 2 percent below optimum and up to 10 percent above anticipated optimum moisture contents. Thus, depending on seasonal conditions and precipitation during construction, the contractor should be prepared to both add a slight amount of water to achieve satisfactory fill placement as well as scarify and aerate (by discing) soils that are too wet of optimum.

Fill should be placed in uniform layers no more than 8 inches thick and adequately keyed into stripped and scarified soils. All fill within the building areas and pavement subgrades should be compacted to a density of not less than 95 percent of the maximum dry density as determined by ASTM D 1557 (Modified Proctor). In non-structural areas outside the building, the fill should be compacted to not less than 90 percent of the same standard.

The on-site soils consist of both granular and cohesive soils. The contractor should be prepared to use a smooth drum vibratory roller to provide effective compaction of the granular soils and a sheepsfoot roller for the cohesive soils. In narrow utility or footing excavations, the more silty or clayey on-site granular materials may be difficult to compact; therefore, a clean granular material may be required in these areas.

6.3 Foundation Excavations

As mentioned earlier, shallow foundations used to support the structure should have a detailed footing inspection performed in each spread or column foundation excavation. These inspections should be performed by a TTL geotechnical engineer or qualified representative to verify that the exposed materials are similar to those encountered in the borings and/or the engineered fills have been satisfactorily placed and compacted at the bearing subgrade.

We recommend that the foundation excavations be concreted as soon as practical after they are excavated and that water not be allowed to pond in any excavation. If it is necessary to leave the bearing surface open for any extended period of time, we recommend that a thin mat of lean concrete be placed over the bottom of the excavation to minimize damage to the surface from weather or construction. Foundation concrete should not be placed on frozen or saturated subgrade.

6.4 Utility Excavations

Although we have not been provided information regarding the depth of utilities at this site, the results of the test boring do not indicate that rock should not be anticipated at this site to depths of at least 30 feet.

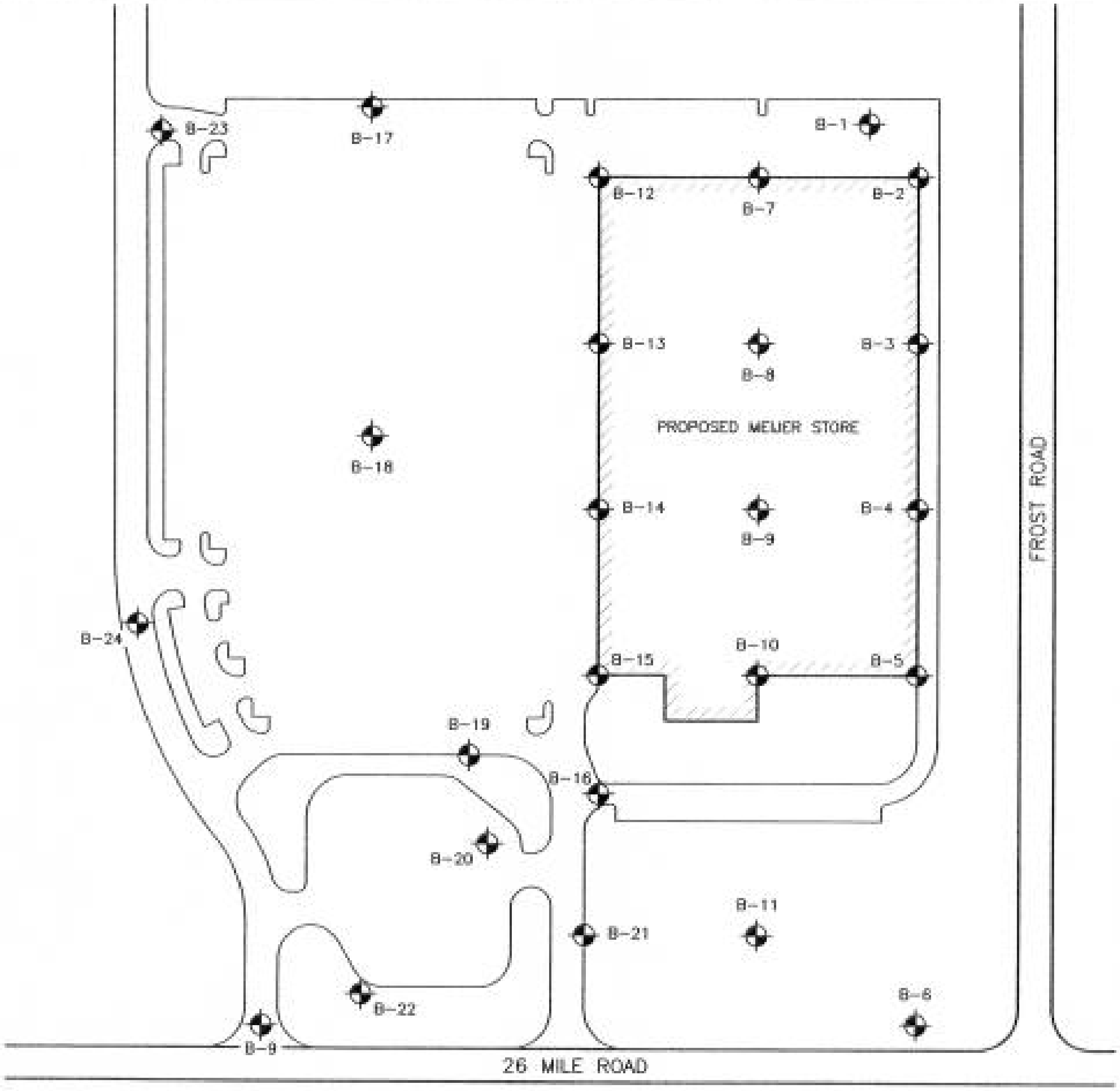
7.0 QUALIFICATION OF RECOMMENDATIONS

Our evaluation of foundation, floor slab, USTs, and pavement design and construction conditions has been based on our understanding of the site and project information and the data obtained during our field investigation. The general subsurface conditions used were based on interpolation of the subsurface data between the borings. Regardless of the thoroughness of a subsurface investigation, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe earthwork and foundation construction to confirm that the conditions anticipated in design are noted. Otherwise, TTL assumes no responsibility for construction compliance with the design concepts, specifications, or recommendations.

The design recommendations in this report have been developed based on the previously described project characteristics and subsurface conditions. If project criteria or locations change, TTL should be permitted to determine whether the recommendations must be modified. The findings of such a review will be presented in a supplemental report.

The nature and extent of variations between the borings may not become evident until the course of construction. If such variations are encountered, it will be necessary to reevaluate the recommendations of this report after on-site observations of the conditions.

Our professional services have been performed, our findings derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. TTL is not responsible for the conclusions, opinions, or recommendations of others based on this data.



LEGEND

B-1 ◆ TEST BORING LOCATION

NOT TO SCALE

N

PLATE 1.0
TEST BORING LOCATION PLAN

PROPOSED MEIJER STORE
NORTHEAST CORNER OF I-94 AND 26 MILE ROAD
NEW BALTIMORE, MICHIGAN

PREPARED FOR
MEIJER, INC.
GRAND RAPIDS, MICHIGAN

DRAWN	ALN/08-22-05	CHECKED	
REVISED		APPROVED	
JOB NO.	20187.01		
DRAWING NUMBER	**2018701-01G**		

TTL associates inc

TTL Associates, Inc.
1810 N 12th Street
Toledo, Ohio 43624
Telephone: 419-324-2222
Fax: 419-241-1808

BORING NUMBER B-01

PAGE 1 OF 1

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/2/05 **COMPLETED** 8/2/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
AT TIME OF DRILLING None
LOGGED BY KKC **CHECKED BY**
AT END OF DRILLING None
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 / ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Stiff Brown/Grey LEAN CLAY w/Sand and Trace Gravel (CL)	SS 1	100	3-7-8 (15)	3.10	99	17 ● ▲
	5		3.5' Moist Very Hard Brown/Grey LEAN CLAY w/Sand and Trace Gravel (CL)	SS 2	100	13-31-26 (57)	3.88	113	18 ● ▲
			-Hard Grey/Brown	SS 3	100	26-20-24 (44)	4.50		21 ● ▲
	10			SS 4	100	9-14-23 (37)	4.50		▲
	15		14.0' Moist Hard Brown/Grey SILTY CLAY w/Sand (CL/ML)	SS 5	100	9-13-19 (32)	4.25		19 ● ▲
	20		18.5' Moist Very Stiff Grey SILTY CLAY w/Sand and Trace Gravel (CL/ML) 20.0'	SS 6	100	6-9-12 (21)	NT		▲
			Bottom of hole at 20.0 feet.						

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BORING NUMBER B-02

PAGE 1 OF 1

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/2/05 **COMPLETED** 8/2/05
GROUND ELEVATION ______ **HOLE SIZE** ______
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
AT TIME OF DRILLING None
LOGGED BY KKC **CHECKED BY** ______
AT END OF DRILLING None
NOTES ______
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Very Stiff Brown/Grey LEAN CLAY w/Sand and Trace Gravel (CL)	SS 1	100	4-8-9 (17)	4.50		▲
				SS 2	100	10-11-12 (23)	4.50	106	18 ●▲
	5		6.0'						
			Moist Hard Brown/Grey LEAN CLAY w/Trace Sand (CL) 7.5'	SS 3	100	15-20-19 (39)	4.25		▲
			Moist Very Stiff Brown/Grey LEAN CLAY w/Sand and Trace Iron Oxide Stain	SS 4	100	6-9-17 (26)	4.25		26 ●
	10		14.0'						
			Moist Hard Grey LEAN CLAY w/Sand and Trace Gravel (CL)	SS 5	100	9-19-18 (37)	5.84	111	18 ● ▲
	15		18.5'						
			Moist Very Stiff Grey SANDY SILT w/Trace Gravel (ML) 20.0'	SS 6	100	9-14-15 (29)	4.50		15 ● ▲
	20		Bottom of hole at 20.0 feet.						

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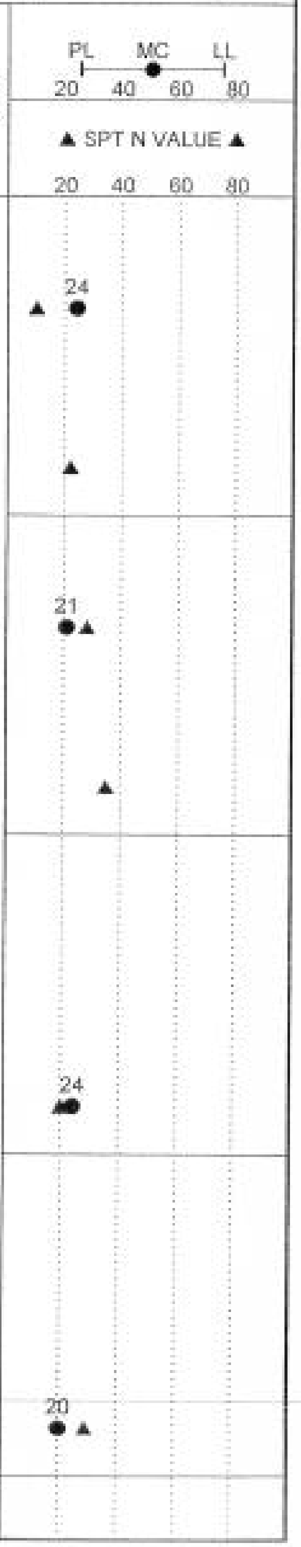
BORING NUMBER B-03

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/2/05 **COMPLETED** 8/2/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
AT TIME OF DRILLING None
LOGGED BY KKC **CHECKED BY**
AT END OF DRILLING None
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 5 Inches 0.4'						
			Moist Stiff Brown/Grey LEAN CLAY w/Sand (CL)	SS 1	100	3-4-6 (10)	4.00		24
			-Very Stiff w/Trace Sand	SS 2	100	8-10-12 (22)	4.50		
	5		-w/Sand and Trace Gravel	SS 3	100	12-14-14 (28)	3.20	103	21
			8.5'						
	10		Moist Hard Brown/Grey SANDY SILT w/Clay (ML)	SS 4	100	9-14-21 (35)	4.50		
			13.5'						
	15		Moist Very Stiff Brown/Grey SANDY SILT w/Clay and Trace Gravel (ML)	SS 5	100	8-8-12 (20)	3.50		24
			16.0'						
	20		Moist Very Stiff Grey SILTY CLAY w/Trace Sand (CL/ML) 20.0'	SS 6	100	14-15-14 (29)	1.98	105	20
			Bottom of hole at 20.0 feet.						



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BORING NUMBER B-04

PAGE 1 OF 1

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/2/05 **COMPLETED** 8/2/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
▽ **AT TIME OF DRILLING** 14.0 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 14.0 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Stiff Grey SANDY SILT w/Clay (ML) 3.5'	SS 1	100	4-4-7 (11)	4.50		▲
	5		Moist Hard Brown/Grey LEAN CLAY w/Trace Sand and Gravel (CL) 6.0'	SS 2	100	10-14-17 (31)	4.50	99	22 ● ▲
			Moist Hard Brown/Grey SILTY CLAY w/Sand and Trace Gravel (CL/ML) 8.5'	SS 3	100	16-20-24 (44)	4.50		▲
	10		Moist Very Stiff Grey/Brown LEAN CLAY w/Sand and Trace Gravel (CL) 14.0'	SS 4	100	5-9-12 (21)	2.79	92	24 ● ▲
	15	▼	Moist Dense Grey SILTY SAND w/Trace Gravel (SM)	SS 5	100	8-12-19 (31)	NP		▲
	20		-Very Dense 20.0'	SS 6	100	32-47-50/4"	NP		12 ● >>▲
			Bottom of hole at 20.0 feet.						

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BORING NUMBER B-05

PAGE 1 OF 1

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/2/05 **COMPLETED** 8/2/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 15.0 ft

LOGGED BY KKC **CHECKED BY**

▼ **AT END OF DRILLING** 17.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Stiff Brown/Grey LEAN CLAY w/Sand and Trace Gravel (CL)	SS 1	100	4-5-8 (13)	4.50	99	18
			-Very Stiff w/Trace Sand	SS 2	100	6-7-12 (19)	3.75		
	5		6.0'						
			Moist Hard Brown/Grey LEAN CLAY w/Sand and Trace Gravel (CL) 8.0'	SS 3	100	17-21-24 (45)	4.50		17
			Moist Very Stiff Grey LEAN CLAY w/Sand and Trace Gravel (CL)	SS 4	100	7-7-14 (21)	4.00		17
	10		13.5'						
			Moist Very Dense Grey SILTY SAND (SM)	SS 5	100	19-26-50/4"	NP		13 >>
	15	▽	-Wet Dense						
		▼							
			-(Free Water in Jar Noted)	SS 6	100	9-9-29 (38)	NP		23
	20		20.0'						
			Bottom of hole at 20.0 feet.						

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BORING NUMBER B-06

PAGE 1 OF 1

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/4/05 **COMPLETED** 8/4/05

GROUND ELEVATION

HOLE SIZE

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

AT TIME OF DRILLING None

LOGGED BY KKC **CHECKED BY**

AT END OF DRILLING None

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches	0.5'						
			Moist Stiff Brown LEAN CLAY w/Silt and Trace Sand (CL)							
					SS 1	100	2-3-6 (9)	2.40	99	21
			-Very Stiff							
					SS 2	100	8-10-12 (22)	4.00		25
	5									
					SS 3	100	12-12-14 (26)	4.50		
				8.5'						
			Moist Hard Brown/Grey LEAN CLAY w/Silt (CL)		SS 4	100	13-18-15 (33)	4.50		22
	10			10.0'						
			Bottom of hole at 10.0 feet.							

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BORING NUMBER B-07

PAGE 1 OF 1

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 15.0 ft

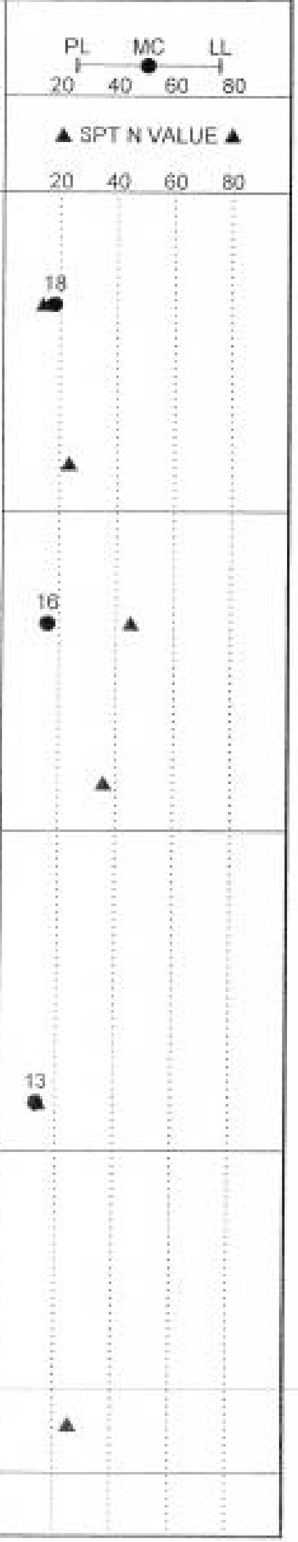
LOGGED BY KKC **CHECKED BY**

▼ **AT END OF DRILLING** 16.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)
	0							
	0.5'		TOPSOIL - 6 Inches					
			Moist Very Stiff Brown LEAN CLAY w/Trace Sand,Silt, and Calcite Stain (CL)	SS 1	100	4-5-9 (14)	NT	
	5			SS 2	100	9-9-14 (23)	4.50	
	6.0'		Moist Hard Brown LEAN CLAY w/Trace Sand and Silt (CL)	SS 3	100	17-23-22 (45)	4.23	114
	10		-w/Sand,Iron Oxide Stain,and Silt	SS 4	100	11-15-21 (36)	4.50	
	13.5'		Moist Medium Dense Grey SILTY SAND (SM)					
	14.0'		Moist Stiff Grey LEAN CLAY w/Silt and Sand (CL)	SS 5	100	10-7-7 (14)	1.98	124
	15.0'	▽ ▼	Moist Medium Dense Grey SILTY SAND (SM)					
	17.0'		Moist Very Stiff Grey SANDY SILTY CLAY (CL/ML)	SS 6	100	10-12-13 (25)	4.50	
	20.0'		Bottom of hole at 20.0 feet.					



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BORING NUMBER B-08

PAGE 1 OF 1

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 14.6 ft

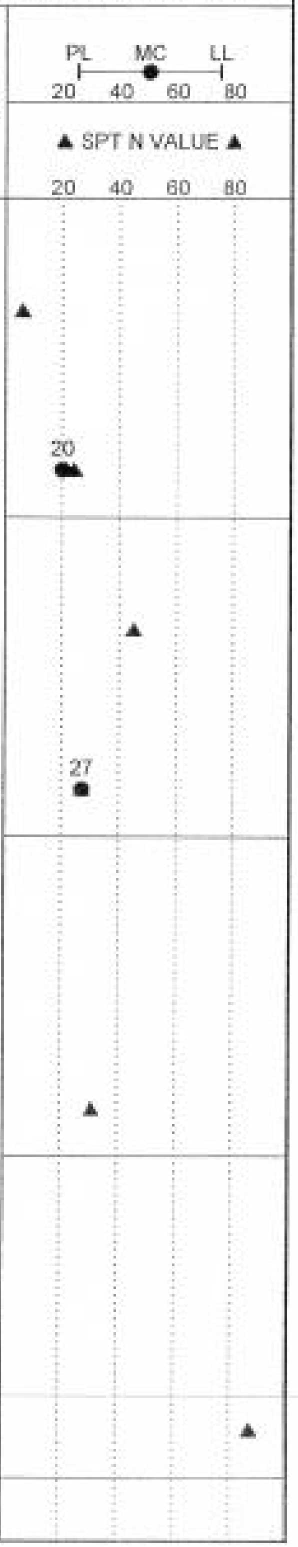
LOGGED BY KKC **CHECKED BY**

▼ **AT END OF DRILLING** 17.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)
	0		TOPSOIL - 3 Inches	0.3'					
			Moist Medium Stiff Brown SANDY SILTY CLAY (CL/ML)	3.5'	SS 1	100	3-3-3 (6)	1.50	
	5		Moist Very Stiff Brown LEAN CLAY (CL)	6.0'	SS 2	100	7-10-14 (24)	4.31	108
			Moist Hard Grey/Brown LEAN CLAY w/Silt and Trace Iron Oxide Stain (CL)	8.5'	SS 3	100	14-21-24 (45)	3.75	
	10		Moist Very Stiff Brown LEAN CLAY (CL)	13.0'	SS 4	100	12-15-12 (27)	2.31	100
			Moist Hard Brown LEAN CLAY (CL)	13.5'					
	15	▽	Moist Dense Grey SILTY SAND (SM) -Very Dense		SS 5	100	7-12-19 (31)	NP	
		▼							
	20			20.0'	SS 6	100	25-40-47 (87)	NP	
			Bottom of hole at 20.0 feet.						



TTL PROTOTYPE 20187.01.GPJ GINT US LAB.GDT 8/18/05

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BORING NUMBER B-09

PAGE 1 OF 1

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/3/05 **COMPLETED** 8/3/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
▽ **AT TIME OF DRILLING** 10.0 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 15.0 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches	0.5'						
			Moist Stiff Brown LEAN CLAY w/Silt and Trace Sand (CL)		SS 1	100	4-6-8 (14)	4.50	111	16
			-Very Stiff							
					SS 2	100	8-11-13 (24)	4.50		
	5			5.0'						
			Moist Hard Brown LEAN CLAY w/Silt and Sand (CL)		SS 3	100	13-21-24 (45)	5.55	115	17
				8.5'						
			Moist Very Stiff Grey SANDY SILTY CLAY (CL/ML)		SS 4	100	9-12-10 (22)	NT		
	10	▽		10.0'						
			Moist Very Dense Grey POORLY GRADED SAND w/Silt (SP/SM)		SS 5	100	26-39-44 (83)	NP		20
	15	▼								
				18.5'						
			Moist Very Dense Grey POORLY GRADED SAND w/Trace Silt (SP)		SS 6	100	47-50/4"	NP		>>
	20			20.0'						
			Bottom of hole at 20.0 feet.							

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BORING NUMBER B-10

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CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/2/05 **COMPLETED** 8/2/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
▽ **AT TIME OF DRILLING** 9.0 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 11.0 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 / ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 4 Inches 0.3'						
			Moist Very Stiff Brown LEAN CLAY w/Sand,Silt,and Trace Calcite Stain (CL) 2.5'	SS 1	100	4-7-10 (17)	4.50		▲
			Moist Hard Brown LEAN CLAY w/Sand and Silt (CL)	SS 2	100	10-17-19 (36)	2.78	112	18 ● ▲
	5		-Very Hard Grey/Brown w/Iron Oxide Stain	SS 3	100	22-26-26 (52)	4.50		▲
		▽	Moist Dense Grey POORLY GRADED SAND w/Trace Silt (SP) (Odor in Jar Noted) 9.0'	SS 4	100	10-17-17 (34)	NP		25 ● ▲
	10	▼							
			-Very Dense (Odor in Jar Noted)	SS 5	100	24-42-48 (90)	NP		▲
	15								
				SS 6	100	47-50/5"	NP		>>▲
	20		20.0'						
			Bottom of hole at 20.0 feet.						

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BORING NUMBER B-11

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CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/2/05 **COMPLETED** 8/2/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
∇ **AT TIME OF DRILLING** 9.0 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 7.0 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 5 Inches 0.4'						
			Moist Stiff Brown LEAN CLAY w/Sand,Silt,and Calcite Stain (CL)	SS 1	100	3-4-7 (11)	3.33	108	20
			-Very Stiff	SS 2	100	7-9-15 (24)	4.50		
	5		6.0'						
			Moist Hard Brown LEAN CLAY w/Trace Gravel (CL)	SS 3	100	16-16-16 (32)	4.42	107	23
		▼							
		∇	9.0'						
			Moist Very Dense Grey POORLY GRADED SAND w/Silt (SP/SM)	SS 4	100	19-31-31 (62)	NP		
	10		10.0'						

Bottom of hole at 10.0 feet.

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BORING NUMBER B-12

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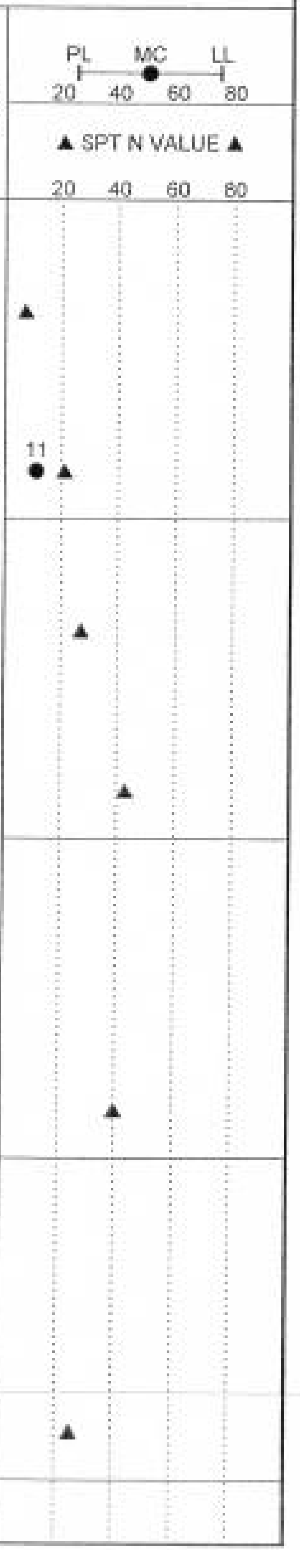
CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/3/05 **COMPLETED** 8/3/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
▽ **AT TIME OF DRILLING** 6.5 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 15.0 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)
	0		TOPSOIL - 3 Inches	0.3'					
			Moist Loose Brown POORLY GRADED SAND (SP)	2.5'	SS 1	100	3-3-4 (7)	NP	
	5		Moist Medium Dense Brown SILTY SAND (SM)	6.5'	SS 2	100	5-9-12 (21)	NP	122
			▽ Moist Medium Dense Grey POORLY GRADED SAND w/Silt (SP/SM)	8.5'	SS 3	100	12-15-12 (27)	NP	
	10		Moist Dense Grey POORLY GRADED SAND w/Silt (SP/SM)	13.5'	SS 4	100	14-17-26 (43)	NP	
	15		Moist Dense Grey SILTY SAND (SM) ▼	18.5'	SS 5	100	21-20-20 (40)	NP	
	20		Moist Medium Dense Grey POORLY GRADED SAND w/Silt (SP/SM)	20.0'	SS 6	100	12-13-12 (25)	NP	
			Bottom of hole at 20.0 feet.						



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BORING NUMBER B-13

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 COMPLETED 8/3/05

GROUND ELEVATION HOLE SIZE

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ AT TIME OF DRILLING 4.0 ft

LOGGED BY KKC CHECKED BY

▼ AT END OF DRILLING 11.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 5 Inches 0.4'						
			Moist Stiff Brown SANDY SILTY CLAY w/Iron Oxide Stain (CL/ML)	SS 1	100	4-5-8 (13)	4.50	102	15
			▽ 4.0'						
	5		Moist Loose Brown POORLY GRADED SAND w/Silt (SP/SM) 6.0'	SS 2	100	4-4-3 (7)	NP		▲
			MOist Medium Dense Brown POORLY GRADED SAND w/Trace Silt (SP) 8.5'	SS 3	100	7-10-12 (22)	NP		23
	10		Moist Dense Brown POORLY GRADED SAND w/Silt (SP/SM) ▼ 13.0'	SS 4	100	10-17-25 (42)	NP		▲
	15		Moist Very Dense Grey CLAYEY SAND (SC) 18.5'	SS 5	100	14-21-40 (61)	NP		▲
	20		Moist Dense Grey POORLY GRADED SAND (SP) 20.0'	SS 6	100	7-15-22 (37)	NP		▲
			Bottom of hole at 20.0 feet.						

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 2.5 ft

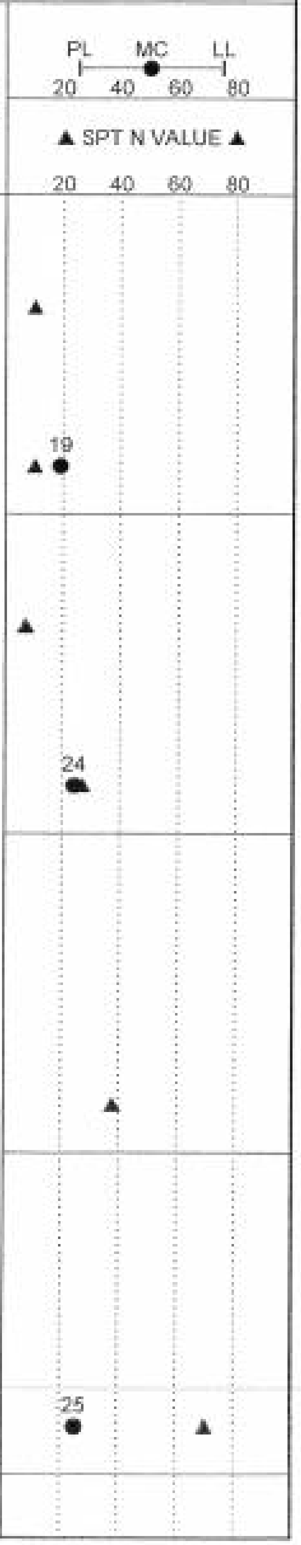
LOGGED BY KKC **CHECKED BY**

▼ **AT END OF DRILLING** 11.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)
	0		TOPSOIL - 6 Inches 0.5'					
			Moist Loose Brown POORLY GRADED SAND (SP)	SS 1	100	3-4-6 (10)	NP	
		▽	-w/Trace Silt					
			-(Odor Noted in Jar)	SS 2	100	5-5-5 (10)	NP	
	5							
				SS 3	100	3-3-4 (7)	NP	
			8.5'					
			Moist Medium Dense Brown POORLY GRADED SAND (SP)	SS 4	100	10-13-14 (27)	NP	
	10							
		▼						
			13.5'					
			Moist Dense Grey POORLY GRADED SAND w/Trace Silt (SP)	SS 5	100	10-15-23 (38)	NP	
	15							
			-Very Dense	SS 6	100	30-40-30 (70)	NP	
	20		20.0'					
			Bottom of hole at 20.0 feet.					



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BORING NUMBER B-15

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION ______ **HOLE SIZE** ______

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 5.0 ft

LOGGED BY KKC **CHECKED BY** ______

▼ **AT END OF DRILLING** 13.0 ft

NOTES ______

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Loose Brown POORLY GRADED SAND w/Trace Silt and Organics (SP) 3.5'	SS 1	100	2-3-3 (6)	NP		11
	5	▽	Moist Medium Dense Brown POORLY GRADED SAND w/Trace Silt (SP) 5.0'	SS 2	100	8-7-7 (14)	NP		
			Moist Loose to Medium Dense Brown POORLY GRADED SAND w/Trace Silt (SP) 9.0'	SS 3	100	5-5-5 (10)	NP		21
	10		Moist Dense Brown POORLY GRADED SAND (SP)	SS 4	94	14-19-23 (42)	NP		
		▼							
	15		-Grey	SS 5	100	24-19-19 (38)	NP		22
	20		-w/Trace Silt 20.0'	SS 6	100	10-13-20 (33)	NP		
			Bottom of hole at 20.0 feet.						

TTL PROTOTYPE 20187.01.GPJ GINT US LAB.GDT 8/23/05

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

AT TIME OF DRILLING None

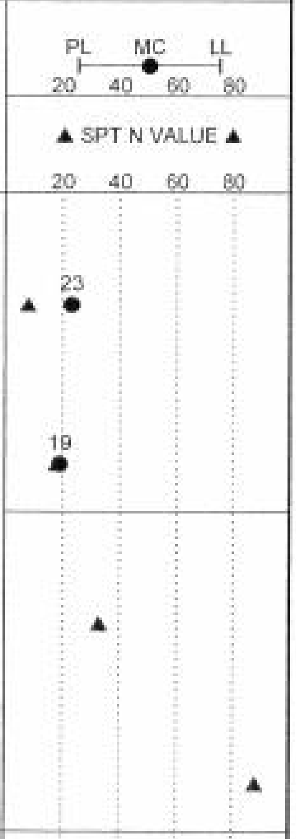
LOGGED BY KKC **CHECKED BY**

AT END OF DRILLING None

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)
	0		TOPSOIL - 6 Inches 0.5'					
		▨	Moist Medium Stiff Brown LEAN CLAY w/Trace Sand and Gravel (CL) 2.5'	SS 1	100	2-3-5 (8)	2.03	99
	5	▨	Moist Very Stiff Brown SILTY CLAY w/Trace Sand and Calcite Stain (CL/ML) 7.0'	SS 2	100	6-7-11 (18)	4.50	
				SS 3	100	7-14-19 (33)	4.50	
		▨	Moist Hard Grey SILTY CLAY w/Trace Sand (CL/ML) 9.0'					
	10		Moist Very Dense Brown POORLY GRADED SAND w/Trace Silt (SP) 10.0'	SS 4	100	31-41-47 (88)	NP	
			Bottom of hole at 10.0 feet.					



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BORING NUMBER B-17

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 5.0 ft

LOGGED BY KKC **CHECKED BY**

▼ **AT END OF DRILLING** 5.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 3 Inches 0.3'						
			Moist Loose Brown POORLY GRADED SAND (SP) (Odor Noted in Jar)	SS 1	100	2-3-4 (7)	NP		12
				SS 2	100	3-4-4 (8)	NP		11
	5		▼ -w/Trace Silt						
				SS 3	100	4-3-4 (7)	NP		
			8.5'						
			Moist Medium Dense Brown POORLY GRADED SAND (SP) (Odor Noted in Jar)	SS 4	100	9-13-15 (28)	NP		
	10		10.0'						

Bottom of hole at 10.0 feet.

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BORING NUMBER B-18

PAGE 1 OF 1

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

AT TIME OF DRILLING None

LOGGED BY KKC **CHECKED BY**

AT END OF DRILLING None

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 3 Inches 0.3'						
			Moist Loose Brown POORLY GRADED SAND (SP)						
			-(Odor in Jar Noted)	SS 1	100	3-4-5 (9)	NP		7 ●▲
			-w/Trace Silt	SS 2	100	4-4-4 (8)	NP		▲
	5		5.0'						
			Moist Medium Dense Brown POORLY GRADED SAND (SP)	SS 3	100	6-8-7 (15)	NP		▲
			-(Odor Noted in Jar)	SS 4	100	6-8-10 (18)	NP		▲
	10		10.0'						
			Bottom of hole at 10.0 feet.						

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BORING NUMBER B-19

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/4/05 **COMPLETED** 8/4/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 5.0 ft

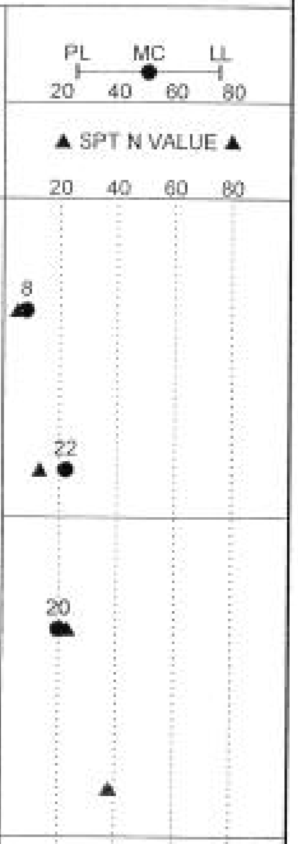
LOGGED BY KKC **CHECKED BY**

▼ **AT END OF DRILLING** 7.0 ft

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)
	0		TOPSOIL - 6 Inches	0.5'					
			Moist Very Loose Brown POORLY GRADED SAND (SP)	3.5'	SS 1	100	1-2-3 (5)	NP	
	5	▽	Moist Stiff Brown SANDY SILT (ML) (Odor in Jar Noted)		SS 2	100	4-5-8 (13)	NT	
		▼	-Very Stiff Grey	7.0'	SS 3	100	8-9-14 (23)	NT	
	10		Mosit Dense Grey SILTY SAND (SM)	10.0'	SS 4	100	15-15-23 (38)	NP	
			Bottom of hole at 10.0 feet.						



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BORING NUMBER B-20

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CLIENT Meijer Inc
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/4/05 **COMPLETED** 8/4/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
∇ **AT TIME OF DRILLING** 6.5 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 14.5 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Stiff Brown LEAN CLAY w/Silt and Sand (CL) 2.5'	SS 1	100	5-9-6 (15)	4.50	106	17
			Moist Very Stiff Brown SANDY LEAN CLAY w/Silt (CL) 5.0'	SS 2	100	10-13-15 (28)	2.15	113	19
	5		BOULDER 6.5'						
		∇	Moist Dense Brown SILTY SAND (SM)	SS 3	100	47-27-15 (42)	NP		
	10		-Grey 13.5'	SS 4	100	18-26-20 (46)	NP		
	15	▼	Moist Medium Dense Grey SILTY SAND (SM) (Odor in Jar Noted) 18.5'	SS 5	100	12-15-15 (30)	NP		25
	20		Moist Dense Grey POORLY GRADED SAND w/Silt (SP/SM) 20.0'	SS 6	100	12-15-17 (32)	NP		
			Bottom of hole at 20.0 feet.						

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BORING NUMBER B-21

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/4/05 **COMPLETED** 8/4/05

GROUND ELEVATION ____ **HOLE SIZE** ____

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 13.5 ft

LOGGED BY KKC **CHECKED BY** ____

▼ **AT END OF DRILLING** 22.0 ft

NOTES ____

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Very Stiff Brown LEAN CLAY w/Silt and Sand (CL) 2.5'	SS 1	100	5-7-9 (16)	2.50	108	15 ●
			Moist Very Stiff Brown SANDY SILTY CLAY (CL/ML)	SS 2	100	8-10-12 (22)	NT		▲
	5		6.5'						
			Moist Hard Grey SANDY LEAN CLAY w/Silt (CL) 8.0'	SS 3	100	14-14-20 (34)	2.25		▲
			Moist Very Dense Grey POORLY GRADED SAND w/Silt (SP/SM)	SS 4	100	26-33-35 (68)	NP		15 ● ▲
	10								
		▽	-(Odor in Jar Noted)	SS 5	100	33-37-45 (82)	NP		▲
	15								
			-(Odor in Jar Noted)	SS 6	100	18-25-25 (50)	NP		21 ● ▲
	20								

(Continued Next Page)

BORING NUMBER B-21

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 / ▲ SPT N VALUE ▲ 20 40 60 80
		▼	Moist Very Dense Grey POORLY GRADED SAND w/Silt (SP/SM) *(continued)*						
			23.5'						
	25		Moist Very Hard Grey SANDY SILT (ML) (Odor in Jar Noted)	☒ SS 7	100	20-30-50 (80)	1.25		▲ 80
			28.0'						
			Moist Very Dense Grey SILTY SAND w/Clay (SM)	☒ SS 8	100	25-50	NP		
	30		30.0'						
			Bottom of hole at 30.0 feet.						

TTL Associates, Inc.
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BORING NUMBER B-22

PAGE 1 OF 2

CLIENT Meijer Inc.	**PROJECT NAME** Proposed Meijer Store
PROJECT NUMBER 20187.01	**PROJECT LOCATION** New Baltimore, MI
DATE STARTED 8/4/05 **COMPLETED** 8/4/05	**GROUND ELEVATION** **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM	**GROUND WATER LEVELS:**
DRILLING METHOD 3-1/4 in. HSA	▽ **AT TIME OF DRILLING** 6.5 ft
LOGGED BY KKC **CHECKED BY**	▼ **AT END OF DRILLING** 16.5 ft
NOTES	**0hrs AFTER DRILLING** Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 / ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches 0.5'						
			Moist Stiff Brown SANDY LEAN CLAY w/Silt,Calcite, and Iron Oxide Stain (CL) 2.5'	SS 1	100	3-4-5 (9)	4.50		17
			Moist Medium Dense Grey SILTY SAND w/Clay (SM)	SS 2	100	10-15-15 (30)	NP		
	5								
		▽	Moist Very Dense Grey SILTY SAND (SM) 6.5'	SS 3	100	14-15-14 (29)	NP		17
				SS 4	100	19-39-33 (72)	NP		
	10								
			-Dense (Odor in Jar Noted)	SS 5	100	14-21-20 (41)	NP		21
	15								
		▼							
			-(Odor in Jar Noted)	SS 6	100	16-20-17 (37)	NP		
	20								

(Continued Next Page)

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BORING NUMBER B-22

CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
			Moist Very Dense Grey SILTY SAND (SM) *(continued)*						
	25			☒ SS 7	100	13-21-18 (39)	NP		23 ● ▲
			28.5'						
	30		Moist Very Dense Grey POORLY GRADED SAND w/Silt (SP/SM) 30.0'	☒ SS 8	100	25-50	NP		

Bottom of hole at 30.0 feet.

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BORING NUMBER B-23

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CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/3/05 **COMPLETED** 8/3/05

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

AT TIME OF DRILLING None

LOGGED BY KKC **CHECKED BY**

AT END OF DRILLING None

NOTES

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 3 Inches 0.3'						
			Moist Very Loose Brown POORLY GRADED SAND (SP)	SS 1	100	1-2-2 (4)	NP		5 ●
	5		-Loose	SS 2	100	2-3-2 (5)	NP		10 ▲●
			6.5' Moist Medium Dense Grey POORLY GRADED SAND (SP)	SS 3	100	6-8-7 (15)	NP		▲
	10		10.0'	SS 4	100	5-6-8 (14)	NP		▲
			Bottom of hole at 10.0 feet.						

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BORING NUMBER B-24

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI

DATE STARTED 8/4/05 **COMPLETED** 8/4/05

GROUND ELEVATION ______ **HOLE SIZE** ______

DRILLING CONTRACTOR TTL Associates CW JM

GROUND WATER LEVELS:

DRILLING METHOD 3-1/4 in. HSA

▽ **AT TIME OF DRILLING** 9.0 ft

LOGGED BY KKC **CHECKED BY** ______

AT END OF DRILLING None

NOTES ______

0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 3 Inches 0.3'						
			Moist Loose Brown POORLY GRADED SAND (SP)						
				SS 1	100	1-2-3 (5)	NP		4 ●▲
				SS 2	100	6-5-5 (10)	NP		8 ●▲
	5								
				SS 3	100	3-3-3 (6)	NP		▲
			▽ 9.0'						
			Moist Medium Dense POORLY GRADED SAND (SP)	SS 4	100	5-7-8 (15)	NP		▲
	10		10.0'						
			Bottom of hole at 10.0 feet.						

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BORING NUMBER B-25

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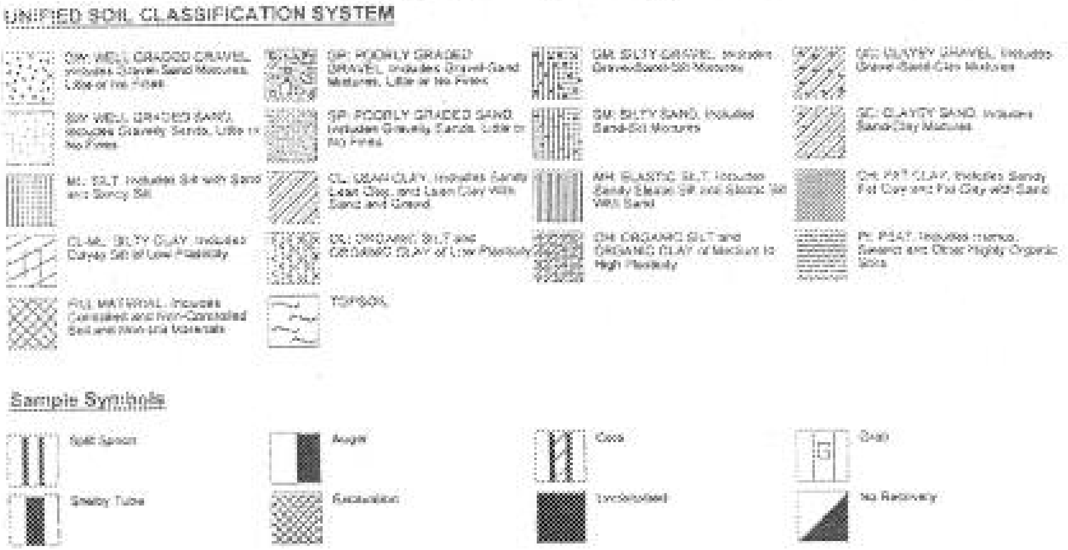
CLIENT Meijer Inc.
PROJECT NAME Proposed Meijer Store
PROJECT NUMBER 20187.01
PROJECT LOCATION New Baltimore, MI
DATE STARTED 8/4/05 **COMPLETED** 8/4/05
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR TTL Associates CW JM
GROUND WATER LEVELS:
DRILLING METHOD 3-1/4 in. HSA
▽ **AT TIME OF DRILLING** 7.0 ft
LOGGED BY KKC **CHECKED BY**
▼ **AT END OF DRILLING** 9.0 ft
NOTES
0hrs AFTER DRILLING Backfilled w/Cuttings and Bentonite Chips

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL ● MC ● LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	0		TOPSOIL - 6 Inches	0.5'						
			Moist Stiff Brown SANDY SILTY CLAY w/Iron Oxide Stain (CL/ML)	2.5'	SS 1	100	4-5-7 (12)	4.50		14 ●▲
	5		Moist Very Stiff Brown LEAN CLAY w/Sand and Silt (CL)		SS 2	100	6-10-11 (21)	4.50	114	15 ●▲
		▽		7.0'	SS 3	100	12-20-20 (40)	NP		▲
			Moist Dense Brown SILTY SAND (SM)	9.0'						
	10	▼	Moist Very Stiff Grey SANDY SILTY CLAY (CL/ML)	10.0'	SS 4	100	20-12-12 (24)	1.50		▲
			Bottom of hole at 10.0 feet.							

LEGEND KEY

Sample And Soil Symbol Legends



Notes:

1. Exploratory borings were drilled from August 2 to August 4, 2005 using 3¼ -inch inside diameter hollow-stem augers.
2. These logs are subject to the limitations, conclusions, and recommendations in the report and should not be interpreted separate from the report.
3. Boring locations were established in the field by SSOE.

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
B-1	SS-1	2.5		15	17.3	99.8	6,194											
	SS-2	5.0		57	17.7	113.4	7,763											
	SS-3	7.5		44	21.0		+9,000											
	SS-4	10.0		37			+9,000											
	SS-5	15.0		32	18.5		8,500											
	SS-6	20.0		21			NT											
B-2	SS-1	2.5		17			+9,000											
	SS-2	5.0		23	18.3	106.8	+9,000											
	SS-3	7.5		39			8,500											
	SS-4	10.0		26	25.8		8,500											
	SS-5	15.0		37	17.6	110.6	11,674											
	SS-6	20.0		29	14.8		+9,000											

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
B-3	SS-1	2.5		10	23.9		8,000											
	SS-2	5.0		22			+9,000											
	SS-3	7.5		28	20.5	103.2	6,405											
	SS-4	10.0		35			+9,000											
	SS-5	15.0		20	24.1		7,250											
	SS-6	20.0		29	20.2	105.3	3,954											
B-4	SS-1	2.5		11			+9,000											
	SS-2	5.0		31	9.5	110.0	+9,000											
	SS-3	7.5		44			+9,000											
	SS-4	10.0		21	23.6	92.0	5,584											
	SS-5	15.0		31			NP											
	SS-6	20.0		50/4"	12.3		NP											

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
	SS-6	20		25			+9,000											
B-8	SS-1	2.5		6			3,000											
	SS-2	5		24	20.1	108.5	8,629											
	SS-3	7.5		45			7,500											
	SS-4	10		27	26.8	99.8	4,623											
	SS-5	15		31			NP											
	SS-6	20		87			NP											
B-9	SS-1	2.5		14	16.3	112.9	+9,000											
	SS-2	5		24			11,101											
	SS-3	7.5		45	17.5	115.3	4,101											
	SS-4	10		22														
	SS-5	15		83	20.0													
	SS-6	20		50/4"			NP											

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
B-10	SS-1	2.5		17			+9,000											
	SS-2	5		36	17.9	112.7	5,564											
	SS-3	7.5		52			+9,000											
	SS-4	10		34	25.3		NP											
	SS-5	15		90			NP											
	SS-6	20		50/5"			NP											
B-11	SS-1	2.5		11	20.4	107.5	6,667											
	SS-2	5		24			+9,000											
	SS-3	7.5		32	22.9	106.5	8,834											
	SS-4	10		62			NP											
B-12	SS-1	2.5		7			NP											
	SS-2	5.0		21	11.0	122.9	NP											
	SS-3	7.5		27			NP											
	SS-4	10		43			NP											
	SS-5	15		40			NP											

PROJECT: Meijer Store, New Baltimore, MI | **TTL Associates, Inc** | PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
	SS-6	20		25			NP											
B-13	SS-1	2.5		13	15.4	102.1	+9,000											
	SS-2	5.0		7			NP											
	SS-3	7.5		22	22.8		NP											
	SS-4	10		42			NP											
	SS-5	15		61			NP											
	SS-6	20		37			NP											
B-14	SS-1	2.5		10			NP											
	SS-2	5.0		10	19.1		NP											
	SS-3	7.5		7			NP											
	SS-4	10		27	23.5		NP											
	SS-5	15		38			NP											
	SS-6	20		70	24.6		NP											

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
B-15	SS-1	2.5		6	11.0		NP											
	SS-2	5.0		14			NP											
	SS-3	7.5		10	21.3		NP											
	SS-4	10		42			NP											
	SS-5	15		38	21.8		NP											
	SS-6	20		33			NP											
B-16	SS-1	7.5		8	22.9	99.3	4,036											
	SS-2	10		18	19.2		+9,000											
	SS-3	15		33			+9,000											
	SS-4	20		88			NP											

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
B-17	SS-1	2.5		7	11.8		NP											
	SS-2	5.0		8	11.5		NP											
	SS-3	7.5		7			NP											
	SS-4	10		28			NP											
B-18	SS-1	2.5		7	6.6		NP											
	SS-2	5.0		8			NP											
	SS-3	7.5		15			NP											
	SS-4	10		18			NP											
B-19	SS-1	2.5		5	7.5		NP											
	SS-2	5.0		13	21.6		NT											
	SS-3	7.5		23	19.7		NT											
	SS-4	10		38			NP											

PROJECT: Meijer Store, New Baltimore, MI

TTL Associates, Inc

PROJECT NO: 20187.01

TABULATION OF TEST DATA

Boring Number	Sample Number	Tip Depth (Feet)	Tip Elevation (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)		Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification
									Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
B-20	SS-1	2.5		15	17.3	106.2	+9,000											
	SS-2	5		28	18.9	113.2	4,291											
	SS-3	7.5		42			NP											
	SS-4	10		46			NP											
	SS-5	15		30	24.9		NP											
	SS-6	20		32			NP											
B-21	SS-1	2.5		16	15.2	107.9	4,992											
	SS-2	5.0		22			NT											
	SS-3	7.5		34			4,500											
	SS-4	10		68	15.4		NP											
	SS-5	15		82			NP											
	SS-6	20		50	21.4		NP											
	SS-7	25		80			2,500											
	SS-8	30		SSR			NP											

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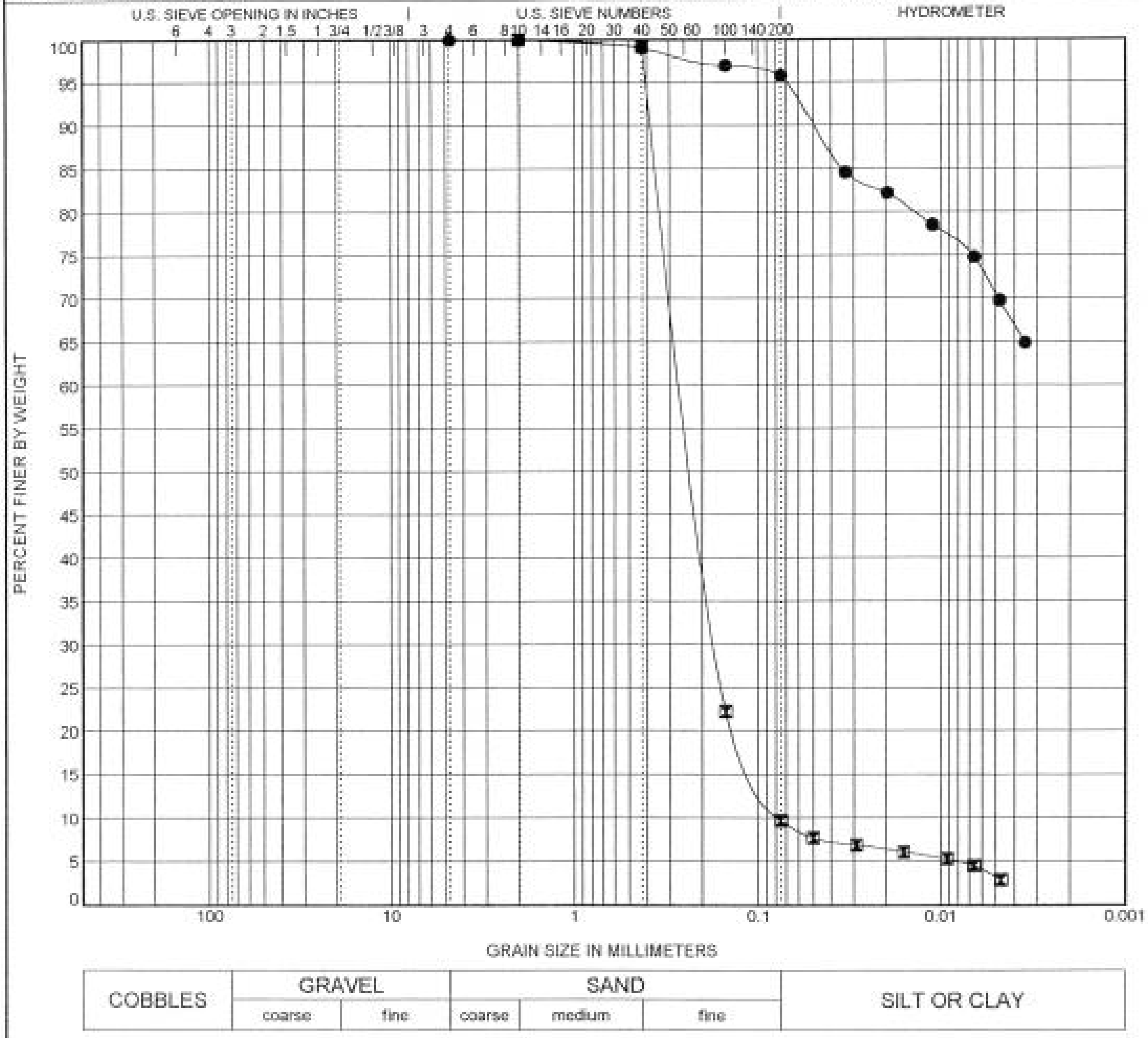
GRAIN SIZE DISTRIBUTION

CLIENT Meijer Inc.

PROJECT NAME Proposed Meijer Store

PROJECT NUMBER 20187.01

PROJECT LOCATION New Baltimore, MI



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-06	1.0	**FAT CLAY (CH)**	56	27	29		
Ⓘ	B-24	3.5	**POORLY GRADED SAND with SILT (SP-SM)**	NP	NP	NP	1.45	3.28

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-06	1.0	4.75				0.0	4.2	25.4	70.4
Ⓘ	B-24	3.5	2	0.25	0.166	0.076	0.0	90.3	6.5	3.2