GEOTECHNICAL INVESTIGATION
EATON COUNTY 911 CENTRAL DISPATCH
CHARLOTTE, MICHIGAN

SME PROJECT LG22586

January 13, 1995

January 13, 1995

Mr. John Ewen
Physical Plant Director
Eaton County
1045 Independence Blvd.
Charlotte, MI 48813

RE: Geotechnical Investigation
Eaton County 911 Central Dispatch
Charlotte, Michigan
SME Project LG22586

Dear Mr. Ewen:

We have completed the geotechnical investigation for the proposed Eaton County 911 Central Dispatch Facility in Charlotte, Michigan. This report presents our interpretation of the soil and groundwater conditions encountered at the soil boring locations and recommendations regarding foundations, slabs-on-grade, pavements, and construction considerations.

We have appreciated the opportunity of serving you during this phase of the project. If there are any questions concerning this report, please contact us.

Yours very truly,

SOIL AND MATERIALS ENGINEERS, INC.

Robert C. Rabeler, P.E.
Principal/Vice President

2 pcs Mr. Robert Van Putten, Architect

lg22586r/mjt-br

SUMMARY

The report conclusions and recommendations are summarized as follows:

1. The site work required to achieve design grades is assumed to consist of as much as 4 feet of fill in the parking areas and 2 feet of fill within the proposed building area. After removal of existing trees, vegetation, topsoil or buried topsoil and fill materials with organic matter, the areas of the site to be filled should be proofrolled prior to fill placement.

2. Shallow foundations bearing on suitable natural clays or clayey sands or engineered fill are recommended for support of the proposed structure. A maximum net allowable soil bearing pressure of 2,000 psf is recommended for footings bearing on these soils.

3. Natural sands and clays, which are properly prepared, are generally suitable subgrade for supporting slabs-on-grade. Furthermore, the natural sands, clays are considered suitable for use as engineered fill in mass grading operations provided they are properly moisture-controlled.

4. The pavements are anticipated to carry primarily cars and light trucks. Pavement design recommendations are provided in this report.

5. Standard sump pit and pumping procedures are anticipated to be adequate to remove groundwater accumulations which may occur due to seepage during construction excavation activities.

The summary presented above is general in nature and should not be considered apart form the entire test of the report with all the qualifications and considerations mentioned therein. Detail of our findings and recommendations are discussed in the following sections and in the appendices of this report.

REPORT PREPARED BY:	**REPORT REVIEWED BY:**
Michael J. Thelen, E.I.T. Senior Engineer	Larry P. Jedele, P.E. Senior Consultant

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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for the proposed Eaton County 911 Central Dispatch Facility in Charlotte, Michigan. This investigation was authorized by Mr. John Ewen, Physical Plant Director-Eaton County, per our proposal letter dated November 9, 1994, along with the amended proposal dated November 16, 1994, to include a soil boring and recommendations for a proposed tower.

1.1 Site Conditions

The site is located west of the intersection of Courthouse and Independence Drive in the city of Charlotte, Michigan. This site is bounded to the south and west by the New York Central Railroad, to the east by an existing pond, and to the north by an existing Eaton County Juvenile Home. Based on the preliminary site plan provided by Landmark Design Group (the Architect) dated December 12, 1994, the existing ground surface varies from Elevation 935 (at about the existing pond level) to Elevation 942 feet.

At the time of our investigation, the site was primarily covered with grass, with the exception of the western portion of the site which was covered with grass, weeds, and scattered trees.

1.2 Project Description

Based on our understanding of the project, the proposed 911 Central Dispatch Facility will be a 1-story, framed structure with interior columns, load-bearing walls and a basement. Interior column loads of 60 kips are anticipated. The exterior load-bearing walls are intended to provide shelter during tornados and are intended to be 16 inches thick with a minimum 2-foot wide footing. Wall loads of up to 6 kips per foot are anticipated. The finish floor elevation of the main level is planned at about 948 feet and the finish floor elevation of the basement is planned at about 936 feet. Future construction is anticipated on the north and the south ends of the structure.

The proposed building will be serviced by an access drive off of Courthouse and Independence Drive with a 50-car parking lot west of the building. In addition, a tripod radio tower with a mat foundation is planed west of the proposed building.

Based on the proposed grades shown on the preliminary site plan, we estimate the earthwork required to achieve design grades will consist of as much as 4 feet of fill in the proposed parking area. No proposed grades were provided for the building area. We have assumed final grades along the perimeter of the building will be within 2 feet of existing grades.

1.3 Scope of Services

Our scope of services for this project was outlined in our proposal dated November 9, 1994, and amended proposal dated November 16, 1994. Reference should be made to these documents for the specific scope of services.

Our scope of our services did not include detailed recommendations for construction dewatering, excavation sheeting, or allowable temporary slopes, erosion control, cost or quantity estimates, plans, specifications or construction quality control. SME offers the above and other related services to our clients, and we would be pleased to provide further information and estimates for additional services, if desired.

The results of our environmental assessment for this project will be addressed under separate cover. Authorization to proceed on our environmental assessment is pending the results of the geotechnical investigation presented in this report.

2.0 INVESTIGATION PROCEDURES

2.1 Field Operations

A total of 6 borings were performed by SME between December 27 and 28, 1994 for this investigation. The number, location, and depth of the soil borings were determined by SME. The boring locations were staked in the field by SME. The boring locations are shown on the Soil

Boring Location Diagram included in Appendix A. These boring locations should be considered approximate.

The soil borings were drilled using a rotary-type drill rig mounted on an all-terrain vehicle. The soil borings were advanced to sampling depth using 4-inch diameter, solid-stem, continuous-flight augers. In general, the borings included soil sampling based on ASTM D-1586 (split-barrel sampling procedures).

The boring log information includes materials encountered, penetration resistance, and pertinent field observations made during the drilling operations. The logs are included in Appendix A.

Groundwater measurements were recorded both during and after completion of drilling operations. Since the boreholes were backfilled soon after drilling, long-term water level information is not available from these borings. However, at Boring 2, a temporary observation well was installed to measure static groundwater levels at future dates.

The samples were sealed in glass jars in the field and returned to the laboratory for further examination and testing.

2.2 Laboratory Testing

All samples obtained were classified in general accordance with the Unified Soil Classification System by an experienced geotechnical engineer. The general testing program consisted of performing moisture content and unconfined compressive strength (calibrated hand-penetrometer) tests upon portions of the cohesive samples obtained. In the hand-penetrometer test, the unconfined compressive strength of a cohesive material is estimated by measuring the resistance of the sample to penetration by a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4 1/2 tsf.

The results of the laboratory testing are included on the soil boring logs in Appendix A.

3.0 SUBSURFACE CONDITIONS

3.1 Soil Conditions

The following gives a generalized summary-description of the soils encountered in the borings, beginning at the top and proceeding downward:

Stratum 1: Topsoil. The driller reported encountering 6 to 12 inches of topsoil at the boring locations.

Stratum 2: Sandy Clay Fill. Fill materials were encountered at Borings 1 through 5 and consisted of sandy clays with trace to some silt, trace gravel and topsoil. These fill materials extended to depths ranging from about 2 1/2 to 4 1/2 feet below existing grades (Elevations 934.5 to 937.5 feet), except at B-6 where fill materials were not encountered. Unconfined compressive strengths ranging from about 3 to greater than 4 1/2 tsf were reported. Corresponding moisture contents ranged from about 11 to 22 percent.

One foot of possible sand fill was encountered below the clay fill in Boring 4. Also, a 1/2-foot thick layer of possible topsoil was encountered below the clay fill in Boring 2.

Stratum 3: Fine and Fine to Medium Sands with Varying Amounts of Clay. These sands were encountered in Borings 1 and 2. These sands extended to depths of about 8 feet below existing grades (Elevation 933 feet). Penetration Resistances (N-values) range from 7 to 8 blows per foot, indicating a loose condition.

Stratum 4: Sandy/Silty Clay. Clay was encountered to the explored depths of soil borings. Unconfined compressive strengths ranged from about 1 to greater than 4 1/2 tsf. Corresponding moisture contents ranged from about 9 to 28 percent.

In addition, the driller reported encountering a 5 1/2-foot thick layer of cobbles and possible boulders in Boring 1. This layer extended to a depth of about 22 feet below the existing grade (Elevation 919.5 feet). A reported N-value of 53 blows per foot was recorded, indicating a dense condition.

The soil descriptions and properties, in addition to groundwater conditions observed by the driller, are graphically presented in the soil boring logs appended to this report along with a boring location diagram.

The soil profiles described above and depicted on the soil boring logs are generalized descriptions of the conditions encountered at the boring locations. The individual boring logs should be consulted for more specific information. The stratification depths shown on the boring logs and discussed above are intended to indicate a zone of transition from one soil type to another. The stratification lines are not intended to shown an exact geologic or man-made change. It should also be noted that soil conditions may vary between boring locations from those conditions noted on the logs.

3.2 Groundwater Conditions

The driller reported encountering groundwater during and/or upon completion of drilling in Boring 1. Groundwater was encountered during drilling at a depth of about 12 feet (Elevation 929.5) and upon completion of drilling at a depth of about 15 feet below the existing grade (Elevations 926.5 feet).

In cohesive soils, a long time may be required for the water level in the borehole to reach an equilibrium position. Therefore, the use of a groundwater level observation well (piezometer) is necessary to accurately determine the static water level within the clay soils. Short-term groundwater level readings at the boring locations during and after drilling may not represent the existing groundwater level.

A temporary observation well was installed within Boring 2 to evaluate the static groundwater conditions. The bottom of the well was set at a depth of about 23 1/2 feet below the existing ground surface or about Elevation 918 feet. The well consisted of 2-inch diameter, 5-foot long PVC screen and PVC riser. The annulus between the screen/riser and borehole was filled with well-graded sand to a depth of about 18 1/2 feet below the existing ground surface. Then the annulus was generally filled with bentonite chips to the existing grade to prevent surface water from entering the well.

The well was installed in a dry borehole on December 28, 1994. Water level readings are presented below. SME will remove the well at a future time at the direction of the Engineer.

Date	Boring Location	Elevation (ft.)
12/30/94	2	931.3
1/2/95	2	931.6

The water levels above represent the conditions at the time the readings were taken. It should be noted that actual groundwater levels may vary at the time of construction.

Based on these readings, it appears that static groundwater level has not stabilized within this well. SME intends to obtain one additional set of readings. This reading will be presented under separate cover.

Changing color from brown to gray is often times an indicator of long-term groundwater level and can sometimes be used to estimate the site groundwater levels. Based on this color change observed in the borings, the groundwater level is between Elevations 920 1/2 and 928 feet.

Groundwater levels should be anticipated to fluctuate throughout the year with variations in precipitation, evaporation, runoff, and the level of the existing pond. Groundwater levels discussed herein and indicated on the boring logs represent the conditions at the time the measurements were obtained.

4.0 ANALYSIS AND RECOMMENDATIONS

Shallow foundations bearing on suitable natural clays or clayey sands, or engineered fill are recommended for the support of the proposed structure. The natural soils and existing clay fill are judged to be suitable subgrade for slabs and pavement or for placing engineered fill.

Groundwater is not expected to cause significant difficulties during construction. Our specific recommendations are presented below.

4.1 Site Preparation and Earthwork Recommendations

Based on the preliminary site plan provided by the Architect, and our understanding of the proposed construction, the proposed final grades are within about 2 feet of existing grades near the building area and as much as 4 feet of fill may be required in the parking areas.

In the building and pavement areas, we recommend any existing vegetation, topsoil, and other deleterious materials (including that encountered within the fill materials) be removed to expose suitable natural soils or existing fill prior to engineered fill placement. After exposing suitable subgrade soils, the entire area should be thoroughly proofrolled in the presence of SME. The purpose of proofrolling is to locate areas of unsuitable loose subgrade and to uniformly compact the surface. Areas of unsuitable subgrade revealed during proofrolling should be mechanically stabilized (compacted) in-place. If it is not possible to compact the unsuitable subgrade, it may be necessary to remove and replace them with engineered fill. Proofrolling of clay should be performed with a fully-loaded, tandem-axle dump truck or other suitable piece of pneumatic-tired equipment.

Based on the soil borings and our understanding of the earthwork required for this project, the subgrades soils to receive engineered fill placement will typically consist of natural clay or clay fill. In several borings, these upper clayey soils exhibited moderate to high strengths with moisture contents estimated to be near or slightly above optimum moisture. These soils are prone to disturbance between the construction operation from repeated trafficking and exposure to rainwater.

Engineered fill placed for the building pads, pavements, walks, and other structural areas, should be placed and compacted per the recommendations in the Engineered Fill Requirements section of this report.

4.2 Engineered Fill Requirements

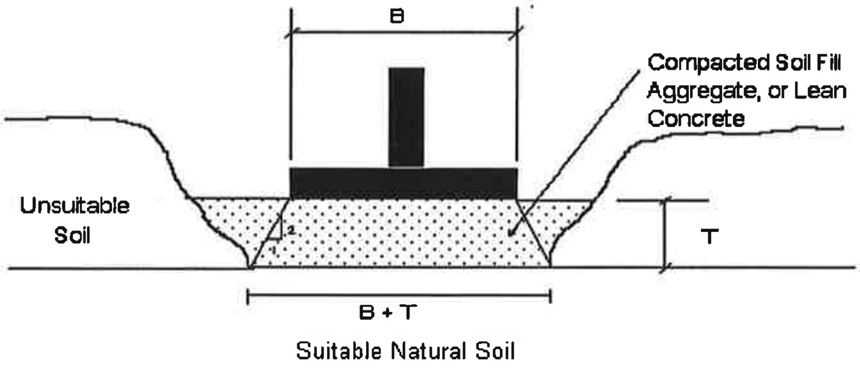
Any fill placed within the building and pavement areas, including utility trench backfill, should be an approved material, free of frozen soil, organics, or other deleterious materials. The fill should be spread in level layers not exceeding 9 inches in loose thickness and be compacted to a minimum of 95 percent of the maximum dry density as determined in accordance with ASTM D-1557 (Modified Proctor).

It is our opinion that some of the existing clay fill and clayey sands encountered at the boring locations should be suitable for use as general site engineered fill. In addition, the natural clayey soils encountered at the boring locations are suitable for use as general site engineered fill (provided they are properly moisture-controlled) in relatively open areas where large construction equipment is utilized to move, spread, and compact the soil. The natural clay and clay fill may require discing, aeration, and drying to allow for proper compaction. The success of aeration and drying of clay soils is dependent on the time of year, the associated weather conditions, and the contractor's effort. Also, clay soils are very difficult to compact in confined areas where compaction by hand-operated equipment is required. An imported granular fill material could be used for engineered fill below pavements or for backfill behind below-grade walls or utility trenches. For this case, we recommend the engineered fill consist of a granular material meeting MDOT Class II specifications.

4.3 Foundation Recommendations

Shallow foundations bearing on suitable natural clay or clayey sands, or engineered fill are recommended for support of the proposed structure. A maximum net allowable soil bearing pressure of 2,000 psf is recommended for foundations bearing on these soils. Suitable foundation bearing soils were generally encountered at the proposed basement floor elevation of about 936 feet.

The net allowable bearing pressure just presented is achievable at this site, however, some preparation of the bearing surface where the clayey sands are exposed may be required to attain this value. It has been our experience with similar sandy soil conditions that such soils may become loosened from 12 to 24 inches below the subgrade level from the excavation activities. As a result, the recommended net allowable bearing pressures cannot be achieved unless the exposed bearing surface is compacted with vibratory equipment, prior to placing foundation concrete. Generally, a hoe-pac mounted on a backhoe is sufficient. However testing of the subgrade, after surficial compaction, may indicate additional improvement by undercutting and replacing the loose sand with engineered fill may be necessary.



SME should be on-site to verify foundation subgrades prior to engineered fill placement and foundation construction.

For recommended net allowable bearing pressure above, a total settlement of less than 1 inch would be anticipated for spread foundations. Differential settlements are anticipated to be less than 1/2 of the total settlement. The settlement estimates provided are based on the available soil boring information and the estimated structural loads.

Foundations should be situated a minimum of 42 inches below final site grade along exterior walls, or in any unheated areas for protection against frost during normal winters. In heated areas of the structures, interior footings may be constructed just below the floor slabs, provided the footings bear on suitable natural soils and the footings are protected from freezing conditions during construction. If foundation construction occurs during the winter, the foundations must be protected from frost action by either embedment or proper insulation.

For bearing capacity and settlement considerations, isolated spread-footing type foundations should be at least 30 inches wide, and continuous strip-footing foundations should be at least 18 inches wide.

4.4 Slab-on-Grade Recommendations

Based on the soil boring results and the anticipated basement depth, we anticipate the subgrade soils for slabs-on-grade will generally consist of natural clayey sands or clay. In general, these soils are considered suitable for support of slabs-on-grade. We recommend placing a sand cushion over the subgrade for a leveling course in heated areas of the structure. A 4-inch layer of sand meeting MDOT Class II gradation is recommended for this purpose.

The basement pad subgrade soils are prone to disturbance during the construction operations. Slab subgrade soils which become disturbed should be removed and replaced with engineered fill. Extra care should be taken in areas where higher moisture content clays are encountered.

4.5 Pavement Design Recommendations

Based on the soil borings and the proposed final grading plan, the predominant pavement subgrade materials are anticipated to consist primarily of engineered site fill placed over sandy clay fill, or the natural silty clay encountered at Boring 6. Where the fill is not believed to be underlain by topsoil, we judge the material to be acceptable for pavement support.

Prior to placement of engineered fill, general subgrade preparation should include stripping unsuitable materials and proofrolling with a fully loaded, triaxle dump truck. This proofrolling should be performed in the presence of an SME representative. Any loose or soft areas should be mechanically stabilized or removed and replaced with granular fill material. Discing and aeration should be anticipated if the clay fill encountered at the boring locations is to be used as general site fill. Refer to Site Preparation and Earthwork Recommendations section of this report.

The pavements are anticipated to carry primarily cars and light trucks. Thus, we believe environmental factors will control the design with a slightly thickened pavement section for the drive areas to accommodate the channelized flow. Based on our experience in the area, we recommended the following pavement section:

	DRIVE THICKNESS (in.)	GENERAL PARKING THICKNESS (in.)
1100T Wearing Course	1.5	1.5
1100L Leveling Course	2.0	1.5
21AA*Base Course	9.0	8.0

*Crushed limestone or slag. If alternate materials are considered, the recommended base course thickness should be evaluated.

The designs are based on the soil boring information and our interpretation of the traffic use. If soil conditions are encountered which vary significantly from those described above, or our assumptions concerning the traffic are incorrect, we should be contacted in order to evaluate the effect on our design.

The above design should provide 20 years of service, with some maintenance activities, such as localized patching and crack-filling being required in the intervening years.

The following construction notes should be incorporated into the project specifications:

1. In general, earthwork and pavement construction should be performed in accordance with MDOT 1990 specifications, unless otherwise noted in the following items.
2. The subgrade soils should be thoroughly proofrolled using a fully loaded triaxle truck under the observation of a soils/pavement engineer. Soft or yielding areas which cannot be mechanically stabilized should be removed and replaced with an approved compacted granular material. The top 12 inches of the subgrade, as well as the aggregate base, should be compacted to achieve a 95 percent compaction level (Modified Proctor, ASTM D-1557).
3. The bituminous courses should be compacted to a minimum density of 97 percent of the maximum Marshall density (50 blow Marshall). Initial density measurements should be verified by coring to correlate nuclear gauge measurements.
4. A bond coat of SS-1h emulsion should be required between the leveling course and the wearing course, when either 48 hours have elapsed between placement of the bituminous courses, or the surface of the pavement has been contaminated with dirt, dust, or foreign

material. In the event a bond coat is not required, the base course may require localized broom cleaning.

5. Penetration grade 120-150 asphalt cement should be used in the production of all bituminous mixtures.
6. Placement of finger drains at all catch basins is recommended. A minimum of four 10-foot finger drains should be provided in parking areas with an invert crown drainage system and three 10-foot finger drains should be provided at curb and gutter inlet sites.
7. Final pavement elevations should be designed to provide positive surface drainage. A minimum surface slope of 1 1/2 percent is recommended.
8. These recommendations assume typical conditions during the June through September construction season. Any substitution of materials or deviation from these stated assumptions should be reviewed to assess potential impact on the recommended design.

5.0 CONSTRUCTION CONSIDERATIONS

All excavations should be sloped, shored, or braced in accordance with MI-OSHA requirements. The contractor should provide an adequately constructed and braced shoring system for employees working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads.

SME should be on-site to inspect foundation subgrades prior to concrete placement. The recommendations in this report should be considered preliminary and should only be used to assist in foundation design. The recommendations will become final when an SME representative verifies the actual soil conditions are consistent with those presented in this report.

Groundwater seepage may be encountered during excavation. Also, if natural clays are exposed, rainwater could accumulate and pond on these materials. Based on the proposed basement depth, standard sump pit and pumping procedures should be adequate to control this seepage or ponding on a local basis.

The foundation bearing soils are prone to disturbance from workers placing forms and reinforcing steel during construction. To minimize this disturbance, we recommend the foundation bearing soil be protected with a layer of crushed aggregate or crushed concrete.

6.0 GENERAL COMMENTS

The foundation construction activities should be monitored, and the foundation bearing soil tested under the direction of the project geotechnical engineer (SME) to verify conditions are as anticipated. Specifically, experienced professionals should monitor site preparation activities, including observation and testing during backfilling operations.

SME requests the opportunity to review the project plans and specifications to verify the project factors affecting foundation performance are consistent with the design recommendations set forth in this report.

This report has been prepared in accordance with generally accepted geotechnical engineering practice to assist in the design of this project. If the building location or the design criteria are changed, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based upon the data obtained from the 6 soil borings performed at the approximate locations indicated on the appended location plan. This report does not reflect variations which may occur between the borings or from the individual soil borings. The nature and extent of the variations may not become evident until the time of construction. If significant variations then become evident, it may be necessary for us to re-evaluate the recommendations of this report.

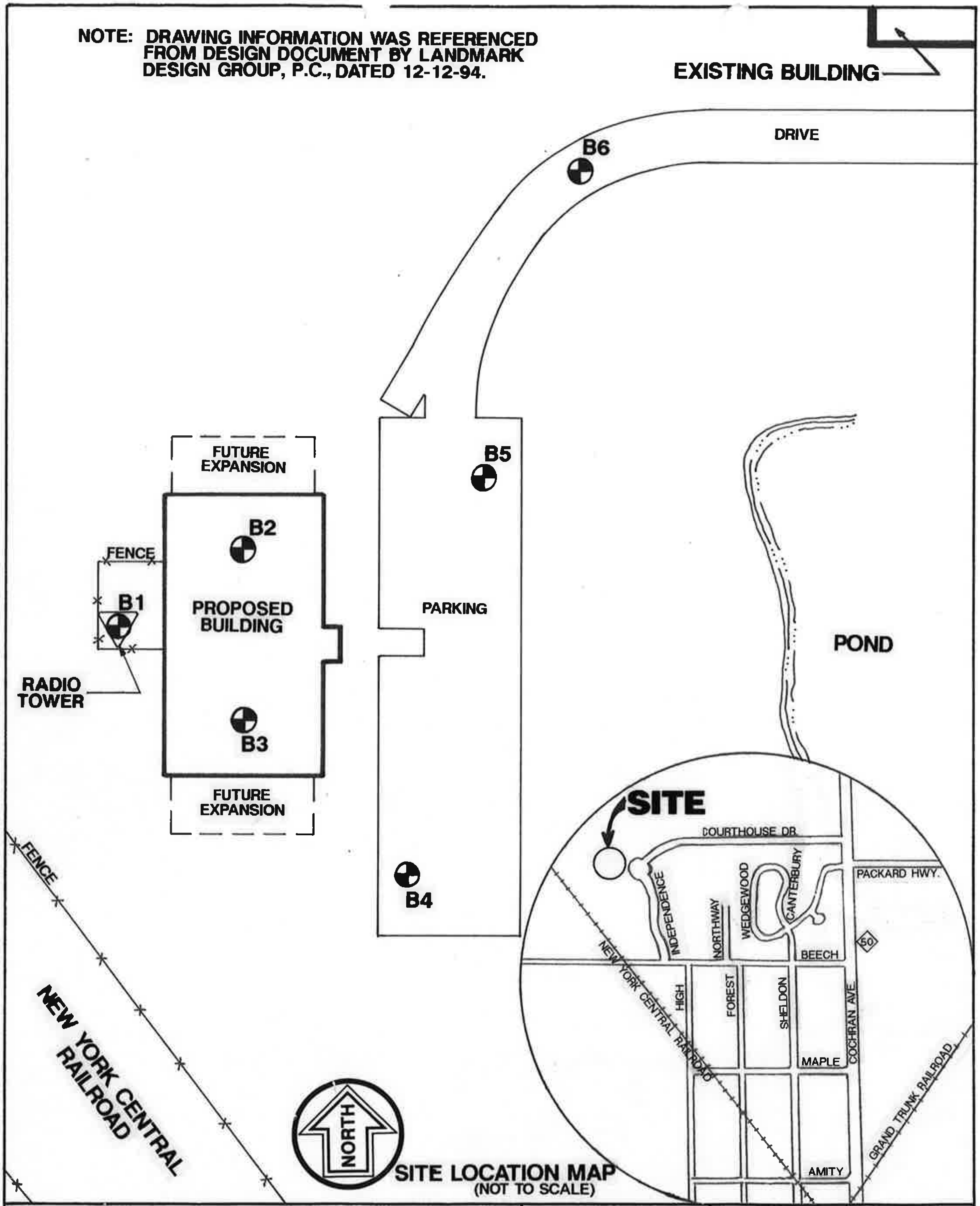
In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering.

Specifically, field logs are prepared during the drilling and sampling operations that describe field occurrences, sampling locations, and other information. However, the samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the final logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data, and then prepares the final boring logs. Our recommendations are based on the contents of the final logs and the information contained therein.

This report should be made available to bidders prior to submitting their proposals and to the successful contractor and subcontractors for their information only and to supply them with facts relative to the subsurface investigation and laboratory test results.

APPENDIX A

NOTE: DRAWING INFORMATION WAS REFERENCED FROM DESIGN DOCUMENT BY LANDMARK DESIGN GROUP, P.C., DATED 12-12-94.



SOIL BORING LOCATION DIAGRAM
EATON COUNTY 911 CENTRAL DISPATCH
CHARLOTTE, MICHIGAN

sme
soil and materials engineers, inc.

Bay City
Kalamazoo
Lansing
Plymouth

DATE 1-5-95
DRAWN BY TJP
SCALE 1"-60'
JOB NO. LG22586

soil and materials engineers, inc.

JOB NAME: Eaton County 911 Center
JOB LOCATION: Charlotte, Michigan
OWNER: Eaton County

A/E: Landmark Design Group, P.C.
BY: JR/MT **DATE:** 12-27-94
JOB NUMBER: LG22586

BORING 1
SHEET: 1

DRILLER: JR
RIG: 64

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 941.5

Driller Reported 10" Topsoil

Sandy Clay Fill-Trace to Some Silt-Trace Gravel-Brown-Hard (CL/Fill)

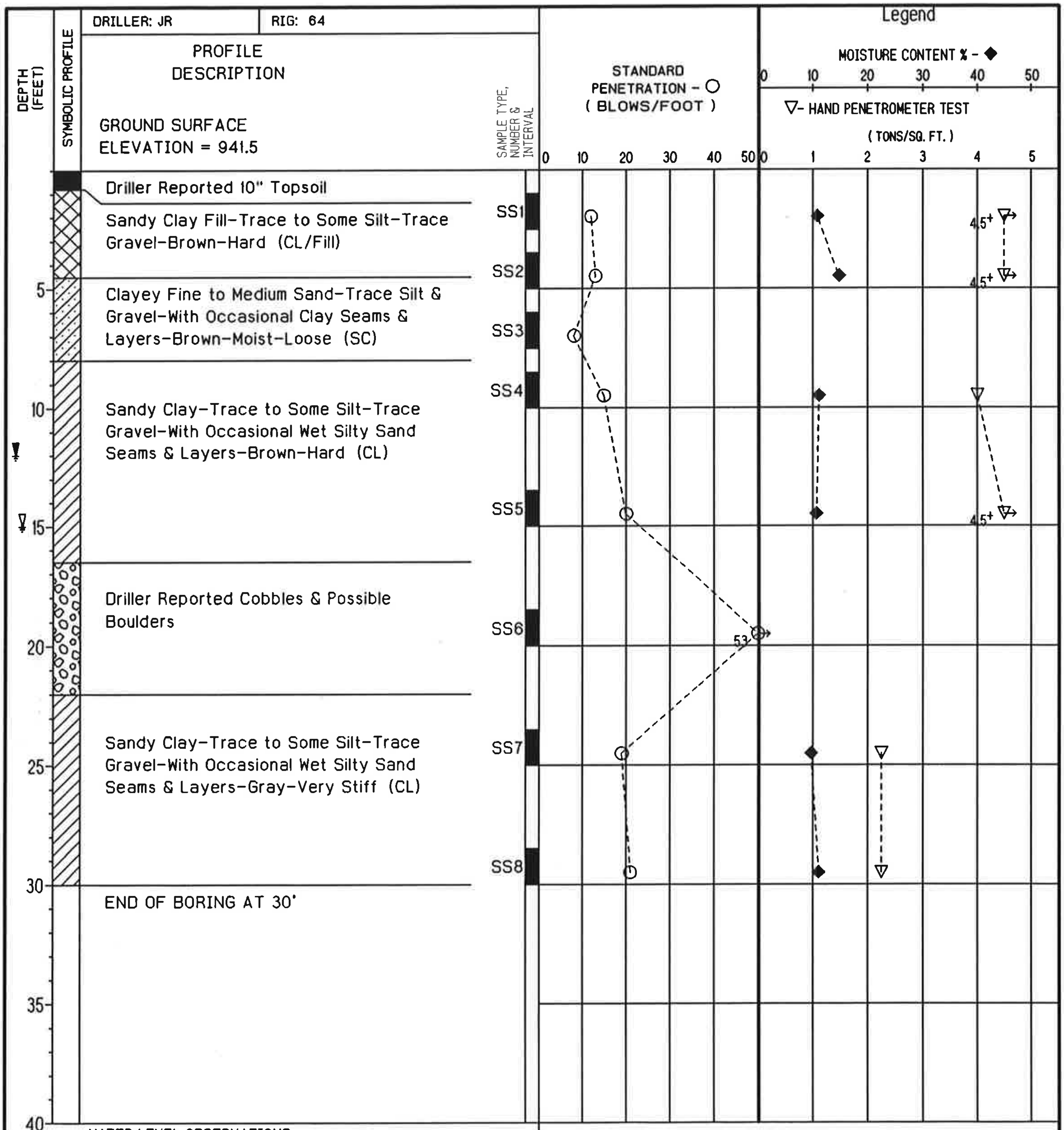
Clayey Fine to Medium Sand-Trace Silt & Gravel-With Occasional Clay Seams & Layers-Brown-Moist-Loose (SC)

Sandy Clay-Trace to Some Silt-Trace Gravel-With Occasional Wet Silty Sand Seams & Layers-Brown-Hard (CL)

Driller Reported Cobbles & Possible Boulders

Sandy Clay-Trace to Some Silt-Trace Gravel-With Occasional Wet Silty Sand Seams & Layers-Gray-Very Stiff (CL)

END OF BORING AT 30'



WATER LEVEL OBSERVATIONS

▼ GROUNDWATER ENCOUNTERED DURING DRILLING
▽ GROUNDWATER 0 HOURS AFTER DRILLING

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

JOB NAME: Eaton County 911 Center
JOB LOCATION: Charlotte, Michigan
OWNER: Eaton County

A/E: Landmark Design Group, P.C.
BY: JR/MT DATE: 12-28-94
JOB NUMBER: LG22586

BORING 2
SHEET: 1

DRILLER: JR
RIG: 64

DEPTH (FEET)
SYMBOLIC PROFILE

PROFILE DESCRIPTION

GROUND SURFACE
ELEVATION = 941.5

Driller Reported 6" Topsoil

Sandy Clay Fill-Trace to Some Silt-Trace Gravel & Topsoil-Brownish Black-Hard (CL/Fill)

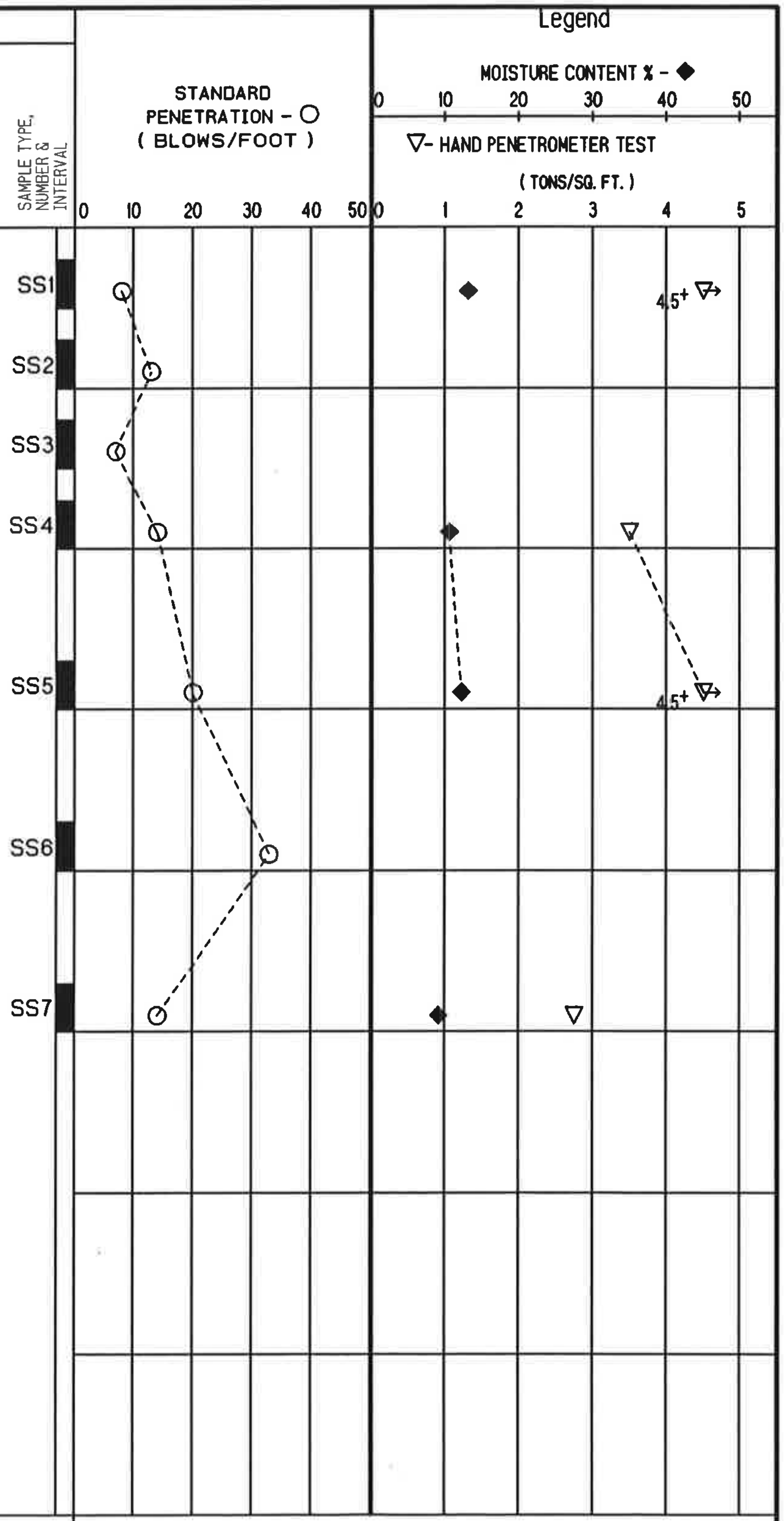
Clayey Fine to Medium Sand-Trace Silt, Roots, & Wood Fragments-Black- Moist (SC/Possible Original Topsoil)

Clayey Fine Sand-Trace Silt-Gray- Moist-Loose (SC)

Sandy Clay-Trace to Some Silt-Trace Gravel-With Occasional Moist to Wet Silty Sand & Clayey Sand Seams & Layers-Brown Turning Gray at 21'-Very Stiff to Hard (CL)

END OF BORING AT 25'

NOTE: No groundwater was encountered.



WATER LEVEL OBSERVATIONS

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

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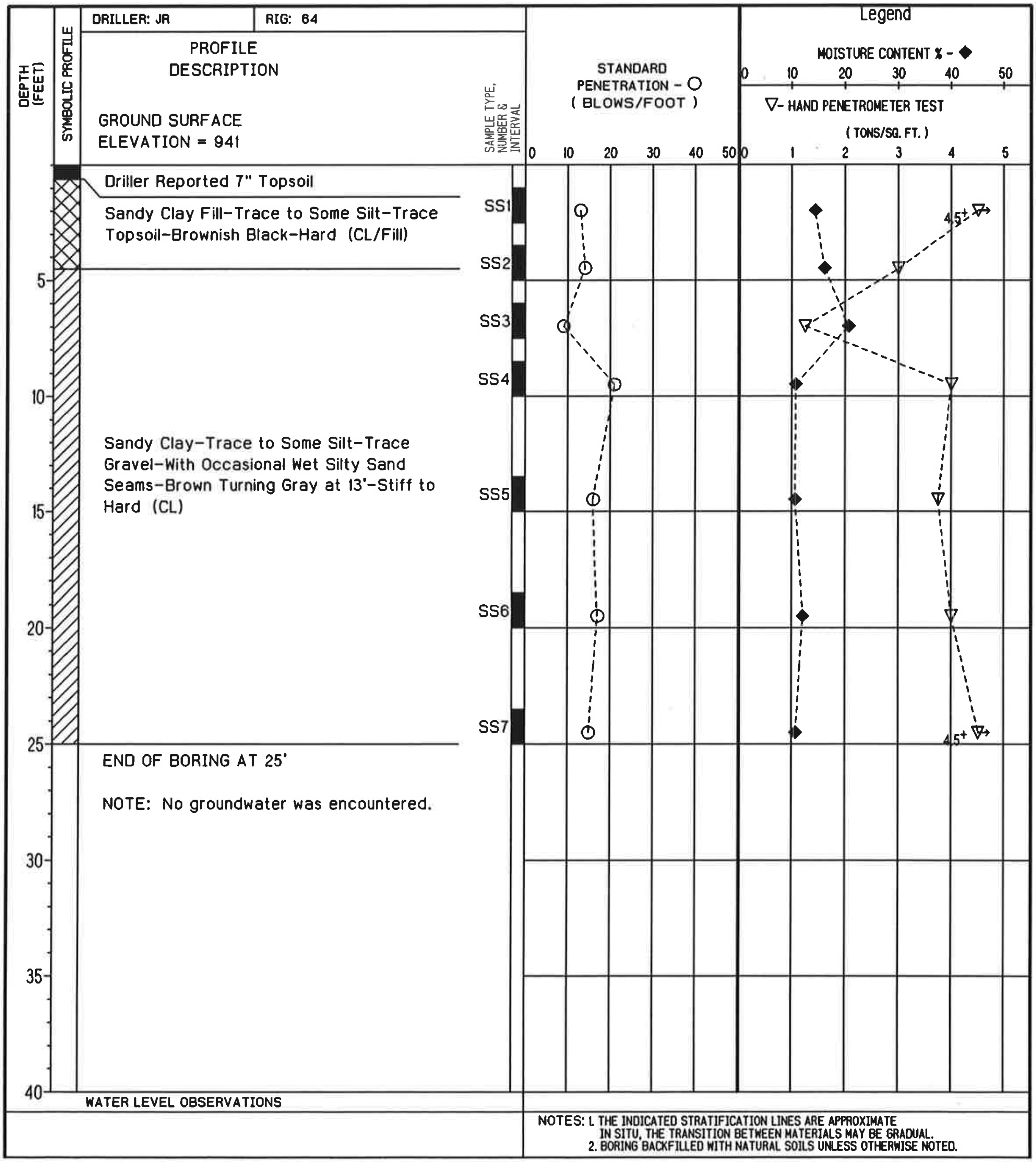
JOB LOCATION: Charlotte, Michigan
OWNER: Eaton County

A/E: Landmark Design Group, P.C.
BY: JR/MT **DATE:** 12-28-94
JOB NUMBER: LG22586

BORING 3
SHEET: 1



DRILLER: JR

RIG: 64

PROFILE DESCRIPTION

GROUND SURFACE ELEVATION = 941

Driller Reported 7" Topsoil

Sandy Clay Fill-Trace to Some Silt-Trace Topsoil-Brownish Black-Hard (CL/Fill)

Sandy Clay-Trace to Some Silt-Trace Gravel-With Occasional Wet Silty Sand Seams-Brown Turning Gray at 13'-Stiff to Hard (CL)

END OF BORING AT 25'

NOTE: No groundwater was encountered.

WATER LEVEL OBSERVATIONS

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

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JOB LOCATION: Charlotte, Michigan
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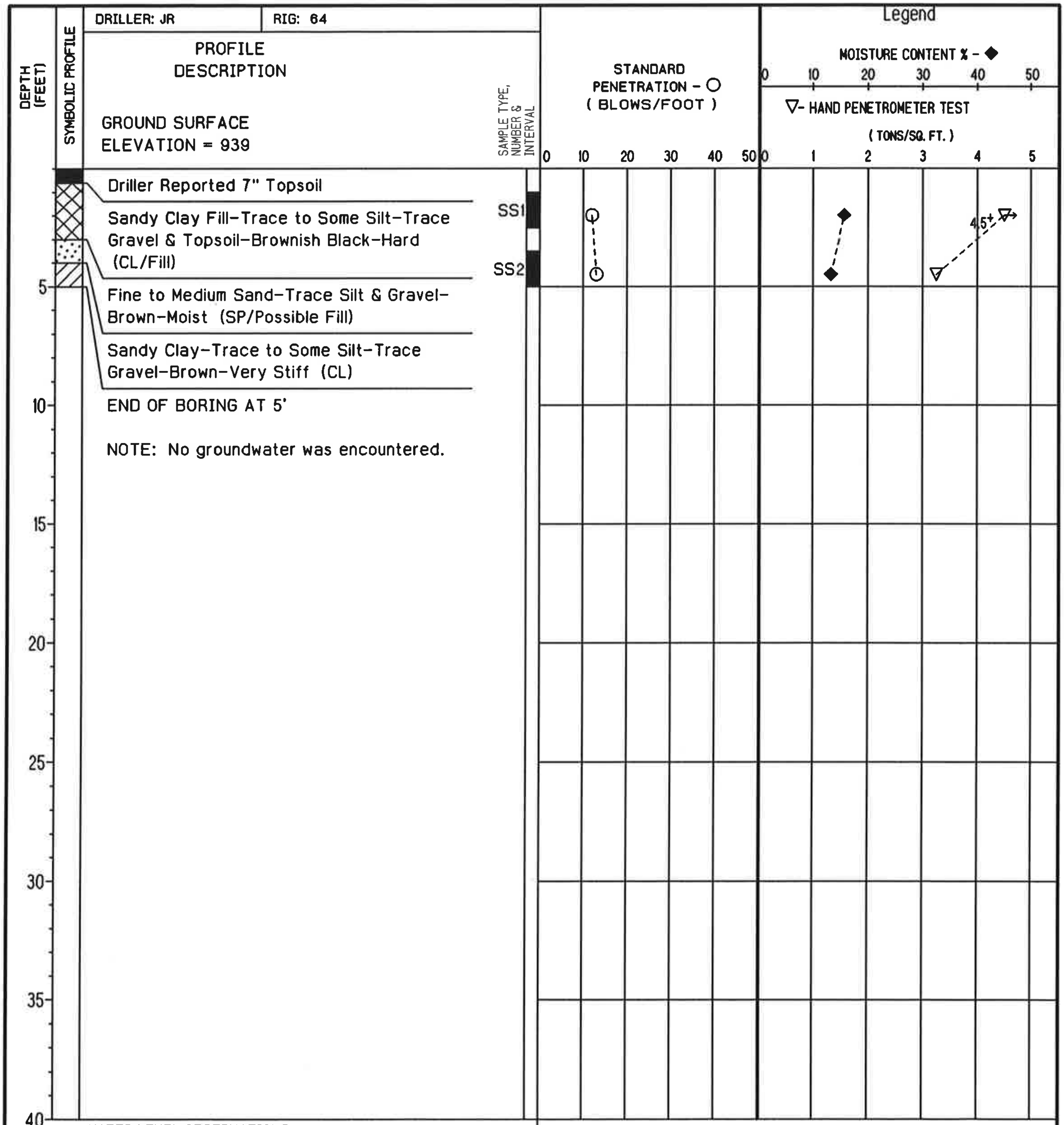
BORING 4
SHEET: 1



DRILLER: JR

RIG: 64

PROFILE DESCRIPTION

GROUND SURFACE
ELEVATION = 939

Driller Reported 7" Topsoil

Sandy Clay Fill-Trace to Some Silt-Trace Gravel & Topsoil-Brownish Black-Hard (CL/Fill)

Fine to Medium Sand-Trace Silt & Gravel-Brown-Moist (SP/Possible Fill)

Sandy Clay-Trace to Some Silt-Trace Gravel-Brown-Very Stiff (CL)

END OF BORING AT 5'

NOTE: No groundwater was encountered.

WATER LEVEL OBSERVATIONS

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

JOB NAME: Eaton County 911 Center
JOB LOCATION: Charlotte, Michigan
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BORING 5
SHEET: 1

DRILLER: JR **RIG:** 64

DEPTH (FEET)

SYMBOLIC PROFILE

PROFILE DESCRIPTION

GROUND SURFACE
ELEVATION = 937

SAMPLE TYPE, NUMBER & INTERVAL

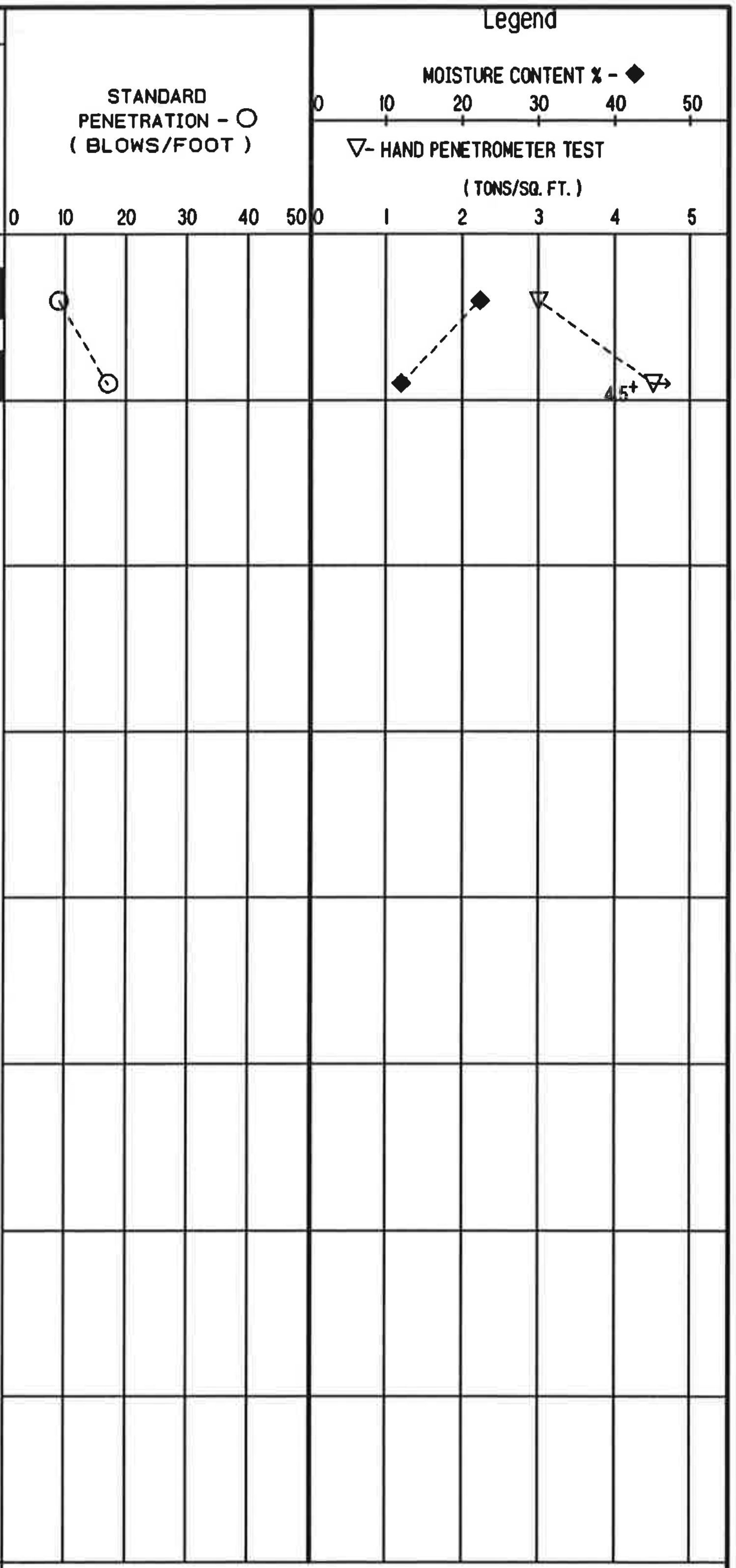
Driller Reported 12" Topsoil

Sandy Clay Fill-Trace Silt & Gravel-Brown-Very Stiff (CL/Fill) SS1

Sandy Clay-Trace to Some Silt-Brown-Very Stiff to Hard (CL) SS2

END OF BORING AT 5'

NOTE: No groundwater was encountered.



5 10 15 20 25 30 35 40

WATER LEVEL OBSERVATIONS

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.

soil and materials engineers, inc.

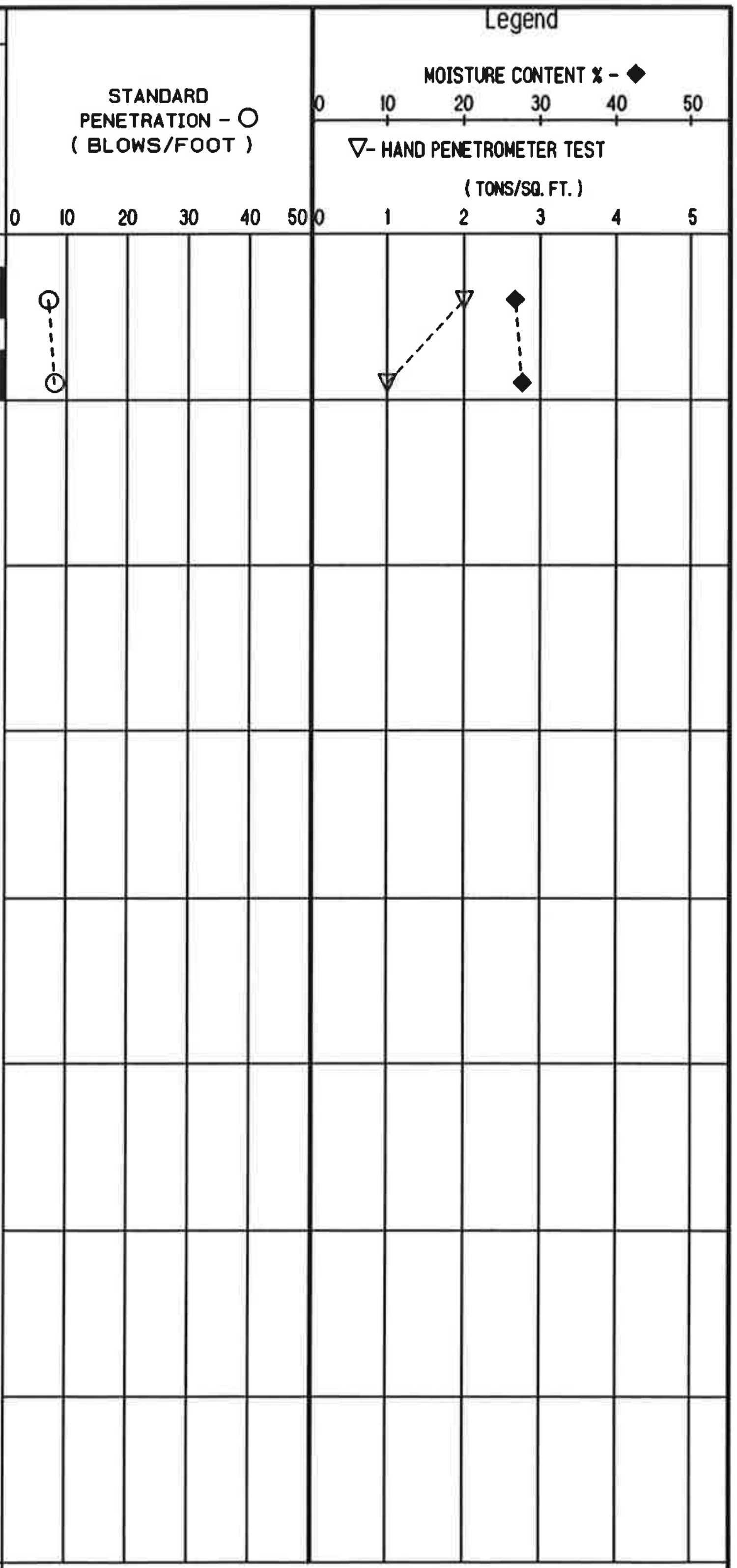
JOB NAME: Eaton County 911 Center
JOB LOCATION: Charlotte, Michigan
OWNER: Eaton County

A/E: Landmark Design Group, P.C.
BY: JR/MT **DATE:** 12-27-94
JOB NUMBER: LG22586

BORING 6
SHEET: 1

DRILLER: JR **RIG:** 64

DEPTH (FEET)	PROFILE DESCRIPTION GROUND SURFACE ELEVATION = 936.5	SAMPLE TYPE, NUMBER & INTERVAL
0–0.5	Driller Reported 6" Topsoil	
0.5–5	Silty Clay-Trace Sand-Mottled Brown & Gray-Stiff to Very Stiff (CL)	SS1 SS2
5	END OF BORING AT 5'	
	NOTE: No groundwater was encountered.	



WATER LEVEL OBSERVATIONS

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.