

**GEOTECHNICAL INVESTIGATION
PROPOSED BUILDING ADDITIONS "A", "F" AND "M"
2200 EGLINTON AVENUE
MISSISSAUGA, ONTARIO
FOR
CREDIT VALLEY HOSPITAL**

Distribution:

**1 cc: Client
3 cc: Halsall Associates Limited
1 cc: PML Toronto**

PML Ref: 99TF101A

August 2001

August 24, 2001

PML Ref: 99TF101A

Mr. David Cunic
Project Manager
Credit Valley Hospital
2200 Eglinton Avenue West
Mississauga, Ontario
L5M 2N1

Dear Mr. Cunic

Geotechnical Investigation
Proposed Building Additions "A", "F" and "M"
Credit Valley Hospital
Mississauga, Ontario

We are pleased to present the result of the geotechnical investigation recently completed for the above-referenced project. Mr. Michael Buckley, P. Eng. of Halsall Associates Limited authorized the work by fax dated June 8, 2001. A Peto MacCallum Ltd. Engineering Services Agreement Change Order is to be signed and returned.

The proposed expansion project involves the construction of three building additions, including Building "A" in the southeast corner, Building "F" in the southwest side and Building "M" in the northeast corner of the existing hospital building envelope proper, respectively, at 2200 Eglinton Avenue, Mississauga, Ontario. Halsall Associates Limited sent a fax dated June 8, 2001 showing the site plan with the proposed building plan areas noting the maximum anticipated column loads and the proposed top of lowest floor slab levels.

The purpose of the investigation is to determine the subsurface soils and groundwater conditions at the site, based on the information obtained, prepare a report presenting the factual data together with geotechnical recommendations pertaining to the design and construction of the proposed building additions "A", "F" and "M". Comments regarding foundation type, allowable bearing pressures, excavation and backfill, slab-on-grade construction and earthquake considerations are to be provided.

At the time of this investigation, the development plans have not been finalized. Consequently, the geotechnical assessment addresses proposed development for the site based on available design information. Peto MacCallum Ltd. should review the final drawings when they are available. The results of this review may be a modification of our recommendations or it may require additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

LIST OF REFERENCED DOCUMENTS

For over the past 20 years, Peto MacCallum Ltd. has conducted subsurface investigations and prepared geotechnical reports at the Credit Valley Hospital property which is situated on one of the most complex geologic sites in Ontario. For the proposed building additions "A", "F" and "M", Peto MacCallum Ltd. reviewed the previous geotechnical reports and inferred the stratigraphic conditions at the proposed plan areas based on previous subsurface information. The referenced documents are listed as follows.

Reference document No. (2) presented the investigation procedure and borehole logs for series 500, drilled recently in December 2000 and March 2001 for the current proposed hospital expansion.

- (1) Peto MacCallum Ltd. Environmental Site Assessment, Phase I and Phase II, Credit Valley Hospital Additions and Renovations. 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 99TF101A), dated April, 2001.
- (2) Peto MacCallum Ltd. Geotechnical Investigation, Road, Parking Area and Heliport, 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 99TF101A), dated May, 2001.
- (3) Peto MacCallum Ltd. Geotechnical Overview Additions/Renovation. 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 99TF101).
- (4) Peto MacCallum Ltd. Geotechnical Investigation. Proposed Apartment Building, 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 88F348).

- (5) Peto MacCallum Ltd. Geotechnical Investigation. New Parking Structure, 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 87F479).
- (6) Peto MacCallum Ltd. Supplementary Geotechnical Investigation. Hospital Building, 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 81F35A).
- (7) Peto MacCallum Ltd. Preliminary Geotechnical Investigation. Hospital Building, 2200 Eglinton Avenue West, Mississauga, Ontario for Credit Valley Hospital (PML Ref.: 81F35).

SUMMARIZED SUBSURFACE CONDITIONS

Based on our experience in the vicinity of the site, a major preglacial U-shaped valley crosses the property. The overburden thickness across the site varies dramatically. At the north west corner of the parking garage and the south east corner of the property, shale bedrock is extremely shallow, typically at 1.5 to 4.0 m depth below existing grades. Within the hospital building envelope proper, the overburden thickness increases dramatically up to 24.0 m. Generally, the overburden consists of an upper clayey silt till unit overlying saturated glacial fluvial silts, sands and gravels.

In shallow bedrock areas the clayey silt till overburden directly mantles the shale. Within the buried valley environment the clayey silt till is underlain by extensive and variable granular strata under artesian pressure.

The following sections presented the summarised stratigraphic information at the proposed plan sites.

Proposed Building "A" Addition

Reference is made to Appendix A appended which presents the pertinent stratigraphic and groundwater information for 9 boreholes drilled adjacent to or within the footprint of the proposed Building "A".

The proposed addition will comprise a maximum anticipated column load of 5,000 kN. The structure does not have basement level and the top of the lowest floor level in the structure is at elevation 156.2.

Based on the appended subsurface information, the proposed addition Building "A" extends across an area varying from shallow bedrock to thick glacial till and granular deposits in the buried valley environment. Along the east and north limits of the new addition (boreholes 206, 207, 208 and 510) hard silt till overburden directly mantles shale bedrock at 1.4 to 4.9 m depths, elevation 153.5 to 154.4. Contrastingly, along the south and west sides of the proposed addition, the overburden increases from 8.8 to 12.2 m at boreholes 110, 122 and 511. The inferred bedrock level in this portion ranged from elevation 150.8 to 147.7.

In the buried valley environment, the silt till and silt strata are underlain by water bearing granular deposits typically at 3.1 to 5.3 m depth, elevation 156.4 to 155.2. The thickness of the granular deposit ranged from about 1.2 to 3.3 m.

It is noted that the groundwater levels observed in March 1981 and August 1982 ranged from elevation 154.1 to as high as elevation 157.6. However, boreholes 508 to 511 drilled in December 2000 indicated that upon completion of augering, no free water was encountered.

The present groundwater level at the site has been modified by the installation of the parking lot, hospital building expansion and below grade utilities.

Proposed Building "F" Addition

Reference is made to Appendix B appended which presents the pertinent stratigraphic and groundwater information for 9 boreholes drilled adjacent to or within the footprint of the proposed addition Building "F".

The proposed addition will comprise a maximum anticipated column load of 7,000 kN. The structure does not have basement level and the top of the lowest floor level in the structure is at elevation 161.0.

Based on the appended subsurface information, the proposed addition Building “F” locates in an area of the major preglacial valley. The inferred bedrock ranged from 13.1 m, elevation 150.0 at borehole 106 to as deep as 23.6 m, elevation 142.4 at borehole 121.

In the buried valley environment, the silt till and silt strata are underlain by water bearing granular deposits typically at 0.4 to 7.6 m depth, elevation 160.6 to 153.4. The thickness of the granular deposit ranged from about 0.2 to 5.7 m.

It is noted that the groundwater levels observed in March 1981 and August 1982 ranged from elevation 154.0 to as high as elevation 160.1. However, boreholes 506, 512 and 519 drilled in December 2000 and March 2001 indicated that the groundwater levels ranged from 8.1 m depth, elevation 152.9 to 1.9 m depth below existing grades, elevation 158.3.

The present groundwater level at the site has been modified by the installation of the parking lot, hospital building expansion and below grade utilities.

Proposed Building “M” Addition

Reference is made to Appendix C appended which presents the pertinent stratigraphic and groundwater information for 4 boreholes drilled adjacent to or within the footprint of the proposed addition “M”.

The proposed addition will comprise a maximum anticipated column load of 6,000 kN. The structure does not have a basement level and the top of the lowest floor level in the structure is at elevation 161.0.

Based on the appended subsurface information, the proposed addition Building “M” crosses an area varying from shallow bedrock to thick glacial till and granular deposits in the buried valley environment. Along the north limit of the proposed addition (borehole 1) stiff silt till overburden directly mantles shale bedrock at 0.8 m depths, elevation 164.5. Contrastingly, along the south east and west sides of the proposed addition, the overburden increases from 9.3 to 12.2 m at boreholes 101, 310 and 110. The inferred bedrock level in this portion ranged from elevation 147.7 to 150.9.

In the buried valley environment, the silt till and silt strata are underlain by water bearing granular deposit typically at 4.0 to 4.3 m depth, elevation 156.3 to 155.9. The thickness of the granular deposit ranged from about 1.2 to 3.3 m.

It is noted that groundwater levels observed in March 1981 ranged from elevation 156.8 to as high as elevation 157.6. However, boreholes 310 and 1 drilled in October 1987 and July 1988, respectively, indicated that upon completion of augering, no free water was encountered.

The present groundwater level at the site has been modified by the installation of the parking lot, hospital building expansion and below grade utilities.

ENGINEERING DISCUSSION

Based on the results of the summarised subsurface conditions, the plan areas are considered feasible for the proposed building additions "A", "F" and "M" from a geotechnical point of view.

Foundation

Based on our brief summary of the overburden, bedrock and groundwater conditions at these proposed locations, foundations for the proposed building additions may be supported on conventional spread footings. Table 1 provides reference founding levels and allowable soil bearing pressures for spread footings at the borehole locations.

Total and differential settlement of footings, designed as outlined above, and imposing the maximum allowable soil bearing pressure, should not exceed 25 and 19 mm, respectively, provided that the subgrade at founding levels is not loosened or softened by construction activities or prolonged exposure to the elements. To this end, if the footing concrete is not cast immediately, it is recommended that the founding surfaces be covered with a 50 mm thick skim slab of lean concrete immediately after excavation and inspection.

Footings must be located above an imaginary line extending down from the edges of adjacent footings at an inclination of 7 vertical to 10 horizontal. Where footings are stepped down, a maximum level difference of 600 mm should be maintained.

TABLE 1
SPREAD FOOTING REFERENCE FOUNDING LEVELS *

| Building | Elevation (m) | Depth (m) | Footing Bearing Layer | Allowable Soil Bearing Pressure (kPa) |
|---|---------------------|-----------------|--|---------------------------------------|
| Building “A” (Top of the lowest floor level at Elevation 156.2, maximum anticipated column load 5,000 kN) | Below 154.5 – 155.7 | Below 1.4 – 4.8 | Very dense sandy silt sand till or hard clayey silt till | 500 |
| | Below 154.3 – 154.5 | Below 1.4 – 1.5 | Hard weathered shale | 500 |
| Building “F” (Top of the lowest floor level at Elevation 161.0, maximum anticipated column load 7,000 kN) | Below 159.1– 160.5 | Below 1.0 – 5.4 | Dense to very dense silt or hard clayey silt till | 400 |
| Building “M” (Top of the lowest floor level at Elevation 161.0, maximum anticipated column load 6,000 kN) | Below 158.7 – 160.5 | Below 1.5 – 4.1 | Hard clayey silt till | 400 |
| | Below 161.5 | Below 4.8 | Hard weathered shale | 500 |

* The reference founding levels are based on borehole locations only.

Note: The elevations and depths are based on the information in related borehole logs. The existing ground surface elevations at this time may be different because of hospital expansions.

Exterior footings and all footings exposed to seasonal freezing conditions must be provided with frost protection. The recommended minimum frost protection comprises 1.2 m of earth cover or thermal equivalent.

Prior to placement of concrete, all founding surfaces must be inspected by geotechnical personnel from Peto MacCallum Ltd. to ensure that the founding soils area similar to those identified in the boreholes and are capable of supporting the design bearing pressure.

Alternatively, the proposed additions, especially Building “F” and Building “M” may be supported by short augered caissons found on competent native soils or sound shale bedrock. It is recognized that, given the column loads, bellling of the caisson bases would probably be required. Belling would generally be advisable only in the clayey silt till deposit.

Care should be taken not to auger the caisson into the water bearing granular deposits. These deposits are saturated and under artesian pressure and basal instability would probably occurred.

In the event of buried valley environment, the caissons should be founded approximately 1.0 m below the top of the end bearing layers and the base levels should be kept in the same layers.

In the case of the shallow bedrock, it is recommended that straight-sided caissons be socketed into the bedrock. The socket should penetrate the highly weathered bedrock, which may be up to one diameter below the sound bedrock surface. Table 2 provides caisson reference founding levels and allowable soil end bearing pressures at the proposed locations.

The caissons should have a minimum length of at least 3 times of its diameter and have a minimum diameter of 760 mm and be provided with temporary steel liners to permit hand cleaning and inspection of the founding surface. Although no boulders were detected within the drilled boreholes, these obstructions should be normally anticipated.

The caisson bottom should be cleaned of all loose materials. Given the different founding conditions, it is recommended that the caisson installation operations must be inspected throughout by Peto MacCallum Ltd. personnel. Some ground water seepage may enter the caisson and should be pumped out prior to inspection and concreting. Air quality monitoring should be conducted prior to caisson inspection.

The caisson drilling procedure should be review by Peto MacCallum Ltd. prior to the work. Settlements for caissons designed as recommended should be within tolerable limits.

TABLE 2
CAISSON REFERENCE FOUNDING LEVELS *

| Building | Estimated Elevation (m) | Estimated Depth (m) | Caisson End Bearing Layer | Allowable Soil End Bearing Pressure (kPa) |
|---|-------------------------|---------------------|---|---|
| Building "A" (Top of the lowest floor level at Elevation 156.2, maximum anticipated column load 5,000 kN) | Below 151.4 – 153.5 | Below 4.4 – 8.6 | Very dense silt till or hard clayey silt till | 2000 |
| | Below 153.0 – 153.6 | Below 2.3 – 4.1 | Sound Shale Rock | 2800 |
| Building "F" (Top of the lowest floor level at Elevation 161.0, maximum anticipated column load 7,000 kN) | Below 153.2 – 157.1 | Below 7.0 – 8.1 | Very dense silt till or hard clayey silt till | 2000 |
| Building "M" (Top of the lowest floor level at Elevation 161.0, maximum anticipated column load 6,000 kN) | Below 151.6 – 156.3 | Below 8.1 – 8.6 | Very dense silt till or hard clayey silt till | 2000 |
| | Below 159.2 | Below 6.1 | Sound Shale Rock | 2800 |

* The reference founding levels are based on borehole locations only.

Note: The elevations and depths are based on the information in relevant borehole logs. The existing ground surface elevations at this time may be different because of hospital expansions.

The caisson foundations, as outlined above, have minimal interference to the existing buildings. However, the caisson foundation system would have very variable founding elevations and would be difficult to install through the dense glacial fluvial sediments and would have the added problem of ground water under artesian pressure. Therefore, shallow foundations, such as conventional spread footings are more appropriate and economical.

Slab-on-Grade

At the time of the investigation, the preliminary top of the lowest floor levels of the proposed building additions “A”, “F” and “M” were provided by Halsall Associates Limited.

Slab-on-grade design and construction are considered feasible at this site. The stratigraphy at the proposed lowest floor subgrade levels will typically comprise dense to very dense silt, very stiff to hard clayey silt till. Because of sloping nature of the site, at some specific locations, slabs may be supported by engineered fill pad, as described in Appendix D, using allowable soil bearing capacity of 150 kPa. The engineered fill construction should be monitored on a full-time basis by geotechnical personnel from Peto MacCallum Ltd. to examine and approve backfill materials, to evaluate placement operations, and to verify that the specified degree of compaction is being achieved uniformly throughout the fill.

It is recommended that all topsoil, fill and other obviously unsuitable materials be removed from the entire underfloor area. The final subgrade should be proof rolled using heavy equipment and inspected by geotechnical personnel from Peto MacCallum Ltd. Any soft, wet, or deleterious material that becomes evident during proof rolling should be subexcavated and replaced with approved backfill compacted to at least 98% standard Proctor maximum dry density.

The area can then be brought up to the design subgrade level with suitable and approved materials. The backfill should be placed in lifts not more than 200 mm thick in the loose state, each lifts being compacted to at least 98% standard Proctor maximum dry density before subsequent lifts are placed.

A minimum 150 mm thick layer of compacted 19 mm clear crushed stone is recommended immediately below the floor slab. If a moisture sensitive floor finish is to be provided, polyethylene sheeting should be used as a vapour barrier.

In-situ density tests should be carried out by Peto MacCallum Ltd. technicians on all engineered fill to ensure the specified levels of compaction are being obtained.

In order to minimise infiltration of surface water, in unpaved area the upper 600 mm of backfill should be comprised relatively impervious compacted clayey materials and sloped away from the proposed building additions.

Excavation and Groundwater Control

It is considered that excavation for the proposed plan areas can be carried out in open cuts using conventional equipment. Cobbles and boulders are anticipated within the native deposits, if encountered, construction progress may be hampered.

All construction work must be carried out in accordance with the Occupational Health and Safety Act (OHSA) and local regulations. With respect to the OHSA, the native very stiff and hard silt till is considered as Type 2 soils. The fill, the cohesionless soils are considered as Type 3 soils. Native soils below the groundwater levels are considered as Type 4 soils. If an excavation contains more than one soil type, trench excavation and excavation slope geometry shall be governed by the highest numbered soil type.

The OHSA requires an excavation be cut at a predetermined inclination, based on soil types. For example, excavation entirely in Type 2 soils, side slopes should be cut vertically in the lower 1.2 m from the base of excavation and at an inclination of 1 horizontal to 1 vertical above the height of 1.2 m; in Type 3 soils, side slopes should be cut at an inclination of 1 horizontal to 1 vertical from the base of excavation; in Type 4 soils, side slopes should be cut at an inclination of 3 horizontal to 1 vertical from the base of the excavation.

Excavation slopes should be continually inspected, particularly following periods of heavy rainfall, spring thaw and when the trench has been left open for any extended period of time. The excavating and backfilling operations should be carried out in such a manner as to minimise the time that an excavation is left open at any time.

During excavation, if a shoring system is deemed to be necessary, Peto MacCallum Ltd. will provide shoring design guideline upon request. For design of underpinning requirements, reference is made to Appendix E.

While groundwater was encountered in the granular valley deposits under artesian pressure, the fairly shallow excavations required for the conventional spread footing foundations should encounter only minor seepage which will be controlled by conventional pumping from open sumps. However, in the case of caisson deep foundations or any excavations below groundwater table, it may be necessary to use a more effective means of groundwater control to maintain stability of the bottom of excavation.

The present groundwater levels at the plan areas have been modified by the installation of the parking lot, hospital building expansion and below grade utilities. It is recommended that trial excavations be carried out at the proposed building areas prior to tendering or at the tendering stage to determine the volume of water to be handled and the preferred means of groundwater control during construction. The trial excavation should be carried out in the presence of the Engineer and contractors bidding for the work.

If the final excavation level is not more than 0.5 m below the groundwater level, it is anticipated that groundwater inflow can be controlled by conventional sump pumping techniques. More positive groundwater control measures should be considered when the final excavation level is more than 0.6 m below the groundwater level. Well points and eductor wells should be surrounded by a graded granular filter to prevent removal of fine particles during pumping.

If dewatering is deemed to be necessary, it should be carried out by a specialist Contractor and carried out to sufficient depth at least 1.0 m below the base level to ensure stable excavation conditions and to maintain the integrity and safety of adjacent structures and services.

The Contractor's proposed method of dewatering should be reviewed by the Engineer prior to implementation. The effectiveness of the dewatering system should be verified by installing piezometers in the water bearing deposits as close to the excavation as possible. The dewatering system must be maintained until the excavation and backfilling are completed.

Backfill Considerations

The native soils which are not mixed with topsoil or other obviously unsuitable material may be reused as backfill if the moisture content is within 2% of their optimum moisture content from standard Proctor moisture-density relationship tests. Some water content adjustments would likely be required for efficient compaction depending upon weather conditions at the time of construction.

Any frozen, organic, excessively wet or other deleterious materials should not be used for backfill purposes. These materials should be separated and set aside for non-critical purposes. Any shortfall of suitable on-site excavated material can be made up with approved and imported materials.

The native soils, which are not free draining, should not be used where this characteristic is required. Imported granular material conforming OPSS Granular “B” Type 1 would be suitable for these purposes.

Backfill should be placed simultaneously on both sides of the foundation walls. The material should be placed in thin lifts not more than 300 mm thick and compacted to 95% of the standard Proctor maximum dry density.

Heavy compactors, which generate large stress, should be kept at a safe distance from existing structures to avoid structural damage or the walls should be suitable braced.

All backfill and compaction operations should be monitored by representative of Peto MacCallum Ltd. to approve material, to evaluate placement operations and to verify that the specified degree of compaction is being achieved uniformly throughout the fill.

Earthquake Considerations

The proposed structures must be designed to resist a minimum earthquake force. The Ontario Building Code specifies that structures should be designed to withstand a minimum lateral force, V , which is assumed to act non-concurrently in any direction on the structure as per the following expression:

$$V = vSKIFW$$

The terms, which are relevant to the geotechnical conditions at the site, are the zonal velocity ratio, v , and the foundation factor, F .

The zonal velocity ratio, v , for this area from Table 2.5.1A of the Ontario Building Code is 0.05. The foundation factor, F , which should be applied to the native soils at this site is 1.3. These parameters should be reviewed by the Structural Engineer.

CLOSURE

The recommendations in this report have been based on the findings in the boreholes. Soil conditions may vary between and beyond the boreholes. Variations in conditions identified during construction may necessitate updates in design consideration.

The specific environmental site assessment results are addressed in our Phase I and Phase II Environmental Site Assessment (ESA) report (PML Ref.: 99TF101A).

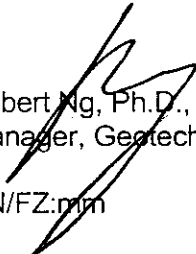
We trust that this report complete within our terms of reference. If you have any questions, please contact our office.

Sincerely

Peto MacCallum Ltd.



Frank Zhang, B.Eng., M.Eng.
Project Co-ordinator



Robert Ng, Ph.D., M.B.A., P.Eng.
Manager, Geotechnical Engineering Services

RN/FZ:mm



Enclosures:

List of Abbreviations

Borehole Location Plan

- Appendix A: Summarised Subsurface Conditions – Building "A"
- Appendix B: Summarised Subsurface Conditions – Building "F"
- Appendix C: Summarised Subsurface Conditions – Building "M"
- Appendix D: Engineered Fill
- Appendix E: Underpinning

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N'. - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 0.3m INTO THE SUBSOIL. DRIVEN BY MEANS OF A 63.5kg HAMMER FALLING FREELY A DISTANCE OF 0.76m.

DYNAMIC PENETRATION RESISTANCE: - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 51mm, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS. 0.3m INTO THE SUBSOIL. THE DRIVING ENERGY BEING 475J PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

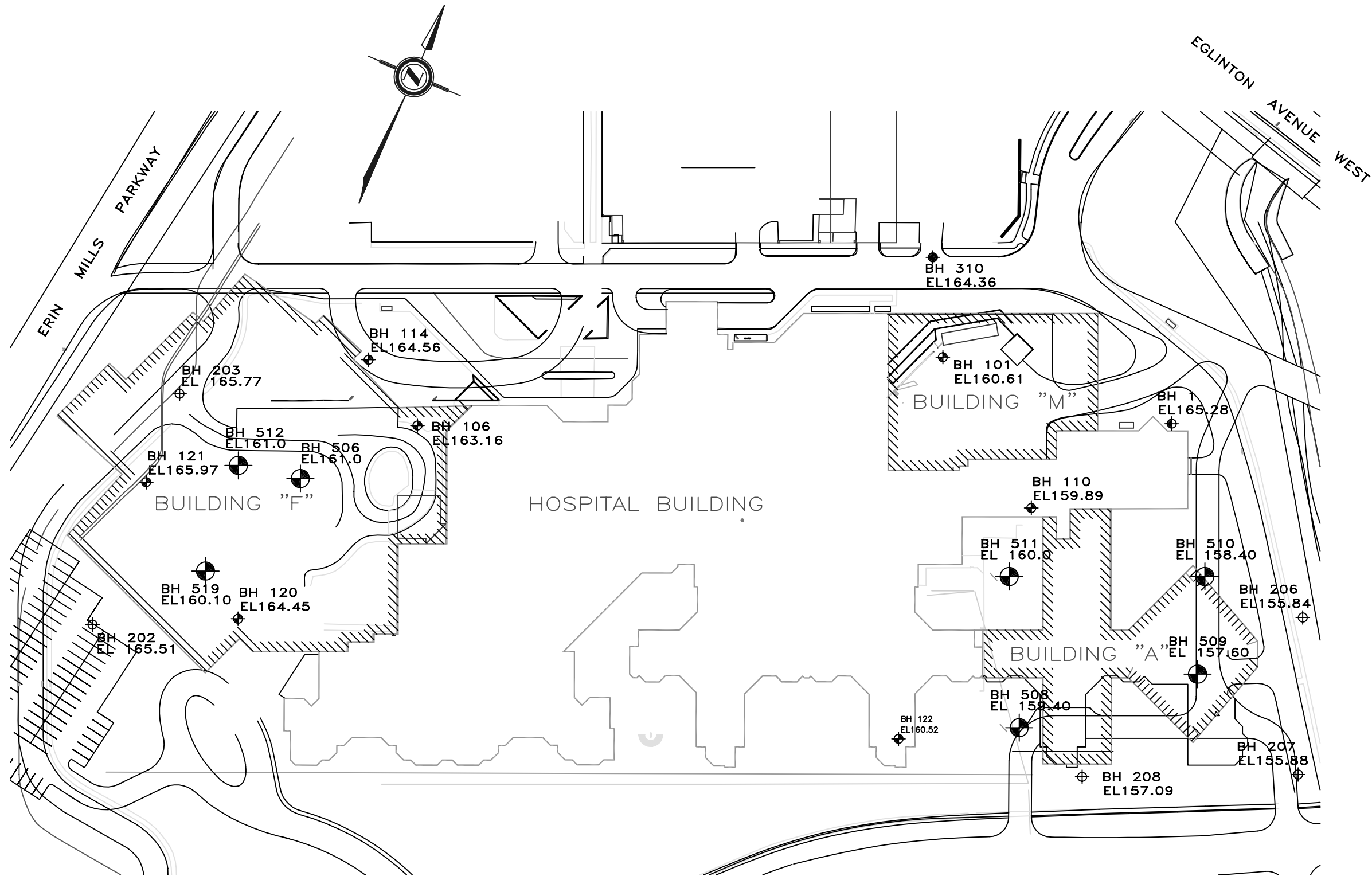
| <u>CONSISTENCY</u> | <u>'N' BLOWS/0.3m</u> | <u>c kPa</u> | <u>DENSENESS</u> | <u>'N' BLOWS/0.3m</u> |
|------------------------------------|-----------------------|----------------------------|-----------------------------------|-----------------------|
| VERY SOFT | 0 - 2 | 0 - 12 | VERY LOOSE | 0 - 4 |
| SOFT | 2 - 4 | 12 - 25 | LOOSE | 4 - 10 |
| FIRM | 4 - 8 | 25 - 50 | COMPACT | 10 - 30 |
| STIFF | 8 - 15 | 50 - 100 | DENSE | 30 - 50 |
| VERY STIFF | 15 - 30 | 100 - 200 | VERY DENSE | > 50 |
| HARD | > 30 | > 200 | | |
| W.T.P.L. WETTER THAN PLASTIC LIMIT | | | D.T.P.L. DRIER THAN PLASTIC LIMIT | |
| | | A.P.L. ABOUT PLASTIC LIMIT | | |

TYPE OF SAMPLE

| | |
|------------------------------------|------------------------|
| S.S. SPLIT SPOON | T.W. THINWALL OPEN |
| W.S. WASHED SAMPLE | T.P. THINWALL PISTON |
| S.B. SCRAPER BUCKET SAMPLE | O.S. OESTERBERG SAMPLE |
| A.S. AUGER SAMPLE | F.S. FOIL SAMPLE |
| C.S. CHUNK SAMPLE | R.C. ROCK CORE |
| S.T. SLOTTED TUBE SAMPLE | |
| P.H. SAMPLE ADVANCED HYDRAULICALLY | |
| P.M. SAMPLE ADVANCED MANUALLY | |

SOIL TESTS

| | |
|-------------------------------------|----------------------|
| Qu UNCONFINED COMPRESSION | L.V. LABORATORY VANE |
| Q UNDRAINED TRIAXIAL | F.V. FIELD VANE |
| Qcu CONSOLIDATED UNDRAINED TRIAXIAL | C CONSOLIDATION |
| Qd DRAINED TRIAXIAL | |



1. THE INFERRED STRATIGRAPHY REFERRED TO IN THIS REPORT IS BASED ON DATA FROM THESE BOREHOLES, SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY AT OTHER POINTS BETWEEN THE BORINGS MAY VARY FROM THAT SHOWN.
2. GROUND ELEVATIONS INTERPOLATED FROM ELECTRONIC AUTOCAD FILE SUM010B.DWG PROVIDED BY HALSALL ASSOCIATES LIMITED.



LEGEND

- BH 519
EL160.1 BOREHOLE (JOB No 99TF101A)
- BH 1
EL165.28 BOREHOLE (JOB No 88F348)
- BH 310
EL164.36 BOREHOLE (JOB No 87F479)
- BH 208
EL157.09 BOREHOLE (JOB No 81F35A)
- BH 122
EL160.52 BOREHOLE (JOB No 81F35)

| | | | |
|-----|----------------------------------|--------------|------|
| | | | |
| 1 | BOREHOLES 106 AND 508 ELEVATIONS | JAN. 2, 2002 | F.Z. |
| No. | REVISIONS | DATE | BY |

CREDIT VALLEY HOSPITAL
PROPOSED BUILDING ADDITIONS "A", "F" AND "M"
2200 EGLINTON AVENUE,
MISSISSAUGA, ONTARIO

BOREHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS

| | | | | |
|---------------|------------|---------|----------|-------------|
| DRAWN: N.A. | DATE | SCALE | JOB NO. | DRAWING NO. |
| CHECKED: F.Z. | AUG., 2001 | 1: 1000 | 99TF101A | 1 |
| APPROVED: | | | | |

APPENDIX A

SUMMARISED SUBSURFACE CONDITIONS – BUILDING “A”

TABLE I
SUMMARIZED STRATIGRAPHIC CONDITIONS
BUILDING "A"
CREDIT VALLEY HOSPITAL
MISSISSAUGA, ONTARIO

| Borehole Designation | PML Report | Ground Elev. ⁽¹⁾ (m) | Hole Details | | Subgrade Type at Elevation 156.2 | Clayey Silt Till/Silt Boundary | | Granular Strata Sand/Sandy Silt/Sand and Gravel | | | Bedrock | | Groundwater ⁽²⁾ Observations | |
|----------------------|------------|------------------------------------|--------------|-----------|----------------------------------|--------------------------------|-----------|---|-----------|---------------|-----------|-----------|---|-----------|
| | | | Depth (m) | Elev. (m) | | Depth (m) | Elev. (m) | Depth (m) | Elev. (m) | Thickness (m) | Depth (m) | Elev. (m) | Depth (m) | Elev. (m) |
| 110 | 81F35 | 159.9 | 12.2 | 147.7 | Dense Sandy Silt | 2.9 | 157.0 | 4.0 | 155.9 | 3.3 | 12.2 | 147.7AR | 2.3 | 157.6 |
| 122 | 81F35 | 160.5 | 8.8 | 151.7 | Very hard Silt Till | NE | NE | 5.3 | 155.2 | 1.2 | 8.8 | 151.0AR | 3.2 | 157.3 |
| 206 | 81F35A | 155.8 | 2.4 | 153.4 | New Fill | NE | NE | NE | NE | NE | 1.4 | 154.4QS | 1.4 | 154.4 |
| 207 | 81F35A | 155.9 | 2.3 | 153.6 | New Fill | NE | NE | NE | NE | NE | 1.5 | 154.4QS | 1.8 | 154.1 |
| 208 | 81F35A | 157.1 | 4.1 | 153.0 | Very stiff Silt Till | NE | NE | NE | NE | NE | 3.2 | 153.9QS | 3.0 | 154.1 |
| 508 | 99TF101A | 159.4 | 6.3 | 153.1 | Very dense Silty Sand | NE | NE | 3.1 | 156.4 | 1.5 | NE | NE | NE | NE |
| 509 | 99TF101A | 157.6 | 4.4 | 153.2 | Very stiff Silt Till | NE | NE | NE | NE | NE | NE | NE | NE | NE |
| 510 | 99TF101A | 158.4 | 4.9 | 153.5 | Very stiff Silt Till | NE | NE | NE | NE | NE | 4.9 | 153.5AR | NE | NE |
| 511 | 99TF101A | 160.0 | 8.8 | 151.2 | Very dense Silt Till | NE | NE | NE | NE | NE | 8.8 | 151.2AR | NE | NE |

Notes:

(1) Existing ground surface elevation may be different due to site grading carried out.

(2) Groundwater observations are in the open boreholes during drilling March 1981, August 1982 and December 2000 and may be subject to yearly and seasonal fluctuations and are affected by the construction of the hospital structure.

NE Not Encountered.

AR Borehole terminated upon auger refusal, inferred probably bedrock.

QS Borehole terminated upon practical auger refusal or practical refusal to split spoon sampler in Queenston Shale.



JOB NAME: Proposed Credit Valley Hospital

JOB No. 81 F 35

LOCATION: Palinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE: March 20, 1981

ENGINEER: B.R. Gray

BORING METHOD: Continuous Solid Stem Flight Augers

TECHNICIAN: W. Junker

| SOIL PROFILE | | | | | | | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | | GROUNDWATER OBSERVATIONS AND REMARKS |
|-----------------------|-----------------------------------|--------|-----------|---------|------|--------------------------|---|----|---------------------|----|-------------------|--|
| DEPTH in METRES | DESCRIPTION | LEGEND | ELEVATION | SAMPLES | | BLOWS/0.3m N - VALUES | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | PLASTIC LIMIT W_P | | WATER CONTENT W | |
| | | | | NUMBER | TYPE | | BLOWS/0.3m | | WATER CONTENT W | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 10 | |
| | GROUND ELEVATION: 159.89 | | | | | | | | | | | |
| 0.25m | TOPSOIL: dk. bn. clayey silt | | | | | | | | | | | |
| | CLAYEY SILT TILL: | | | | | | | | | | | |
| | hard reddish brown to brown | | 159 | | | | | | | | | |
| | moist clayey silt, trace to | | | 1 | SS | 42 | | | | | | |
| | some sand and fine gravel | | 158 | | | | | | | | | |
| | D.P.T.L. | | | 2 | SS | 36 | | | | | | |
| | | | | | | | | | | | | |
| 2.09 | | | 157 | | | | | | | | | |
| | | | | 3 | SS | 42 | | | | | | |
| 3.0 | SILT: compact grey silt, very | | | | | | | | | | | |
| | moist, occasional fine sand seams | | | 4 | SS | 21 | | | | | | |
| | | | 156 | | | | | | | | | |
| 3.96 | | | | | | | | | | | | |
| | SANDY SILT: dense grey | | | | | | | | | | | |
| | sandy silt with gravel, and wet | | | | | | | | | | | |
| | sand seams | | 155 | | | | | | | | | |
| | | | | 5 | SS | 48 | | | | | | |
| 5.18 | | | | | | | | | | | | |
| | LAYERED SAND AND SAND AND GRAVEL | | | | | | | | | | | |
| | very dense reddish brown well | | 154 | | | | | | | | | |
| | graded wet sand and sandy gravel | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | 6 | SS | 80 | | | | | | |
| | | | 153 | | | | | | | | | |
| 7.32 | | | | | | | | | | | | |
| 7.5 | SILT TILL: hard reddish brown | | | | | | | | | | | |
| 7.77 | brown clayey silt with shale | | 152 | | | | | | | | | |
| | fragments | | | 7 | SS | 58/0 | 15 m | | | | | |
| | Unsampled borehole below 7.77 m | | | | | | | | | | | |
| | | | 151 | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | 150 | | | | | | | | | |
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| | | | | | | | | | | | | |
| | | | 149 | | | | | | | | | |
| 11.28 | | | | | | | | | | | | |
| | Probable SILT TILL | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | 148 | | | | | | | | | |
| 12.0 | very gravelly and cobbly | | | | | | | | | | | |
| 12.19 | BOREHOLE TERMINATED AT 12.19 m | | | | | | | | | | | |
| | upon refusal to auger | | | | | | | | | | | |
| | (assumed bedrock) | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 13.5 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 15.0 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 16.5 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 18.0 | | | | | | | | | | | | |

NOTES:

CHECKED BY: BEG/JP



JOB NAME Proposed Credit Valley Hospital

JOB No. B1.F.35

LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 20, 1981

ENGINEER B.R. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN W. Junker

| SOIL PROFILE | | | SAMPLES | | | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | GROUNDWATER OBSERVATIONS AND REMARKS | |
|-----------------------|--|--------|-----------|--------|------|------------------------|---|--------------------|-----------------|--|--|
| DEPTH in METRES | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | BLOWS/0.3m N-VALUES | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | WATER CONTENT % | | |
| | | | | | | | BLOWS/0.3m | | WATER CONTENT % | | |
| 0.22 | GROUND ELEVATION: 160.52 TOPSOIL: dk. bn. clayey silt | | | | | | 20 | 40 | 60 | 80 | |
| 1.5 | CLAYEY SILT TILL: hard reddish brown to brown moist clayey silt; trace to some sand and fine gravel D.P.T.L. | | 160 | | | | | | | | |
| | | | | 1 | SS | 48 | | | | | |
| | | | 159 | | | | | | | | |
| | | | | 2 | SS | 55 | | | | | |
| | | | 158 | | | | | | | | |
| | | | | 3 | SS | 70 | | | | | |
| | | | 157 | | | | | | | | |
| 3.66 | | | | 4 | SS | 53/0.15 m | | | | | |
| 4.5 | SILT TILL: very hard reddish brown clayey silt, trace sand and fine gravel; occasional shale and limy shale fragments | | 156 | | | | | | | | |
| | | | | 5 | SS | 100/0.15 m | | | | | |
| 5.33 | | | 155 | | | | | | | | |
| 6.0 | SAND AND GRAVEL: very dense reddish brown wet, trace silt | | 154 | | | | | | | | |
| | | | | 6 | SS | 71/0.15 m | | | | | |
| 6.55 | | | 153 | | | | | | | | |
| | SILT TILL: very hard reddish brown clayey silt, trace sand and fine gravel numerous shale and limy shale fragments | | | 7 | SS | 100/0.13 m | | | | | |
| | | | 152 | | | | | | | | |
| 8.84 | BOREHOLE TERMINATED AT 8.84 m upon refusal to auger (assumed bedrock) | | | | | | | | | | |
| 9.0 | | | | | | | | | | | |
| 10.5 | | | | | | | | | | | |
| 12.0 | | | | | | | | | | | |
| 13.5 | | | | | | | | | | | |
| 15.0 | | | | | | | | | | | |
| 16.5 | | | | | | | | | | | |
| 18.0 | | | | | | | | | | | |

NOTES:

CHECKED BY BRS/SP

JOB NAME PROPOSED CREDIT VALLEY HOSPITAL

JOH No. 81 F 35A

LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BOOKING DATE August 23/82

ENGINEER S. Pilch

BOHRING METHOD Solid Stem Continuous Flight Augers

TECHNICIAN B.L. Klok

| SOIL PROFILE | | | | SAMPLES | | | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | PLASTIC LIMIT W_P | | GROUNDWATER OBSERVATIONS AND REMARKS |
|-----------------|--|--------|-----------|---------|------|-----------------------|--|--|--------------------|--|---------------------|--|---|
| DEPTH IN METRES | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | BLOWS 0.3m X - VALUES | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | WATER CONTENT % | | WATER CONTENT % | | |
| | | | | | | | BLOWS 0.3m X - VALUES | | WATER CONTENT % | | WATER CONTENT % | | |
| | GROUND ELEVATION: 161.07 | | | | | | | | | | | | |
| 0.46 | TOPSOIL: brown clayey silt | | | | | | | | | | | | |
| | CLAYEY SILT TILL: very stiff to hard reddish brown mottled clayey silt with trace of sand and gravel | | 160 | 1 | SS | 10 | | | | | | | |
| | | | | 2 | SS | 32 | | | | | | | |
| | | | 159 | 1 | SS | 30 | | | | | | | |
| | | | | 4 | SS | 21 | | | | | | | |
| | | | 158 | 5 | SS | 27 | | | | | | | |
| | SILT: compact grey silt to clayey silt | | 157 | | | | | | | | | | |
| 4.57 | BOREHOLE TERMINATED AT 4.57 m | | | 5 | SS | 21 | | | | | | | Upon completion of drilling, Borehole open, no free water |
| | | | | | | | | | | | | | |
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NOTES:

CHUCK EDEN



JOB NAME PROPOSED CREDIT VALLEY HOSPITAL

RIB No. 81 F 35A

LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE August 23/82

ENGINEER S. Pilch

BORING METHOD Solid Stem Continuous Flight Augers

TECHNICIAN B.L. Rook

| DEPTH in METRES | SOIL PROFILE DESCRIPTION | LEGEND | ELEVATION | SAMPLES | | BLOWS 0.3m N - VALUES | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | GROUNDWATER OBSERVATIONS AND REMARKS |
|-----------------------|--|--------|-----------|---------|------|--------------------------|---|----|---------------------|-------------------|--|
| | | | | NUMBER | TYPE | | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | PLASTIC LIMIT W_P | WATER CONTENT W | |
| | GROUND ELEVATION: 155.88 | | | | | | BLOWS 0.3m | | WATER CONTENT % | | |
| 0.30 | TOPSOIL: dr. br. clayey silt | | | | | | 20 | 10 | 100 | 80 | |
| | SILT TILL: very stiff to hard reddish brown clayey silt, weathered shale fragments | | 155 | 1 | SS | 35 | | | | | |
| 1.50 | | | | 2 | SS | 21 | | | | | |
| | SHALE: hard weathered red shale (Queenston formation) | | 154 | 3 | SS | 50/0 | 1m | | | | |
| 2.34 | | | | 4 | SS | 50/0 | 05m | | | | |
| | BOREHOLE TERMINATED AT 2.34 m UPON PRACTICAL REFUSAL TO SPLIT SPOON SAMPLE | | | | | | | | | | Upon completion of drilling, Borehole open, W.L. at 1.83 m |
| 0.25 | TOPSOIL: dr. br. clayey silt | | | | | | | | | | |
| | CLAYEY SILT TILL: stiff to very stiff brown clayey silt, trace sand and gravel | | 156 | 1 | SS | 9 | | | | | |
| 1.07 | | | | 2 | SS | 24 | | | | | |
| | SILT TILL: very stiff to hard reddish brown clayey silt with some grey limey shale fragments and weathered red shale fragments | | 155 | 3 | SS | 19 | | | | | |
| 3.20 | | | 154 | 4 | SS | 81/0 | 13m | | | | |
| | SHALE: hard weathered red shale (Queenston Formation) | | 153 | 5 | SS | 50/0 | 08m | | | | |
| 4.14 | | | | 6 | SS | 50/0 | 03m | | | | |
| | BOREHOLE TERMINATED AT 4.14 m | | | | | | | | | | Upon completion of drilling, Borehole open, W.L. at 3.05 m |

NOTES

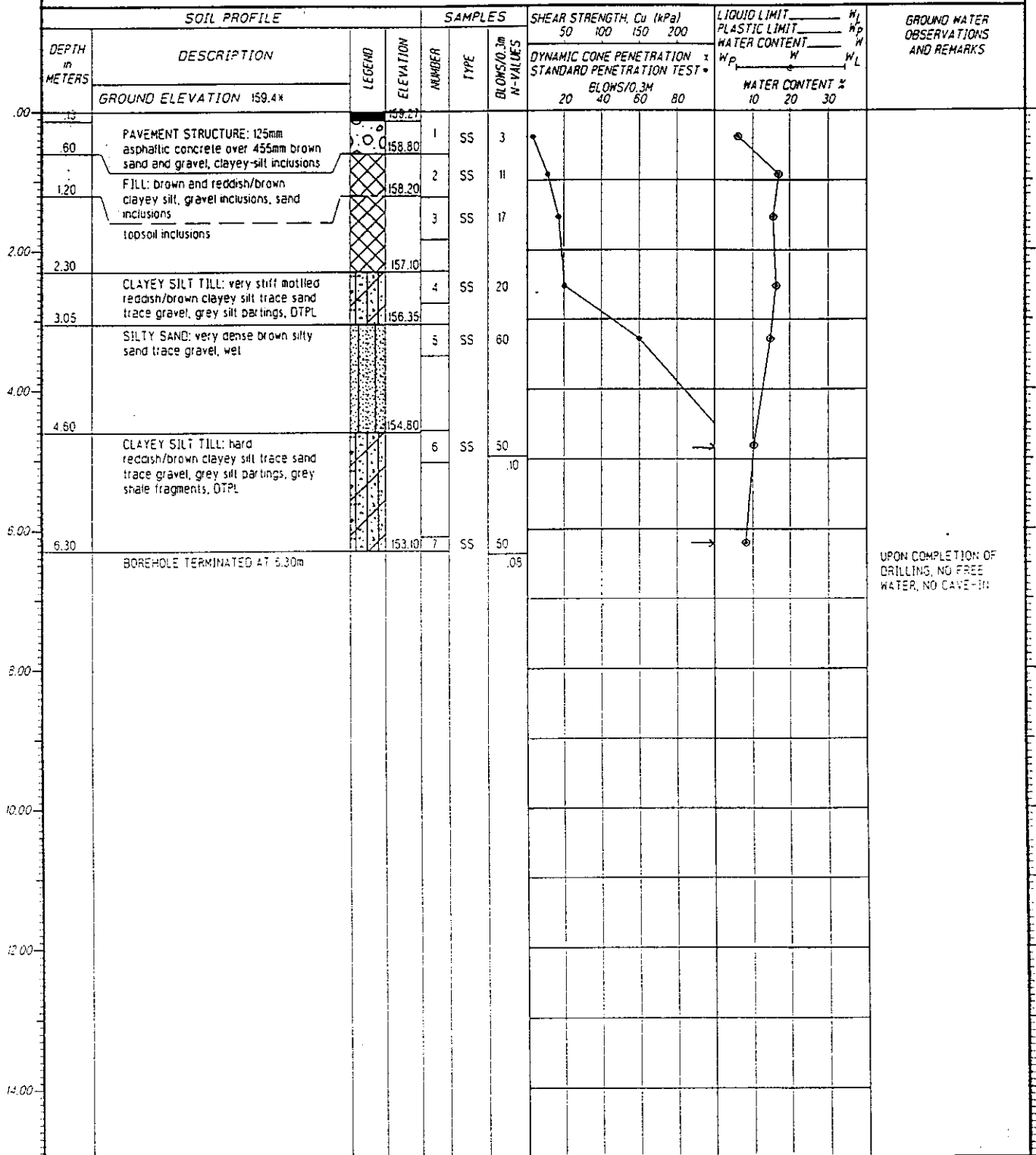
CHECKED BY

LOG OF BOREHOLE NO. 508

PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS
 LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO
 BORING METHOD: CONTINUOUS FLIGHT SOLID STEM AUGERS

BORING DATE: DEC. 21, 2000

OUR PROJECT NO.: 98TF101A
 ENGINEER: D.H.
 TECHNICIAN: V.K.



UPON COMPLETION OF
 DRILLING, NO FREE
 WATER, NO CAVE-IN

NOTES: * - GROUND ELEVATION INTERPOLATED FROM ELECTRONIC AUTOCAD FILE SUM0105.DWG
 PROVIDED BY HALSALL ASSOCIATES LIMITED.

--- UNDISTURBED FIELD VANE
 --- REMOLDED FIELD VANE
 * --- LAB SHEAR TEST
 † --- POCKET PENETROMETER

CHECKED BY: *MA*

LOG OF BOREHOLE NO. 509

PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS

LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO

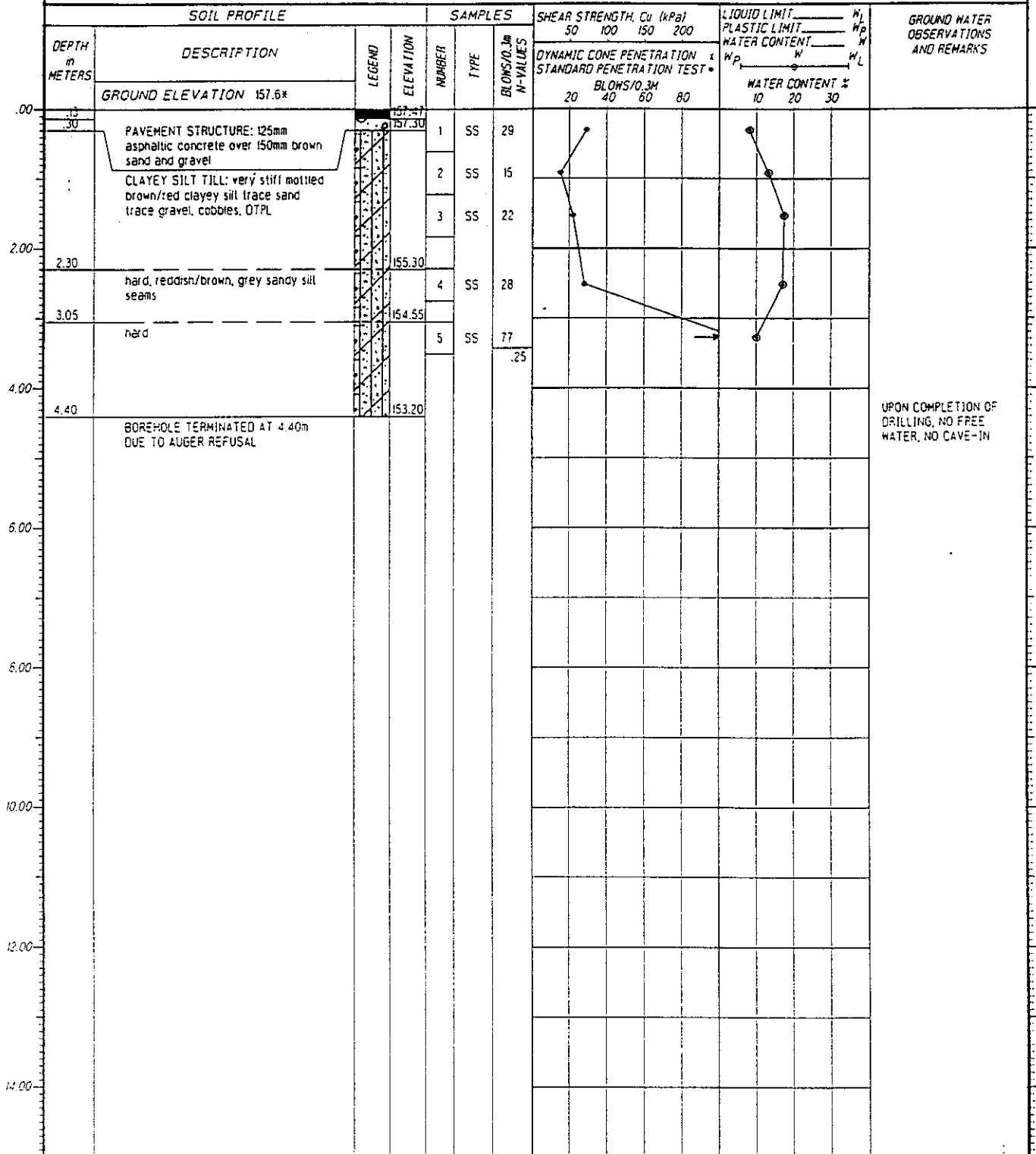
BORING METHOD: CONTINUOUS FLIGHT SOLID STEM AUGERS

BORING DATE: DEC. 21, 2000

OUR PROJECT NO.: 99TF101A

ENGINEER: D.M.

TECHNICIAN: V.K.



NOTES: * - GROUND ELEVATION INTERPOLATED FROM ELECTRONIC AUTOCAD FILE SUM010B.DWG PROVIDED BY HALSALL ASSOCIATES LIMITED.

+ --- UNDISTURBED FIELD VANE
 ⊕ --- REMOLDED FIELD VANE
 * --- LAB SHEAR TEST
 ▲ --- POCKET PENETROMETER

CHECKED BY: *[Signature]*

LOG OF BOREHOLE NO. 510

PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS
 LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO
 BORING METHOD: CONTINUOUS FLIGHT SOLID STEM AUGERS

BORING DATE: DEC. 21, 2000

OUR PROJECT NO.: 99TF101A
 ENGINEER: D.H.
 TECHNICIAN: V.K.

| SOIL PROFILE | | | SAMPLES | | SHEAR STRENGTH, C_u (kPa) | | LIQUID LIMIT | | GROUND WATER OBSERVATIONS AND REMARKS | | | | | |
|-----------------------|-------------|--------|-----------|--------|-----------------------------|---|--------------|-----|---------------------------------------|-----------------|--|--|--|--|
| DEPTH in METERS | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | 50 | 100 | 150 | | 200 | | | | |
| | | | | | | DYNAMIC CONE PENETRATION * STANDARD PENETRATION TEST * | | | | WATER CONTENT | | | | |
| | | | | | | BLOWS/0.3M | | | | WATER CONTENT % | | | | |
| | | | | 20 | 40 | 60 | 80 | 10 | 20 | 30 | | | | |

| | | | | | | | | | | | |
|-------|--|--|--------|---|----|----|--|--|--|--|--|
| 0.00 | GROUND ELEVATION 158.4* | | 158.4* | | | | | | | | |
| 0.50 | PAVEMENT STRUCTURE: 125mm asphaltic concrete over 380mm brown sand and gravel | | 157.90 | 1 | SS | 33 | | | | | |
| 1.20 | FILL: reddish/brown clayey silt, grey sandy silt partings | | 157.20 | 2 | SS | 10 | | | | | |
| | mottled brown/red clayey silt, gravel inclusions, grey sandy silt partings, DTPL | | 156.30 | 3 | SS | 14 | | | | | |
| 2.10 | TOPSOIL: dark brown clayey silt topsoil, rootlets | | 156.10 | 4 | SS | 14 | | | | | |
| 2.30 | CLAYEY SILT TILL: very stiff mottled brown/red clayey silt trace sand gravel, DTPL | | 155.40 | 5 | SS | 50 | | | | | |
| 3.00 | hard, grey shale fragments, grey sandy silt partings | | | | | 13 | | | | | |
| 4.90 | BOREHOLE TERMINATED AT 4.90m DUE TO AUGER REFUSAL | | 153.50 | 6 | SS | 50 | | | | | |
| | | | | | | 13 | | | | | |
| 5.00 | | | | | | | | | | | |
| 6.00 | | | | | | | | | | | |
| 7.00 | | | | | | | | | | | |
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| 10.00 | | | | | | | | | | | |
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| 12.00 | | | | | | | | | | | |
| 13.00 | | | | | | | | | | | |
| 14.00 | | | | | | | | | | | |

UPON COMPLETION OF
DRILLING, NO FREE
WATER, NO CAVE-IN.

UPON COMPLETION OF
 DRILLING, NO FREE
 WATER, NO CAVE-IN.

NOTES: * - GROUND ELEVATION INTERPOLATED FROM ELECTRONIC AUTOCAD FILE SUM0109.DWG
 PROVIDED BY HALSALL ASSOCIATES LIMITED.

+ --- UNDISTURBED FIELD VANE
 ⊕ --- REMOLDED FIELD VANE
 ⊕ --- LAB SHEAR TEST
 ▲ --- POCKET PENETROMETER

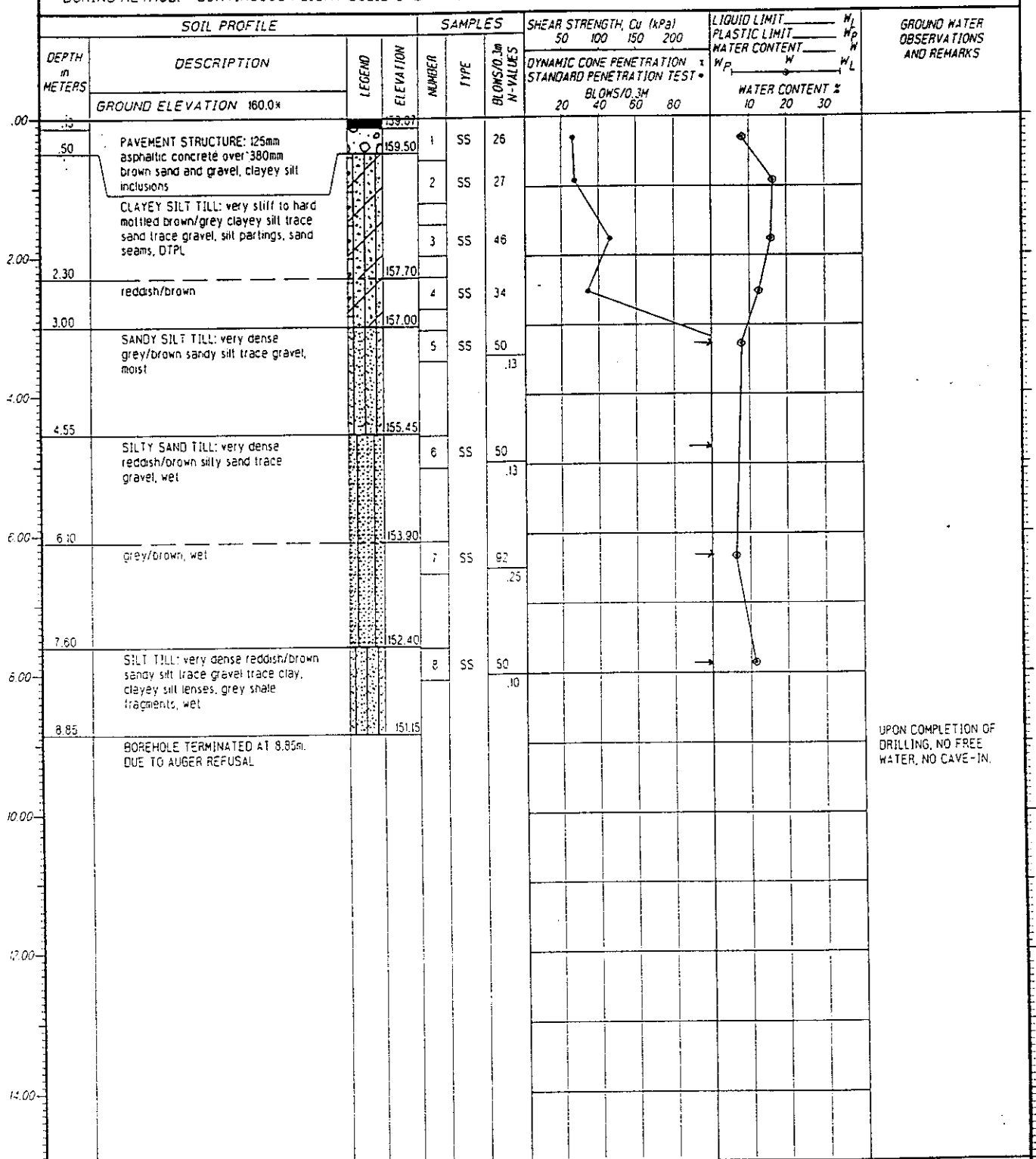
CHECKED BY: *DH*

LOG OF BOREHOLE NO. 511

PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS
LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO
BORING METHOD: CONTINUOUS FLIGHT SOLID STEM AUGERS

BORING DATE: DEC. 21, 2000

OUR PROJECT NO.: 99TF101A
ENGINEER: D.H.
TECHNICIAN: V.K.



UPON COMPLETION OF DRILLING, NO FREE WATER, NO CAVE-IN.

NOTES: * - GROUND ELEVATION INTERPOLATED FROM ELECTRONIC AUTOCAD FILE SUM010B.DWG PROVIDED BY HALSALL ASSOCIATES LIMITED.

+ --- UNDISTURBED FIELD VANE
+ --- REMOLDED FIELD VANE
+ --- LAB SHEAR TEST
+ --- POCKET PENETROMETER

CHECKED BY:

APPENDIX B

SUMMARISED SUBSURFACE CONDITIONS – BUILDING “F”

TABLE II
SUMMARIZED STRATIGRAPHIC CONDITIONS
BUILDING "F"
CREDIT VALLEY HOSPITAL
MISSISSAUGA, ONTARIO

| Borehole Designation | PML Report | Ground Elev. ⁽¹⁾ (m) | Hole Details | | Subgrade Type at Elevation 161.0 | Clayey Silt Till/Silt Boundary | | Granular Strata Sand/Sandy Silt/Sand and Gravel | | | Bedrock | | Groundwater ⁽²⁾ Observations | |
|----------------------|------------|------------------------------------|--------------|-----------|----------------------------------|--------------------------------|-----------|---|----------------|---------------|-----------|-----------|---|-----------|
| | | | Depth (m) | Elev. (m) | | Depth (m) | Elev. (m) | Depth (m) | Elev. (m) | Thickness (m) | Depth (m) | Elev. (m) | Depth (m) | Elev. (m) |
| 106 | 81F35 | 163.2 | 13.1 | 150.0 | Hard clayey Silt Till | 2.4 | 160.8 | 6.7 | 156.5 | 1.4 | 13.1 | 150.0AR | 9.3 | 154.0 |
| 114 | 81F35 | 164.6 | 14.3 | 150.3 | Very dense Silt | 3.4 | 161.2 | 5.2 | 159.4 | 1.2 | NE | NE | 4.6 | 160.0 |
| 120 | 81F35 | 164.5 | 8.1 | 156.4 | Hard clayey Silt Till | 3.7 | 160.8 | NE | NE | NE | NE | NE | NE | NE |
| 121 | 81F35 | 166.0 | 23.8 | 142.2 | Very dense Silt | 4.1 | 161.9 | NR | NR | NR | 23.6 | 142.4QS | 5.9 | 160.1 |
| 202 | 81F35A | 165.5 | 4.6 | 160.9 | Very dense Silt | 4.0 | 161.5 | NE | NE | NE | NE | NE | 3.5 | 162.0 |
| 203 | 81F35A | 165.8 | 4.6 | 161.2 | Very dense Silt | 4.0 | 161.8 | NE | NE | NE | NE | NE | NE | NE |
| 506 | 99TF101A | 161.0 | 11.2 | 149.9 | Existing Pavement | NE | NE | 0.4 | 160.6 | 5.7 | NE | NE | 8.1 | 152.9 |
| 512 | 99TF101A | 161.0 | 9.3 | 151.7 | Existing Pavement | NE | NE | 0.4 7.6 | 160.6 153.4 | 0.5 0.2 | NE | NE | 2.7 | 158.3 |
| 519 | 99TF101A | 160.1 | 8.6 | 151.6 | New Fill | NE | NE | 5.2 | 154.9 | 3.4 | NE | NE | 1.9 | 158.2 |

Notes:

- (1) Existing ground surface elevation may be different due to site grading carried out.
- (2) Groundwater observations are in the open boreholes during drilling March 1981, August 1982, December 2000 and March 2001 and may be subject to yearly and seasonal fluctuations and are affected by the construction of the hospital structure.
- NE Not Encountered.
- NR Not recorded; portion of borehole unsampled.
- AR Borehole terminated upon auger refusal, inferred probably bedrock.
- QS Borehole terminated upon practical auger refusal or practical refusal to split spoon sampler in Queenston Shale.



JOB NAME Proposed Credit Valley Hospital

JOB No. B1 F 35

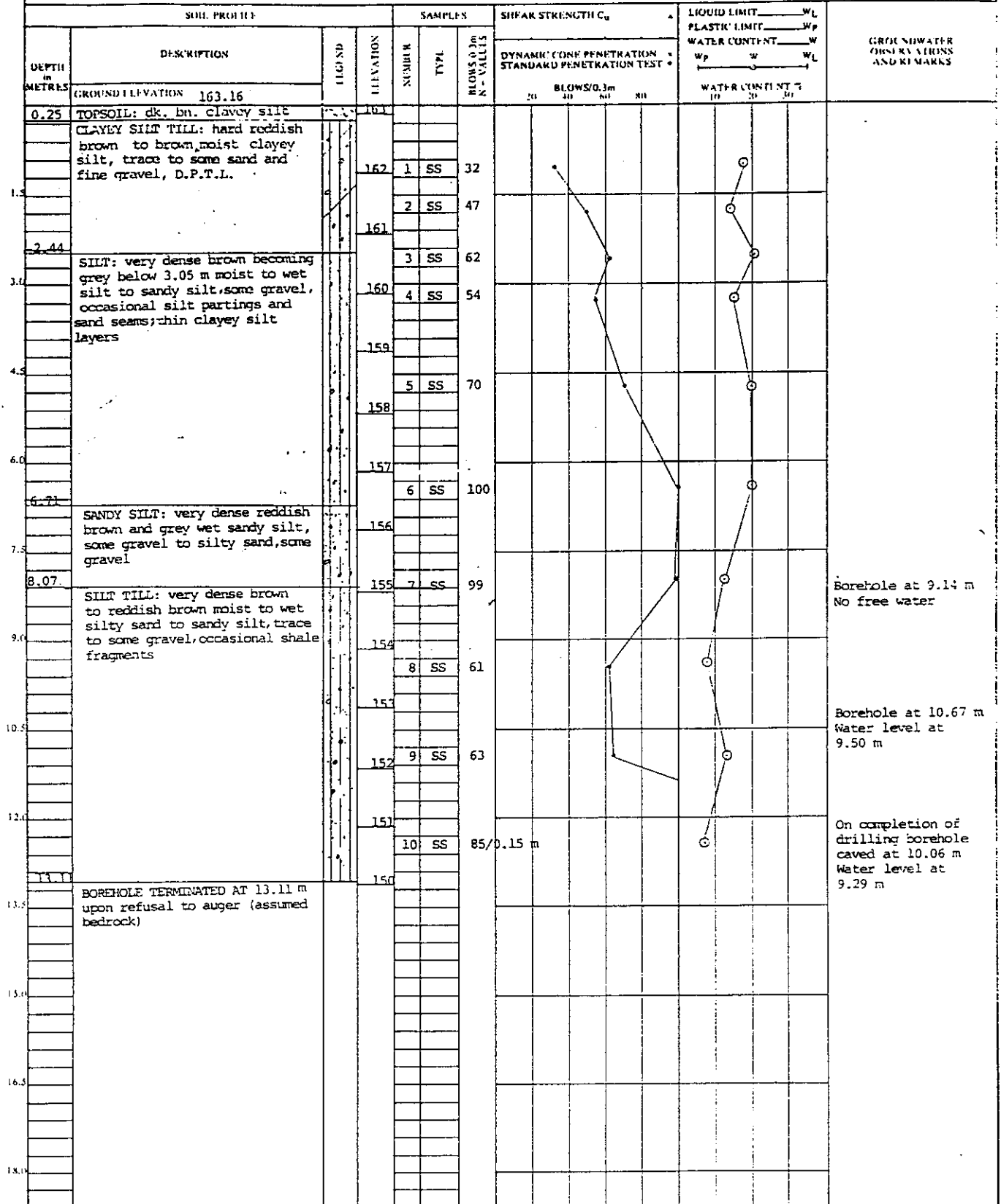
LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 16, 1981

ENGINEER B.R. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN W. Junker



NOTES:

CHECKED BY P26/512



JOB NAME Proposed Credit Valley Hospital

JOB No. 81 F. 35

LOCATION Eslington Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 19, 1981

ENGINEER P.R. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN D. Naylor

| SOIL PROFILE | | | | SAMPLES | | | SHEAR STRENGTH C_u | | | | LIQUID LIMIT W_L | | | GROUNDWATER OBSERVATIONS AND REMARKS |
|-----------------------|---|-----------|--------|---------|-------------------------|---|----------------------|----|----|---------------------|--------------------|-------|---|--|
| DEPTH in METRES | DESCRIPTION | ELEVATION | NUMBER | TYPE | BLOWS/0.3m N - VALUE | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | | | PLASTIC LIMIT W_p | | | | |
| | | | | | | BLOWS/0.3m | | | | WATER CONTENT % | | | | |
| | | | | | | 20 | 40 | 60 | 80 | W_p | W | W_L | | |
| | | | | | | GROUND ELEVATION: 164.56 | | | | | | | | |
| 0.20 | TOPSOIL: dk. bn. clayey silt | | | | | | | | | | | | After sample 6, water level at 4.88 m | |
| | CLAYEY SILT TILL: hard reddish brown to brown moist clayey silt, trace to some sand and fine gravel D.P.T.L. | 164 | | | | | | | | | | | | |
| | | | 1 | SS | 30 | | | | | | | | | |
| | | 163 | | | | | | | | | | | | |
| | | | 2 | SS | 47 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 162 | | | | | | | | | | | | |
| | | | 3 | SS | 49 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 161 | | | | | | | | | | | | |
| 3.35 | | | 4 | SS | 58 | | | | | | | | 1 hour after drilling completion water level at 4.57 m | |
| | SILT: very dense brown becoming grey below 3.65 m dry to moist silt to sandy silt, some gravel occasional silt parting and sand seams | | | | | | | | | | | | | |
| | | 160 | | | | | | | | | | | | |
| | | | 5 | SS | 76 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 159 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 158 | | | | | | | | | | | | |
| | | | 6 | SS | 56/0.15 m | | | | | | | | | |
| | | 157 | | | | | | | | | | | | |
| 5.19 | | | | | | | | | | | | | | |
| | SAND AND GRAVEL: very dense reddish brown and grey wet sand and gravel, occ. shale fragments | | | | | | | | | | | | | |
| | | 156 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 155 | | | | | | | | | | | | |
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| | | 154 | | | | | | | | | | | | |
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| | | 153 | | | | | | | | | | | | |
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| | | 152 | | | | | | | | | | | | |
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| | | 151 | | | | | | | | | | | | |
| | more difficult to auger | | | | | | | | | | | | | |
| | | 150 | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | |
| 14.33 | BOREHOLE TERMINATED AT 14.33 m | | | | | | | | | | | | | |

NOTES

CHECKED BY BRG/SP



JOB NAME Proposed Credit Valley Hospital

JOB No. 81 F 35

LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 20, 1981

ENGINEER B.R. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN W. Junker

| SOIL PROFILE | | | | SAMPLES | | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | GROUNDWATER OBSERVATIONS AND REMARKS | | |
|--------------------------|--|--------|-----------|---------|------|--------------------------|---|--------------------|-----------------|--|--|----|
| DEPTH in METRES | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | BLOWS 0.3m N - VALUES | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | WATER CONTENT % | | | |
| | | | | | | | BLOWS/0.3m | | W_p W W_L | | | |
| | | | | | | | 20 | 40 | 60 | | 80 | 10 |
| GROUND ELEVATION: 164.45 | | | | | | | | | | | | |
| 0.22 | TOPSOIL: dk. bn. clayey silt | | 164 | | | | | | | | On completion of drilling. Bore- hole open and just wet at the bottom | |
| | CLAYEY SILT TILL: hard reddish brown to brown moist silty clay to clayey silt; trace to some sand and fine gravel seams and pockets of silt and sandy silt | | 163 | 1 | SS | 32 | | | | | | |
| 1.5 | | | | 2 | SS | 57 | | | | | | |
| | | | 162 | | | | | | | | | |
| | | | 3 | SS | 53 | | | | | | | |
| 3.0 | | | 161 | 4 | SS | 49 | | | | | | |
| 3.66 | | | | | | | | | | | | |
| | | | 160 | | | | | | | | | |
| 4.5 | SILT: very dense to dense grey silt, trace to some fine sand with wet layers of sandy silt and clayey silt; occasional sand seams and partings | | | 5 | SS | 65 | | | | | | |
| | | | 159 | | | | | | | | | |
| 6.0 | | | | | | | | | | | | |
| | | | 158 | 6 | SS | 53 | | | | | | |
| 7.5 | | | 157 | | | | | | | | | |
| | | | | 7 | SS | 30 | | | | | | |
| 8.07 | | | | | | | | | | | | |
| | BOREHOLE TERMINATED AT 8.07 m | | | | | | | | | | | |
| 9.0 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 10.5 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 12.0 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 13.5 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 15.0 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 16.5 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 18.0 | | | | | | | | | | | | |

On completion of
drilling. Bore-
hole open and just
wet at the bottom

NOTES:

CHECKED BY BRG/SP



JOB NAME Proposed Credit Valley Hospital

JOB No. 81 F 35

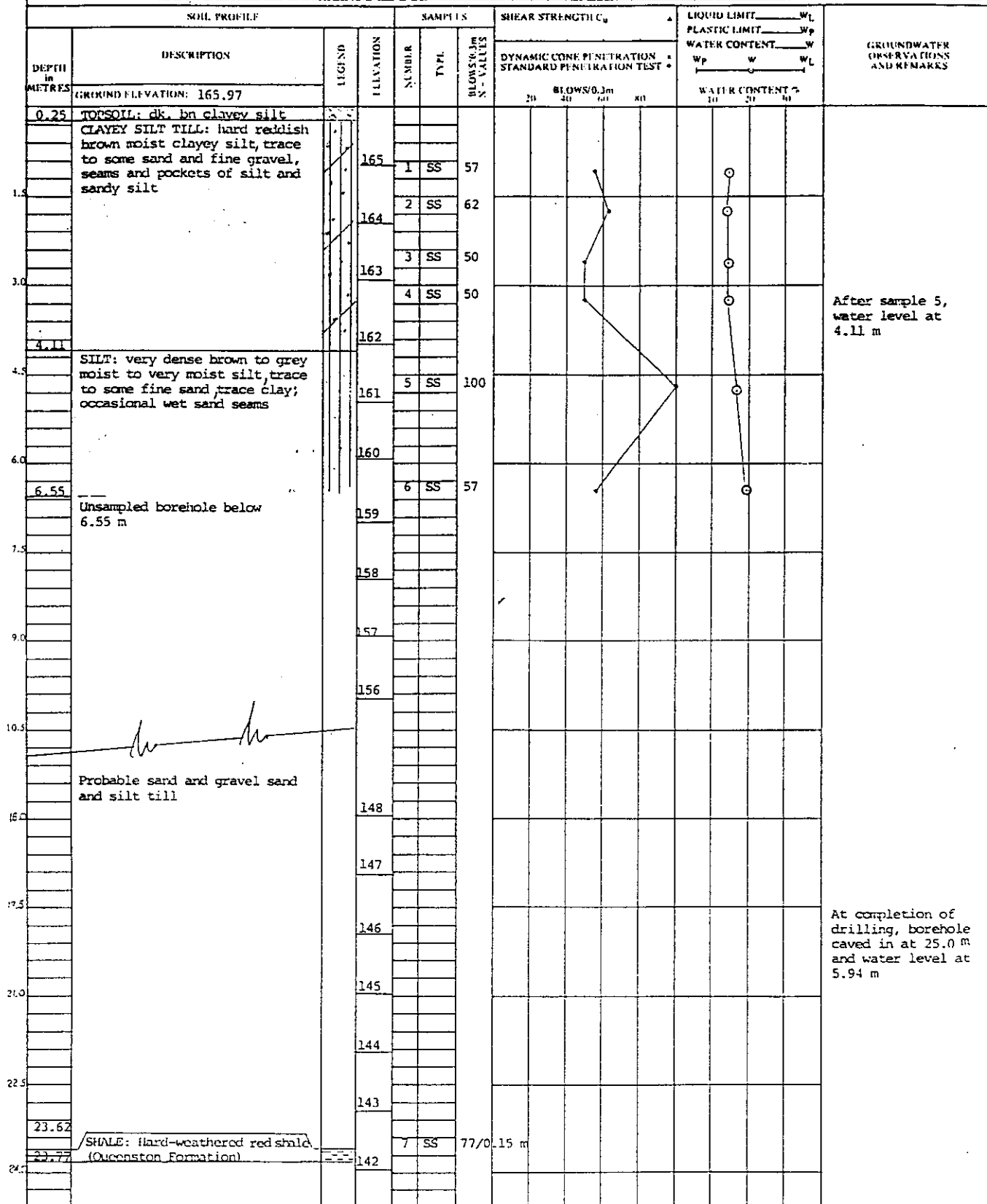
LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 19/81

ENGINEER B.R. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN D. Naylor



NOTES: BOREHOLE TERMINATED AT 23.77 m upon practical refusal of split spoon sampler in shale bedrock

CHECKED BY BRG/SF



JOB NAME PROPOSED CREDIT VALLEY HOSPITAL

JOB No. 81 F 35A

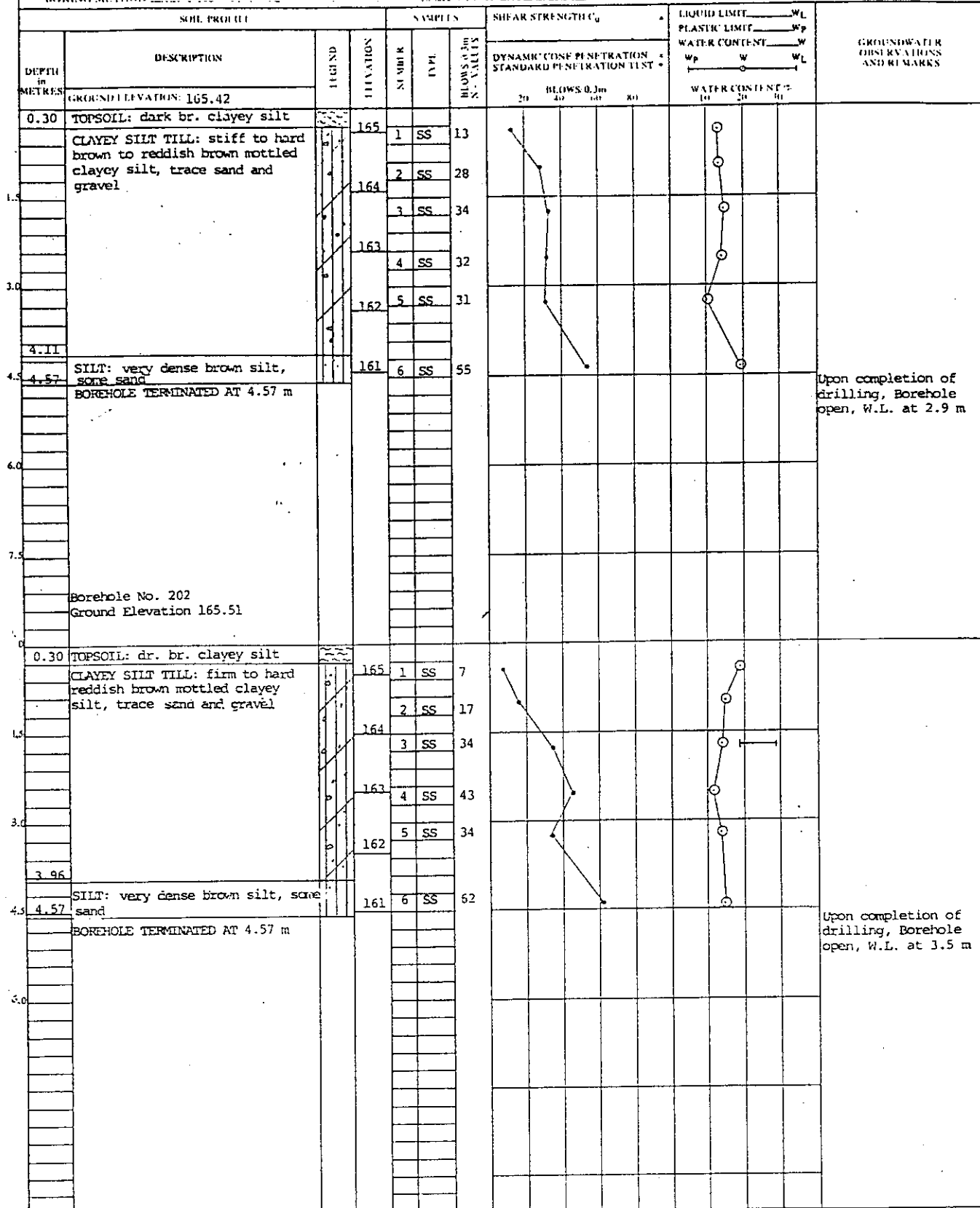
LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE August 23/82

ENGINEER S. Pilch

BORING METHOD Solid Stem Continuous Flight Augers

TECHNICIAN B.L. Kwok



NOTES:

CHECKED BY

SP



JOB NAME PROPOSED CREDIT VALLEY HOSPITAL

JOB No. 81 F 35A

LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE August 21/82

ENGINEER S. Pilch

BORING METHOD Solid Stem Continuous Flight Augers

TECHNICIAN B.L. Kwok

| SOIL PROFILE | | | SAMPLES | | | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | GROUNDWATER OBSERVATIONS AND REMARKS | |
|-----------------------|--|-----------|---------|------|-------------------------|---|--|--------------------|--|---|--|
| DEPTH in METRES | DESCRIPTION | ELEVATION | NUMBER | TYPE | BLOWS/0.3m S. VALUES | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | WATER CONTENT % | | | |
| | | | | | | | | W_p W W_L | | | |
| | | | | | | | | | | | |
| | GROUND ELEVATION: 165.77 | | | | | 20 40 60 80 | | 10 20 30 40 | | | |
| 0.46 | TOPSOIL: brown clayey silt | | | | | | | | | Upon completion of drilling, Borehole open, no free water | |
| | CLAYEY SILT TILL: very stiff to hard brown to reddish brown clayey silt with trace of sand and gravel | 165 | 1 | SS | 27 | | | | | | |
| | | | 2 | SS | 27 | | | | | | |
| 1.5 | | | 164 | 3 | SS | 39 | | | | | |
| | | | 163 | 4 | SS | 25 | | | | | |
| 3.0 | | | | 5 | SS | 35 | | | | | |
| 3.96 | | 162 | | | | | | | | | |
| 4.57 | SILT: very dense grey silt to clayey silt | 161 | 6 | SS | 66 | | | | | | |
| | BOREHOLE TERMINATED AT 4.57 m | | | | | | | | | | |
| 6.0 | | | | | | | | | | | |
| 7.5 | | | | | | | | | | | |
| | Borehole No. 204 Ground Elevation 159.94 | | | | | | | | | | |
| 0.30 | TOPSOIL: brown clayey silt | | | | | | | | | Upon completion of drilling, Borehole open, no free water | |
| | CLAYEY SILT TILL: very stiff brown clayey silt with trace of sand and gravel | 159 | 1 | SS | 13 | | | | | | |
| | | | 2 | SS | 30 | | | | | | |
| 1.5 | | | 158 | 3 | SS | 25 | | | | | |
| 2.13 | | | | | | | | | | | |
| | SILT: compact grey silt, to clayey silt | | 4 | SS | 16 | | | | | | |
| 3.0 | | 157 | 5 | SS | 13 | | | | | | |
| | | 156 | | | | | | | | | |
| 4.57 | | | 6 | SS | 16 | | | | | | |
| | BOREHOLE TERMINATED AT 4.57 m | | | | | | | | | | |
| | | | | | | | | | | | |
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NOTES:

CHECKED BY *SP*

LOG OF BOREHOLE NO. 506

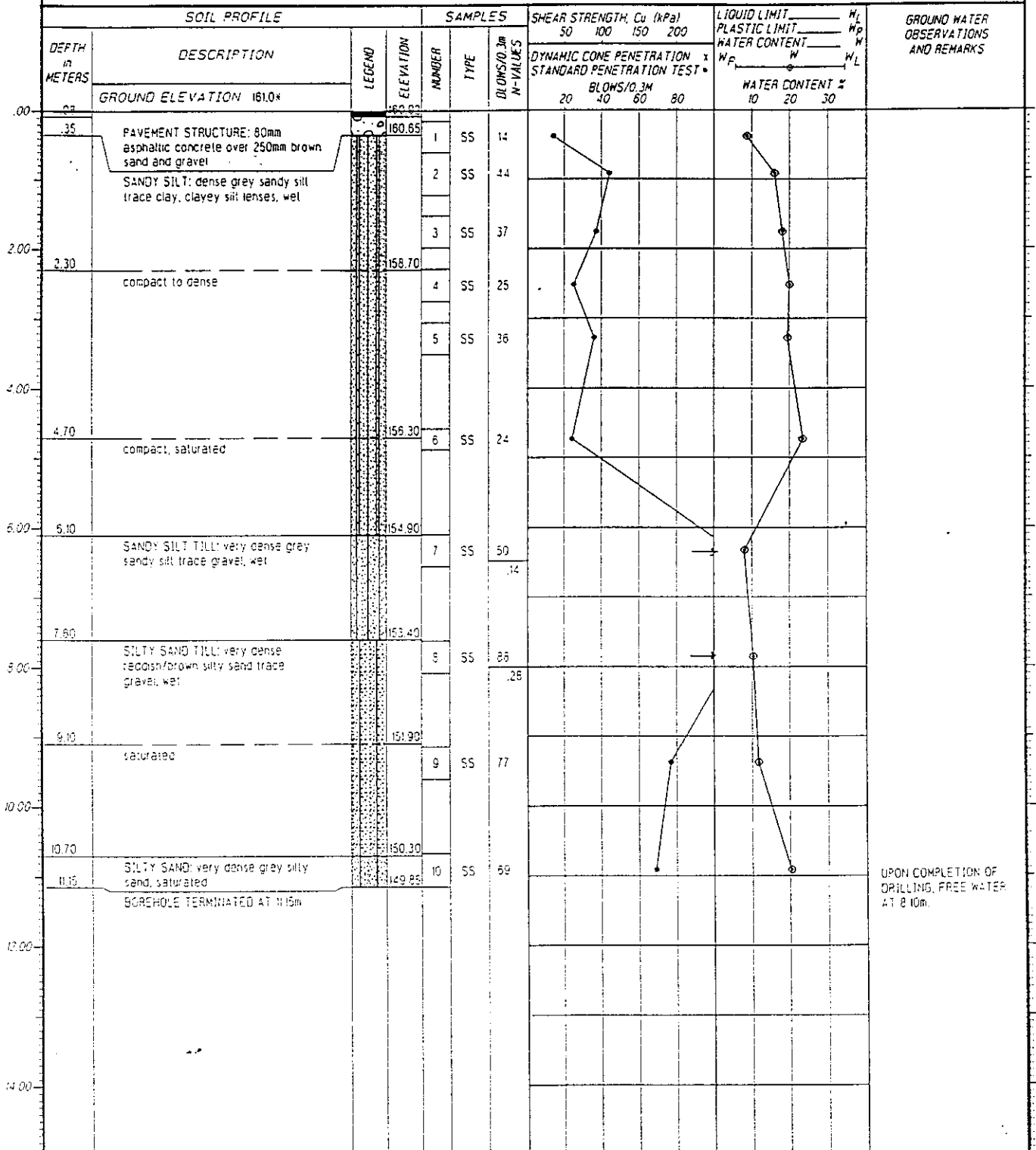
PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS
LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO
BORING METHOD: CONTINUOUS FLIGHT SOLID STEM AUGERS

BORING DATE: DEC. 21, 2000

OUR PROJECT NO.: 99TF01A

ENGINEER: D.H.

TECHNICIAN: V.K.



NOTES: * - GROUND ELEVATION INTERPOLATED FROM ELECTRONIC AUTOCAD FILE SUM0108.DWG PROVIDED BY HALSALL ASSOCIATES LIMITED.

--- UNDISTURBED FIELD VANE
--- REMOLDED FIELD VANE
--- LAB SHEAR TEST
--- POCKET PENETROMETER

CHECKED BY: *[Signature]*

Peto MacCallum Ltd.

CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 512

PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS

LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO

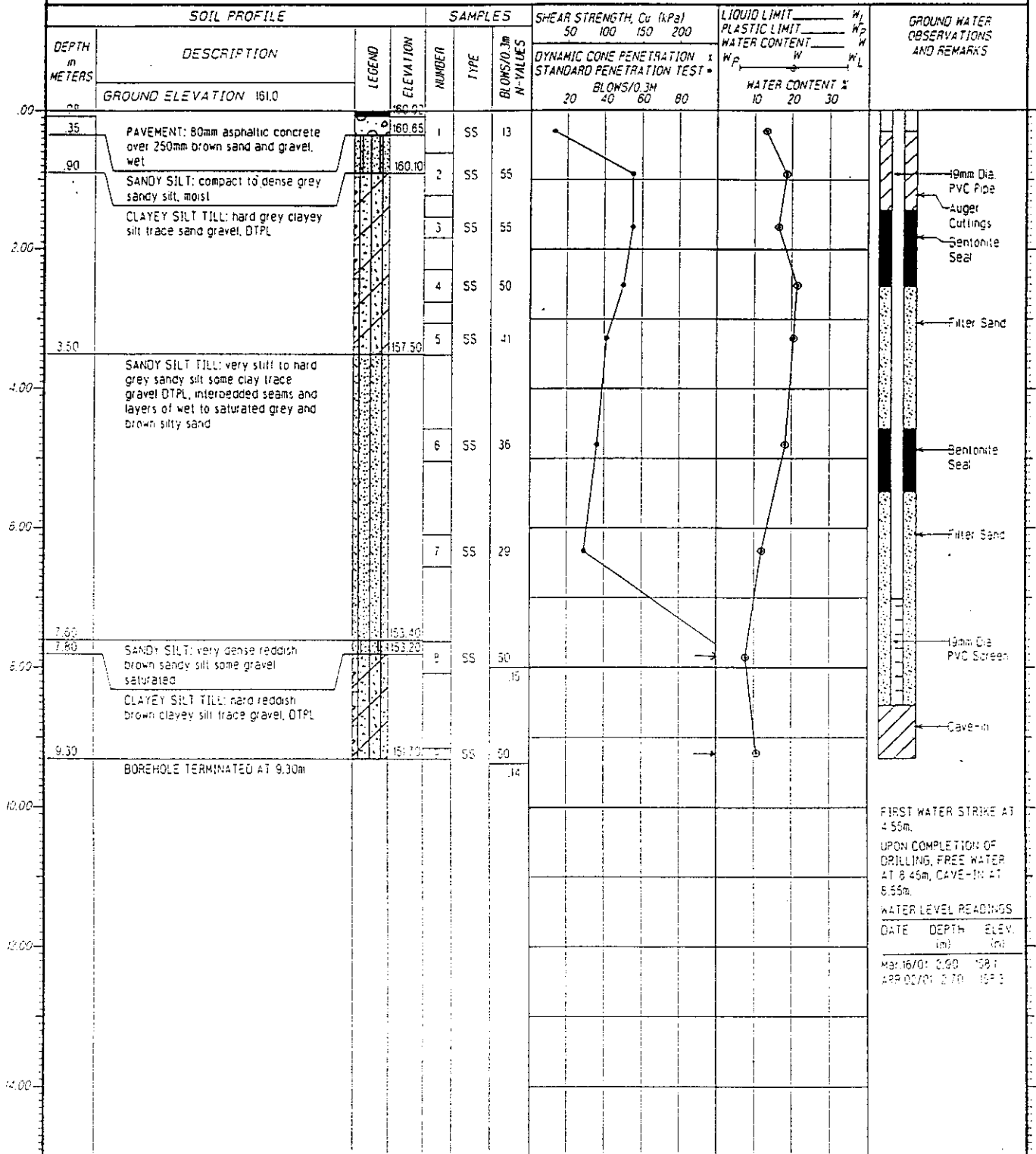
BORING METHOD: CONTINUOUS FLIGHT HOLLOW STEM AUGERS

BORING DATE: MAR. 12, 2001

OUR PROJECT NO.: 99TF1014

ENGINEER: D.J.B.

TECHNICIAN: R.B.



NOTES:

--- UNDISTURBED FIELD VANE
+--- REMOLDED FIELD VANE
*--- LAB SHEAR TEST
▲--- POCKET PENETROMETER

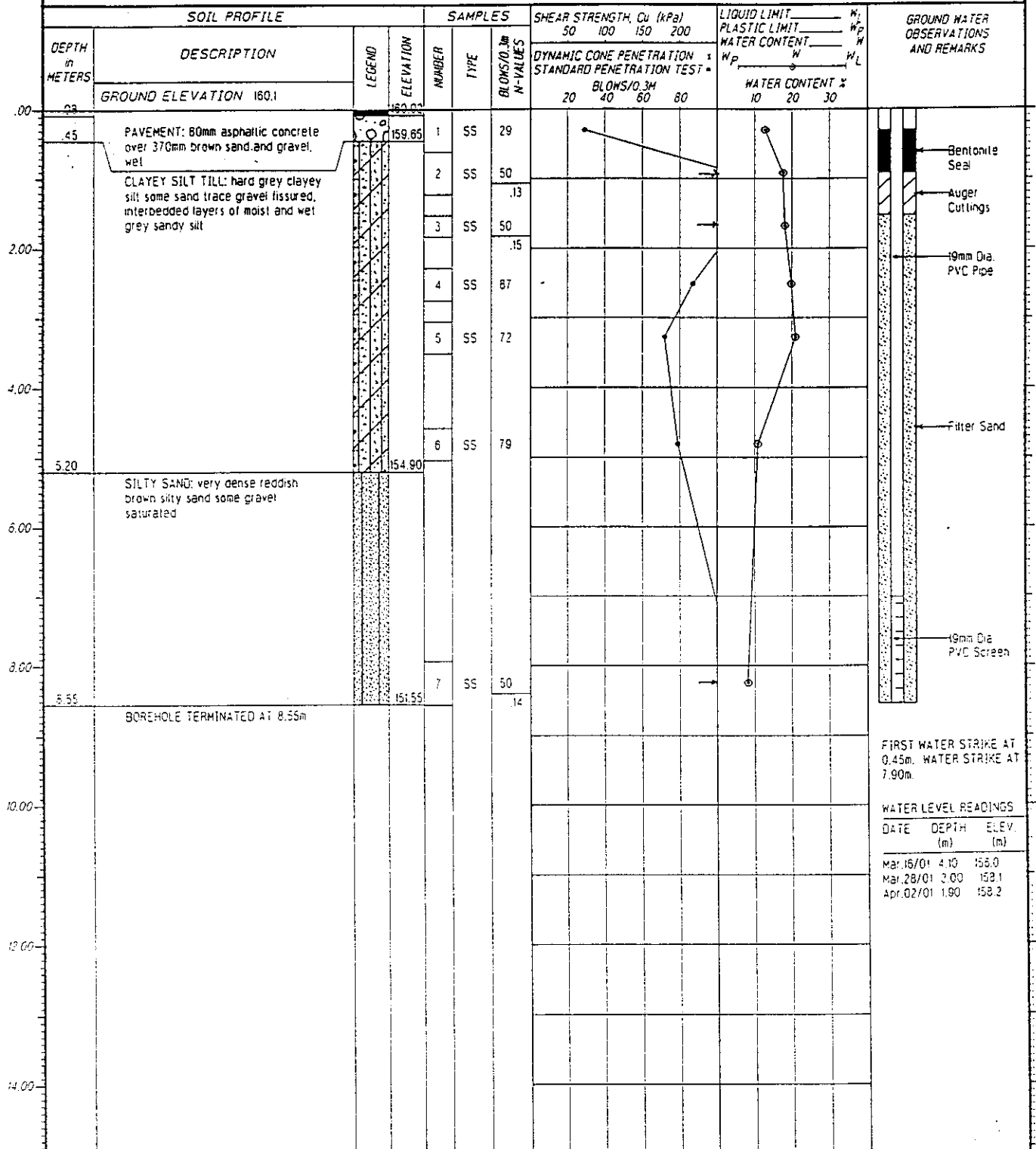
CHECKED BY: *DB*

LOG OF BOREHOLE NO. 519

PROJECT: CREDIT VALLEY HOSPITAL ADDITIONS/RENOVATIONS
LOCATION: 2200 EGLINTON AV. WEST, MISSISSAUGA, ONTARIO
BORING METHOD: CONTINUOUS FLIGHT HOLLOW STEM AUGERS

BORING DATE: MAR. 12, 2001

OUR PROJECT NO.: 99TF101A
ENGINEER: D.J.B.
TECHNICIAN: R.B.



FIRST WATER STRIKE AT 0.45m. WATER STRIKE AT 7.90m.

WATER LEVEL READINGS

| DATE | DEPTH (m) | ELEV. (m) |
|------------|-----------|-----------|
| Mar. 16/01 | 4.10 | 156.0 |
| Mar. 28/01 | 3.00 | 159.1 |
| Apr. 02/01 | 1.90 | 158.2 |

NOTES:

+ --- UNDISTURBED FIELD VANE
 = --- REMOLDED FIELD VANE
 * --- LAB SHEAR TEST
 ▲ --- POCKET PENETROMETER

CHECKED BY: *AB*

APPENDIX C

SUMMARISED SUBSURFACE CONDITIONS – BUILDING “M”

**TABLE III
SUMMARIZED STRATIGRAPHIC CONDITIONS
BUILDING "M"
CREDIT VALLEY HOSPITAL
MISSISSAUGA, ONTARIO**

| Borehole Designation | PML Report | Ground Elev. ⁽¹⁾ (m) | Hole Details | | Subgrade Type at Elevation 161.0 | Clayey Silt Till/Silt Boundary | | Granular Strata Sand/Sandy Silt/ Sand and Gravel | | | Bedrock | | Groundwater ⁽²⁾ Observations | |
|----------------------|------------|------------------------------------|--------------|-----------|----------------------------------|--------------------------------|-----------|--|-----------|---------------|-----------|-----------|---|-----------|
| | | | Depth (m) | Elev. (m) | | Depth (m) | Elev. (m) | Depth (m) | Elev. (m) | Thickness (m) | Depth (m) | Elev. (m) | Depth (m) | Elev. (m) |
| 1 | 88F348 | 165.3 | 6.10 | 159.2 | Weathered Shale | NE | NE | NE | NE | NE | 0.8 | 164.5 | NE | NE |
| 101 | 81F35 | 160.6 | 9.3 | 151.3 | New Fill | 3.1 | 157.6 | 4.3 | 156.3 | 1.2 | 9.3 | 151.3AR | 3.8 | 156.8 |
| 110 | 81F35 | 159.9 | 12.2 | 147.7 | New Fill | 2.9 | 157.0 | 4.0 | 155.9 | 3.3 | 12.2 | 147.7AR | 2.3 | 157.6 |
| 310 | 87F479 | 164.4 | 8.1 | 156.3 | Hard clayey Silt Till | 5.1 | 159.3 | NE | NE | NE | NE | NE | NE | NE |

Notes:

- ⁽¹⁾ Existing ground surface elevation may be different due to site grading carried out.
- ⁽²⁾ Groundwater observations are in the open boreholes during drilling March 1981, October 1987 and July 1988 and may be subject to yearly and seasonal fluctuations and are affected by the construction of the hospital structure.
- NE Not Encountered.
- AR Borehole terminated upon auger refusal, inferred probably bedrock.
- QS Borehole terminated upon practical auger refusal or practical refusal to split spoon sampler in Queenston Shale.

LOG OF BOREHOLE NO. 1

PROJECT PROPOSED APARTMENT BUILDINGS

OUR PROJECT NO 88 F 348

LOCATION Eglinton Avenue and Erin Mills Parkway

BORING DATE July 7, 1988

ENGINEER AEG

BORING METHOD Continuous Flight Solid Stem Augers

TECHNICIAN JH

| SOIL PROFILE | | | | SAMPLES | | SHEAR STRENGTH C_u | | | | LIQUID LIMIT W_L | | | | GROUND WATER OBSERVATIONS AND REMARKS | |
|-----------------------|--|--------|-----------|---------|------|-------------------------|---|----|----|--------------------|---------------------|----|----|---|--|
| DEPTH IN METRES | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | BLOWS/30 cm - VALUES | DYNAMIC CONE PENETRATION - STANDARD PENETRATION TEST * | | | | PLASTIC LIMIT W_P | | | | |
| | | | | | | | BLOWS/0.3M | | | | WATER CONTENT W | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 10 | 20 | 30 | | |
| | GROUND ELEVATION 165.28 | | | | | | | | | | | | | | |
| | CLAYEY SILT TILL: stiff brown clayey silt, trace of sand and gravel, moist | | 165 | | | | | | | | | | | | |
| 1.5 | SHALE: highly weathered red shale of the Queenston formation, moist | | 164 | 1 | SS | 30 | | | | | | | | | |
| | | | | 2 | SS | 80 | | | | | | | | | |
| | | | 163 | | | | | | | | | | | | |
| 3.0 | | | | 3 | SS | 50/150 mm | | | | | | | | | |
| | | | 162 | 4 | SS | 50/80 mm | | | | | | | | | |
| | hard augering below 3.6 m | | | | | | | | | | | | | | |
| 4.5 | | | 161 | | | | | | | | | | | | |
| | | | | 5 | SS | 50/30 mm | | | | | | | | | |
| | | | 160 | | | | | | | | | | | | |
| 6.0 | BOREHOLE TERMINATED AT 6.10 m RETURNAL TO AUGERS | | 159 | 6 | SS | 50/30 mm | | | | | | | | | |
| 7.5 | | | | | | | | | | | | | | | |
| 9.0 | | | | | | | | | | | | | | | |
| 10.5 | | | | | | | | | | | | | | | |
| 12.0 | | | | | | | | | | | | | | | |
| 13.5 | | | | | | | | | | | | | | | |
| 15.0 | | | | | | | | | | | | | | | |
| 16.5 | | | | | | | | | | | | | | | |

NOTES

CHECKED BY GDP

JOB NAME Proposed Credit Valley Hospital

JOB No. 81 E 35

LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 12, 1981

ENGINEER D. P. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN W. Junker

| SOIL PROFILE | | | SAMPLES | | | SHEAR STRENGTH C_u | | LIQUID LIMIT W_L | | PLASTIC LIMIT W_P | | WATER CONTENT W | | GROUNDWATER OBSERVATIONS AND REMARKS |
|-----------------|--|--------|-----------|--------|------|----------------------|--|--------------------|-----------------|---------------------|-----------------|-------------------|----|--------------------------------------|
| DEPTH IN METRES | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | BLOWS PER 30 CM | DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST | | WATER CONTENT % | | WATER CONTENT % | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 10 | 20 | 30 | |
| 0.22 | TOPSOIL: dk. bn clayey silt | | 160.61 | | | | | | | | | | | |
| | CLAYEY SILT TILL: hard reddish brown to brown moist clayey silt, trace to some sand and fine gravel D.P.T.L. | | | 1 | SS | 40 | | | | | | | | |
| | | | | 2 | SS | 45 | | | | | | | | |
| | | | | 3 | SS | 36 | | | | | | | | |
| | | | | 4 | SS | 21 | | | | | | | | |
| | SILT: compact wet grey silt, occasional silty sand seams | | | | | | | | | | | | | |
| | | | | 5 | SS | 19 | | | | | | | | |
| | SANDY SILT: reddish brown and grey SAND AND GRAVEL: compact grey wet silty sand and gravel | | | | | | | | | | | | | |
| | | | | 6 | SS | 46 | | | | | | | | |
| | SILT: dense grey silt seams of wet sand | | | | | | | | | | | | | |
| | | | | 7 | SS | 60 | | | | | | | | |
| | SAND: very dense reddish brown wet well graded sand, some fine gravel, layers of grey fine to medium sand. | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | SILT TILL: very dense reddish brown sandy silt, some gravel, occasional cobbles | | | | | | | | | | | | | |
| | BOREHOLE TERMINATED AT: 9.30 m upon refusal to auger (assumed bedrock) | | | | | | | | | | | | | |
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NOTES

*'N' value may be influenced by groundwater

CHICK KIDNEY 826/52



JOB NAME Proposed Credit Valley Hospital

JOB No. 81 F 35

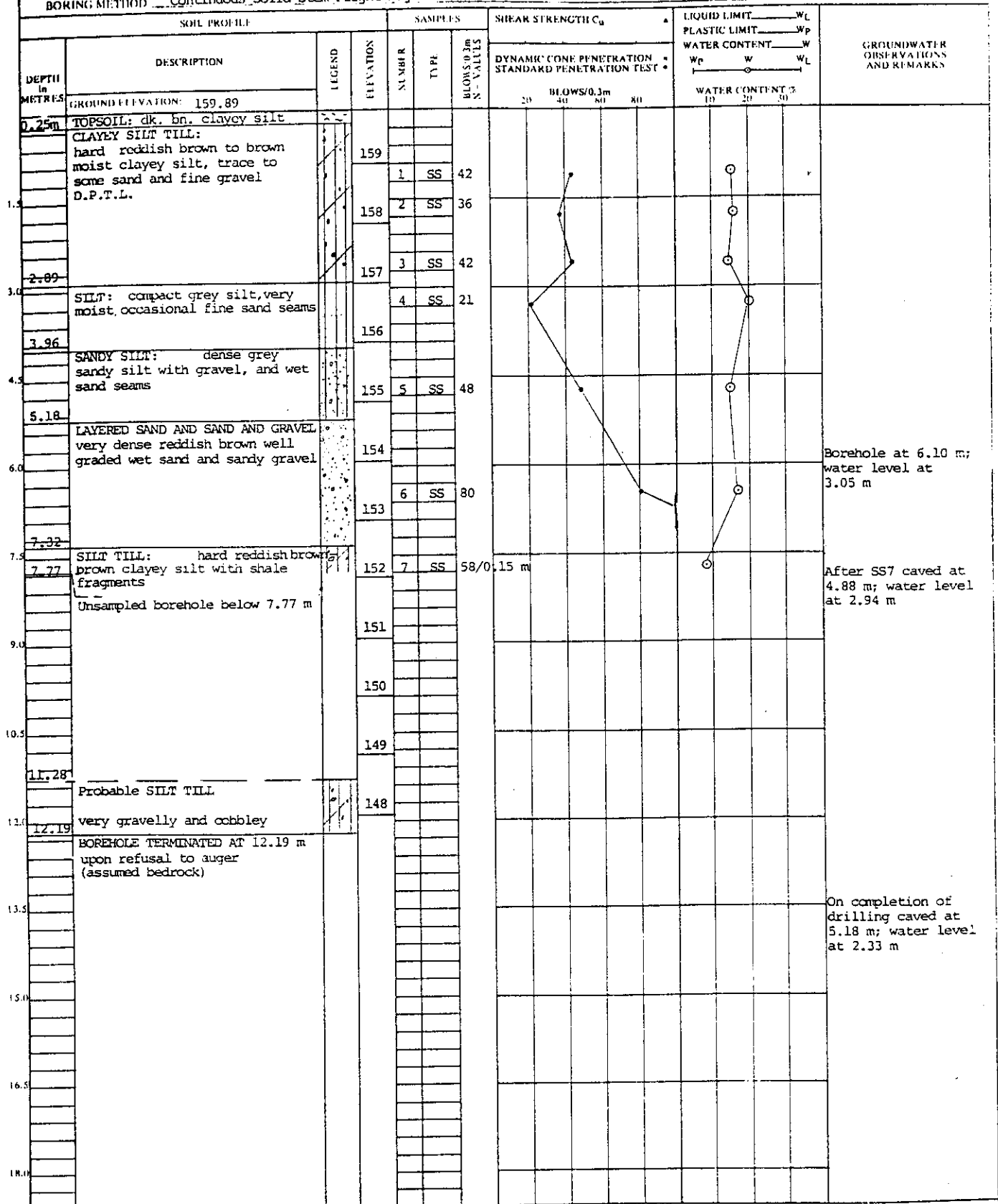
LOCATION Eglinton Avenue at Erin Mills Parkway, Mississauga

BORING DATE March 20, 1981

ENGINEER B.R. Gray

BORING METHOD Continuous Solid Stem Flight Augers

TECHNICIAN W. Junker



NOTES:

CHECKED BY BCG/SP

LOG OF BOREHOLE NO. 310

PROJECT NEW PARKING STRUCTURE

OUR PROJECT NO. 87 E 479

LOCATION Credit Valley Hospital, Mississauga

BORING DATE October 26, 1987 ENGINEER JGP

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN RKB

| SOIL PROFILE | | | | SAMPLES | | SHEAR STRENGTH C_u kPa | | LIQUID LIMIT W_L | | GROUND WATER OBSERVATIONS AND REMARKS | | |
|-----------------------|--|--------|-----------|---------|------|--------------------------|---|--------------------|-----|---------------------------------------|-----|----|
| DEPTH in METRES | DESCRIPTION | LEGEND | ELEVATION | NUMBER | TYPE | BLOWS/3m N - VALUES | 50 | 100 | 150 | | 200 | |
| | | | | | | | DYNAMIC CONE PENETRATION - STANDARD PENETRATION TEST * | | | | | |
| | | | | | | | 20 | 40 | 60 | | 80 | 10 |
| | GROUND ELEVATION 164.36 | | | | | | | | | | | |
| 11.41 | PAVEMENT: 75 mm asphalt underlain by 355 mm sand & gravel | | 164 | | | | | | | | | |
| | FILL: very stiff brown and red clayey silt, trace to some gravel, scattered rootlets, A.P.L. to D.T.P.L. | | 163 | 1 | SS | 16 | | | | | | |
| 1.5 | some straw, organic odour | | 162 | 2 | SS | 17 | | | | | | |
| | stiff | | 161 | 3 | SS | 8 | | | | | | |
| 2.0 | | | 161 | 4 | SS | 22 | | | | | | |
| 3.26 | | | 160 | 5 | SS | 58 | | | | | | |
| | CLAYEY SILT TILL: hard mottled brown grey and red clayey silt, trace of gravel, scattered red shale fragments, rust stains, D.T.P.L. | | 159 | 6 | SS | 69 | | | | | | |
| 4.5 | | | 158 | 7 | SS | 85 | | | | | | |
| 5.10 | | | 157 | 8 | SS | 59 | | | | | | |
| 7.00 | SILT: very dense brown silt, trace of fine sand, rust layers, moist a few wet seams becoming grey | | | | | | | | | | | |
| 8.08 | saturated | | | | | | | | | | | |
| | BOREHOLE TERMINATED AT 8.08 m | | 156 | | | | | | | | | |
| 9.0 | | | | | | | | | | | | |
| 10.5 | | | | | | | | | | | | |
| 12.0 | | | | | | | | | | | | |
| 13.5 | | | | | | | | | | | | |
| 15.0 | | | | | | | | | | | | |
| 16.5 | | | | | | | | | | | | |

Upon completion of augering, borehole open, no free water

Upon completion of augering, borehole open, no free water

NOTES 2 Undrained shear strength determined by pocket penetrometer

DESIGNED BY JGP

APPENDIX D
ENGINEERED FILL

APPENDIX D

ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1) Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

2) Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope may be defined from a geotechnical perspective by:

- at founding level, extend 500 mm beyond the outer edge of the foundations
- from the perimeter so-established project downward and outward at 45° to meet the subgrade

All fill below the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

3) Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of fill.

4) Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths should not be blocked.

5) Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project-specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

6) Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed for the various backfill material types using different lift thickness and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in backfill sources, natural moisture content of the material and weather conditions.

7) Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be done with full time inspection and to the satisfaction of Peto MacCallum Ltd.

All founding surfaces must be inspected and approved by Peto MacCallum Ltd. prior to placement of concrete.

8) Protection of Fill

Fills are generally more susceptible to the effects of weather than are natural soils. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where inadequate protection has been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

APPENDIX E
UNDERPINNING

UNDERPINNING

Where the excavation is to be taken below the level of existing footings, reference should be made to Figure I-1 to determine whether underpinning will be required. If it will be necessary to have the footings underpinned prior to completion of the excavation, the procedures shown in Figure I-2 should be followed.

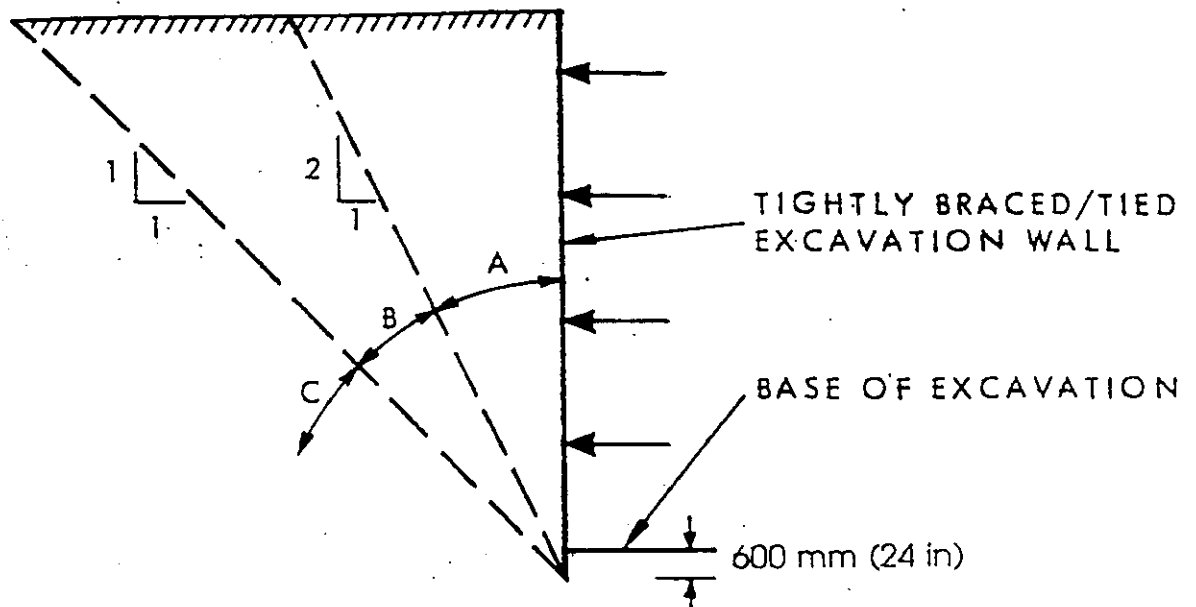
The excavation may be taken up to the line shown in Figure I-2, thus leaving a berm to provide support for the existing building. The underpinning should then be carried out in short panels. A maximum width of 1.5 m (5.0 ft) is recommended.

At all times, at least two intact panels must be left between open panels; i.e. only panels having a like number on Figure I-2 may be opened at one time. The base of the underpinning should be 1.5 times the existing footing width and the resulting bearing pressure should not exceed two thirds of the values given under "Foundations" in the body of the report.

Underpinning may be done by pouring concrete panels up to approximately 80 mm (3 in.) below the underside of the existing footing. Once the concrete has cured, the remaining space must be filled tightly with dry-pack grout.

Care must be taken to avoid loss of soil below the floor, and any voids must be grouted.

Underpinning operations should be inspected by geotechnical personnel from Peto MacCallum Ltd.



Reference:
Canadian Foundation, Engineering Manual
Part 4, Chapter 3

ZONE A:

Foundations within this zone generally require underpinning. Horizontal and vertical pressures on excavation wall of non-underpinned foundations must be considered.

ZONE B:

Foundations within this zone generally do not require underpinning. Horizontal and Vertical pressures on excavation wall of non-underpinned foundations must be considered.

ZONE C:

Underpinning to structures must be founded in this zone. Pressures from underpinning generally need not be considered.

FIGURE 1-1
ZONES OF INFLUENCE

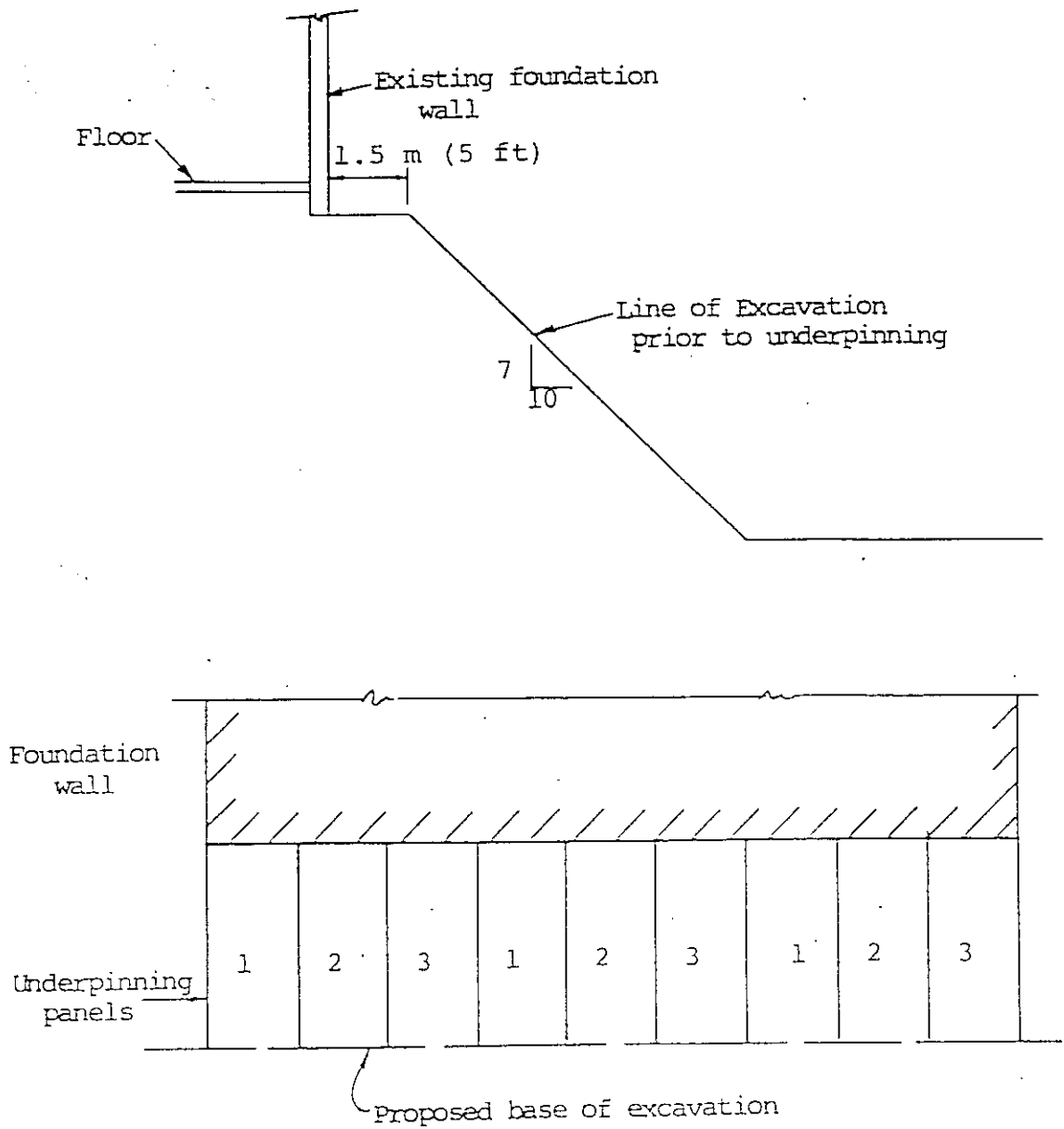


FIGURE 1-2
UNDERPINNING PROCEDURE