

DEPARTMENT OF HIGHWAYS ONTARIO

23-67-40

## MEMORANDUM

To: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division.  
Attention: Mr. S. McCombie

FROM: Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

DATE: September 20, 1966

OUR FILE REF.

IN REPLY TO: OCT 26 1966

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Retaining Walls at  
Q.E.W. and Hwy. #27 Interchange  
District #6 (Toronto)  
W.J. 66-F-47 -- W.P. 275-64-4

Enclosed, please find our complete foundation investigation report for Retaining Walls No's 10, 11, 7, 15, 1, 16, 18, 19, 25, 26, 13, 14, 9, 40, 5 and 6, to be constructed at the Q.E.W. and Hwy. #27 Interchange.

We believe the information contained in the report will be sufficient for your design purposes. If any points require further clarification, please contact this Office.

AGS/MdeF  
Attach.

cc: Messrs. B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
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Foundations Office  
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*A. G. Stermac*  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Retaining Walls at  
Q.E.W. and Hwy. #27 Interchange  
District #6 (Toronto)  
W.J. 66-F-47 - W.P. 275-64-4

1. INTRODUCTION:

A request for a foundation investigation at the sites of a number of retaining walls to be constructed as part of the proposed Q.E.W. and Hwy. #27 interchange was received by this Section on May 6, 1966. The request was made verbally by Mr. R. Strain, Direct Expenditures Supervisor, Program Division, and Mr. J. McAllister, Bridge Location Supervisor, Bridge Division.

Due to the urgency of the work, the investigations for each wall are reported separately as soon as the field work is completed, and according to a particular time schedule supplied to us by Mr. Strain. The individual walls are identified by number.

Field work, laboratory work, and the preparation of the Record of Borehole sheets, have been undertaken by Dominion Soil Investigation Ltd.

This report contains the results of the field and laboratory investigations, together with our recommendations pertaining to foundation design.

2. DESCRIPTION OF SITE:

The site is located in the general area of the intersection of Hwy. #27 and the Q.E.W. in the Twp. of Etobicoke, Metropolitan Toronto. The surrounding district is heavily built up both of light industry and residential buildings. The topography of this area may be described as flat to gently undulating.

2. DESCRIPTION OF SITE: (cont'd.) ...

Physiographically, the area is situated in the low-lying part of the region referred to as the Iroquois Plain which was formed during the late Pleistocene period by the body of water since designated Lake Iroquois. Soils in this part of the region are mainly heavy-textured shale and limestone tills.

3. SUBSOIL CONDITIONS:

Subsoil over the site area, consists generally of deposits of silty sand to sandy silt followed by clayey silt, sand and gravel (glacial till), followed by shaley limestone bedrock. Depth to bedrock ranges from about 4 feet (El. 365.0) at the south end of the project to about 30 feet (El. 350.0) at the north end. The boundaries between the different deposits are shown on the borelog sheets contained in the Appendix of this report. The estimated stratigraphical profiles shown on Drawings 66-F-47-A, B, C, etc., are based upon this information. Detailed descriptions of the subsoil conditions at each of the retaining wall sites investigated, are given separately in Section 4 below:

4. DISCUSSION AND RECOMMENDATIONS:

Sixteen retaining walls are included in this project. These are numbered: 10, 11, 7, 15, 1, 16, 18, 19, 25, 26, 5, 6, 9, 40, 13 and 14. Subsoil conditions and recommendations for the individual retaining wall foundations are discussed separately, as follows:

cont'd. /3 .....

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #10 -

1. Soil Conditions:

Four borings were carried out at the site of this wall. The borings are numbered: 23, 24, 25 and 26. Subsoil consists of from 1 to 4 feet of sandy silt to silty sand fill material, followed by about 22 feet of very stiff to hard glacial till, followed by limestone bedrock. The glacial till deposit consists of a heterogeneous mixture of clay, silt, sand and gravel in varied proportions, but is generally of a cohesive nature. Ground water level in the borings was found to range from just below the ground surface to about 7 feet below.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Drawing #66-F-47A.

2. Recommendations:

The proposed retaining wall may be supported on spread footings founded within the hard glacial till stratum. It is estimated that a safe net pressure of 3.5 t.s.f. can be achieved for footings located about 4 feet below present original ground level. In this event, the base of the footings would range from El. 377.0 at the south end of the wall, to El. 379.0 at the north end. For footings placed 6 feet below present original ground level, design pressures up to 4.5 t.s.f. may be assumed.

In computing the resistance to lateral movement on the footing bases, an adhesion value of 3000 p.s.f. may be assumed to act between the underside of footings and the subsoil.

For backfill to the retaining walls, you are referred to a memo from Mr. A. Rutka, Materials and Testing Engineer, to Mr. A. M. Toye, Bridge Engineer, dated March 27, 1963, the subject being: "Hwy. #401, Toronto Bypass Retaining Wall Backfill."

No dewatering problems are anticipated.

cont'd. /4 .....



4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #11 -

1. Soil Conditions:

Five borings were drilled at the site of this wall and are numbered: 20, 27, 28, 29 and 30. Subsoil consists of up to 6 feet of sandy silt to silty sand fill material, followed by 20 to 24 feet of hard glacial till, followed by limestone bedrock. The glacial till deposit consists of a heterogeneous mixture of clay, silt, sand and gravel in varied proportions, but is generally of a cohesive nature. Ground water levels in the borings were found to range from 1 to 4 feet below the ground surface.

The locations and elevations of the borings, together with the inferred soil stratigraphy, are shown on the accompanying Drawing #66-F-47B.

2. Recommendations:

The proposed wall may be supported on spread footings founded within the hard glacial till stratum. For footings founded some 4 feet below present original ground level, a safe net pressure of 3.5 t.s.f. may be assumed for design purposes. In this event, the base of the footings would range from El. 377.0 at the south end of the wall, to El. 383.0 at the north end. For footings placed 6 feet below present original ground level, design pressures up to 4.5 t.s.f. may be assumed.

In computing the resistance to lateral movement on the footing bases, an adhesion value of 3000 p.s.f. may be assumed to act between the underside of footing and the subsoil.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

No dewatering problems are anticipated.

cont'd. /5 .....

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #7 -

1. Soil Conditions:

Three borings were carried out at the site of this wall. The borings are numbered: 19, 37 and 38. Subsoil consists of from 2 to 4 feet of sandy silt fill material, followed by a very dense deposit of glacial till, followed by shaley limestone bedrock. The glacial till deposit extends for about 27 feet and consists generally of sandy silt with traces of gravel, changing to clayey silt with sand and gravel in the lower 10 feet. Groundwater levels in the borings ranged from 3 to 4 feet below the ground surface.

The locations and elevations of all borings, together with the inferred soil stratigraphy, are shown on the attached Drawing #66-F-47C.

2. Recommendations:

The proposed wall may be founded at approximately El. 375.0 in which case, allowable pressures up to 4.5 t.s.f. may be assumed for design purposes.

In computing the resistance to lateral movement on the footing bases, a friction coefficient of 0.5 may be assumed to act between the bottom of the footing and the subsoil.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

This type of subsoil is susceptible to conditions of unbalanced hydrostatic head. It is believed, however, that dewatering of the relatively shallow excavations should present no major problems.

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4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #15 -

1. Soil Conditions:

Seven borings have been carried out at the site of this retaining wall and are numbered: 20, 40, 41, 42, 106, 107, and 123. Subsoil consists of from 3 to 17 feet of sand and silt fill material, followed by a very dense deposit of glacial till, ranging in depth from 12 to 20 feet, followed by shaley limestone bedrock. The glacial till deposit consists generally, of fine sandy silt with traces of gravel. Pockets of hard clayey silt with some sand and gravel and shale fragments are also contained within the deposit. Groundwater levels were found to range from 2 to 9 feet below the ground surface in the boreholes, and corresponded closely to the elevations of the original ground surface.

The locations and elevations of the borings, together with the inferred soil stratigraphy, are shown on the accompanying Drawing #66-F-47D.

2. Recommendations:

At this location the proposed finished ground level on the low side of the retaining wall is approximately 5 to 18 feet higher than the present ground surface. In this case, three alternative types of foundation are proposed for consideration:

a) The proposed wall may be founded some four feet below the original ground surface, assuming a design pressure of 4.5 t.s.f. In this case, the base of footing will range from El. 367.0 at the south end of the wall, to El. 375 at the north end. A friction coefficient of 0.45 may be assumed to apply between the underside of footings and the soil. A dewatering scheme may be required since the soil is likely to 'boil' under conditions of unbalanced hydrostatic head.

cont'd. /7 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #15 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

b) The proposed wall footings may be placed within the fill material some four feet below the finished level and be supported on steel H-piles driven to bedrock, or to practical refusal in the glacial till overlying the rock. For design purposes, the maximum allowable load for the particular section used may be assumed.

c) The proposed walls may be founded on spread footings placed on well compacted G.B.C. Class 'A' fill material. The depth of the foundation should be not less than 4 feet below finished ground level. The G.B.C. Class 'A' material should extend for a minimum width of 3 feet on each side of the footings in the plane of the footing tops. It should then slope down at 1:1 to the existing ground level. All topsoil and loose existing fill material should be removed prior to placing the new granular fill. A safe net pressure of 2 t.s.f. may be assumed for design purposes.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

cont'd. /8 .....

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #1 -

1. Soil Conditions:

Thirteen borings were carried out at the site of this wall. These are numbered: 6, 43, 44, 55, 56, 57, 58, 60, 132, 147, 148, 149, and 150. Subsoil consists of 3 to 9 feet of silty sand to sandy silt fill material, followed by a very dense deposit of glacial till, followed by shale bedrock. The glacial till deposit consists of a heterogeneous mixture of clayey silt, sand and gravel, and is generally of a cohesive nature. The thickness of the till deposit ranges from 8 to 27 feet. Groundwater level in the borings was found to be from 3 feet to 11 feet below the ground surface.

The locations and elevations of the boreholes, together with the inferred soil stratigraphy, are shown on the accompanying Drawing #66-F-47E.

2. Recommendations:

The proposed wall may be founded on spread footings placed 4 feet below finished ground level. In this event, the base of the footings will range from about El. 336.0 at the west end of the wall, to El. 356.0 at the east end. An allowable net pressure of 4.5 tons per sq. ft. may be assumed for design purposes. An adhesion value of 3000 p.s.f. may be assumed to act between the bottom of footings and the soil for purposes of computing lateral resistance.

Where convenient, depending on the depth of excavation, part of the wall may be founded on sound bedrock, utilizing a design pressure of 10.0 t.s.f. Vertical expansion joints should be constructed between the parts of the wall founded on rock and on till.

For backfill to the retaining wall, recommendations for Wall #10 should be followed.

Dewatering problems are anticipated west of B.H. 56 since the soil here at the foundation level is of a fine-grained granular nature and as such, is susceptible to conditions of unbalanced hydrostatic heads.

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #16 -

1. Soil Conditions:

Two borings were drilled at the location of this wall. These are numbered: 45 and 46. Subsoil consists of about 5 feet of sandy silt to silty sand fill material, followed by 11 to 13 feet of very dense glacial till, followed by shaley limestone bedrock. The glacial till deposit consists of a heterogeneous mixture of clayey silt, sand and gravel, and is generally of a cohesive nature. Ground water level in the boreholes was found to range from 3 to 6 feet below the ground surface.

The locations and elevations of the borings, together with the estimated stratigraphical profile, are shown on Drawing #66-F-47F.

2. Recommendations:

The finished ground line on the low side of this wall ranges from approximate El. 344 at the west end to El. 363 at the east end. In this case, part of the wall at the west end will be founded, of necessity, in bedrock. The remaining portion of the wall should be founded 4 feet below the finished ground line, or 4 feet below the surface of the glacial till stratum shown on Drawing #66-F-47F, whichever is the lower elevation. For the portion of wall founded on rock, design loads up to 10 t.s.f. may be assumed. Elsewhere, allowable pressures up to 4 t.s.f. are recommended. Vertical expansion joints should be constructed between the parts of the wall founded on rock and on overburden. An adhesion value of 3000 p.s.f. may be assumed to act between the bottom of footings and the soil.

For backfill to the wall, recommendations for Wall #10 should be followed.

No dewatering problems are anticipated.

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #18 -

1. Soil Conditions:

Ten borings were carried out at the site of this wall. These are numbered: 7, 52, 61, 62, 63, 64, 151, 152, 153, and 154. Subsoil consists of 5 to 10 feet of silty fine sand, followed by a very dense deposit of glacial till, followed by shale bedrock. The glacial till deposit consists of a heterogeneous mixture of clayey silt, sand and gravel, and is generally of a cohesive nature. The thickness of the till deposit ranges from 10 to 23 feet. Groundwater level in the borings was found to be 4 to 11 feet below the ground surface.

The locations and elevations of the boreholes, together with the inferred soil stratigraphy, are shown on the accompanying Drawing #66-F-47G.

2. Recommendations:

The proposed wall may be founded on spread footings placed 4 feet below finished ground level. In this event, the base of the footings will range from El. 338.0 at the west end of the wall to El. 350.0 at the east end. An allowable net pressure of 4.5 tons per sq. ft. may be assumed for design purposes. An adhesion value of 3000 p.s.f. may be assumed to act between the bottom of footings and the soil for purposes of computing lateral resistance.

For backfill to the retaining wall, recommendations for Wall #10 should be followed.

No dewatering problems are anticipated since the soil is relatively impermeable.

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4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #19 -

1. Soil Conditions:

Two borings were drilled at the location of this wall. These are numbered: 53 and 54. Subsoil consists of about 3 feet of sandy silt to silty sand fill material, followed by 4 to 7 feet of very dense silty fine sand, followed by about 10 feet of hard glacial till, followed by shale bedrock. The glacial till deposit consists of a heterogeneous mixture of clayey silt, sand and gravel, and is generally of a cohesive nature. Groundwater level in the boreholes was found to range from 4 to 5 feet below the ground surface.

The locations and elevations of the borings, together with the estimated stratigraphical profile, are shown on Drawing #66-F-47H.

2. Recommendations:

The finished ground line on the low side of this wall ranges from approximate El. 367.0 at the west end to El. 352.0 at the east end. It is recommended to found the wall on spread footings placed 4 feet below the surface of the original ground, or 4 feet below the finished ground line, whichever is the lowest elevation. In this event, the base of the wall will range from El. 360.0 at the west end to El. 347.0 at the east end. Allowable pressures of 4.5 t.s.f. may be assumed for design purposes. Dewatering problems may be encountered since part of the excavation will be in fine-grained granular soil. In this event, care must be taken to prevent 'boiling' of the excavation bases. A friction coefficient of 0.5 may be assumed to act between the bottom of footings and the soil.

For backfill to the wall, recommendations for Wall #10 should be followed.

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4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #25 -

1. Soil Conditions:

Boreholes #69, 70, 130 and 131, were drilled at the site of this retaining wall. Subsoil at the wall location consists of up to 10 feet of dense silty fine sand overlying about 15 feet of glacial till, followed by shale bedrock. The glacial till deposit ranges from a very dense sandy silt with some clay and gravel, to a hard clayey silt containing sand and gravel. The lower ten feet of the deposit contains numerous shale fragments. Groundwater level in the borings was found to range from 6 to 13 feet below the level of existing ground at the centre-line of the proposed wall.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Drawing #66-F-47J.

2. Recommendations:

The proposed wall may be founded on spread footings located some 4 - 6 feet below finished ground levels utilizing a design pressure of 3 t.s.f. The footing elevations recommended at each borehole location, are as follows:

B.H. #70	--	El. 330.0
B.H. #69	--	El. 334.0
B.H. #130	--	El. 341.0
B.H. #131	--	El. 343.0

Intermediate points may be interpolated.

In computing the resistance to lateral movements, a friction coefficient of 0.45 may be assumed to apply between the footing bases and the subsoil below.

cont'd. /13 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #25 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

Due to the granular nature of the subsoil, it is possible that dewatering problems will be encountered and, therefore, precautions should be taken to prevent 'boiling' of the excavation bases.

For backfill to the retaining wall, recommendations given for Wall #10 should be followed.

cont'd. /14 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #26 -

1. Soil Conditions:

Six borings were carried out at the site of this wall. These are numbered: 66, 67, 68, 116, 117 and 118. Subsoil consists of from 5 to 8 feet of loose to dense silty fine sand, followed by about 5 feet of compact to very dense fine to coarse sand to silty sand, followed by about 20 feet of hard glacial till. The hard glacial till deposit is underlain by shale bedrock and consists of clayey silt with some embedded fine gravel. Groundwater in the boreholes was found to range from 8 to 11 feet below the ground surface over most of the area.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Drawing #66-F-47K.

2. Recommendations:

The proposed wall may be founded on spread footings placed 4 feet below finished ground level. An allowable pressure of 3.0 t.s.f. may be assumed for design purposes. If higher pressures are required, 4.5 t.s.f. may be achieved at a depth of 6 feet below finished ground level. No major dewatering problems are anticipated since the groundwater level appears to be fairly low at the south-west half of the wall where the footings will be based in granular soil, and at the north-east half the bases will be in cohesive soil (see Drawing #66-F-47K).

In computing resistance to lateral pressures, a friction coefficient of 0.5 may be assumed for the footings on granular soil, and an adhesion value of 3000 p.s.f. may be assumed for the footings on cohesive soil.

Backfill to the retaining walls should be as recommended for Wall #10.

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #2 -

1. Soil Conditions:

Two boreholes were drilled at the site of this wall. These holes are numbered 106 and 142. Subsoil at the site from ground level downward, was found to consist of about 5 feet of sand and gravel fill material, followed by about 20 feet of glacial till, followed by shale bedrock. The glacial till deposit consists generally of a heterogeneous mixture of clay, silt, sand and gravel, and ranges from very dense silty sand to hard clayey silt.

Groundwater in the boreholes was found to range from el. 383.0 to el. 377.0.

The locations and elevations of the borings, together with the estimated subsoil stratigraphy, are shown on Drawing #66-F-47V.

2. Recommendations:

The finished ground level on the low side of this wall ranges from zero to 14 feet above the present ground level. For spread footings it will be necessary to found the proposed retaining wall at or below el. 376.0 in which case a design load of 3.5 t.s.f. may be assumed. Since the south half of the wall will be constructed within fill material, it might be more economical to found this portion of the wall on piles. In this event, the most suitable piles would be steel H-piles, end bearing in the very dense glacial till layers. It is estimated that a design load of 70 tons/pile will be achieved at or about el. 370.0.

cont'd. /16 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #9 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

A dewatering scheme will be necessary if excavations are carried out below the groundwater level. Subsoil at this site is susceptible to conditions of unbalanced hydrostatic head and is likely to 'boil' under such conditions.

For backfill to the walls, recommendations for Wall #10 should be followed.

In computing the resistance to lateral pressures, a friction coefficient of 0.45 may be assumed for spread footings on granular soil, and an adhesion value of 3000 p.s.f. may be assumed for footings on cohesive soil.

cont'd. /17 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #40 -

1. Soil Conditions:

Two borings were carried out in the vicinity of this wall and are numbered 59 and 141. Subsoil consists of about 4 feet of silty fine sand, followed by at least 22 feet of very dense clayey silt and sand with some gravel (glacial till). Groundwater in the borings ranged from 12 to 22 feet below the ground surface.

The locations and elevations of the borings, together with the estimated soil stratigraphy, are shown on Drawing #66-F-47X.

2. Recommendations:

The proposed wall may be founded some 4 feet below finished ground level utilizing design pressures up to 3.5 t.s.f. In this event, the elevation of the footings will range from el. 344.0 at the south end to el. 336.0 at the north end. No dewatering problems are anticipated.

For computing resistance to lateral pressure, an adhesion value of 3000 p.s.f. may be assumed to act between the footing bottoms and the soil.

For backfill to the walls, recommendations for Wall #10 should be followed.

cont'd. /18 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #13 -

1. Soil Conditions:

The soil profile along the proposed wall is based on 4 boreholes numbered: 22, 34, 35 and 36, and plotted on the attached Drawing #66-F-47R. In each borehole immediately below the ground surface, a fill stratum was observed. In boreholes 22 and 34, at the south portion of the wall, the fill is about 6 - 7 ft. thick, comprising sandy silt with some clay and organic matter. The layer has a loose to compact relative density. The fill below the north portion of the wall is only some 1 - 1.5 ft. thick, consisting mainly of sand and gravel.

Underlying the fill, a heterogeneous mixture of clayey silt and sandy silt with traces of some gravel (glacial till), was encountered. Portions of the deposit, being granular in nature, have relative densities of "dense to very dense," while the cohesive layers exhibit hard consistencies. In borehole #22, shaley limestone bedrock was proved by diamond drilling from elevation 361 ft. down to 355 ft.

Groundwater was encountered in each borehole at some 4 - 7 ft. below ground level.

Locations and elevations of the boreholes as well as the estimated soil profile, are plotted on the enclosed Drawing #66-F-47R.

2. Recommendations:

In view of the foregoing, the proposed retaining wall may be supported on spread footings at relatively shallow depths.

The recommended elevations of the footing at the borehole locations, are as follows:

cont'd. /19 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #13 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

No. of Borehole	Elevation of Base of Footing
22	381 ft. or below
34	381 ft. " "
35	390 ft. " "
36	395 ft. " "

At the above elevations, a safe bearing pressure of 4.5 t.s.f. may be assumed for design purposes.

Excavation for the footings, mainly at the south portion of the wall, will extend below the observed groundwater level. At these locations where the subsoil is of a granular nature, some "boiling" may occur under conditions of unbalanced hydrostatic head; consequently, a dewatering scheme may be necessary.

For calculations of resistance to sliding between the base of the wall and the soil, a coefficient of friction of 0.45 (for the granular sandy silts), or an adhesion value of 3000 p.s.f. (for the cohesive clayey silts), may be used.

cont'd. /20 ...



4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #14 -

1. Soil Conditions:

Four boreholes were carried out at the site of the proposed wall. The boreholes from south to north are numbered: 102, 31, 32 and 33. Subsoil in borehole #31 was found to be a clayey silt with some gravel (glacial till). This material is of a cohesive nature, having a consistency ranging from stiff to hard. In the rest of the boreholes the subsoil was observed to be sandy silt, silty sand and sand (glacial till). The latter deposits have characteristics of granular soils and they are all very dense. In borehole #102, which was drilled to a depth of 64 ft., from elevation 369.0 ft., numerous shale layers and sand seams were encountered, followed by weathered bedrock. Sound shale bedrock was proved from elevation 332 ft. down to elevation 327.0 ft.

Groundwater level was observed in each borehole. The depths of water level varied between 2 ft. and 9 ft. below ground level.

The locations and elevations of the boreholes, together with the stratigraphical profile, are plotted on the attached Drawing #66-F-47S.

2. Recommendations:

The proposed retaining wall may be supported on spread footings, within the hard and very dense glacial till deposit.

The bottom of footing should be placed some 5 - 7 ft. below present ground level.

Recommended footing elevations at the locations of the boreholes are tabulated as follows:

cont'd. /21 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #14 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

No. of Borehole	Elevation of Base of Footing
102	384 ft. or below
31	384 ft. " "
32	387 ft. " "
33	392 ft. " "

At the recommended elevation, a safe bearing pressure of 4.5 t.s.f. may be assumed for design purposes.

During the excavation, some groundwater may be encountered. The sandy silt layer appears to be susceptible to unbalanced hydrostatic head; nevertheless, it is believed that due to the anticipated shallow depths below the water level, major dewatering problems will probably not arise.

In computing the resistance of the wall against lateral earth pressure, a friction coefficient of 0.45 may be assumed to apply between the footing bases and the underlying soil.

Backfill to the retaining walls should be as recommended for Wall No. 10.

cont'd. /22 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #5 -

1. Soil Conditions:

Three boreholes - numbered 49, 50 and 51 - were carried out at the vicinity of the proposed wall.

Below the ground level, a fill material was observed, consisting of silty sand with gravel and traces of clay. The relative density of the fill is generally loose. The thickness of the layer increases toward the south, being 5 ft. at borehole #49 and 9 ft. at borehole #51.

The fill is underlain at each borehole by a glacial deposit of clayey silt with some sand and gravel. The stratum exhibits a hard consistency.

At el. 343 - 345 ft., shale bedrock with bands of limestone was encountered and proved by diamond drilling to a maximum depth of 20 ft.

Groundwater level was established in the borings between el. 348 ft. and 353 ft.

Locations and elevations of the boreholes, together with the estimated soil profile along the length of the wall are shown on Drawing #66-F-47T.

2. Recommendations:

Due to the increasing depth of excavation for the design ground line, and also on account of the inadequate strength of the fill to support the wall, recommendations for a uniform footing design cannot be given.

The north portion of the wall along an approximate length of 80 - 90 ft., may be supported on spread footings at 4 ft. below the proposed grade. The footings will likely be placed on sound bedrock, in which case, an allowable bearing capacity of 10 t.s.f. may be assumed for design purposes.

cont'd. /23 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #5 - (cont'd.)...

2. Recommendations: (cont'd.) ...

The next portion of about 200 - 250 ft. should also be founded on spread footings within the hard clayey silt stratum. The depth of the footing will vary between 4 - 7 ft. below the future grade. An allowable pressure of 4.0 t.s.f. is recommended for this section.

For the remaining length of the wall, three alternative solutions are suggested:

a) The portion in question may be supported on spread footings within the glacial till at or below el. 347 ft. The depth of the footing is estimated to be between 6 and 11 ft. below design grade. 4.0 t.s.f. design load may be employed for this foundation.

b) The wall may also be founded on a well compacted granular backfill, at some 4 ft. below the proposed grade. In this case, the loose sandy fill should be excavated down to the top of the hard glacial till (approx. el. 347 ft.) For the method of construction of the G.B.C. class A backfill, we refer to the recommendations (para. c) for Retaining Wall No. 15. A safe pressure of 2 t.s.f. may be assumed on the compacted backfill.

c) The footings for the section may be placed at four ft. below finished grade and be supported on short H-piles driven to bedrock (approx. el. 345 ft.), or to practical refusal within the glacial till.

The maximum allowable load for the section used may be assumed for design purposes.

cont'd. /24 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #5 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

For methods a) or b), it is to be noted that the silty sand fill is susceptible to conditions of unbalanced hydrostatic head. It is believed, however, that the bottom of the excavations will not "boil" after reaching the cohesive glacial till.

Vertical expansion joints should be incorporated between the portions of the wall supported on bedrock, glacial till and granular backfill.

In computing the resistance along the bottom of the footings against lateral earth pressure, an adhesion value of 3000 p.s.f. may be assumed in the clayey silt, and a friction coefficient of 0.45 for the granular backfill.

cont'd. /25 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #6 -

1. Soil Conditions:

Three boreholes were drilled along the proposed retaining wall and are numbered: 45, 47, and 48.

Subsoil consists of a 6 - 8 ft. thick layer of silty sand fill material with some gravel, having a compact to dense relative density. The fill is underlain by a stratum of hard clayey silt with embedded gravel and occasional shale fragments (glacial till). Shale bedrock with limestone bands were encountered at around el. 348 ft. below the south half of the proposed wall, and at around el. 342 ft. at the north end.

Free water level was noticed in each borehole between el. 352 ft. and el. 355 ft.

The locations and elevations of the boreholes, together with the stratigraphical profile along the proposed wall, are shown on the enclosed Drawing #66-F-47U.

2. Recommendations:

The proposed wall may be supported on spread footings.

Due to the relatively shallow depths of the bedrock below the design ground line, the footings may be placed on bedrock along the whole length of the wall. In this case, the depth of the footing will be some four ft. below the design ground line at the north end of the wall (el. 340 ft.), and some eight to nine ft. below it at the south end (approx. el. 347 - 348 ft.). By placing the footing on rock, a design load of 10 t.s.f. may be employed.

As an alternative, footings may also be placed at four ft. below the finished ground line. In this case, the north portion of the wall will be supported within the shaley

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #6 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

bedrock; the south portion, however, will be in the hard clayey silt stratum. A safe pressure of 10 t.s.f. may be imposed on the portion of the footings supported on sound rock, and 4.0 t.s.f. on the portion supported within the clayey silt.

Bertical expansion joints should be constructed between the parts of the wall founded on rock and on the overburden.

No major dewatering problems are anticipated for the excavations.

An adhesion value of 3000 p.s.f. may be assumed for the calculation of the resisting forces against sliding along the bottom of the footing placed in the overburden.

APPENDIX I



## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS 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 / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### 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	S	SENSITIVITY

# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
s	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
$I_C$	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
$c_v$	COEFFICIENT OF CONSOLIDATION
$C_c$	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
$T_v$	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION
	INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
$\mu$	COEFFICIENT OF FRICTION
$S_r$	SENSITIVITY

## GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

## STRESS AND STRAIN

u	PORE PRESSURE
$\sigma$	NORMAL STRESS
$\bar{\sigma}$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	COEFFICIENT OF EARTH PRESSURE AT REST

## FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
$k_s$	MODULUS OF SUBGRADE REACTION

## SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 23 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. N<sup>o</sup> 27 INTERCHANGE

LOCATION: 180,752 N. 208, 165 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 16, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Advancement of Sampler	20	40	60	80	100	PL	W	LI	
382.6	0	GROUND SURFACE													
		SILTY SAND & GRAVEL FILL													
380.0	1.5	Very Stiff Very Hard		1	S.S.	20									
	5	SILTY CLAY TILL		2	S.S.	45									
375.0		mottled brown grey		3	S.S.	100/5"									
373.6	9.0	SANDY GRAVELLY		4	S.S.	100/8"									
371.6	11.0			5	S.S.	62									
370.0		(shale fragments)		6	S.S.	50/3"									
365.0				7	S.S.	100/1"									
	18.6	END OF BOREHOLE													
	20														

W.L. El. 374.7'  
MAY 20, 1966

GR. 15% , S<sub>d</sub>. 35%  
SL. 45% , CL. 5%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 24 .

OUR REFERENCE NO. 6 - 5 - 29

W.J. 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 181,040 N. 208,090 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING & CORING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 17, 1966

W.P. 275 - 64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content % PL W LI	REMARKS
				NUMBER	TYPE	Advancement of Sampler	2,0	4,0		
384.6	0	GROUND SURFACE								
382.8	1.8	SANDY SILT FILL		1	S.S.	18				
380.0	5	Very Dense greenish brown grey		2	S.S.	110				
375.0	10	SANDY, CLAYEY SILT TILL		3	S.S.	97				
				4	S.S.	70				
370.7	13.9	Intermittent layers of Hard Grey SILTY CLAY TILL and CALCAREOUS SHALES		5	S.S.	82/11"				
370.0	15			6	R.C.					
				7	R.C.	26%				
365.0	20			8	R.C.	52%				
				9	S.S.	50/11"				
361.3	23.3	Grey SHALES - LIMESTONE BEDROCK		10	R.C.	83%				
360.0	25			11	R.C.	76%				
355.0	30	END OF BOREHOLE								

W.L. EL. 384.1'  
MAY 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 2.5.

OUR REFERENCE NO. 6-5-39  
W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 181,200 N. 208,025 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 17, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	20	40	60	80	
384.8	0	GROUND SURFACE									
	1.0	SANDY SILT FILL									
	5	Stiff Hard to Very Hard		1	S.S.	37					
380.0		SILTY CLAY TILL		2	SS	79					
	10	greenish brown grey		3	S.S.	52					
375.0		(shale fragments)		4	S.S.	85					
	13.75			5	S.S.	64/6"					
370.0	15	END OF BOREHOLE									
365.0	20										

W.L. El. 379.8'  
MAY 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 26 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No 27 INTERCHANGE

LOCATION: 181, 480 N. 207, 935 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING & CORING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 17 & 18, 1966

W. P. 275 -- 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	LI		
386.7	0	GROUND SURFACE														
385.0		Brown CLAYEY, SANDY SILT FILL		1	S.S.	12										
382.7	4.0	Hard to Very Hard		2	S.S.	41										
380.0		SILTY CLAY		3	S.S.	57										
	10	greenish brown grey		4	S.S.	67										
375.0		TILL		5	S.S.	76/8"										
373.7	13.5	SANDY and GRAVELLY		6	S.S.	75/4"										
370.0	16.0	calcareous shale cobbles and boulders		7	R.C.											
	20			8	R.C.											
	20.8			9	R.C.											
				10	R.C.	75/4"										

W.L. El. 386.4'  
MAY 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 27 . .

OUR REFERENCE NO. 6-5-39

W. J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 181,087 N. 208,350 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASH BORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 19, 1966

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N Advancement of Sampler	2.0	4.0	6.0	8.0	100	PL	
383.1	0	GROUND SURFACE											
		4" GRANULAR FILL											
381.1	2.0	SANDY SILT FILL											
380.0													
	5	Very Hard CLAYEY SILT TILL		1	S.S.	55							
375.0		greenish brown grey		2	S.S.	76							
372.1	10												
		Very Dense Grey SANDY SILT TILL (Gravelly)		3	S.S.	82/10"							
370.0				4	R.C.								
				5	S.S.	100/26"							
				6	R.C.								
	15			7	S.S.	100/5"							
		cobbles, boulders		8	R.C.								
365.0													
	20	(shale fragments)		9	S.S.	50/6"							
20.5		END OF BOREHOLE											

W.L. E.I. 379.4'  
MAY 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 28 . .

OUR REFERENCE NO. 6-5-39

W. J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 181,292 N. 208,285 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: MAY 18, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	N- or Advancement of Sampler	20	40	60	80	100	PL	W		LI
383.8	0	GROUND SURFACE													
		3" TOPSOIL													
380.0	3.0	Stiff Very Hard													
	5	SILTY CLAY greenish brown grey		1	S.S.	65/6"									
375.0	10	TILL		2	S.S.	70/6"									
				3	S.S.	115									
371.8	12.0	Very Dense		4	S.S.	100/6"									
370.0	15	Grey		5	R.C.										
		SANDY, GRAVELLY SILT TILL		6	S.S.	50/4"									
365.0	20	(shale fragments)		7	R.C.										
20.8	20.8	END OF BOREHOLE		8	S.S.	60/4"									

W.L. El. 381.6'  
MAY 20, 1966



# GEOTECHNICAL DATA SHEET FOR BOREHOLE 29..

OUR REFERENCE NO. 6-5-39  
W. J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 181,568 N. 208, 195 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 17 & 18, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advance-ment of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	LI	
385.3	0	GROUND SURFACE													
	1.5	GRAVEL, SAND, SILT, CLAY FILL													
	5	Very Stiff Very Hard SILTY CLAY TILL		1	SS.	27									
380.0				2	SS.	70									
	10	greenish brown grey		3	SS.	99									
375.0				4	SS.	55									
374.3	11.0	Very Dense Grey		5	SS.	118									
370.0	15	SANDY, GRAVELLY SILT TILL		6	R.C.										
	18.0	cobbles boulders		7		50/1"									
367.3				8	R.C.	30%									
365.0	20	Alternate layers of Hard SILTY CLAY TILL and SHALE		9	R.C.	37%									
	25			10	R.C.	29%									
360.0															
359.3	26.0	Grey SHALE with hard bands of LIMESTONE		11	R.C.	97%									
355.0	30														
	31.0	END OF BOREHOLE													
350.0	35														

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M.

CH'D: J.P.C.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 30 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 181,875 N. 208,095 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 16, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
392.1	0	GROUND SURFACE													
390.0		Multicoloured Loose to Compact SAND, SILT, CLAY some GRAVEL FILL		1	S.S.	19									
386.1	6.0	Very Hard SILTY CLAY TILL		2	S.S.	40									
385.0				3	S.S.	65/4"									
380.0	10	(occasionally sandy or gravelly)		4	S.S.	96									
				5	S.S.	106									
376.6	15.5	Very Dense Grey SANDY SILT TILL (cobbles and boulders)		6	S.S.	100/4"									
375.0				7	R.C.										
372.1	20	Very Dense SILT		8	S.S.	103/10"									
370.0	21.33	END OF BOREHOLE													

W.L. E.I. 389.5'  
MAY 20, 1966

GR. 3%, Sa. 47%  
SL. 43%, CL. 7%

GR. 11%, Sa. 51%  
SL. 36%, CL. 2%

GR. 5%, Sa. 25%  
SL. 65%, CL. 5%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 3 J . .

OUR REFERENCE NO 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. NO 27 INTERCHANGE

LOCATION: 182,087 N 208,025 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING AUGERING & CORING

DIAMETER OF BOREHOLE 4 "

DATE: JUNE 13, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N - Z Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
392.9	0	GROUND SURFACE													
391.4	1.5	SANDY GRAVEL (FILL)													
390.0	5	Stiff to Very Hard CLAYEY SILT with some embedded GRAVEL		1	A.S.										
				2	S.S.	38									
385.0	10	(GLACIAL TILL)		3	S.S.	71									
				4	S.S.	93									
380.0	15	Brown Grey		5	S.S.	81/8'									
				6	S.S.	25/0"									
376.4	16.5	boulders		7	R.C.										
375.0		SANDY below el. 376.9 Ft.		8	S.S.	75/35									
19.3	2.0	END OF BOREHOLE													

W.L. 391.7 Ft.  
JUNE 15, 1966.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 3 2 .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. IN<sup>o</sup> 27 INTERCHANGE

LOCATION: 182,390 N 207,925 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING AUGERING & CORING

DIAMETER OF BOREHOLE 4"

ENCLOSURE NO.

DATE: JUNE 13 & 14, 1966

W.J. 275 - 64 - 4

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	1/2" or Advancement of Sampler	20	40	60	80	100	PL	W	
							SHEAR STRENGTH lbs/sq ft							
393.2	0	GROUND SURFACE												
		6" TOPSOIL												
		Compact to Dense Brown-Grey Mottled SANDY SILT with some GRAVEL and a trace of CLAY												
390.0				1	S.S.	31								
387.7	5.5	predominantly SANDY		2	S.S.	25/1"								
385.0				3	S.S.	75/4"								
384.4	8.8	(GLACIAL TILL)		4	S.S.	83/6"								
380.0		numerous boulders and SHALE fragments below el. 381.0 Ft.		4 A	R.C.									
	15			5	S.S.	75/2"								
375.0				6	R.C.									
	19.5			7	S.S.	100/4"								
	20	END OF BOREHOLE												



W.L. 389.4 Ft.  
JUNE 15, 1966.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 3.3 . .

OUR REFERENCE NO. 6-5-39

W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No 27 INTERCHANGE

LOCATION 182,640 N 207,845 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASH BORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: JUNE 15, 1966

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N or Advance ment of Sampler	20	40	60	80	100	PL	W	
399.4	0	GROUND SURFACE												
		7" TOPSOIL												
		Compact Brown												
		SILTY FINE SAND												
		with some GRAVEL												
395.0	5	(PROBABLY FILL)		1	S.S.	18								
		Very Dense		2	S.S.	43								
		SILTY SAND												
		with some GRAVEL		3	S.S.	103								
390.0	10			4	S.S.	75/6"								
		Very Dense		5 A	S.S.	152								
		Brown		B										
		FINE SAND		6	S.S.	60/3"								
380.0	20													
20.5	20.5	END OF BOREHOLE		7	S.S.	100/6"								

W.L. 389.4 Ft.  
JUNE 15, 1966.

W.L. 389.4 Ft.  
JUNE 15, 1966.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 34 .

OUR REFERENCE NO 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 182,050N 207,750 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASH BORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: JUNE 10, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	20	40	60	80	100	PL	W	LI		
390.4	0	GROUND SURFACE														
		9" TOPSOIL														
		Compact to Loose Greenish Brown SANDY SILT with some CLAY and ORGANIC MATTER		1	S.S.	13										
385.0	5															
383.9	6.5			2	S.S.	9										
		Very Dense SANDY SILT		3	S.S.	63										
380.0	10	Brown Grey with some GRAVEL and a trace of CLAY (GLACIAL TILL) boulders		4	S.S.	76/9"										
				5	S.S.	90/4"										
375.0	15			6	R.C.											
				7	S.S.	50/2"										
				8	R.C.											
370.0	20			9	S.S.	46/3"										
	20.75	END OF BOREHOLE														

W. L. 388.0 Ft.  
JUNE 15, 1966.  
GR. 2 % ; So. 28 %  
SI. 55 % ; CI. 15 %

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 35 .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. N<sup>o</sup> 27 INTERCHANGE

LOCATION: 182, 395 N 207, 645 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: JUNE 11, 1966

W. P. 275 - 60 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N <sup>o</sup> or Advancement of Sampler	20	40	60	80	100	PL	W	LI		
395.4	0	GROUND SURFACE														
		8" SAND & GRAVEL FILL														
		Very Hard Brown-Grey Mottled														
390.0	5	CLAYEY SILT with some GRAVEL (GLACIAL TILL)		1	S.S.	84										
				2	S.S.	45										
385.0	10			3	S.S.	50/1"										
		boulder		3 A	R.C.											
	12.5			4	S.S.	98/11"										
380.0	15	Very Dense Grey														
		SILTY SAND with some GRAVEL (wet)		5		50/3"										
375.1	20															
375.1	20.1	END OF BOREHOLE		6	S.S.	100/1"										

W.L. 389.6 Ft.  
JUNE 15, 1966.

$\gamma = 133$  P.C.F.

W.L. 389.6 Ft.  
JUNE 15, 1966.

$\gamma_s = 133$  P.C.F.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 3.6 . .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 182,740N 207,550E.

DATUM ELEVATION: G.S.C.


METHOD OF BORING: WASHBORING


DIAMETER OF BOREHOLE: 2 3/8"

DATE: JUNE 13 & 14, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	LI	
399.5	0	GROUND SURFACE													
		GRAVELLY, SANDY SILT FILL													
398.0	1.5														
		Compact to													
		Very Dense													
395.0	5	Greenish Brown													
		SANDY SILT													
		with some GRAVEL													
		(GLACIAL TILL)													
390.0	10														
389.0	10.5														
		Very Hard													
		Grey													
385.0	15	CLAYEY SILT													
		with some													
		embedded GRAVEL													
		(GLACIAL TILL)													
380.0	19.1														
	20	END OF BOREHOLE													



W.L. 395.7 Ft.  
JUNE 15, 1966.



W.L. 395.7 Ft.  
JUNE 15, 1966.



OUR REFERENCE NO. 6-5-39

W. J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. &amp; HWY. No 27 INTERCHANGE

LOCATION: 180,175 N; 208,300 E.

DATUM ELEVATION: G. S. C.

## GEOTECHNICAL DATA SHEET FOR BOREHOLE ...37.

METHOD OF BORING AUGERING &amp; CORING

DIAMETER OF BOREHOLE 4"

DATE: MAY 19, 1966

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	N or Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W		LI
381.0	0	GROUND SURFACE													
	1.5	Dark Brown SILTY TOPSOIL		1	S.S.	6	0								
	5	Compact Very Dense FINE SANDY SILT with a trace of fine gravel.		2	S.S.	59/6"									
375.0		oxidized brown grey		3 A B	S.S.	50/3"									
	10	(GLACIAL TILL)		4	S.S.	74/6"									
370.0				5	S.S.	69/6"									
	12.0	----- sand and gravel seam -----		6	S.S.	83/6"									
365.0	15			7	R.C.										
	17.9	Intermittent layers of Grey CLAYEY SILT and SHALE		8	S.S.	94/3"									
360.0	20	END OF BOREHOLE													

W. L. El. 379.4'  
MAY 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE ... 3.8.

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. NO 27 INTERCHANGE

LOCATION: 180,400 N, 208,245 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE 4 "

DATE MAY 19 & 20, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N- Advancement of Sampler	2.0	4.0	6.0	8.0	100	PL	W	LI	
383.8	0	GROUND SURFACE													
	1.5	Dark Brown SILTY TOPSOIL		1	S.S.	5	0								
380.0	5	Loose, Multicoloured CLAYEY, SANDY, SILT (PROBABLY FILL)		2	S.S.	13	0								
375.0	8.5	Very Dense FINE SANDY SILT		3	S.S.	75/5"									
	10	greenish brown grey		4	S.S.	63/6"									
370.0	15	with a trace of CLAY		5	S.S.	50/3"									
	16.5	(saturated)		6	S.S.	56/3"									
365.0	20	Shale Fragments													
	20.1	END OF BOREHOLE		7	S.S.	25/1"									

W. L. El. 379.8'  
MAY 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 40 . .

OUR REFERENCE NO 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No 27 INTERCHANGE

LOCATION: 180, 465 N; 208, 485 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 20, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advance of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	LI	
388.9	0	GROUND SURFACE													
		6" TOPSOIL													
		Brown													
		FINE SAND and		1	S.S.	13									
385.0	5	SILT with some gravel													
		FILL													
	6.5	Dark Brown		2	S.S.	29									
		ORGANIC													
380.0	10	SANDY SILT		3	S.S.	17									
	11.0	V. Stiff, Multicoloured													
		CLAYEY SILT (TILL)		4	S.S.	27									
375.0	13.0														
	15	Very Dense		5	S.S.	115									
		Grey													
		SILT with some		6	S.S.	50/3"									
370.0	20	fine sand													
		(saturated)		7	S.S.	40/2"									
365.0	25														
	25.25	END OF BOREHOLE		8	S.S.	90/9"									

W. L. El. 379.5'  
MAY 20, 1966

OUR REFERENCE NO. 6 - 5 - 39  
W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. NO 27 INTERCHANGE

LOCATION: 180,260 N; 208,565 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 20, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

[illegible]

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 42 .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No 27 INTERCHANGE

LOCATION: 180, 045 N; 208, 665 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 20, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	
379.2	0	GROUND SURFACE												
	1.0	GRANULAR FILL		1	S.S.	23								
		Compact, Dark Brown ORGANIC SANDY SILT (boulder) FILL		2	S.S.	27								
375.0	4.0	Very Dense FINE SANDY SILT		3	S.S.	54								
	5	Greenish Brown Grey trace of gravel		4	S.S.	70								
370.0	10	Saturated SILT		5	S.S.	50/6"								
	13.0			6	S.S.	22								
365.0	15	(GLACIAL TILL)		7	S.S.	80/8"								
362.2	17.0	Grey SHALE		8	R.C.									
360.0	20	with hard bands of LIMESTONE		9	R.C.	80%								
	22.0	END OF BOREHOLE												

W. L. El. 377.1  
MAY 20, 1966  
Boulder at 3', moved  
B.H. 1 ft. north.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 43 .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 177, 221 N; 208, 255 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING AUGERING & CORING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 25, 1966

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Advancement of Sampler	20	40	60	80	100	PL	LI	
363.4	0	GROUND SURFACE												
		TOPSOIL												
360.0	1.5	Compact, Brown SILTY FINE SAND												
	5	Very Dense Grey SILT		1	S.S.	50/4"								
355.0	8.0	with some sand and gravel												
	10	(clayey)		2	S.S.	68								
	12.0			3	S.S.	78								
350.0	15	(shale fragments)		4	S.S.	51/6"								
347.4	16.0	Grey		5	R.C.	84.8%								
345.0	20	SHALE BEDROCK with bands of hard LIMESTONE		6	R.C.	75%								
	21.5	END OF BOREHOLE												

W. L. El. 360.2'  
MAY 27, 1966

GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 44 . .

OUR REFERENCE NO. 6-5-39

W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. N° 27 INTERCHANGE

LOCATION: 177,440 N; 208,471 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE. 2 3/8"

DATE: MAY 24, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	20 40 60 80 100	SHEAR STRENGTH lbs./sq ft	PL W LI	10 20 30 40	
364.1	0	GROUND SURFACE									
360.0	5	Brown FINE SAND with some silt Dense		1	SS.	36		0			
356.1	8.0	Very Hard Grey CLAYEY SILT with some sand and gravel.		2 A B	SS.	120			O	I	
355.0	10			3	SS.	106/6"			O		
350.0	15			4	SS.	120			O	I	
	15.5	Alternate layers of Hard CLAYEY SILT and SHALE		5	SS.	77/6"			O		
				6	R.C.						
345.0	20	Grey SHALE BEDROCK with bands of LIMESTONE		7	R.C.						
340.0	23.3	END OF BOREHOLE									

W.L. El. 361.3'  
MAY 26, 1966  
Sa. 85% ; Sl. 15%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 4.5 .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 177,385 N, 209,568 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 24 & 25, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	2.0	4.0	6.0	8.0	
360.6	0	GROUND SURFACE									
		4" ASPHALT									
		Compact, Brown GRAVELLY to SANDY SILT FILL									
355.0	5.5	Grey CLAYEY SILT with some embedded coarse sand and fine gravel. (GLACIAL TILL)		1A B	S.S.	21					
350.0	10			2	S.S.	26					
		Very Stiff Very Hard									
345.0	15	Alternate layers of Hard CLAYEY SILT and SHALEY LIMESTONE		3	S.S.	10073					
342.6	18.0			4	R.C.						
340.0	20	Grey SHALEY LIMESTONE and SHALE BEDROCK		5	R.C.						
				6	R.C.						
335.0	25.5	END OF BOREHOLE									

W.L. El. 355.6'  
MAY 28, 1966



# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 46 .

OUR REFERENCE NO. 6 - 5 - 39  
W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 177,440 N; 209,729 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 24, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	LI	
							SHEAR STRENGTH      lbs/sq ft				10    20    30    40				

362.6	0	2" ASPHALT Loose																	
360.0		SANDY SILT and GRAVEL FILL																	
358.6	4.0	Compact, Brown Stratified		1	S.S.	21													
	5	SILTY FINE SAND																	
355.6	7.0			2	S.S.	40													
355.0		Grey																	
	9.0	Hard CLAYEY		3	S.S.	25													
	10	V. Stiff SILT																	
	11.5	some embedded fine gravel.		4	S.S.	95/10"													
350.0		V. Hard (GLACIAL TILL)																	
	15	Shale Fragments		5	S.S.	100/1"													
347.6																			
	17.5	SHALE BEDROCK		6	R.C.														
345.0		END OF BOREHOLE																	
	20																		

W.L. El. 358.7  
MAY 24, 1966  
CAVE IN El. 358.6  
MAY 28, 1966  
So. 70% ; Si. 30%

W.L. El. 358.7  
MAY 24, 1966  
CAVE IN El. 358.6  
MAY 28, 1966  
Sa. 70% ; Si. 30%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE ...47...

OUR REFERENCE NO. 6-5-39

YOUR REF. W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: 177,205 N ; 209,578 E

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: JULY 20-21, 1966.

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N or Advance of Sampler	20	40	60	80	100	PL	W	
360.3	0	GROUND SURFACE												
		2" ASPHALT Compact, Brown SAND with some SILT and GRAVEL (FILL)												
355.8	4.5													
355.0	5	Dense to Compact Brown SILTY FINE SAND		1	SS	80								
351.8	8.5													
350.0	10	Very Hard Grey CLAYEY SILT with some embedded GRAVEL and SHALE FRAGMENTS (GLACIAL TILL)		2	SS	70/4"								
345.3	15													
345.0		Grey SHALE with LIMESTONE BANDS BEDROCK		3	SS	100/1"								
				4	RC	85%								
				5	SS	100/NP								
340.0	20			6	RC	82%								
	25	END OF BOREHOLE												

W.L. 355.2 Ft.  
Gr. 4% ; Sa. 64%  
Si. 32%

Gr. 27% ; Sa. 24%  
Si. 38% ; Cl. 10%

# GEOTECHNICAL DATA SHEET FOR POREHOLE . . . 48 . . .

OUR REFERENCE NO. 6-5-39

YOUR REF. No. W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No. 27. INTERCHANGE

LOCATION: 177,020 N ; 209,600 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: JULY 19-20, 1966.

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY water content %	REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	blows per foot	SHEAR STRENGTH lbs/sq ft		
360.4	0	GROUND SURFACE								
		2" ASPHALT								
		Dense Brown								
		GRAVELLY SAND								
		(FILL)								
356.4	4	Compact Brown-Grey								
355.0	5	SILTY SAND								
		with a trace of								
		GRAVEL and CLAY								
		(FILL)								
352.4	8	Very Hard Grey								
		CLAYEY SILT								
		with embedded								
		GRAVEL								
350.0	10	(GLACIAL TILL)								
				2	SS	80				
347.9	12.5	Grey SHALE								
		with intermittent								
		layers of LIMESTONE								
345.0	15			3	RC	62 %				
				4	SS	100/2"				
				5	RC	67 %				
				6	SS	100/2"				
343.2	17.2	weathered								
		sound								
		BEDROCK								
340.0	20			7	RC	80 %				
		END OF BOREHOLE								

Gr. 9% ; So. 52 %  
Sl. 30% ; Cl. 9 %

W.L. 352.0 Ft.  
JULY 20, 1966.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 49

OUR REFERENCE NO. 6-5-39

YOUR REF. W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: 177,260 N ; 209,400 E

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: JULY 18, 1966.

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	blows per foot	lb./sq. ft.	water content %	Pl. W. LI	
359.2	0	GROUND SURFACE									
		1" ASPHALT									
		Compact to Loose Brown									
		SAND, GRAVEL									
		CLAY & SILT									
		(FILL)		1a	CS						
355.0	4.5	ORGANIC TOPSOIL		1b	CS						
354.0	5.2	Very Stiff to		2	SS	18					
		Very Hard, Grey									
		CLAYEY SILT		3	SS	70/2"					
350.0	10	with some SAND									
		and a trace of									
		GRAVEL									
345.0	15	(GLACIAL TILL)									
343.2	16			4	SS	80/4"					
340.0	20	Grey SHALE		5	RC	43 %					
		with intermittent									
		LIMESTONE BANDS									
		BEDROCK		6	RC	97 %					
335.0	25										
		END OF BOREHOLE									
330.0	30										

W.L. 353.5 Ft.  
Gr. 5% ; So. 20%  
Sl. 60% ; Cl. 15%

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE V.G.H. CHD.

## 50

CLIENT: D. H. O.

LOCATION 177,080 N ; 209,455 E

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: JULY 19, 1966

W.P. 275-64-4

ENCLOSURE NO

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE	CONSISTENCY	REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	blows per foot	water content %	
							20 40 60 80 100	PL W LI	
							SHEAR STRENGTH lbs./sq ft		
357.9	0	GROUND SURFACE							
		2" ASPHALT							
355.0		Loose Brown - Grey SILTY SAND with some GRAVEL and a trace of CLAY (FILL)		1	SS	6			Gr. 10 % ; Sa. 50 % Sl. 35 % ; Cl. 5 %
350.0	5								
347.9	10	Very Hard Grey CLAYEY SILT with SHALE FRAGMENTS		2	SS	100/6"			W.L. 345.6 Ft. JULY 19, 1966.
345.3	12.6			3	SS	100/14"			
345.0		Dark Grey SHALE BEDROCK with some hard bands of LIMESTONE		4	RC	79 %			
340.0	15			5	RC	100 %			
335.0	20	END OF BOREHOLE							

OUR REFERENCE NO. 6-5-39  
YOUR REF. W.J.66-F-47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No. 27. INTERCHANGE

LOCATION: 176,920 N ; 209,500 E

DATUM ELEVATION: G. S. C.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE ... 51 ...

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: JULY 19, 1966.

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE					CONSISTENCY				REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	blows per foot					water content %				
							20	40	60	80	100	PL	W	LI		
							SHEAR STRENGTH					lbs/sq ft				
												10	20	30	40	
357.4	0	GROUND SURFACE														
	1.0	SAND and GRAVEL loose														
355.0		SILTY SAND with a trace of GRAVEL and CLAY		1	SS	5										
	5	( FILL )		2	SS	3										
350.0				3	SS	3										
348.7	8.7	ORGANIC TOPSOIL		4	SS	100/4"										
347.4	10	Very Hard Grey CLAYEY SILT with SHALE fragments		5	SS	100/1"										
345.0	12.4	Grey SHALE with intermittent layers of LIMESTONE BEDROCK		6	RC 80%											
340.0		END OF BOREHOLE														
	20															
335.0																

W.L. 352.4 Ft.

Gr. 5 % ; Sa. 50 %  
SI 37 % ; Cl. 8 %

W.L. 352.4 Ft.  
Gr. 5 % ; Sa. 50 %  
SI 37 % ; CL. 8 %

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 52 .

OUR REFERENCE NO. 6 - 5 - 39  
W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 177,045 N; 207,873 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 26 & 27, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- 1 or Ad- justment of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	LI		
							SHEAR STRENGTH      lbs/sq ft					10	20	30	40	
364.8	0	GROUND SURFACE														
360.8 360.0	4.0 5	Dark Brown Compact SANDY SILT FILL														
		Dense Brown SILTY Grey FINE SAND (layered structure)		1	S.S.	44										
355.0	9.3 10	Very Hard, Grey CLAYEY SILT		2	S.S.	155										
352.8	12.0	varved structure less hard														
350.0	15	embedded coarse sand and fine gravel.		3	S.S.	103										
349.3				4	S.S.	98										
345.0	19.5 20	Grey SHALE BEDROCK with bands of Hard LIMESTONE		5	S.S.	50.1"										
				6	R.C.	84.6%										
340.0	25			7	R.C.	49%										
				8	R.C.	29.1%										
340.0	28.0	END OF BOREHOLE														
335.0	30															

W.L. El. 361.0'

MAY 28, 1966

So. 85% ; Si. 15%

100/9"

100/9"

W.L. El. 361.0'  
MAY 28, 1966  
Sq. 85% ; Si. 15%





# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 5.4 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. N<sup>o</sup> 27 INTERCHANGE

LOCATION: 176,835 N; 207,528 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE: 2 7/8"

DATE: MAY 25 & 26, 1966

W. J. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	
365.9	0	GROUND SURFACE												
		5" TOPSOIL												
363.4	2.5	SANDY SILT FILL												
		Brown												
360.0	5	Dense		1	S.S.	34								
		Very Dense SILTY												
		FINE SAND		2	S.S.	79								
		(layered structure)												
356.4	9.5			3	S.S.	100/3								
355.0	10	Very Hard, Grey												
		CLAYEY SILT		4	S.S.	70/6"								
		with some embedded												
		coarse sand and												
		fine gravel.												
350.0	15	(GLACIAL TILL)		5	S.S.	82								
		Alternate layers of												
		Hard CLAYEY SILT		6	R.C.									
		and SHALE.												
345.0	20	END OF BOREHOLE												

W.L. El. 362.1'  
MAY 28, 1966  
So. 75% ; Si. 25%

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: O.H.O.

PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE.

LOCATION: 176,838 N ; 207,892 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING & CORING

DIAMETER OF BOREHOLE 4"

ENCLOSURE NO

DATE: MAY 31, 1966

W. P. 275 - 64 - 4

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE	CONSISTENCY	REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	blows per foot 2.0 4.0 6.0 8.0 10.0		
							SHEAR STRENGTH lbs./sq ft	Pl W LI 10 20 30 40	
364.1	0	GROUND SURFACE							
		6" ASPHALT	[Symbol]						
		Compact to Dense Brown - Grey SILT	[Symbol]						
360.0	5			1	S.S.	29			Sa. 10% ; Si. 88% Cl. 2%
		Very Hard Grey (boulder)	[Symbol]	2	S.S.	40/2"			
355.0	10			2 A	R.C.				W.L. El. 358.5' JUNE 3, 1966
		CLAYEY SILT with some embedded gravel. (GLACIAL TILL)	[Symbol]	3	S.S.	77/11"			Gr. 12% ; Sa. 28% Si. 48% ; Cl. 12%
350.0	15			4	S.S.	75/4 1/2"			
		(boulders)	[Symbol]	5	R.C. 36%				
345.0				6	S.S.	25/2"			
344.1	20			7	R.C. 27.2%				
340.0	25	Dark Grey SHALE BEDROCK	[Symbol]	8	R.C. 61.6%				
		END OF BOREHOLE							



# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 57 . .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D. H. O

PROJECT: Q. E. W. & HWY. NO 27 INTERCHANGE

LOCATION: 176,218 N ; 207,395 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING & CORING

DIAMETER OF BOREHOLE: 4 "

DATE: JUNE 1 & 2, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	N <sup>o</sup> of Advancement of Sampler	blows per foot	SHEAR STRENGTH	water content %	PL W LI	
360.8	0	GROUND SURFACE					2.0 4.0 6.0 8.0 10.0				
360.0		4" GRAVEL FILL									
		Compact to Dense Greyish - Brown									
355.0	5.8	SILTY, SANDY GRAVEL		1	S.S.	60					Gr. 69% ; Sa. 17% Si. 15%
		Hard, Grey (boulders)									W.L. 51.354.5' JUNE 3, 1966
350.0	10	CLAYEY SILT with embedded gravel.		2	S.S.	42					Gr. 10% ; Sa. 20% Si. 50% ; Cl. 20%
		(GLACIAL TILL)									
345.0	15	(boulder)		3	S.S.	91/9"					
				4	R.C.						
340.0	20	Very Dense Grey SANDY SILT with some clay and gravel (GLACIAL TILL)		5	S.S.	112					Gr. 15% ; Sa. 40% Si. 40% ; Cl. 5%
				6	R.C.						
				7	S.S.	92/9"					
				8	S.S.	50/2"					
336.8	24.0	Alternate layers of CLAYEY SILT and SHALE		9	R.C.						
335.0	25										
				10	S.S.	50/3 1/2"					
330.0	30	END OF BOREHOLE									

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. CHD.







# GEOTECHNICAL DATA SHEET FOR BOREHOLE .58..

OUR REFERENCE NO 6-5-39  
W.J. 66-F-47

CLIENT: D.H.O.  
PROJECT: Q.E.W. & HWY No 27 INTERCHANGE  
LOCATION: 175,900 N, 207,155 E  
DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING & CORING  
DIAMETER OF BOREHOLE 4"  
DATE: JUNE 28 3, 1966  
W.P. 275-64-4

ENCLOSURE NO

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	LI		
354.7	0	GROUND SURFACE														
		4" GRAVEL FILL Reddish Brown FINE SAND														
352.2	2.8															
350.0	5	Hard to very Hard Grey CLAYEY SILT														
		with some embedded Gravel (Glacial TILL)														
345.0	10															
		(boulders)														
340.0	15															
		frequent boulders below el. 335 ft.														
335.0	20															
330.0	25															
325.0	30															
324.2	30.5	Dark Grey SHALE with bands of Hard LIMESTONE														
320.0	35															
315.0	40	END OF BOREHOLE														

W.L. EL. 343.4  
JUNE 6, 1966.

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CH'D.

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O

PROJECT: Q. E. W. &amp; HWY. NO. 27 INTERCHANGE

LOCATION. 175,730 N; 207,100 E

DATUM ELEVATION: G.S.C.

# METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 4"

DATE: JUNE 4, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES	PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %  Pl      W      LI	REMARKS
				NUMBER TYPE No or Advancement of Sampler	20 40 60 80 100	SHEAR STRENGTH 1000 lbs./sq ft. 5 10 15 20 25	10 20 30 40	
354.7	0	GROUND SURFACE						
352.7	2-0	Compact, Dark Brown SANDY TOPSOIL	[Symbol]					
350.0	5	Hard to Very Hard CLAYEY SILT with some embedded gravel	[Symbol]	1 S.S. 31			O  -----	γ = 128 P.C.F.
345.0	9-0	Brown Grey (GLACIAL TILL)	[Symbol]	2 S.S. 40			O	γ = 129 P.C.F.
	10		[Symbol]	3 S.S. 31			O  -----	γ = 136 P.C.F.
	15	occasional tiny sand seams below El. 340 ft.	[Symbol]	4 S.S. 43			O	γ = 138 P.C.F.
340.0	20		[Symbol]	5 S.S. 55			O	
			[Symbol]	6 S.S. 85/10"			O	
335.0	21-5	END OF BOREHOLE		7 S.S. 66				

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 60 . .

OUR REFERENCE NO 6-5-39  
W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE

LOCATION: 175, 712 N; 207, 005 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING & CORING

DIAMETER OF BOREHOLE 4"

ENCLOSURE NO.

DATE: JUNE 6, 1966

W.P. 275-64-4

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	2" or Adjustment of Sampler	blows per foot	SHEAR STRENGTH	water content %		
							20 40 60 80 100	lbs/sq ft	PL W LI	10 20 30 40	
351.4	0	GROUND SURFACE									
350.0		8" SANDY TOPSOIL									
		Very Dense									
		SANDY SILT									
		with some gravel									
		and a trace of clay.									
345.0	5			1	S.S.	53					GR. 10%; So. 20% SL. 58%; CL. 12%
		Brown									
	7.5	Grey									W.L. El. 345' JUNE 11, 1966
		(GLACIAL TILL)									
340.0	10			2	S.S.	64					GR. 5%; So. 35% SL. 55%; CL. 5%
	15			3	S.S.	67 1/4"					
335.0				4	R.C.						
		(boulders)									
	20			5	S.S.	80 1/4"					GR. 25%; So. 45% SL. 30%
330.0				5A	R.C.						
				6	S.S.	50 1/2"					
	25	sand content increases below elev. 330 ft.		7	R.C.						
325.0				8	S.S.	72 1/8"					
				9	W.S.						
	30			10	S.S.	25 1/4"					
				11	W.S.						
				12	S.S.	90 1/2"					
320.0				12A	W.S.						
				13	S.S.	100 1/2"					
	35			13A	R.C.						
				14	S.S.	100 1/4"					
315.0		END OF BOREHOLE									
	40										

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 61.

OUR REFERENCE NO. 6-5-39  
W.J. 66-F-47  
CLIENT: D.H.O.  
PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE  
LOCATION: 176,500 N ; 207,440 E  
DATUM ELEVATION: G.S.C.

METHOD OF BORING WASHBORING  
DIAMETER OF BOREHOLE 2 3/8"  
DATE: MAY 31, 1966  
W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- Advancement of sampler	20	40	60	80	100	PL	W	LI	
364.4	0	GROUND SURFACE													
	1.5	3" TOPSOIL to SANDY SILT FILL													
		Dense, Brown													
360.0	5	SILTY FINE SAND		1	S.S.	7.5									Sa. 82 % ; Si. 18 %
											100/9"				W.L. E1. 357.2' JUNE 6, 1966
356.4	8.0	Hard to V. Hard													
355.0	10	Grey CLAYEY SILT with some embedded gravel.		2	S.S.	4.2						0	1		Gr. 7 % ; Sa. 26 % Si. 50 % ; Cl. 17 %
350.0	15			3	S.S.	7.5						0			
	17.0	thin seams of silt or fine sand.		4	S.S.	75/6"						0			
345.0	20			5	S.S.	55/4"									
341.6	22.8			6	S.S.	100/3"									
340.0	25	Grey SHALE BEDROCK		7	R.C.	70%									
	27.76	END OF BOREHOLE													
335.0	30														

VERTICAL SCALE: 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. CHD



# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 62 . .

OUR REFERENCE NO. 6-5-39  
W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE

LOCATION: 176, 315 N ; 207, 295 E

DATUM ELEVATION: G.S.C.

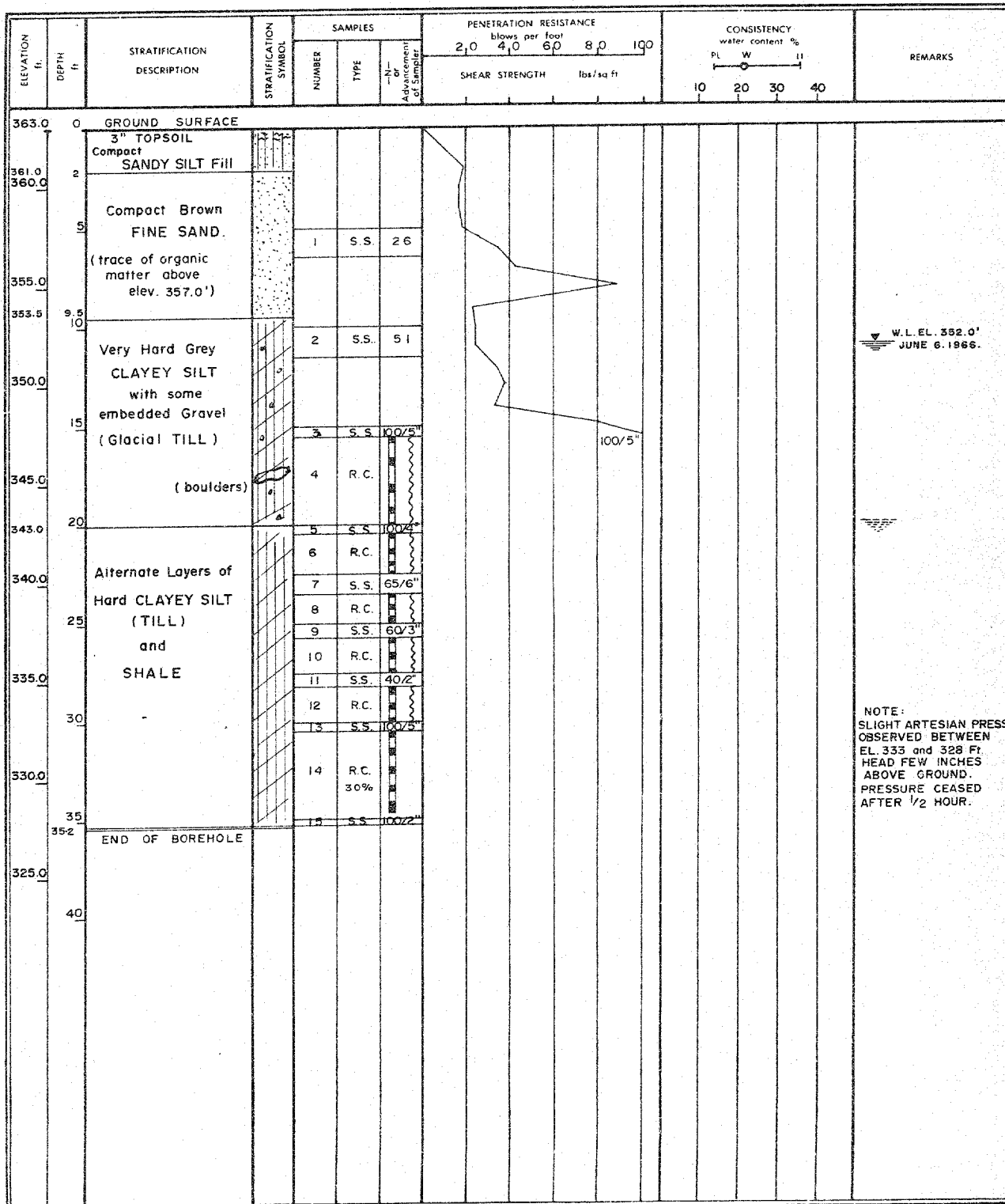
METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: JUNE 1-3, 1966

W.P. 275-64-4

ENCLOSURE NO.



VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. CHD:

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 6.3 .

OUR REFERENCE NO. 6-5-39  
W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27

LOCATION: 176,155 N ; 207,155 E

DATUM ELEVATION: G.S.C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: JUNE 3 - 6, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	LI	
							SHEAR STRENGTH      lbs./sq. ft.				10    20    30    40				
361.0	0	GROUND SURFACE													
360.0		3" TOPSOIL													
		Generally Dense to Compact Brown													
	5	FINE SAND													
355.0		with some SILT		1	S.S.	42									
352.0	9	Hard to very Hard Grey		2	S.S.	41									
350.0	10	CLAYEY SILT													
		with some embedded gravel													
345.0	15	(Glacial TILL)		3	S.S.	60									
340.0	20	(boulder)		4	S.S.	100/0"									
				5	R.C.									No Penetration	
				6	S.S.	60/6"									
				7	R.C.										
335.0	25			8	S.S.	75/6"									
				9	R.C.										
				10	S.S.	60/4"									
332.1	28.9	Alternate Layers of		11	R.C.										
330.0	30	CLAYEY SILT and SHALE		12	S.S.	100/0"									
				13	R.C.	50%									
328.0	33	Dark Grey		14	S.S.	100/0"								No Penetration	
325.0	35	SHALE BEDROCK		15	R.C.	60%									
320.0	40	END OF BOREHOLE													

W.L. EL. 354.0'  
JUNE 8, 1966

No Penetration

No Penetration

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. CHD.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 64 . .

OUR REFERENCE NO 6 - 5 - 39  
W.J. 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 176,225 N ; 207,033 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: JUNE 6 & 7, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	LI		
361.1	0	GROUND SURFACE														
360.0		12" SANDY TOPSOIL Compact to Dense Brown														
355.0	5	FINE SAND with some SILT		1	S.S.	43										
354.1	7	Hard to Very Hard Grey		2	S.S.	46										
350.0	10	CLAYEY SILT with some embedded GRAVEL		3	S.S.	58										
		( GLACIAL TILL )		4	S.S.	38										
345.0	15	( boulder )		5	S.S.	68/10"										
340.0	20			6	R.C.											
21.5	21.5	END OF BOREHOLE		7	S.S.	95										

W.L. 356.0 Ft.  
JUNE 8, 1966.  
So 82% ; Si 18%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 6.6 .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 174,748 N, 206,020 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 27, 1966

W.J. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY water content %	REMARKS
				NUMBER	TYPE	2-8 Adjustment of Sampler	blows per foot	SHEAR STRENGTH lbs/sq ft		
351.9	0	GROUND SURFACE								
350.0		4" TOPSOIL								
		Loose								
		Dark Brown								
	5	SILTY FINE SAND								
		FILL		1	S.S.	4				So. 75% ; Si. 25%
345.0										
343.4	8.5	Hard, Grey								
		CLAYEY SILT		2	S.S.	40				GR. 4% ; So. 42%
340.0		with some								Si. 46% Cl. 8%
	10	embedded								
		fine gravel.								
	15			3	S.S.	85				
335.0		(GLACIAL TILL)								
	20									
		thin fine sand		4	S.S.	71				GR. 16% ; So. 30%
330.0		and silt seams								Si. 43% ; Cl. 11%
				5	S.S.	65				
	25	shale fragments								
				6	S.S.	100/2"				
326.3	25.6									
325.0		Dark Grey								
		SHALE BEDROCK		7	R.C.	70%				
	30									
	30.66									
320.0		END OF BOREHOLE								
	35									

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE .67..

OUR REFERENCE NO. 6-5-39

W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 174,558 N; 205,882 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 30, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advancement of Sampler	2,0	4,0	6,0	8,0	100	PL	W	LI	
									SHEAR STRENGTH		lbs/sq ft				
							</								

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. CHD:

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 68 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. N2 27 INTERCHANGE

LOCATION: 174,400 N; 205,770 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: MAY 30, 1966

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- or Advance- ment of Sampler	20	40	60	80	100	PL	W	LI		
352.6	0	GROUND SURFACE														
350.0		Compact, Brown SANDY SILT some far, ashes FILL		1 A B	S.S.	15										
347.3	5.3	Dense to Compact Brown SILTY SAND with some gravel		2	S.S.	36										
345.0																
342.3	10.3			3 A B	S.S.	28										
340.0		Very Hard Grey CLAYEY SILT with some embedded fine gravel. (GLACIAL TILL)		4	S.S.	62										
335.0	15			5	S.S.	72										
330.0	22.0	Intermittent layers of SHALE and CLAYEY SILT		6	S.S.	50/3"										
	25			7	R.C. 50%											
				8	S.S.	100/4"										
		END OF BOREHOLE														

GR. 19%; So. 47%  
Si. 31%; Cl. 3%

W. L. E. 1. 343.8'  
JUNE 2, 1966  
GR. 12%; So. 60%  
Si. 18%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE .69..

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. N° 27 INTERCHANGE

LOCATION: 174,648 N; 205,172 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 29 - 30, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	No. Advancement of Sampler	2,0	4,0	6,0	8,0	1,00	PL	W	LL	
351.7	0	GROUND SURFACE													
350.0	1.0	TOP SOIL													
		Loose													
		FINE SAND													
		with some org. matter													
345.0	4.0	Dense, Brown													
		SILTY FINE SAND		1	S.S.	39									
		with seams of med.													
		to coarse sand and													
		occasional pockets													
		of silt.													
340.0	10.3	Very Hard		2	S.S.	61									
		Grey													
		CLAYEY SILT													
		with embedded coarse													
		sand and gravel.													
335.0	15.0	(GLACIAL TILL)		3	S.S.	67/8"									
330.0	17.0	Very Dense		4	S.S.	50/5"									
		Grey													
		SAND & SILT		5	S.S.	50/4"									
		with some gravel,													
		shale fragments and													
		a trace of clay.													
327.0	25.0	(GLACIAL TILL)		6	S.S.	25 1/2"									
				7	R.C.	25%									
325.0		Grey		8	R.C.	46.6%									
		SHALE BEDROCK													
		with bands of													
		LIMESTONE		9	R.C.	60.6%									
320.0	30.0	END OF BOREHOLE													
315.0	35.0														

GR. 5%; Sa. 60%  
Si. 24%; Cl. 1%

GR. 8%; Sa. 40%  
Si. 35%; Cl. 5%

W.L. EL. 332.5'  
MAY 31, 1966

VERTICAL SCALE 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 70 . .

OUR REFERENCE NO. 6-5-39  
W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: 174,768 N; 206,282 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: MAY 27, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	20	40	60	80	100	PL	W	LI	
352.1	0	GROUND SURFACE													
	1.0	TOPSOIL													
350.0		SILTY FINE SAND FILL													
	5	to													
345.0		GRAVELLY SAND FILL		1 B	S.S.	12									
	9.0			2	C.S.										
340.0	10	Very Dense Grey SANDY SILT		3	S.S.	54									
	15	with some clay and embedded FINE GRAVEL.		4	S.S.	48									
335.0		(GLACIAL TILL)													
	20			5	S.S.	40/3"									
330.0		Shale Fragments													
326.9	25.2			6	S.S.	77/20"									
325.0		Grey SHALE BEDROCK		7	R.C.	50%									
	30			8	R.C.	78.4%									
320.0	31.75	END OF BOREHOLE													
	35														

W.L. El. 328.2'  
MAY 31, 1966

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. CHD.



# GEOTECHNICAL DATA SHEET FOR BOREHOLE .102.

OUR REFERENCE NO. 6-6-25

CLIENT: D.H.O.  
PROJECT: O.E.W. & HWY. No. 27 INTERCHANGE  
LOCATION: 181, 980 N ; 208,074 E  
DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING  
DIAMETER OF BOREHOLE: 2 5/8"  
DATE: JUNE 21-24, 1966  
WR 278-64

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE Blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N <sub>60</sub> No. of Blows	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
390.1	0	GROUND SURFACE													
	1	dark grey Silt seam													
	2														
	5	Very Dense Sandy SILT with some Gravel and Clay		1	SS	86									
385.0				2	SS	112									
	12	brown grey (Glacial Till)		3	SS	90/70									
380.0				4	SS	75/67									
	15			5	SS	95/107									
375.0															
370.0	20			6	SS	100/72									
369.6	20.5	Numerous SHALE layers and SAND seams		7	R.C. 12 %										
	21			8	SS	100/72									
365.0				9	R.C. 20 %										
	30			10 A B	SS	100/73									
360.0															
	35			11	R.C. 0 %										
355.0				12	SS	100/73									
	40														
350.0															
	43	grey		13	SS	100 no pen.									
347.1															
345.0	45	SHALE BEDROCK		14	R.C. 45 %										
340.0	50			15	R.C. 50 %										
335.0	55	Broken, weathered		16	R.C. 15 %										
		Sound													
330.0	60			17	R.C. 95 %										
325.0	65	END OF BOREHOLE													

WL 384.2 ft.  
JUNE 25, 1966

CAVE-IN  
369.0 ft.  
JUNE 25, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 1.0.6 .

OUR REFERENCE NO. 6 - 6 - 24

CLIENT: D. H. O.  
PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE  
LOCATION: 180, 640 N; 208, 460 E.  
DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING  
DIAMETER OF BOREHOLE: 2 3/8"  
DATE: JUNE 25-27, 1966  
W P 35 - 65

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY water content %	REMARKS
				NUMBER	TYPE	PL or Advancement of Sampler	blows per foot	SHEAR STRENGTH lbs./sq. ft.		
382.7	0	GROUND SURFACE					2.0 4.0 6.0 8.0 10.0		PL W LI	
380.0	3.5	Compact CLAYEY SILT and GRAVEL (FILL)								
379.2	5	Compact, Brown COARSE SAND								
375.0	10	Very Dense Grey SAND and SILT with a trace of GRAVEL and CLAY (GLACIAL TILL)		1	S.S.	60			O	W.L. 376.2 Ft. JUNE 28, 1966. Gr. 7 % ; Sa. 32 % Si 49 % ; Cl. 12 %  Gr. 8 % ; Sa. 46 % Si. 46 %  Sa. 15 % ; Si 80 % CL. 5 %
				2	S.S.	75/6"				
370.0	15	Very Dense Grey SILT with a trace of CLAY and some FINE SAND SEAMS		3	S.S.	80/8"				
				4	S.S.	100/4"				
				5	S.S.	40/2"				
365.0	20	Very Dense Grey SAND and SILT		6	W.S.					Sa. 40 % ; Si. 60 %
				7	S.S.	60/6"				
360.0	23	Hard CLAYEY SILT (GLACIAL TILL)		8	S.S.	100/4"				
359.7	25	Grey SHALE BEDROCK		9	R.C.	95 %				
357.6	25.1									
355.0	30	END OF BOREHOLE								
350.0	30.5									
	35									

VERTICAL SCALE 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CH'D.



OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE

LOCATION: 174,212 N; 205,630 E.

DATUM ELEVATION: G. S. C.

## METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 4 "

DATE: JUNE 15, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO

[illegible]

OUR REFERENCE NO 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q F V

PROJECT: O.E. W. & HWY. N° 27 INTERCHANGE

LOCATION: 174,145 N; 205,578 E.

DATUM ELEVATION: G. S. C.

## METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 4"

DATE: JUNE 15, 1966

W.P. 275 - 64- 4

ENCLOSURE NO

[illegible]

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 118 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. NO 27 INTERCHANGE

LOCATION: 174,060 N, 205,508 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE 4"

DATE: JUNE 15, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	
352.8	0	GROUND SURFACE												
	1-3	SANDY TOPSOIL		1	SS	4								
350.0		Loose to Compact Brown		2	SS	6								
	5	SILTY FINE SAND		3 A B	SS	12								
345.7 345.0	7-1			4 A B	SS	50								
				5	SS	107/9"								
	10	Very Dense Greyish Brown FINE to COARSE SAND		6 A B C	SS	64								
340.0	12-7			7	SS	31								
	15	Hard, Grey CLAYEY SILT with some embedded gravel. (GLACIAL TILL)		8	SS	36								
335.0	16.5	END OF BOREHOLE												
	20													

100/4"

W. L. El. 341.8'  
JUNE 15, 1966

GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 123 . .

OUR REFERENCE NO 6-5-39

YOUR REF. W. J. 66-F-47

CLIENT. D. H. O.

PROJECT: Q.E.W. &amp; HWY. No. 27 INTERCHANGE

LOCATION 179,815 N ; 208,730 E

DATUM ELEVATION: G. S. C.

## METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE 3"

DATE: JULY 26, 1966.

W.P. 275 - 64 - 4

ENCLOSURE NO

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES		PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	blows per foot	SHEAR STRENGTH lbs./sq ft.	water content % PL W LI	
376.1	0	GROUND SURFACE								
375.0		Compact Brown GRAVELLY SAND with some SILT (FILL)	[Symbol]	1	SS	19				
	5									
370.1	6.0	Dense Brown FINE SAND	[Symbol]	2	SS	51				
368.9	7.2	Very Hard Grey CLAYEY SILT with some embedded GRAVEL and Shale fragments (GLACIAL TILL.)	[Symbol]	3	SS	75/6"				
	10									
365.0				4	SS	50/2"				
				5	SS	100/2"				
361.3	14.8			6	SS	100/NP				
360.0	15	Grey SHALE BEDROCK	[Symbol]	7	RC	92%				
	20									
355.0		END OF BOREHOLE								

W.L. 371.3 Ft.  
JULY 26, 1966.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 130 .

OUR REFERENCE NO. 6-5-39

YOUR REF. W. J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No. 27. INTERCHANGE

LOCATION: 174,345 N; 205,915 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 3"

DATE: AUG. 22, 1966.

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY water content %	REMARKS
				NUMBER	TYPE	Advancement of Sample	blows per foot	SHEAR STRENGTH lbs/sq ft		
353.0	0	GROUND SURFACE								
		3" TOPSOIL								
350.0	5	Compact, Brown SILTY FINE SAND		1	SS	11				
345.5	7.5									
345.0	10	Hard to V. Hard Grey CLAYEY SILT	T	2	SS	31				
		with some sand		3	SS	44				
340.0	15	and embedded gravel.	T	4	SS	64				
		(GLACIAL TILL)		5	SS	56				
335.0	20		T	6	WS					
				7	SS	59				
330.0	23.5		T	8	SS	20/NP				
329.5	25	Very Hard, Grey CLAYEY SILT	T	9	RC					
		with some embedded gravel and occasional layers of weathered shale.		10	SS	52/6"				
325.0	30			11	SS	50/1"				
		END OF BOREHOLE								
320.0	35									

W.L. 346.8 Ft.  
AUG. 23, 1966.

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CND.



# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 13! . .

OUR REFERENCE NO 6-5-39  
YOUR REF. W. J. 66 - F - 47

CLIENT: D. H. O.  
PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE  
LOCATION: 174, 165 N ; 205, 760 E.  
DATUM ELEVATION: G. S. C.

METHOD OF BORING WASHBORING  
DIAMETER OF BOREHOLE 3"  
DATE: AUG. 18, 1966.  
W.P. 275 - 64 - 4

ENCLOSURE NO

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	20	40	60	80	100	PL	W	LI	
352.9	0	GROUND SURFACE													
		4" TOPSOIL													
350.0		Loose, Brown SILTY SAND													
	5	CLAYEY SILT SEAM		1	SS	2									
345.0	8.0	Compact, Brown MEDIUM SAND with a trace of silt and gravel		2	SS	17									
	10			3	SS	28									
340.0	12.0	Very Hard Grey		4	SS	33									
	15	boulder CLAYEY SILT with embedded gravel.		5	SS	80/4"									
335.0	20	and SHALE FRAGMENTS below elev. 332'		6	SS	77									
				7	SS	90/9"									
330.0				8	RC										
	25			9	SS	20/NP									
		END OF BOREHOLE													

W.L. 346.4 Ft.  
AUG. 23, 1966.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 132 .

OUR REFERENCE NO. 6 - 5 - 39  
Your Ref. No. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No. 27 INTERCHANGE -

LOCATION: 175, 812 N.; 207, 212 E. R.W. No. 1

DATUM ELEVATION: G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE AUG 26, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N- of Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	
355.4	0	GROUND SURFACE											
		6" TOPSOIL											
		Loose to Compact Brown											
		FINE SAND											
350.0	5												
349.6	5.8	Very Hard Grey		1	SS	49							
		CLAYEY SILT		2	SS	52							
345.0	10	with some embedded gravel and shale fragments.		3	SS	54							
		(GLACIAL TILL)		4	SS	72							
340.0	15			5	SS	72							
				6	SS	90							
335.0	20	boulder		7	SS	100/NF							
		Very Dense SANDY SILT											
330.0	25	(GLACIAL TILL)		8	SS	100/4							
25.3		END OF BOREHOLE											

W.L. El. 352.8'  
AUG. 26, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE .141..

OUR REFERENCE NO. 6-5-39

YOUR REF. W. J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No. 27. INTERCHANGE

LOCATION: 175,580 N; 206,980 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 3"

DATE: AUG. 23. 1966.

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Adjusted value	20	40	60	80	
352.1	0	GROUND SURFACE									
		3" TOPSOIL									
350.0		Loose, Brown SILTY FINE SAND									
347.6	4.3										
345.0	5	Very Dense CLAYEY	T	1	SS	48					
	10	brown-grey, mottled grey	T	2	SS	73					
340.0											
	15	SILT & SAND with some gravel.	T	3	SS	45					
335.0											
	20	(GLACIAL TILL)	T	4	SS	61					
330.0											
	25										
325.0											
	30	END OF BOREHOLE									
				5	SS	98/9"					
				6	SS	60/3"					
				7	SS	78/8"					

W.L. El. 330.9'  
AUG. 25, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 142.

OUR REFERENCE NO. 6 - 5 - 39  
YOUR REF. W. J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE

LOCATION: 180,540 N; 208,540 E.

DATUM ELEVATION: S. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: AUG. 24 & 25, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	N or Advancement of Sampler	0	40	60	80	100	PL	W		LI
383.3	0	GROUND SURFACE													
380.0	4.5	Dense to Compact Brown SAND & GRAVEL with a trace of silt.													
375.0	8.3	Hard, Grey CLAYEY SILT some gravel (GLACIAL TILL)		1	S.S.	28									
	10	Very Dense Grey SILT with some sand and a trace of fine gravel. (GLACIAL TILL)		2	S.S.	50/4"									
370.0	15			3	S.S.	58/6"									
	20			4	S.S.	70/6"									
365.0	20.75			5	S.S.	75/6"									
		END OF BOREHOLE		6	S.S.	50/3"									

W. L. El. 381.8'  
AUG 25, 1966

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 1

LOCATION: 176,455 N, 207,590 E.

DATUM ELEVATION: G.S.C.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 147

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: SEPT. 14, 1966

W.P. 275 - 64 - 1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	No. of Advancement of Sampler	20	40	60	80	100	PL	W	
363.9	0	GROUND SURFACE												
		4" TOPSOIL												
		Very Dense		1	C.S.									
		Brown												
360.0	5	FINE SAND		2	S.S.	65								
		with some silt												
				3	S.S.	54								
355.0		COARSE SAND Seam												
354.1	9-8 10	Hard, Grey		4	S.S.	46								
		CLAYEY SILT												
		(GLACIAL TILL)		5	S.S.	43								
350.0														
349.0	14-9 15	Very Dense		6	S.S.	82/8"								
		Grey												
		SANDY SILT		7	S.S.	115								
		with occasional												
		shale fragments.												
345.0				8	S.S.	200/2"								
344.2	19-7 20			9	S.S.	200/2"								
		Grey		10	S.S.	250/2"								
		WEATHERED		11	S.S.	200/2"								
		SHALE		12	S.S.	200/2"								
340.0				13	S.S.	200/2"								
	25			14	S.S.	200/2"								
				15	S.S.	200/2"								
	27-1			16	S.S.	150/1"								
335.0	30	END OF BOREHOLE												

W.L. El. 359.9'  
SEPT. 15, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE ! 48.

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 1

LOCATION: 176,625 N; 207,735 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASH BORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: SEPT. 15, 1966

W. P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	No. of Advancement of Sampler	20	40	60	80	100	PL	W		LI
363.9	0	GROUND SURFACE													
		3" ASPHALT													
		6" GRAVEL													
		Dense, Brown													
360.0	5	FINE SAND		1	C.S.										
		with some silt		2	S.S.	118									
357.1	6.8	Very Dense		3	S.S.	25/1"									
		Grey													
355.0	10	CLAYEY to		4	S.S.	122									
		SANDY SILT		5	S.S.	176/10"									
350.0	15	with some gravel		6	S.S.	75/2"									
		and shale		7	S.S.	140/24"									
		fragments.		8	S.S.	100/4"									
		(GLACIAL TILL)		9	S.S.	210/3"									
345.0	20	Dark Grey		10	S.S.	200/2"									
344.4		Extremely WEATHERED		11	S.S.	150/3"									
		SHALE		12	S.S.	200/2"									
340.0	25	END OF BOREHOLE		13	S.S.	160/10"									
335.0	30														

HOLE DRY - SEPT. 20/66

Hammer Bouncing

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 149.

OUR REFERENCE NO. 6-5-39

Your Ref. No. W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 1

LOCATION: 176,780 N; 207,860 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

ENCLOSURE NO.

DATE: SEPT 19, 1966

W.P. 275-64-4

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
364.2	0	GROUND SURFACE													
		3" ASPHALT 3" GRAVEL													
		Dense, Brown													
360.0	5	SILTY, VERY FINE SAND			C.S.										
				2	S.S.	80/3"									
357.0	7.2			3	S.S.	100/5"									
355.0	10	Hard, Grey CLAYEY SILT (GLACIAL TILL)		4	S.S.	43									
351.9	12.3			5 A	S.S.	38									
351.2	13.0	SILT SEAM													
350.0	15	Very Dense, Grey SILTY SAND (GLACIAL TILL)		6	S.S.	51									
347.7	16.5			7	S.S.	100/5"									
		Hard, Grey SILTY CLAY with some gravel. (boulder) (GLACIAL TILL)		8	R.C.										
345.0	19.2			9	S.S.	100/2"									
	20	Grey WEATHERED SHALE		10 A	S.S.	170/6"									
				11	S.S.	200/2"									
				12	S.S.	200/4"									
	22.8			13	S.S.	250/4"									
340.0		END OF BOREHOLE													

W.L. El. 354.9'  
SEPT. 20, 1966

Hammer Bouncing

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 150 .

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W.J. 66-F-47

CLIENT: D. H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 1

LOCATION: 176,945 N; 207,990 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: SEPT. 15, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	
364.4	0	GROUND SURFACE												
		8" TOPSOIL Brown												
		SILTY FINE SAND		1A	C.S.									
360.4	4.0			1B	C.S.									
360.0	5	Very Dense, Brown SAND		2	S.S.	100/2"								
		with some gravel												
357.7	6.7			3	S.S.	115								
		Very Hard CLAYEY SILT												
355.0	10	to		4	S.S.	188/9"								
		Very Dense SANDY SILT												
350.0	15	with some fine embedded gravel and shale fragments		5	S.S.	100/6"								
		(GLACIAL TILL)		6	S.S.	200/4"								
				7	S.S.	200/2"								
				8	S.S.	100/3"								
345.0	20			9	S.S.	94								
343.4	21.0	Grey WEATHERED SHALE		10	S.S.	200/2"								
				11	S.S.	200/1"								
	22.5	END OF BOREHOLE		12	S.S.	100/NP								
340.0														

W.L. EL. 360.1'  
SEPT. 20, 1966

Hammer Bouncing



# GEOTECHNICAL DATA SHEET FOR BOREHOLE .151..

OUR REFERENCE NO. 6 - 5 - 39  
Your Ref. No 66 - F - 47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 18

LOCATION: 176,945 N; 207,768 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 3/8"

DATE: SEPT. 20, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N- or Advancement of Sampler	20	40	60	80	100	PL	W	
365.1	0	GROUND SURFACE												
		12" TOPSOIL												
		Very Dense												
		Brown		1	C.S.									
360.0	5	SILTY FINE SAND		2	S.S.	81								
358.1	7.0			3	S.S.	95								
		Very Hard												
		CLAYEY SILT		4	S.S.	110								
355.0	10	to												
		Very Dense												
		SANDY SILT		5	S.S.	100/8"								
		with some embedded		6	S.S.	100/6"								
350.0	15	gravel and shale		7	S.S.	100/NP								
		fragments.		8	S.S.	120/6"								
		(boulder)		9	S.S.	105/6"								
		(GLACIAL TILL)		10	S.S.	100/3"								
345.0	20			11	S.S.	150/9"								
		WEATHERED SHALE		12	S.S.	200/4"								
344.0	21.1	END OF BOREHOLE												

W.L. El. 358.8'  
SEPT. 20, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 152.

OUR REFERENCE NO. 6 - 5 - 39  
Your Ref. No. W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 18

LOCATION: 176,715 N; 207, 625 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: SEPT. 23, 1966

W.P. 275-64-4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	26 Advance of Sampler	2.0	4.0	6.0	8.0	10.0	Pl	W	LI	
364.1	0	GROUND SURFACE													
		3" ASPHALT 6" GRAVEL													
		Dense Brown		1	W.S.										
360.0	5	SILTY FINE SAND		2	S.S.	62									
357.1	7.0	GRAVEL		3A	W.S.										
356.4	7.7	Very Hard Grey		3	S.S.	65									
355.0	10	CLAYEY SILT (GLACIAL TILL)		4	S.S.	106/11"									
351.5	12.6			5	S.S.	170/2"									
350.0	15	Very Dense Grey SANDY SILT with occasional small gravel and shale fragments.		6	S.S.	200/5"									
				7	S.S.	108/6"									
				8A B	S.S.	162/9"									
345.0	20			9A B	S.S.	100/3"									
344.0	20.1	Grey WEATHERED SHALE		10A B	S.S.	200/3"									
				11	S.S.	100/1"									
				12	S.S.	200/2"									
				13	S.S.	200/4"									
340.0	23.5	END OF BOREHOLE		14	R.C.	82%									
	25														

W.L. El. 353.3 ft.  
Sept. 26, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 153 .

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W.J. 66-F-47

CLIENT: D.H.O.

PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE - R.W. No 18

LOCATION: 176, 608 N; 207, 490 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

DATE: SEPT. 21, 1966

W.P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N - 0 Advancement of Sampler	20	40	60	80	100	PL	W	LI	
362.9	0	GROUND SURFACE													
		3" ASPHALT 9" GRAVEL													
360.0		Loose, Brown SILTY FINE SAND		1	S.S.	3									
356.1	6.8	Very Hard Grey CLAYEY SILT with some fine gravel and shale fragments (GLACIAL TILL)		2	S.S.	65									
355.0				3	S.S.	62									
350.0				4	S.S.	100/5"									
				5	S.S.	100/5"									
				6	S.S.	100/1"									
				7	S.S.	81									
345.0				8	S.S.	160/5"									
343.5	19.4			9	S.S.	190/6"									
	20	Grey Weathered S H A L E		10	S.S.	200/5"									
340.0				11	S.S.	200/6"									
				12	S.S.	200/5"									
				13	S.S.	200/2"									
				14	S.S.	250/4"									
25	25	END OF BOREHOLE													

W.L. El. 357.0 ft  
Sept. 26, 1966

▼ W.L. El. 357.0 ft  
Sept. 26, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 154.

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q. E. W. 8 HWY. No 27 INTERCHANGE - R.W. No 18

LOCATION: 176,420 N; 207,375 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASH BORING

DIAMETER OF BOREHOLE 2 3/8"

ENCLOSURE NO.

DATE: SEPT. 21 & 22, 1966

W. P. 275-64-4

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	No. of Advancement of Sampler	20	40	60	80	100	PL	W	LI	
364.0	0	GROUND SURFACE													
		6" TOPSOIL													
		Dense, Brown													
360.0	5	FINE SAND													
		with some silt		1	S.S.	64									
356.5	7.5														
355.0	10	Hard, Grey		2	S.S.	31									
		CLAYEY SILT													
		with some		3	S.S.	63									
		embedded gravel													
350.0	15			4	S.S.	70 1/4"									
		(SHALE FRAGMENTS													
		BELOW EL. 349 ft.)		5	S.S.	100									
345.0	20	(GLACIAL TILL)		6	S.S.	130									
				7	S.S.	49									
341.0	23.0			8	S.S.	108									
340.0	25	Grey, Weathered		9	S.S.	200 1/4"									
		SHALE		10	S.S.	200 1/4"									
25.1		END OF BOREHOLE													

W.L. EL. 354.8 ft.  
Sept. 22, 1966

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 201 . .

OUR REFERENCE NO 6-5-39  
Your Ref. No W. J. 66 - F - 47

CLIENT D. H. O.  
PROJECT Q. E. W. & HWY No 27 INTERCHANGE. - R. W. No 7  
LOCATION 179,985 N 208,335 E  
DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING  
DIAMETER OF BOREHOLE 2 3/8"  
DATE JAN. 16 - 18. 1967.  
W. P. 275 - 64 - 4

ENCLOSURE NO

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	20	40	60	80	100	PL	W	
378.6	0	GROUND SURFACE												
		12" TOPSOIL Loose, Brown FINE SAND												
375	3.5	Very Stiff to Hard CLAYEY SILT with some embedded Gravel (GLACIAL TILL) Greenish Grey Grey		1	SS	17								
	5			2	SS	29								
372				3	SS	52								
370 369.6	9.0			4	SS	100/3"								
	10	Shale Fragments below el. 366 FT.  Granite Boulder		5	SS	100/2"								
				6	SS	100/NP								
365				7	RC									
				8	SS	200/1"								
363.1	15.5	Grey Weathered SHALE		9	RC	49%								
360	20			10	RC	22%								
357.1	21.5			11	SS	71/1"								
355		END OF BOREHOLE												

W.L. 373.9  
JAN. 20. 1967.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 202.

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W. J. 66 - F - 47

CLIENT D. H. O.  
PROJECT Q. E. W. & HWY. No 27 INTERCHANGE R. W. No 7  
LOCATION 179, 840 N 208, 365 E  
DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING  
DIAMETER OF BOREHOLE 2 3/8"  
DATE JAN. 18, 1967.

ENCLOSURE NO

W. P. 275 - 64 - 4

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N Advance of Sampler	20	40	60	80	100	PL	W	LI	
376.6	0	GROUND SURFACE													
375		15" TOPSOIL Compact to Dense Brown, Organic SANDY SILT some Clay FILL		1	SS	34									
371.4	5.2	Dense, Brown FINE SAND with some Silt		2	SS	36									
369				3	SS	100/3"									
368.1	8.5	Very Dense SANDY SILT with a trace of Clay and some Gravel (GLACIAL TILL)		4	SS	71/6"									
365	10			5	SS	150/2"									
363.6	13.0	Hard Grey CLAYEY SILT with a trace of Gravel and increasing Shale Fragments with depth		6	SS	150/5"									
360	15			7	SS	200/2"									
		Possibly extremely Weathered SHALE below el. 360.6 Ft.		8	SS	200/2"									
356.5	20			9	SS	150/1"									
355	20.1	END OF BOREHOLE													

W. L. 373.3  
JAN. 20, 1967.

GEOTECHNICAL DATA SHEET FOR BOREHOLE 203.

OUR REFERENCE NO. 6-5-39  
Your Ref. No. W.J. 66-F-47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. N<sup>o</sup> 27 INTERCHANGE. R.W. N<sup>o</sup> 7

LOCATION: 179,695 N 208,400 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE. 2 3/8"

DATE. JAN. 19 - 20. 1967.

W. P. 275 - 64 - 4

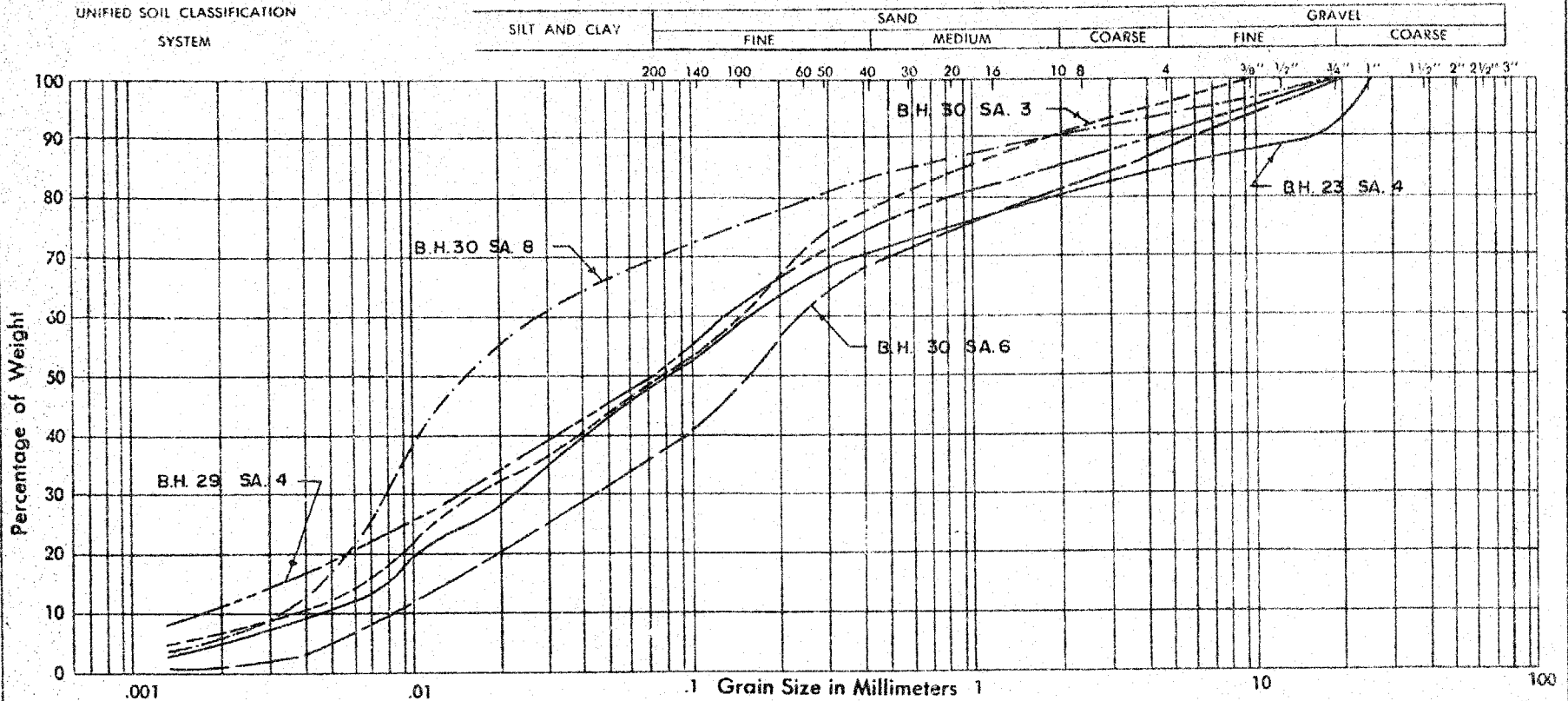
ENCLOSURE NO.

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# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 5 - 39



PROJECT: W. J. 66 - F - 47 , W.P. 275-64-4    COEFFICIENT OF UNIFORMITY  
 LOCATION: Q.E.W. & HWY. N°27 INTERCHANGE    COEFFICIENT OF CURVATURE  
 BOREHOLE NO.: 23 29 30 30 30  
 SAMPLE NO.: 4 ' 4 ' 3 ' 6 ' 8  
 DEPTH OF SAMPLE:  
 ELEVATION OF SAMPLE:

**Classification of Sample and Group Symbol:**  
 SAND and SILT  
 with some GRAVEL and CLAY

PLASTIC PROPERTIES:

LIQUID LIMIT	% =
PLASTIC LIMIT	% =
PLASTICITY INDEX	% =
MOISTURE CONTENT	% =
ACTIVITY	=

Enclosure No.



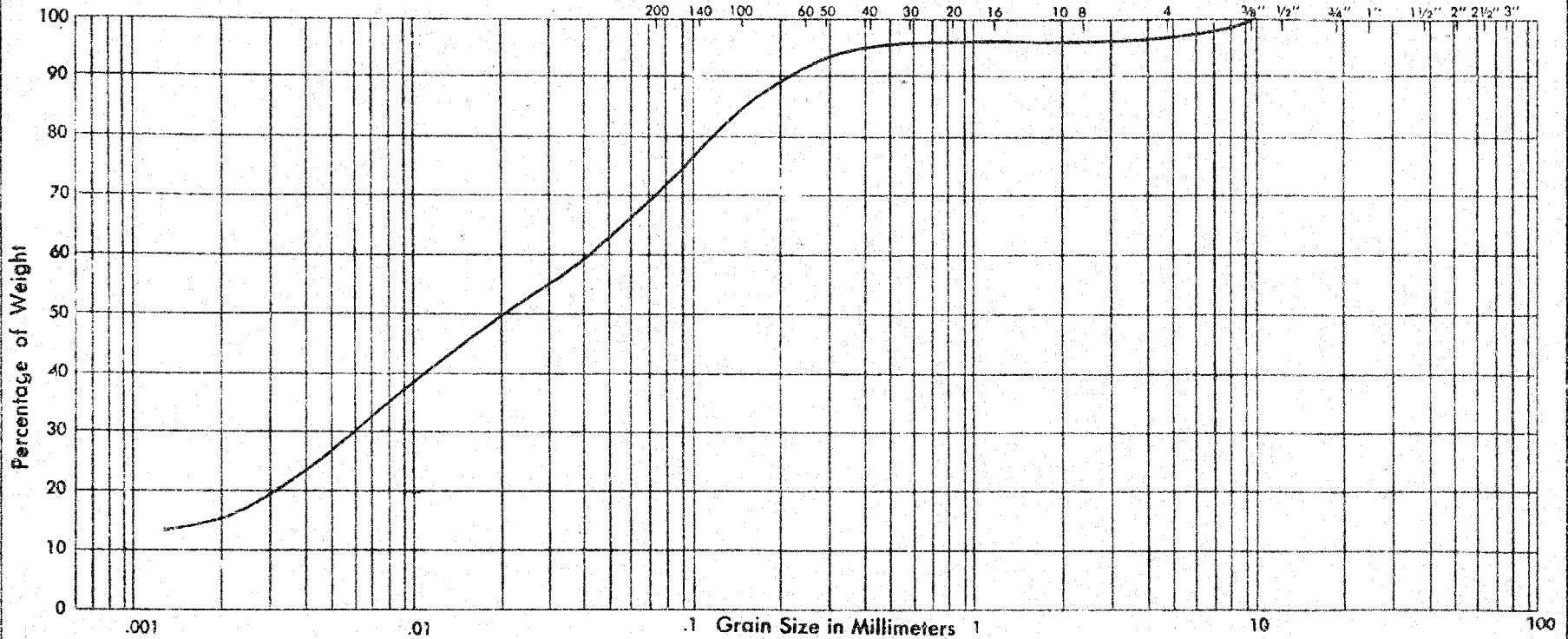
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39  
YOUR REF. No. W.P. 275-64-4

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND						GRAVEL		
	FINE		MEDIUM		COARSE		FINE	COARSE	



PROJECT: Q.E.W. & HWY. 27. INTERCHANGE

LOCATION: RETAINING WALL No. 13.

BOREHOLE NO.: 34

SAMPLE NO.: 1

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

**Classification of Sample and Group Symbol:**

**SANDY SILT with some CLAY**

Enclosure No.

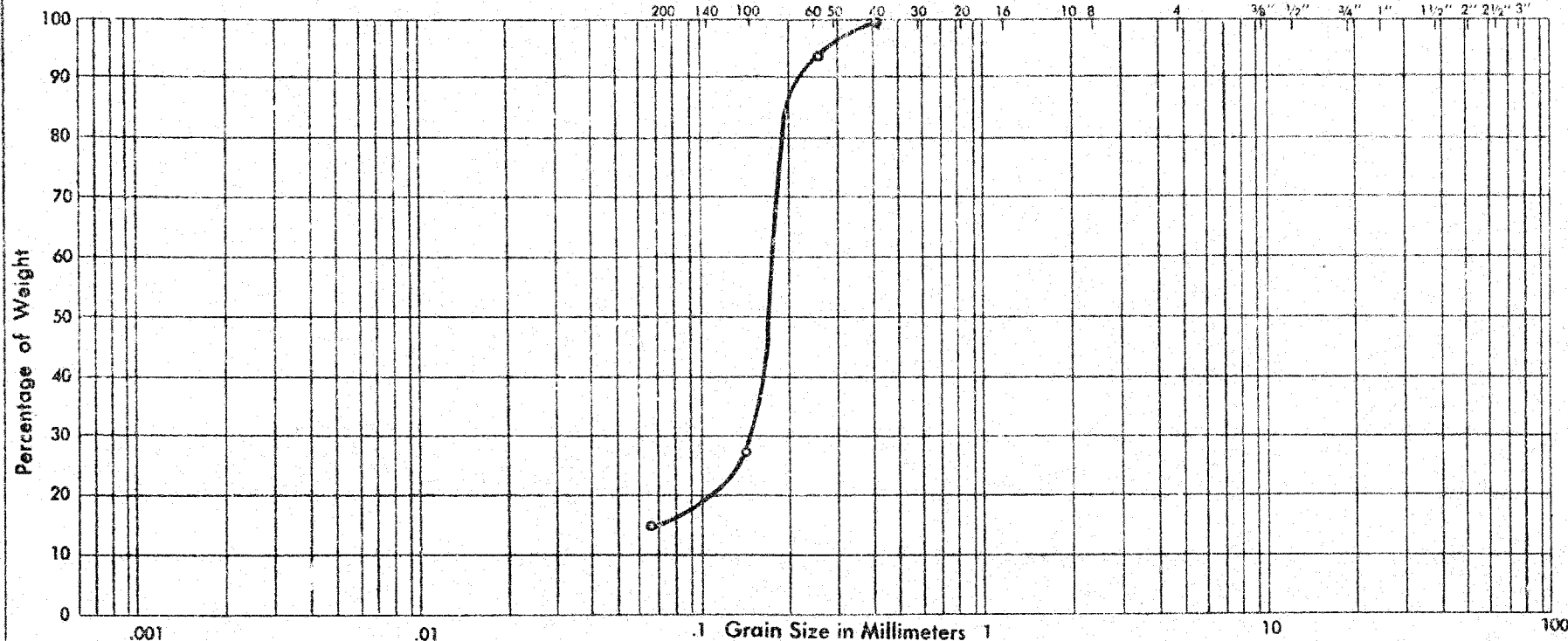
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66-F-47; W.P. 275-64-4

LOCATION: Q.E.W. & HWY. N<sup>o</sup> 27

BOREHOLE NO.: 44

SAMPLE NO.: 1

DEPTH OF SAMPLE: 4 ft.

ELEVATION OF SAMPLE: 359 ± ft.

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

Classification of Sample and Group Symbol:

FINE SAND with some silt.

Enclosure No.

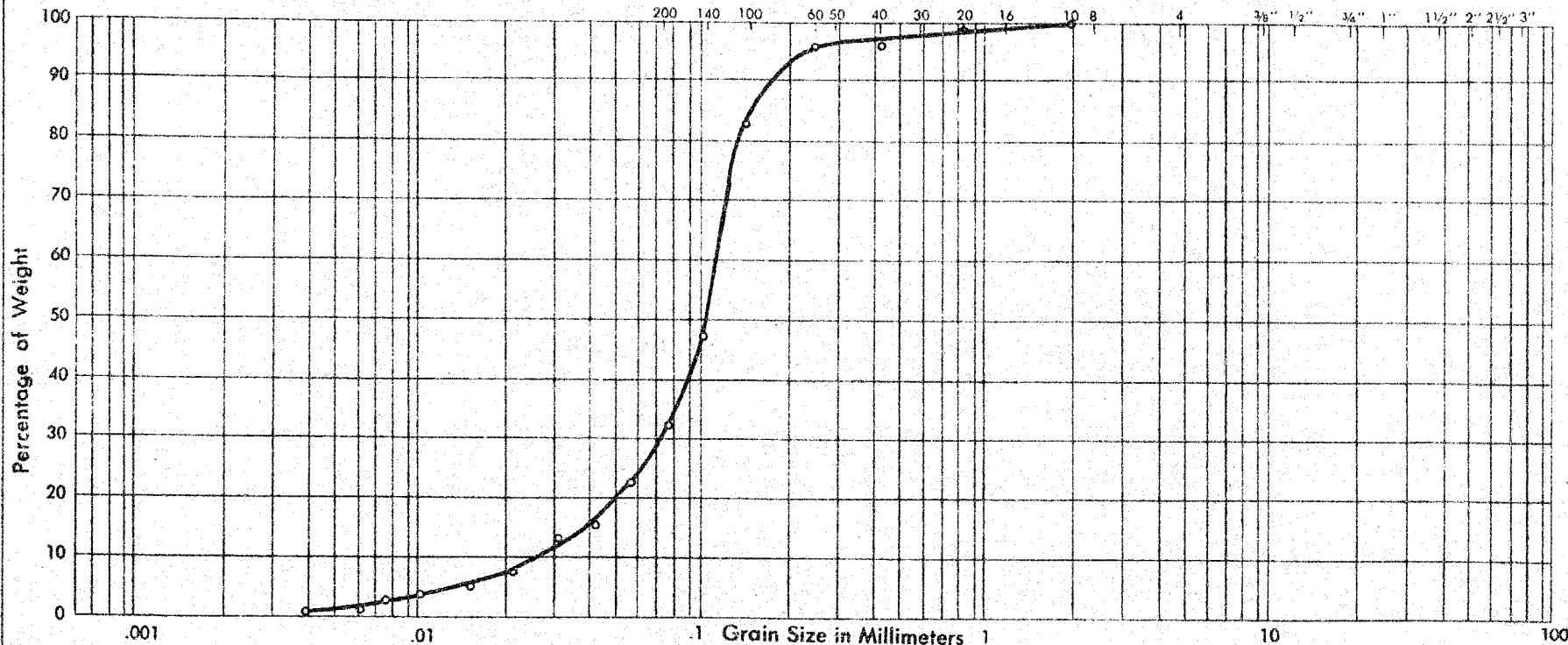
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 5 - 39

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66-F-47 ; WP 275-64-4

LOCATION: Q.E.W. & HWY. No 27

BOREHOLE NO.: 46

SAMPLE NO.: 1

DEPTH OF SAMPLE: 4 ft.

ELEVATION OF SAMPLE: 357 ± ft.

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

Classification of Sample and Group Symbol:

SILTY FINE SAND

Enclosure No.

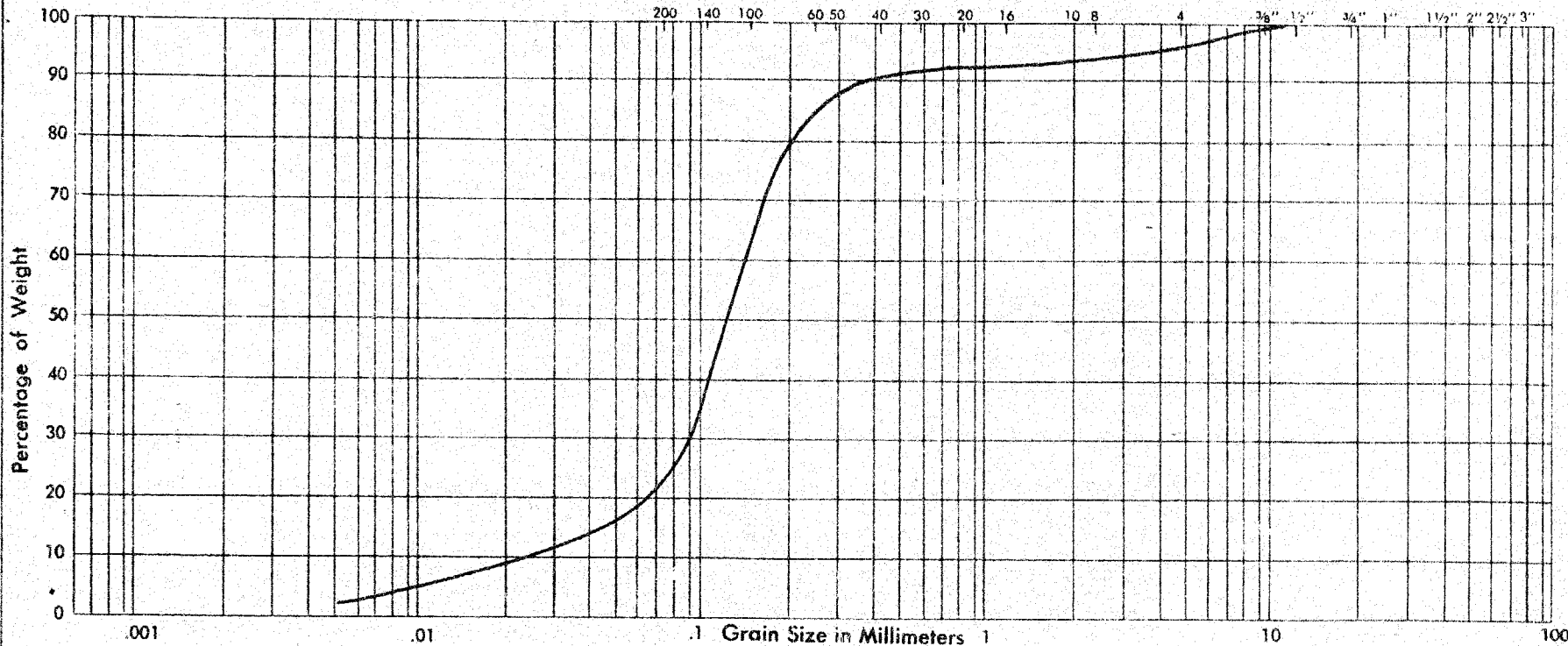
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39  
YOUR REF. No. W.P. 275-64-4

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: RETAINING WALLS No. 5 & 6.

BOREHOLE NO.: 47

SAMPLE NO.: 1

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

Classification of Sample and Group Symbol:

FINE SAND with some SILT

Enclosure No.

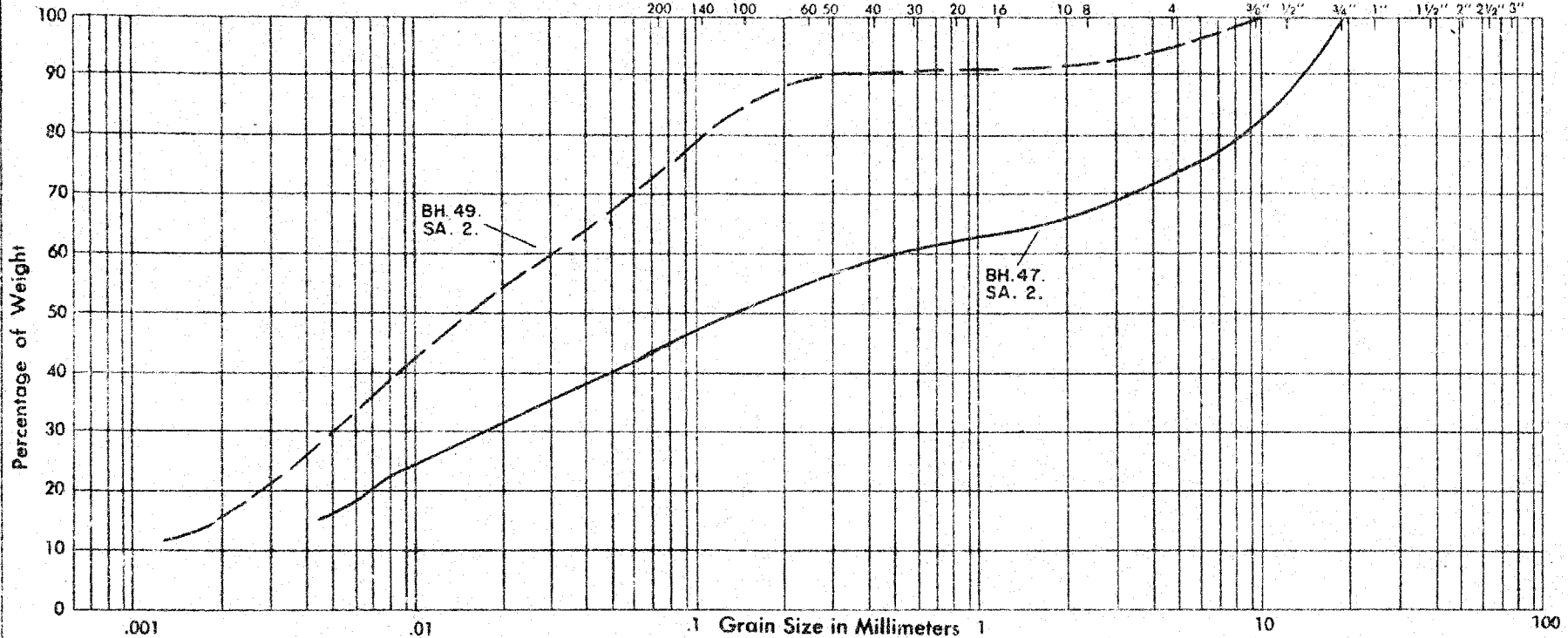
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 6-5-39  
YOUR REF. No. W.P. 275-64-4

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: RETAINING WALLS No. 5 & 6.

BOREHOLE NO.: 47 ; 49

SAMPLE NO.: 2 2

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMITED % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

ACTIVITY ==

**Classification of Sample and Group Symbol:**

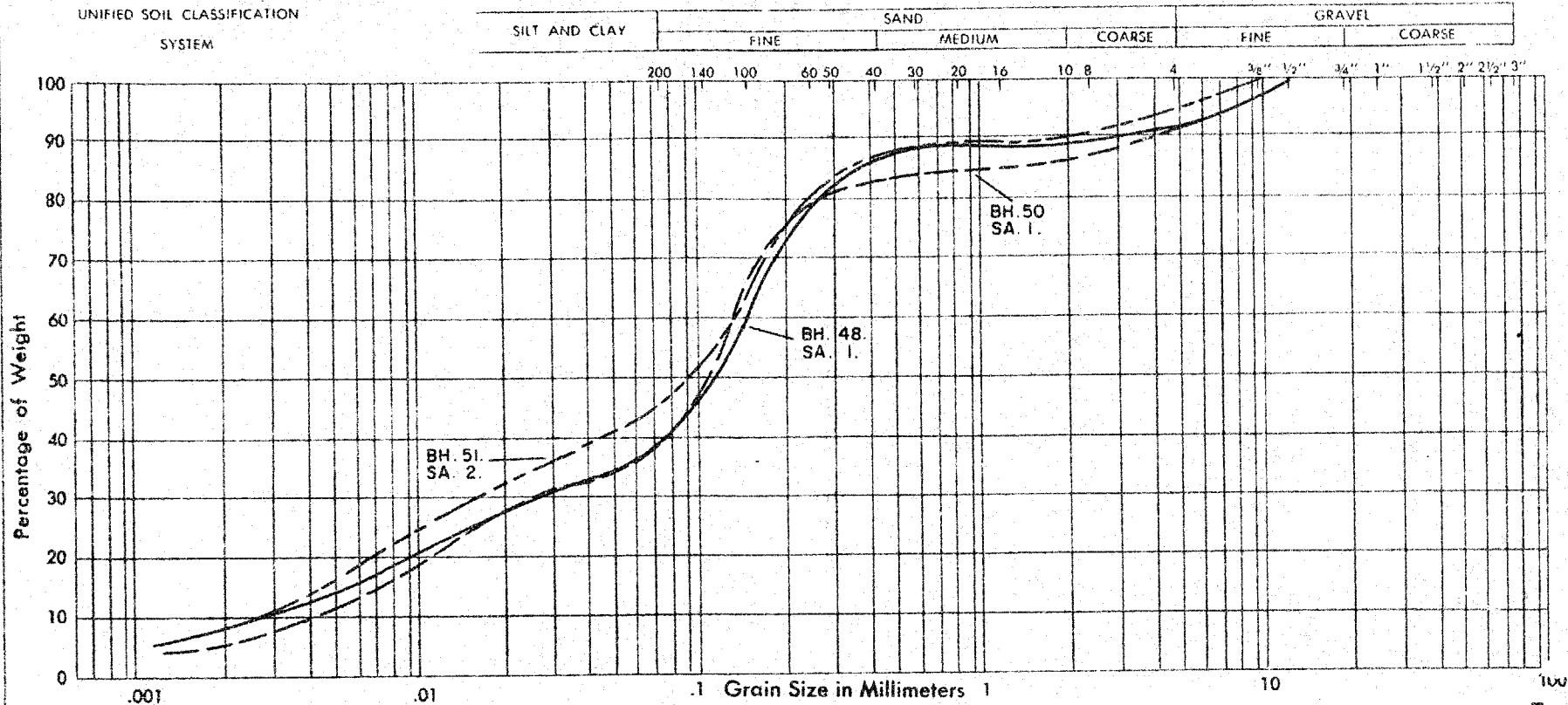
SAND and SILT  
with some GRAVEL and CLAY  
(GLACIAL TILL)

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39  
YOUR REF. No. W.P. 275-64-4



PROJECT: Q.E.W. & HWY. No. 27 INTERCHANGE

LOCATION: RETAINING WALLS No. 5 & 6.

BOREHOLE NO.: 48 ; 50 ; 51

SAMPLE NO.: 1 1 2

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMITED % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

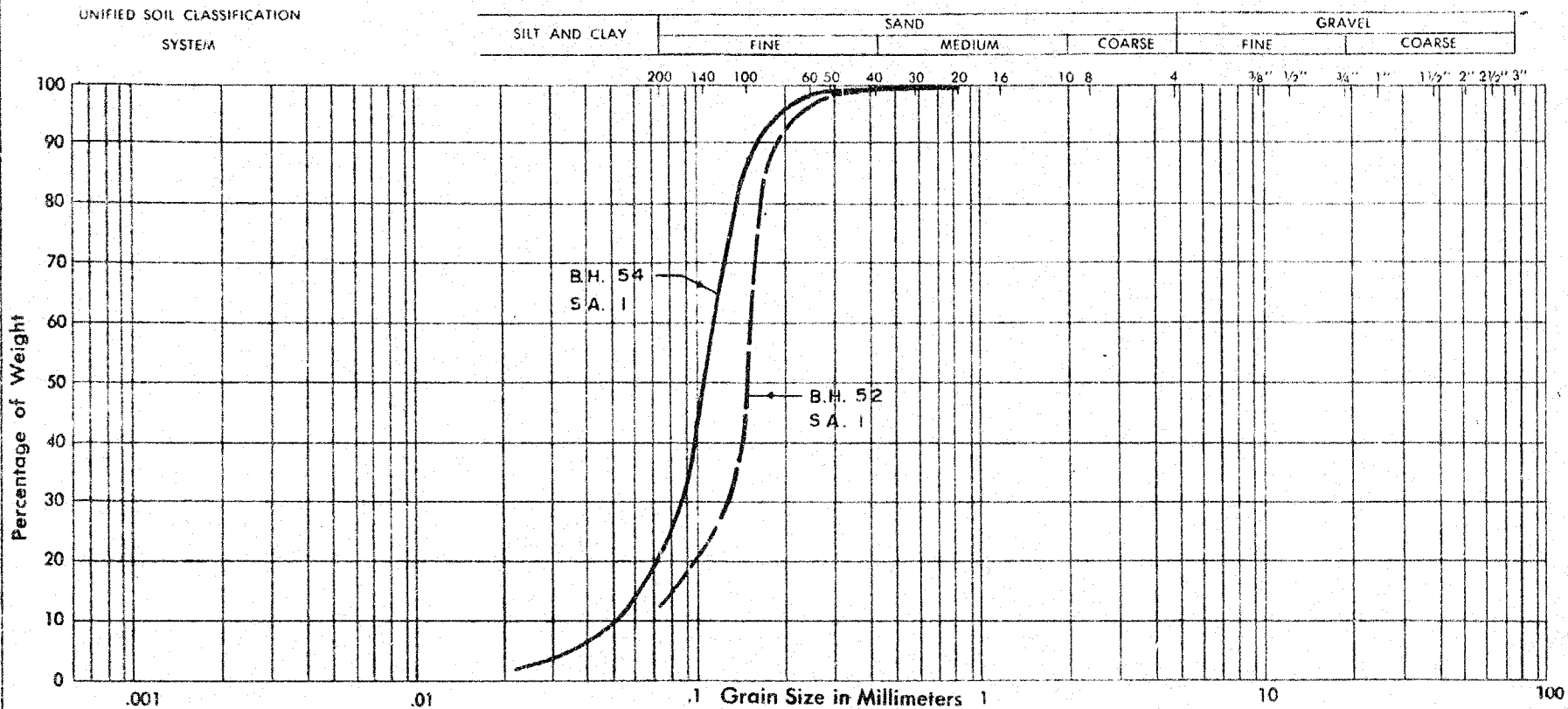
ACTIVITY % ==

**Classification of Sample and Group Symbol:**  
**SILTY SAND**  
with a trace of CLAY and GRAVEL  
(FILL)

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39



PROJECT: W.J. 66-F-47, W.P. 275-64-4

LOCATION: Q.E.W. & HWY. No 27

BOREHOLE NO.: 52, 54

SAMPLE NO.: 1, 1

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY ~ 2.5

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

Classification of Sample and Group Symbol:

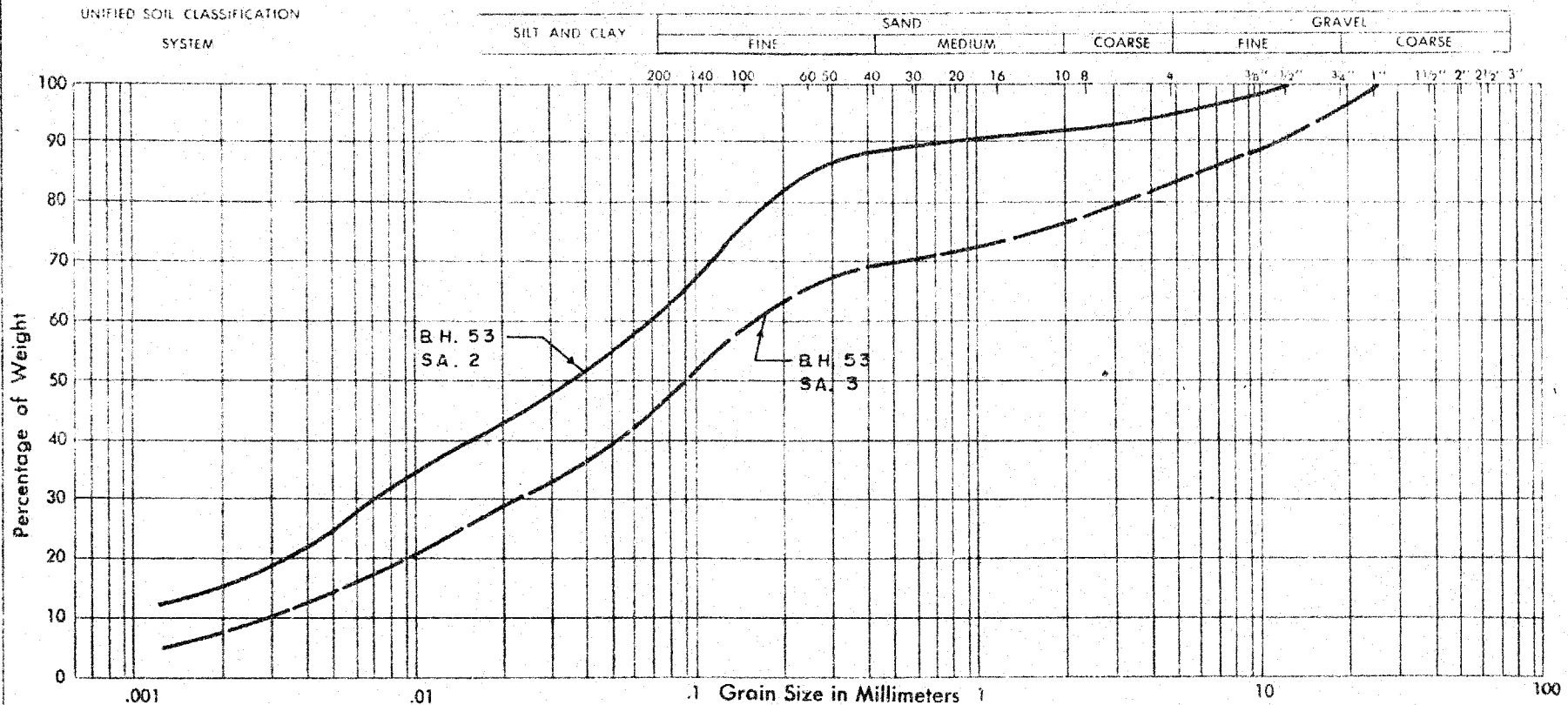
SILTY FINE SAND

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39



PROJECT: W. J. 66-F-47; W.P. 275-64-4

LOCATION: Q.E.W. 6 HWY. N<sup>o</sup> 27

BOREHOLE NO.: 53 53

SAMPLE NO.: 2 3

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

ACTIVITY ==

**Classification of Sample and Group Symbol:**

SANDY SILT with some CLAY and a  
trace of FINE GRAVEL

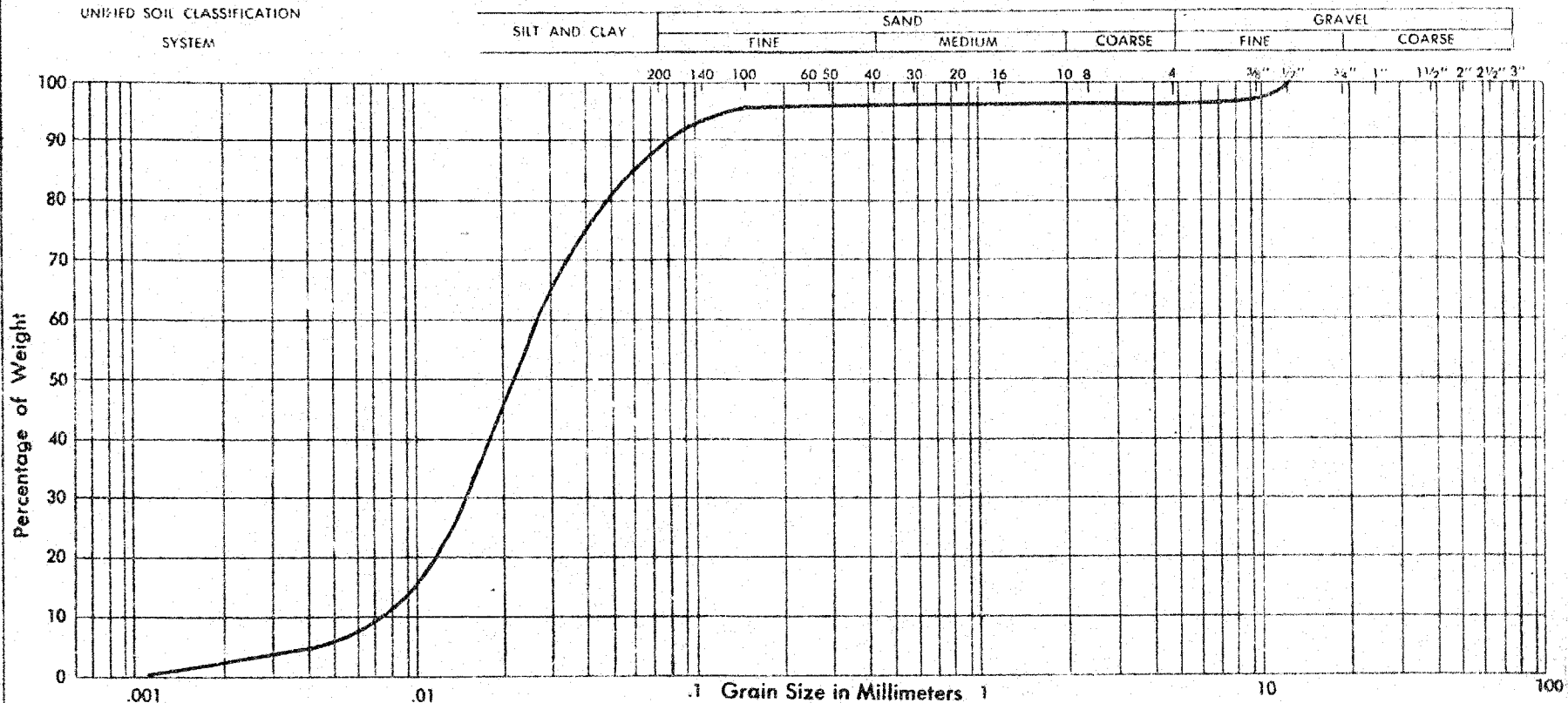
Enclosure No.



# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39



PROJECT: W.J. 66-F-47, W.P. 275-64-4

LOCATION: Q.E.W. 8 HWY. N<sup>o</sup> 27

BOREHOLE NO.: 55

SAMPLE NO.: 1

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**

SILT with trace of SAND and CLAY

PLASTIC PROPERTIES:

LIQUID LIMITED % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

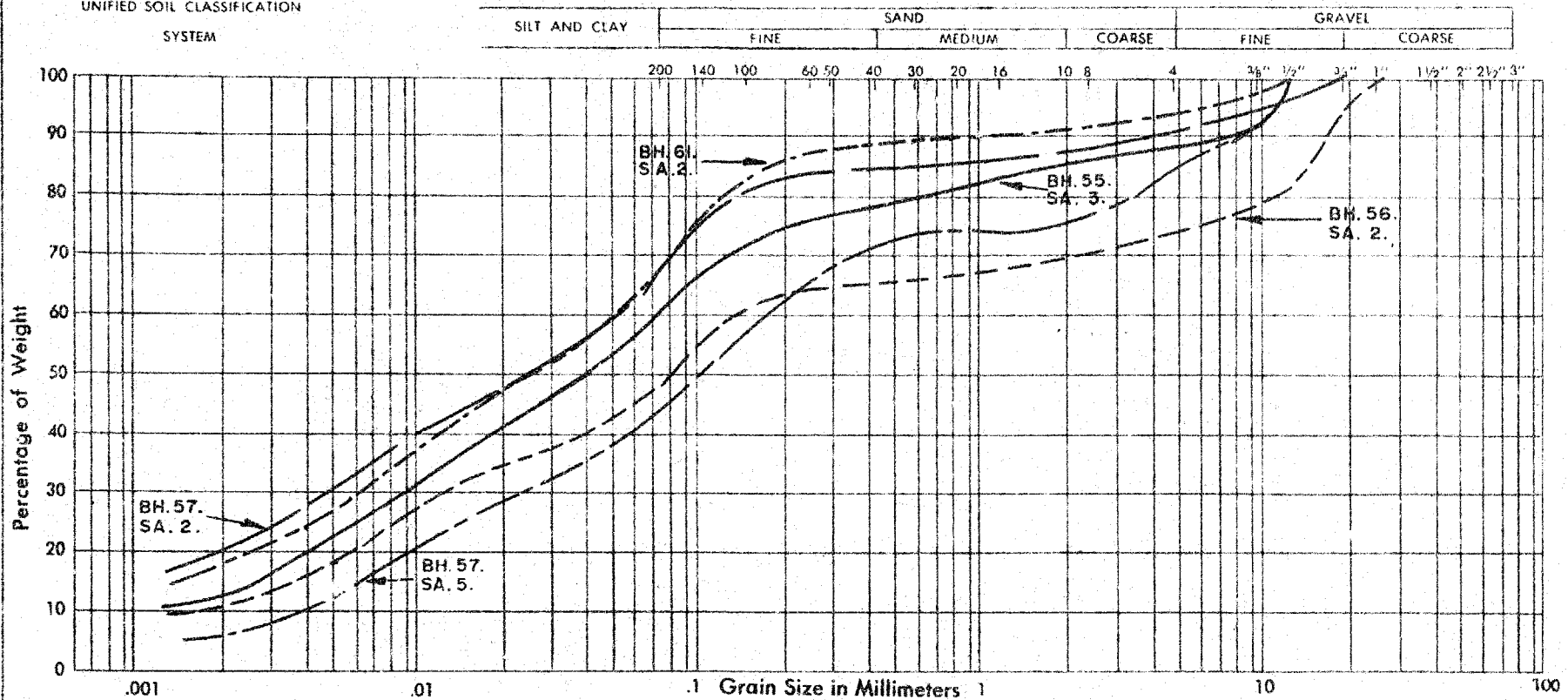
Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39

UNIFIED SOIL CLASSIFICATION  
SYSTEM

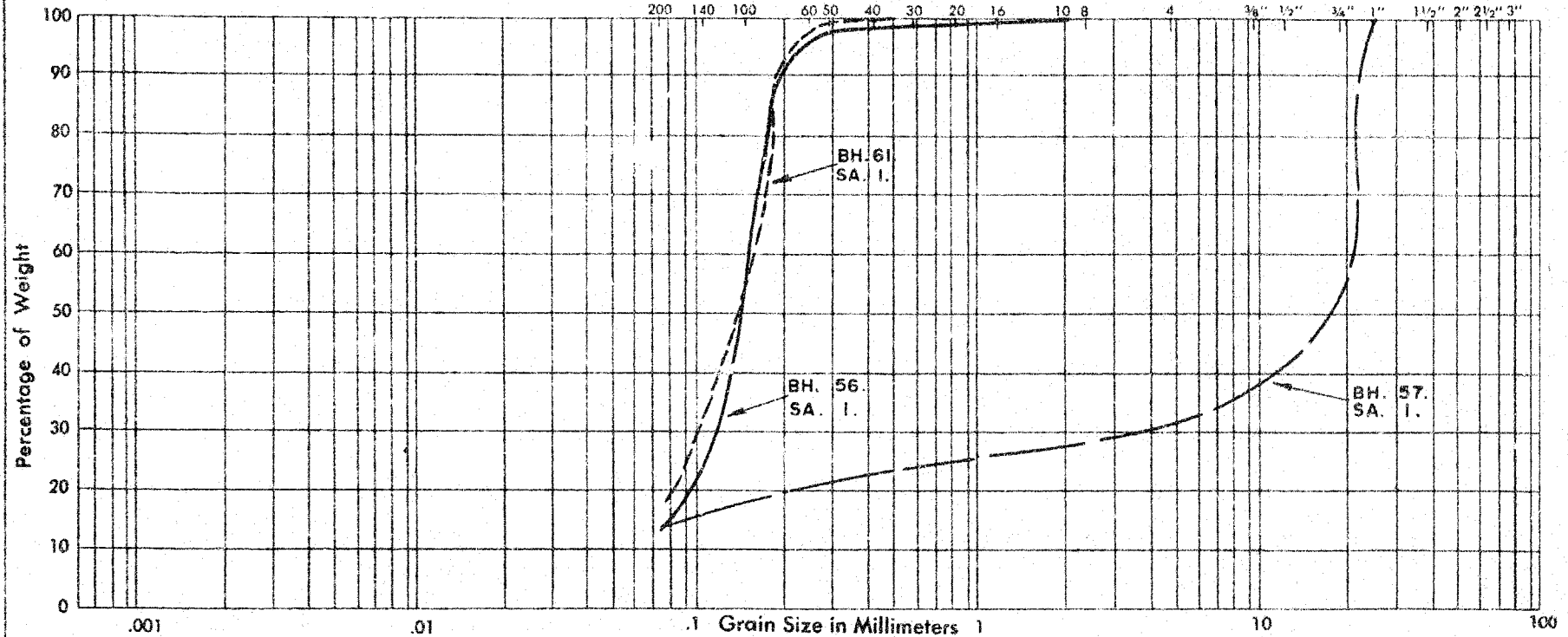


# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: W. J. 66-F-47, W. P. 275-64-4

LOCATION: Q. E. W. & HWY. N° 27

BOREHOLE NO.: 56 ; 57 ; 61

SAMPLE NO.: 1 1 1

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**

SAND (and GRAVEL) with some SILT

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

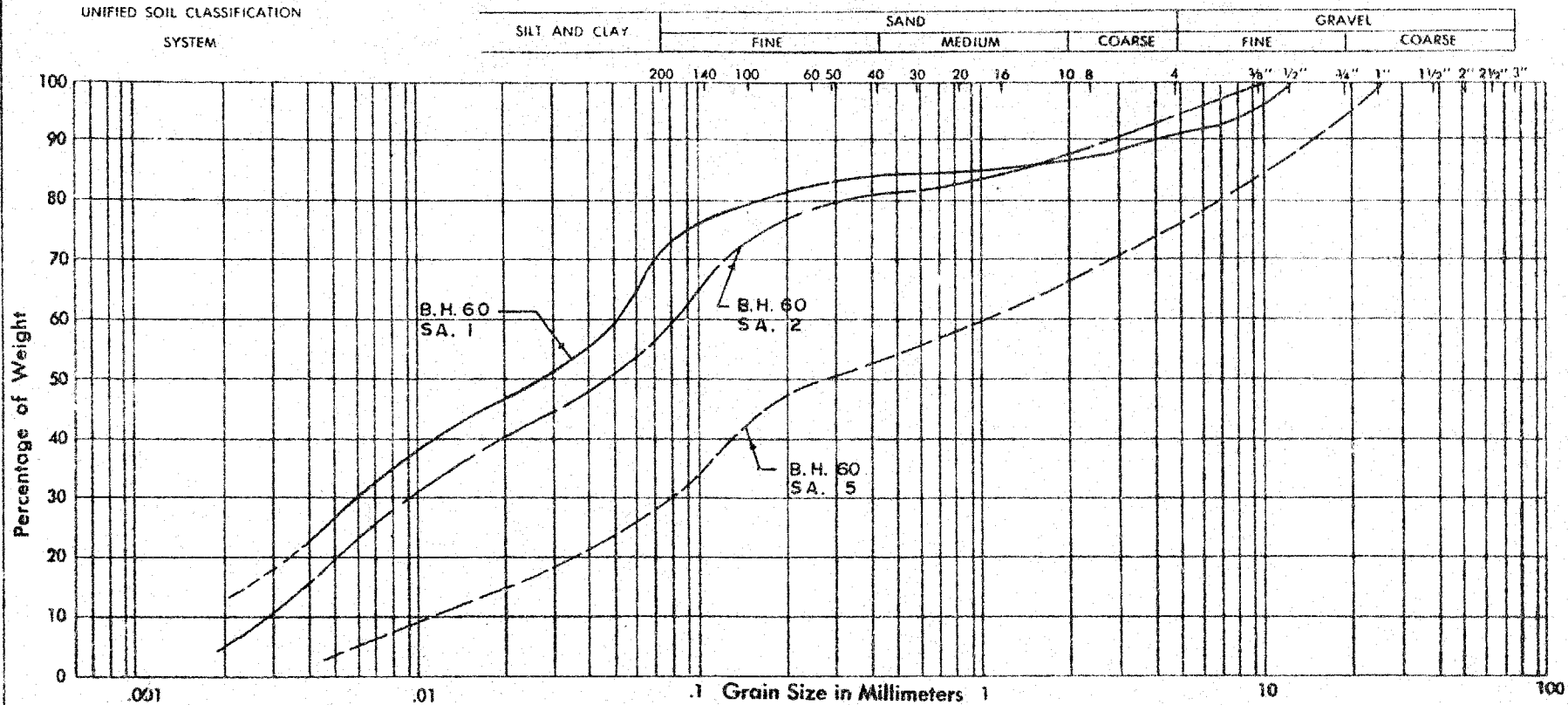
ACTIVITY =

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 5 - 39



PROJECT: W.J. 66-F-47; W.P. 275-64-4

LOCATION: Q.E.W. 8 HWY. N° 27

BOREHOLE NO.: 60, 60, 60

SAMPLE NO.: 1, 2, 5

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**

**SANDY SILT with some GRAVEL and a trace of CLAY**

**( GLACIAL TILL )**

**PLASTIC PROPERTIES:**

LIQUID LIMITED % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

Enclosure No.

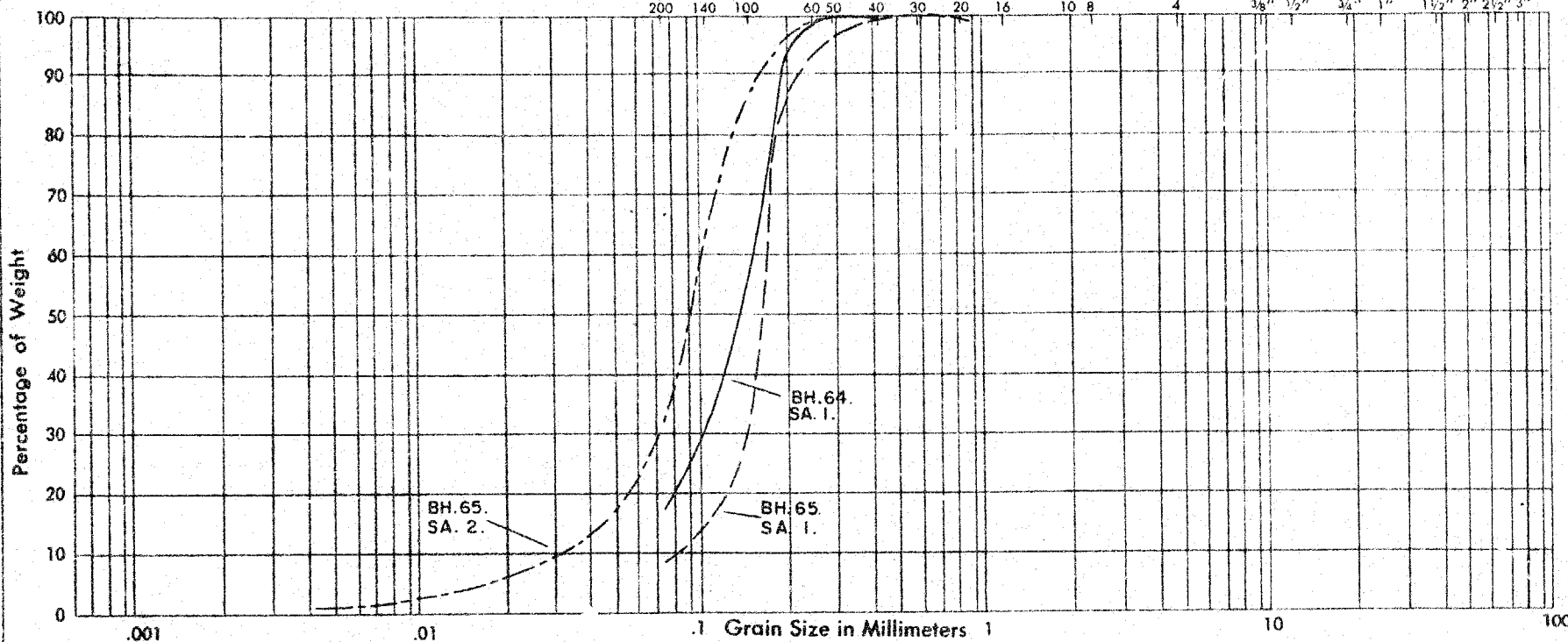
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39  
YOUR REF. No. W.P. 275-64-4  
W.J. 66-F-47

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE  
LOCATION: RETAINING WALL No. 22.  
BOREHOLE NO.: 64 ; 65 ; 65  
SAMPLE NO.: 1 1 2  
DEPTH OF SAMPLE:  
ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY  
COEFFICIENT OF CURVATURE

### Classification of Sample and Group Symbol:

FINE SAND  
with some to a trace of SILT

### PLASTIC PROPERTIES:

LIQUID LIMITED      % =  
PLASTIC LIMIT      % =  
PLASTICITY INDEX      % =  
MOISTURE CONTENT      % =  
ACTIVITY      =

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

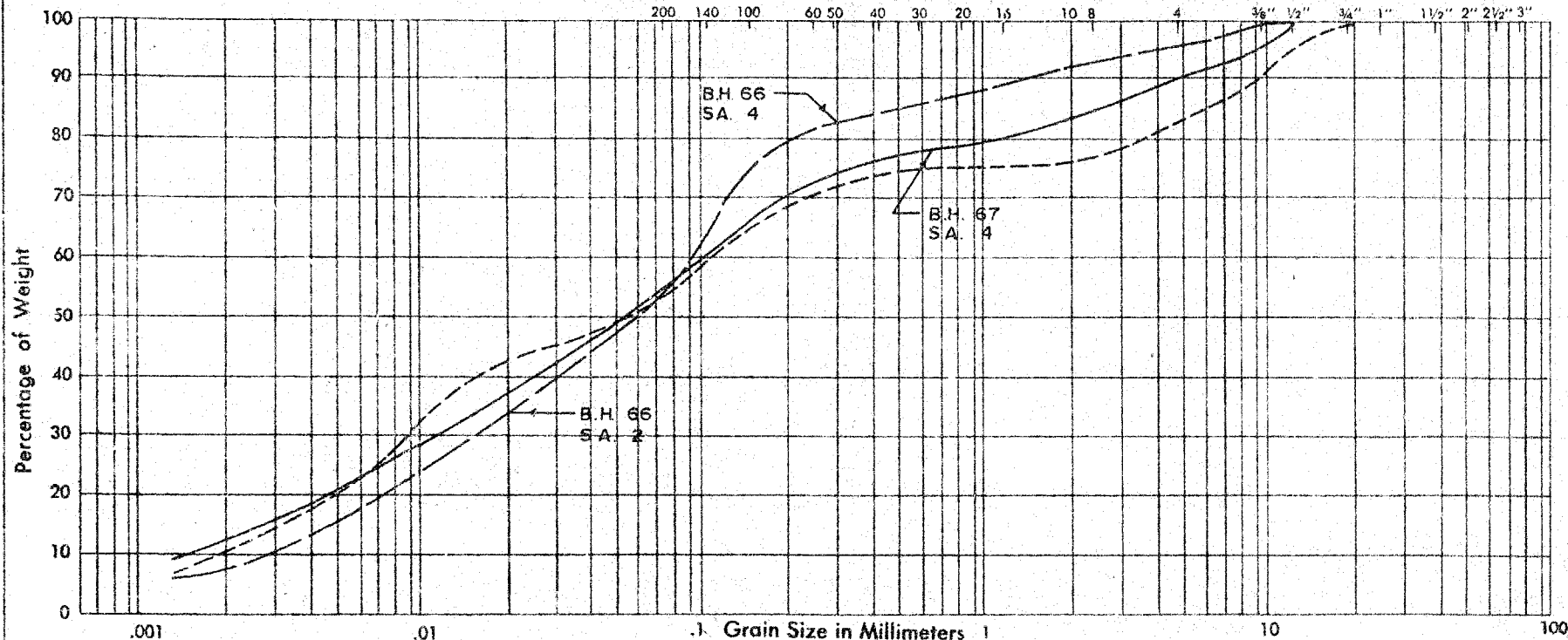
## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 5 - 39

UNIFIED SOIL CLASSIFICATION

SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66-F-47, WP. 275-64-4

LOCATION: Q.E.W. & HWY. No 27

BOREHOLE NO.: 66, 66, 67

SAMPLE NO.: 2 ; 4 ; 4

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

### Classification of Sample and Group Symbol:

SILT and SAND  
with some GRAVEL and CLAY  
(GLACIAL TILL)

### PLASTIC PROPERTIES:

LIQUID LIMITED % =  
PLASTIC LIMIT % =  
PLASTICITY INDEX % =  
MOISTURE CONTENT % =  
ACTIVITY =

Enclosure No.

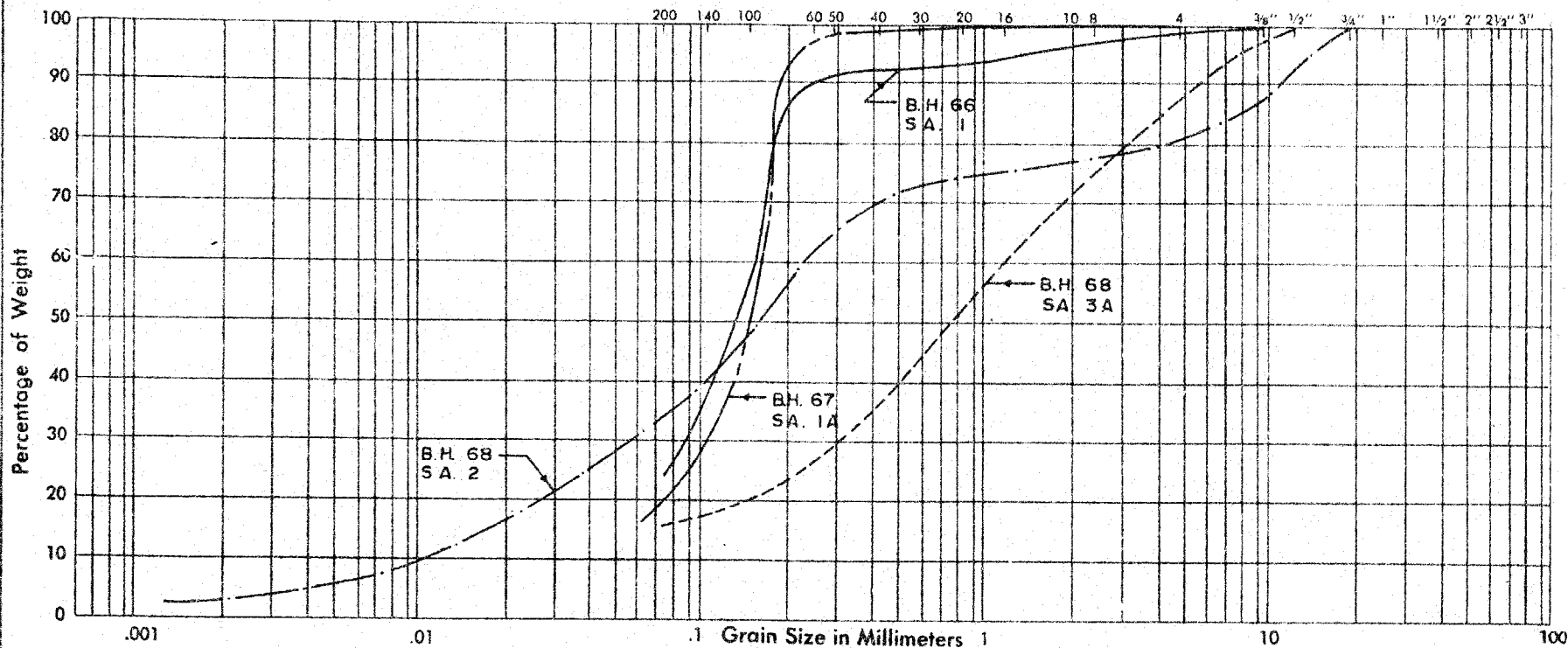
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-5-39

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66-F-47, W.P. 275-64-4

LOCATION: Q.E.W. & HWY. No 27

BOREHOLE NO.: 66 67 68 68

SAMPLE NO.: 1 ; 1A ; 2 ; 3A

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMITED % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

ACTIVITY ==

**Classification of Sample and Group Symbol:**

**SILTY SAND**

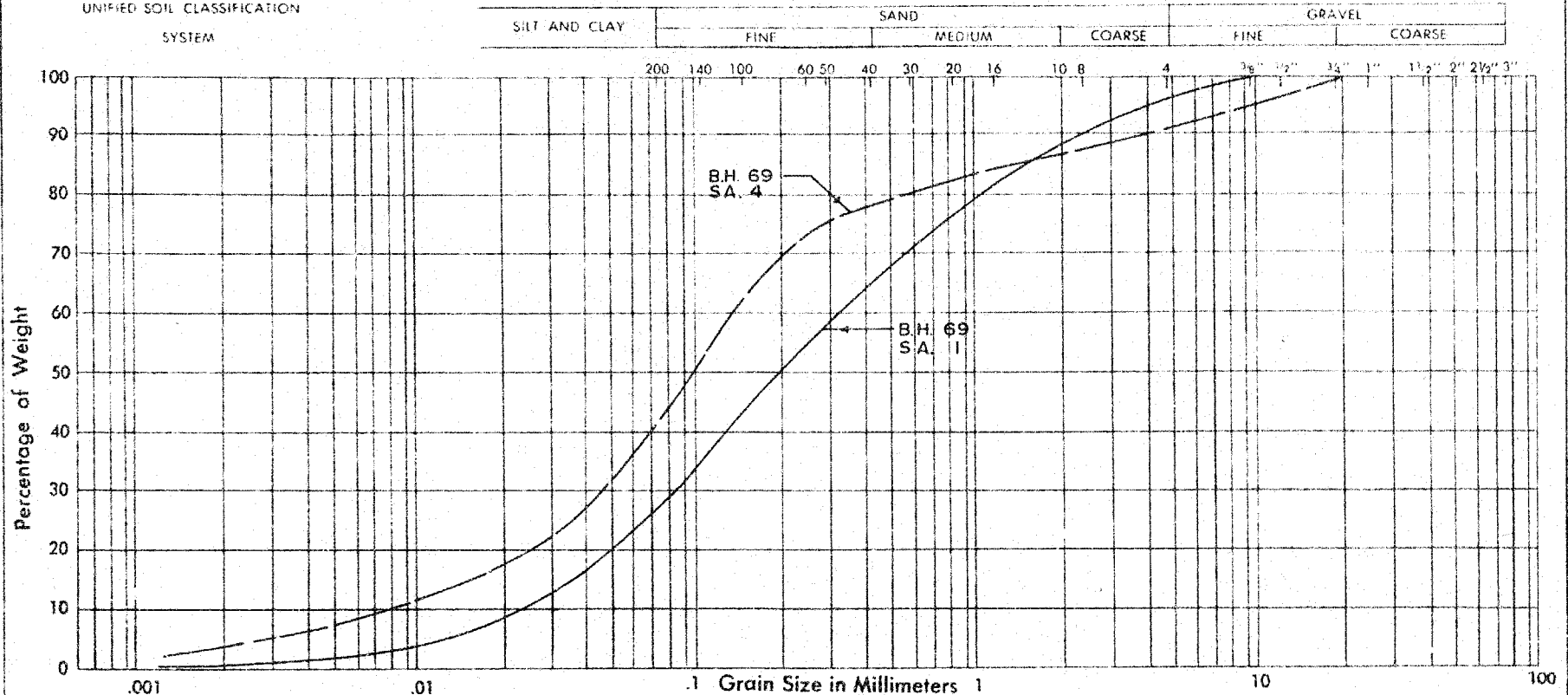
Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 6-5-39

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: W.J. 66-F-47, WP. 275-64-4

LOCATION: Q.E.W. & HWY. No 27

BOREHOLE NO.: 69 ; 69

SAMPLE NO.: 1 4

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

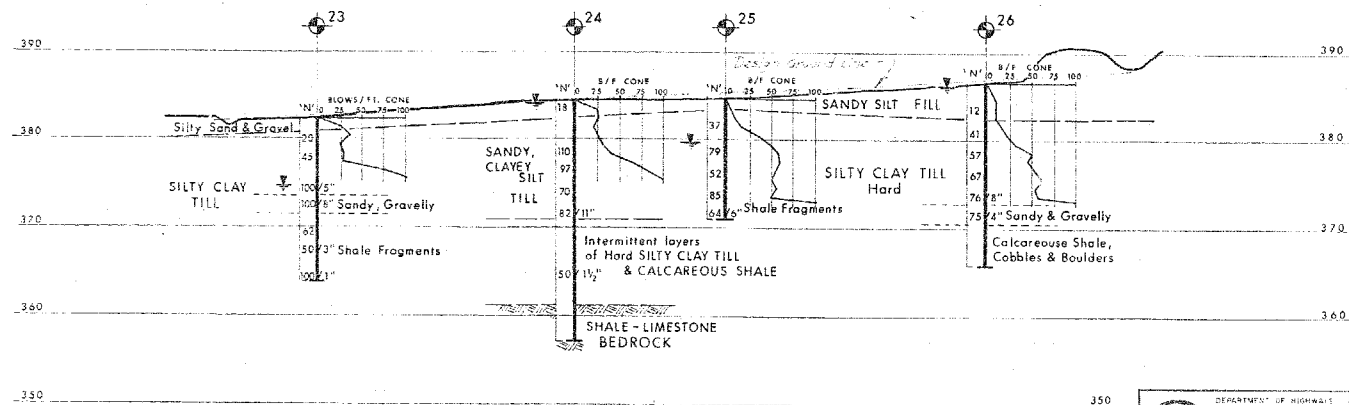
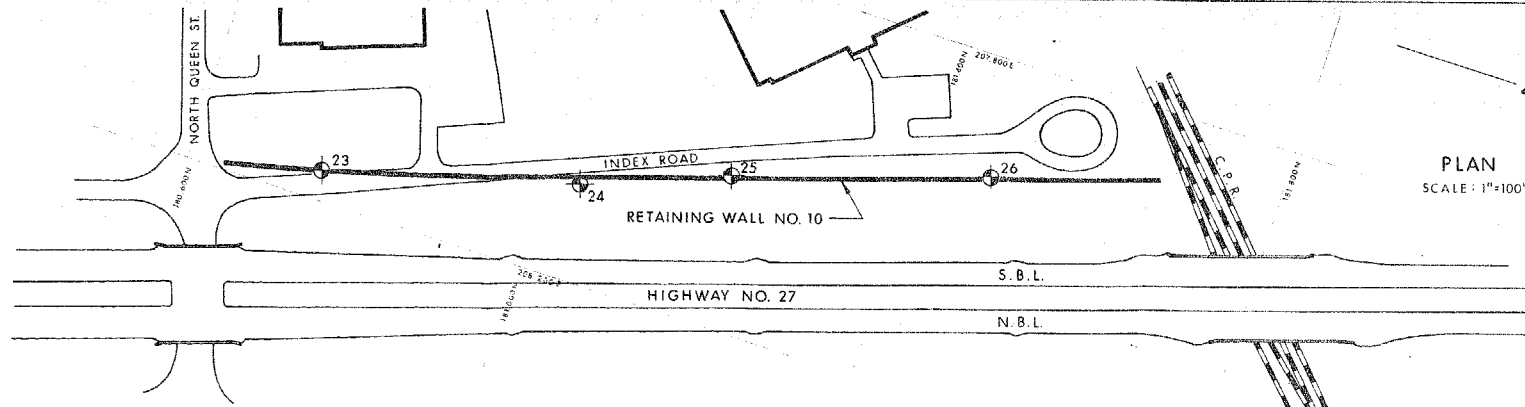
ACTIVITY ==

**Classification of Sample and Group Symbol:**

**SILTY SAND with a trace of gravel and clay**

Enclosure No.





## SECTION ALONG RETAINING WALL

SCALE: Vert. 1" = 10'  
Horiz. 1" = 100'



DATE 25 MAY 1966

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

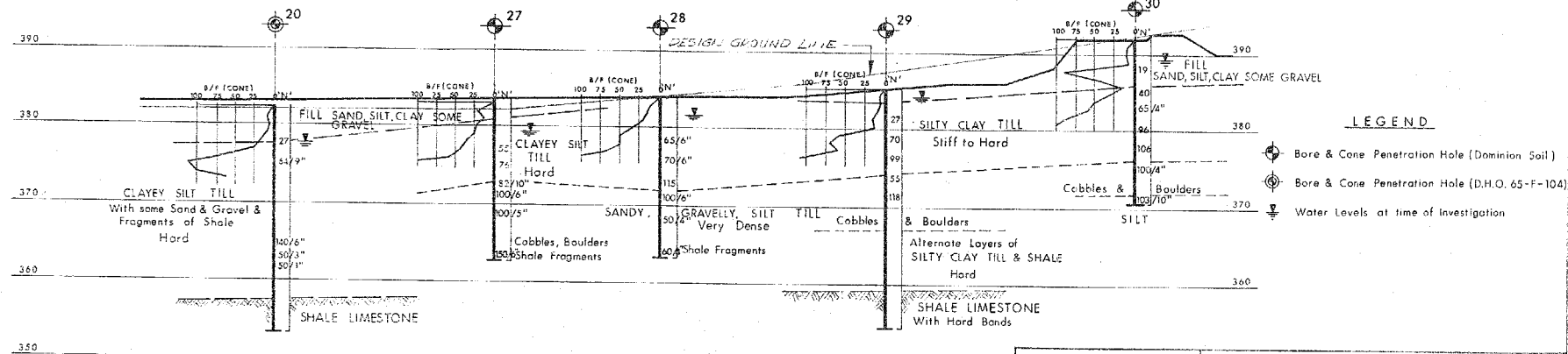
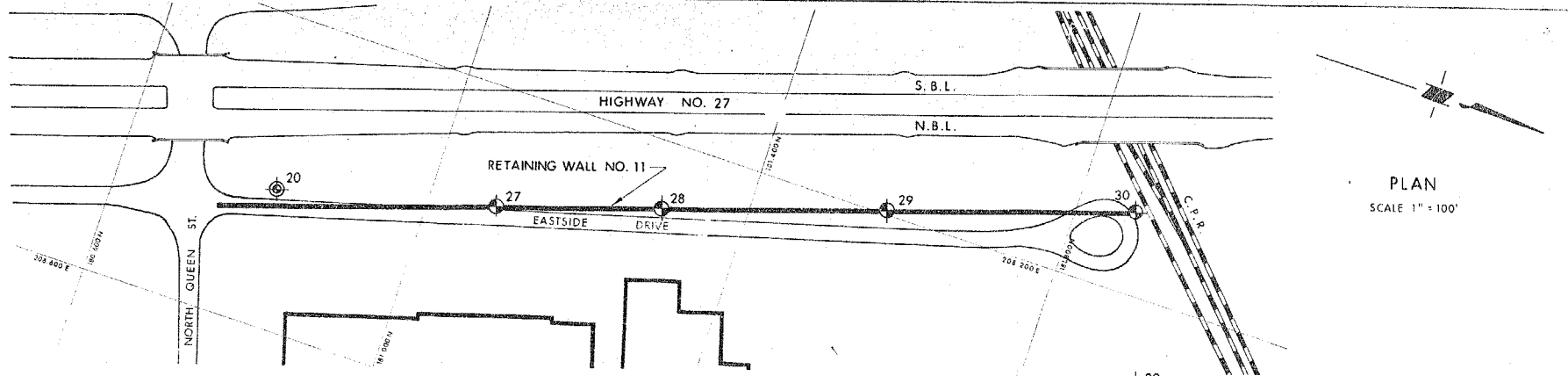
RETAINING WALL NO. 10

W.P. 275-64-4

APPROVED

JOB 66-F-47

DRAWING NO. 65-F-47A



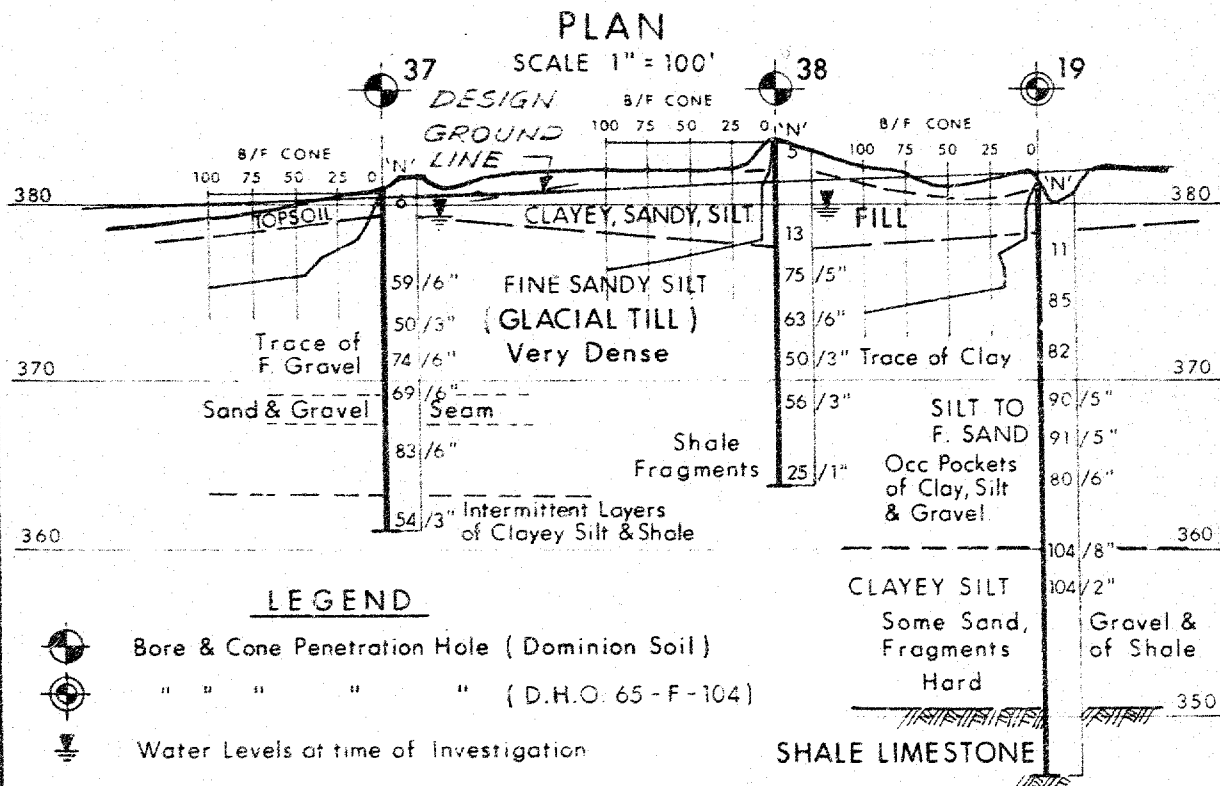
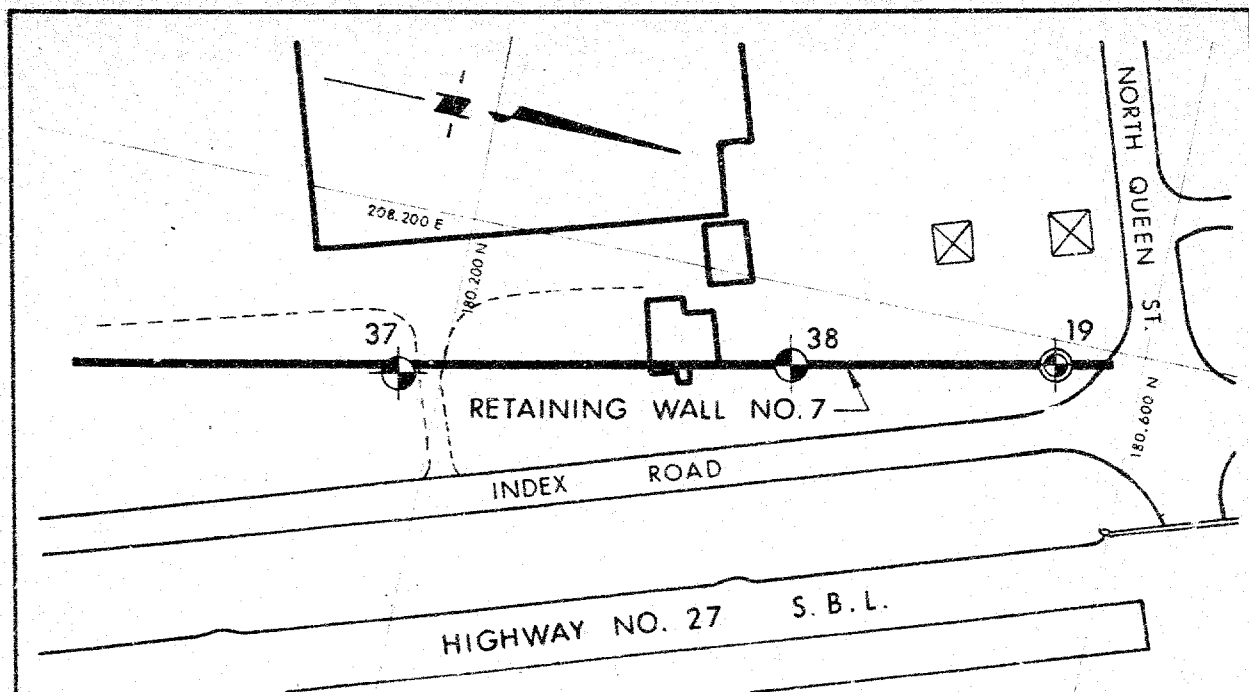
DATE 27 MAY, 1966

DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE  
RETAINING WALL NO. 11

W.P. 275-64-4  
JOB 66-F-47

APPROVED: M. R. S. (Signature)  
DRAWING NO. 66-F-47 B



### SECTION ALONG RETAINING WALL

SCALE: Vert. 1" = 10', Horiz. 1" = 100'



DEPARTMENT OF HIGHWAYS  
**MATERIALS and  
TESTING  
DIVISION**

DATE 2 JUNE 1966

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

**RETAINING WALL NO. 7**

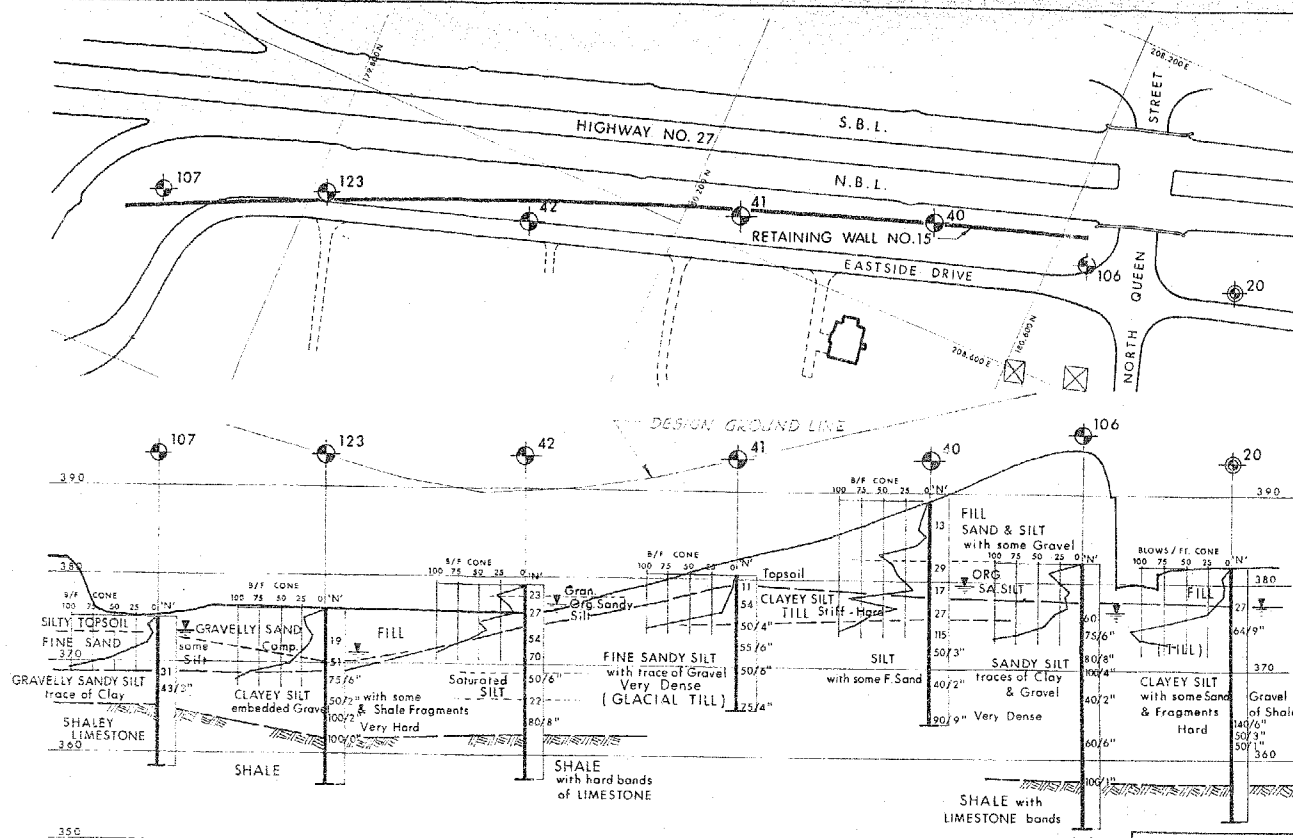
W.P. 275-64-4

JOB 66-F-47

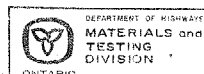
APPROVED

*G. Bailey*

DRAWING NO. **66-F-47C**



REVISED 11 AUG. 1966



HIGHWAY NO. 27 & Q.E.W. INTERCHANGE  
RETAINING WALL NO. 15

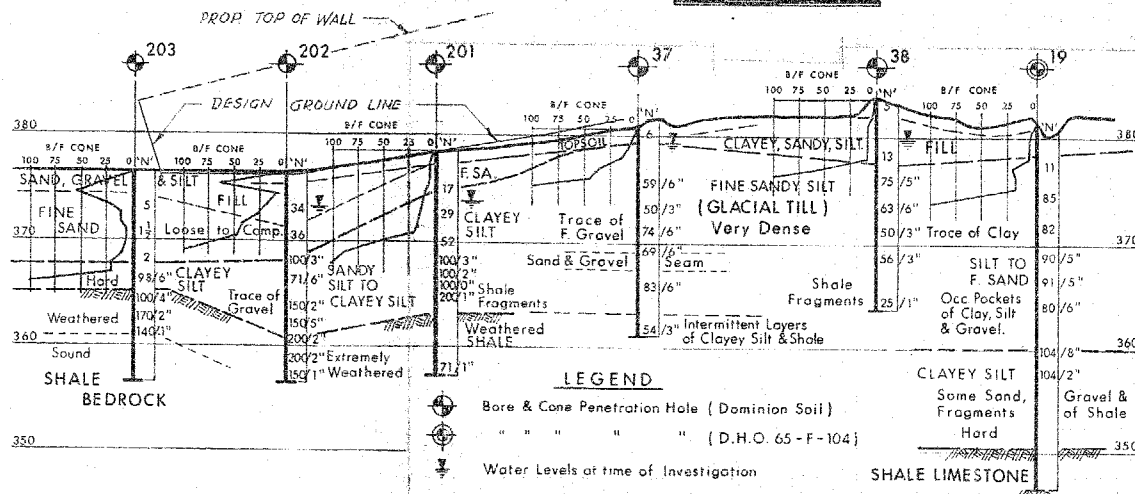
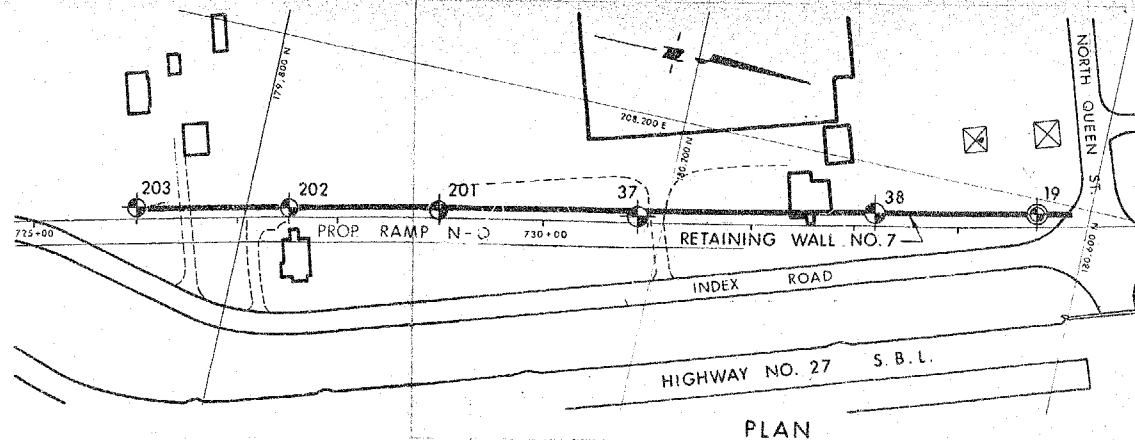
DATE 2 JUNE 1966

WP 275-64-4

APPROVED *alstomar*

JOB 66-F-47

66-F-47D



**- NOTE -**

The complete soil investigation report for this structure may be examined at the Bridge Office and Foundation Office Downsview, and at the Toronto District Office.

**- NOTE -**

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

RETAINING WALL EXTENDED 300' SOUTH  
BORE HOLES 201, 202 & 203 ADDED

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING DIVISION - CONSTRUCTION SECTION

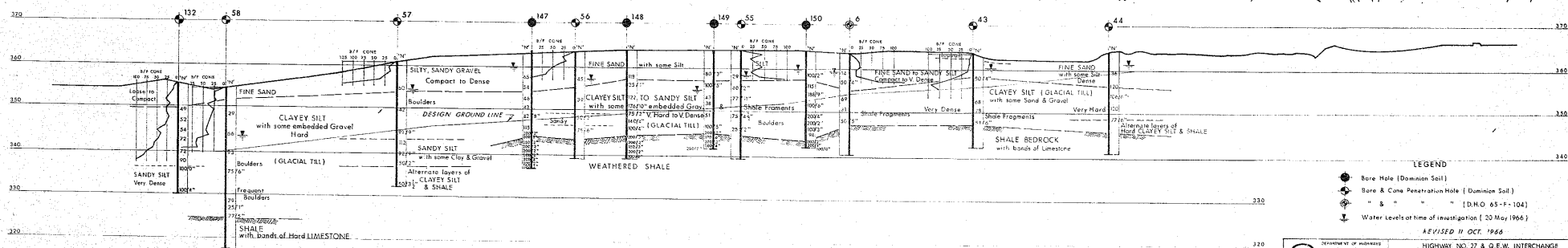
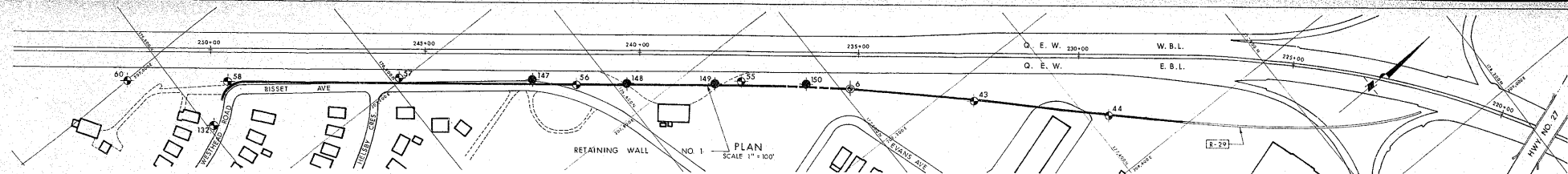
**RETAINING WALL No 7**

KING'S HIGHWAY NO. 27 & D.E.W. INTERCHANGE DIST NO. 6  
CD METROPOLITAN TORONTO  
TWP. ETOBICOKE LOT CON.

**BORE HOLE LOCATIONS & SOIL STRATA**

SUBNO. P. 5	CHECKED A. B.	DATE NO. 275-54-4	DATE 10/1/60
SPRNO. D. R.	CHECKED A. B.	DATE NO. 60-F-47	DATE 10/1/60
DATE 2 JUNE 1960	DATE NO.	DATE NO.	DATE NO.
APPROVED	DATE NO.	DATE NO.	DATE NO.

**66-F-47C**

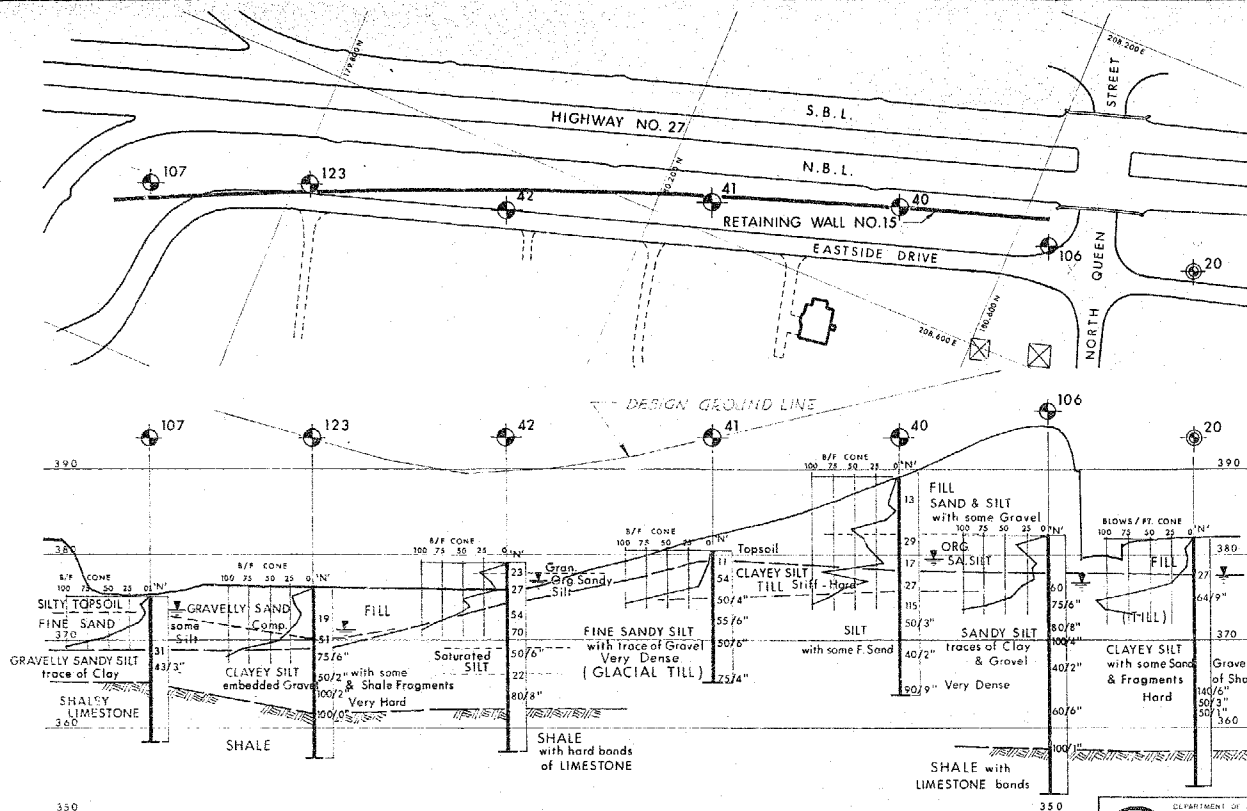


- LEGEND
- Bore Hole (Dominion Soil)
  - Bore & Cone Penetration Hole (Dominion Soil)
  - " & " " " (D.H.O. 65-F-104)
  - ▽ Water Levels at time of investigation (20 May 1966)



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION  
ONTARIO

REVISED 11 OCT. 1966  
HIGHWAY NO. 27 & Q.E.W. INTERCHANGE  
RETAINING WALL NO. 1  
WP 275-64-4  
JOS 66-F-47  
DATE 26 JULY 1966  
DRAWING NO. 66-F-47 E



REVISED 11 AUG 1966



DATE 2 JUNE 1966

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

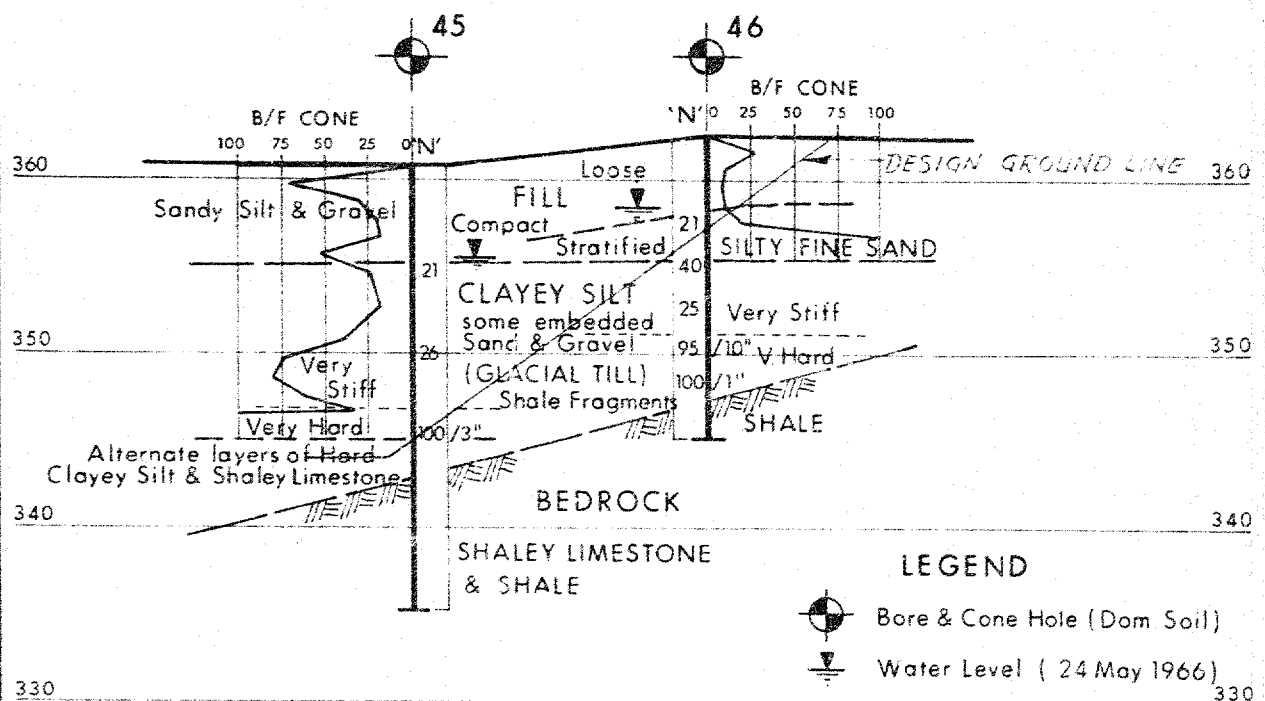
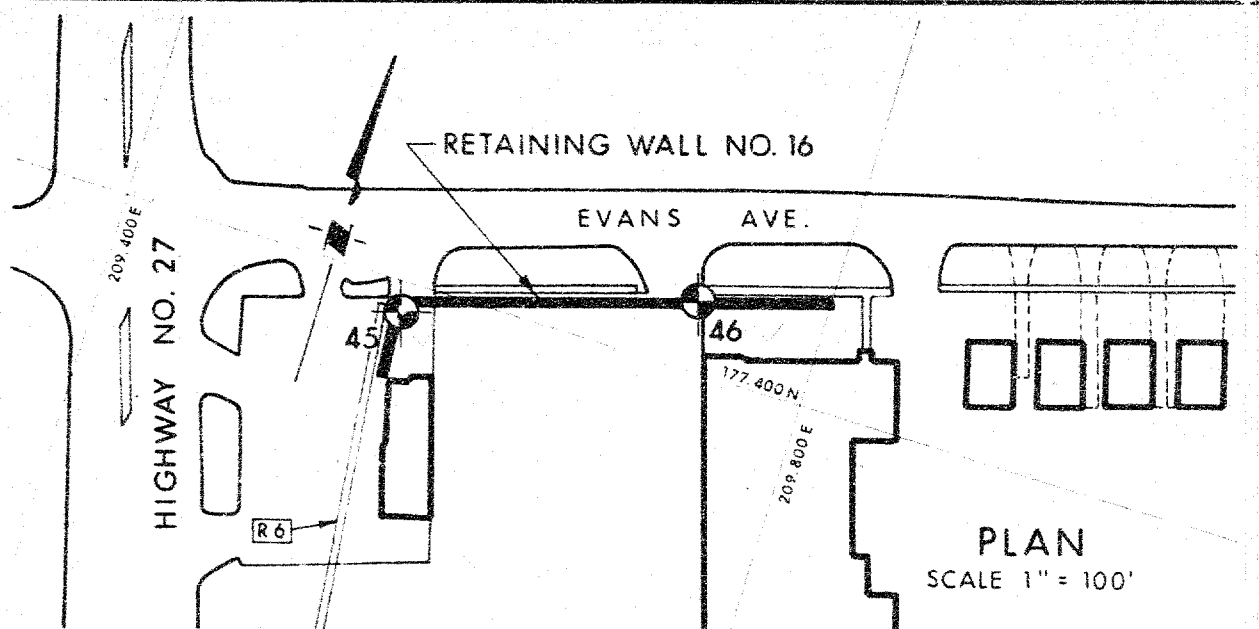
RETAINING WALL NO. 15

WP 275-64-4

JOB 66-F-47

APPROVED *alderman*

DRAWING NO. 66-F-47D



## SECTION ALONG RETAINING WALL

SCALE: Vert. 1" = 10'  
Horiz. 1" = 100'



ONTARIO

DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 16

W.P. 275-64-4

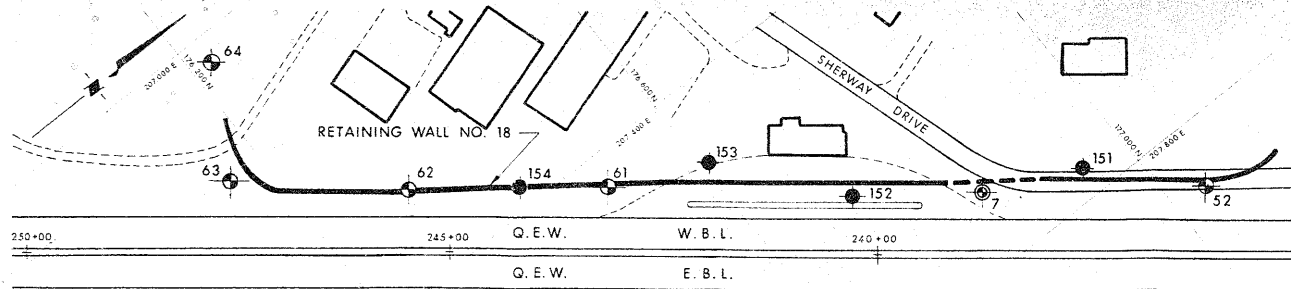
JOB 66-F-47

DATE 9 JUNE 1966

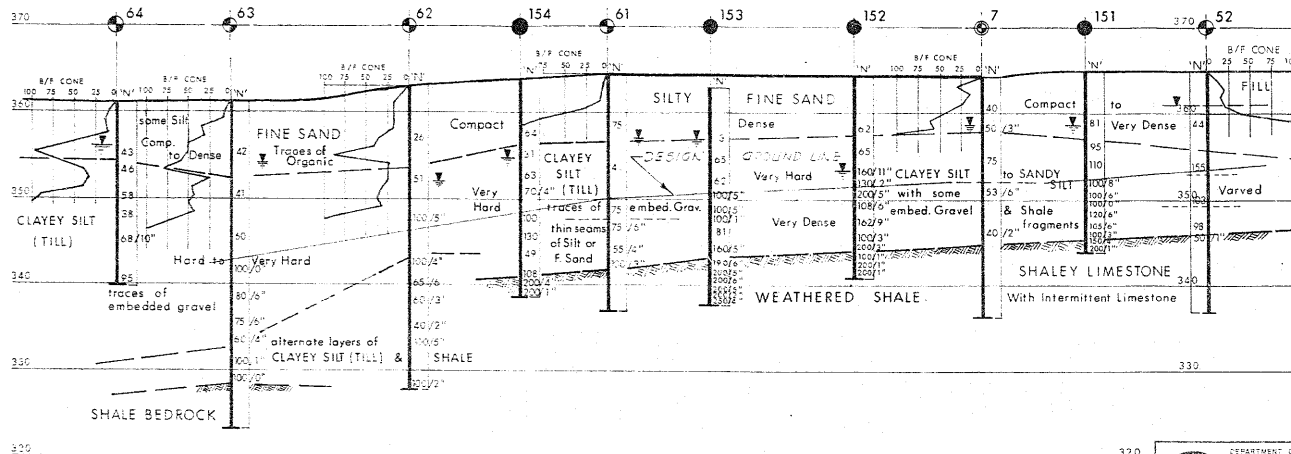
APPROVED

DRAWING NO. 66-F-47 F





PLAN  
SCALE 1" = 100'



SECTION ALONG RETAINING WALL

SCALE: Vert. 1" = 10'  
Horiz. 1" = 100'



HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 18

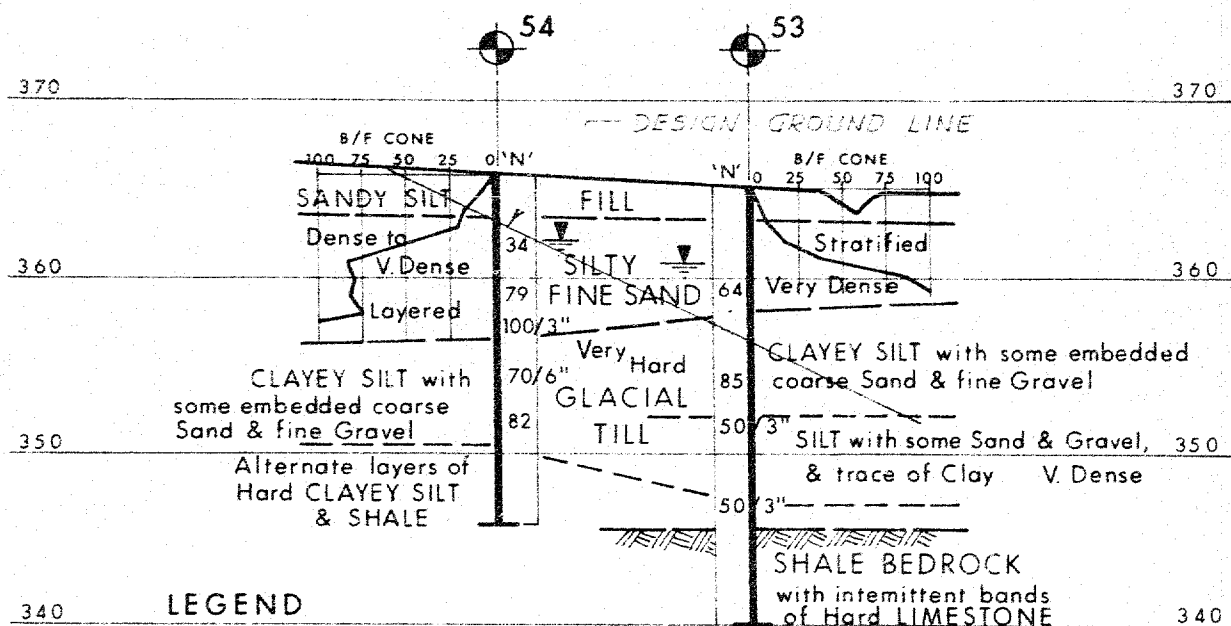
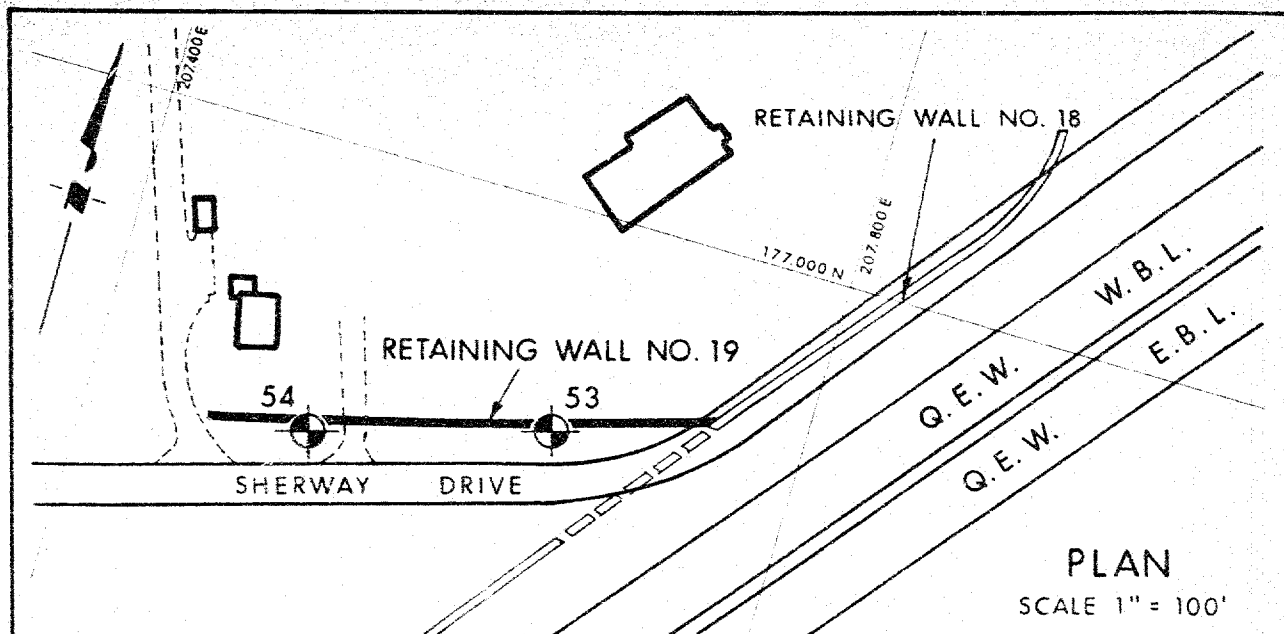
W.P. 275-64-4

JOB 66-F-47

APPROVED *alstomac*

DRAWING NO. 66-F-47 G

18 OCT. 1966  
REVISED 12 AUG. 1966



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

ONTARIO

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 19

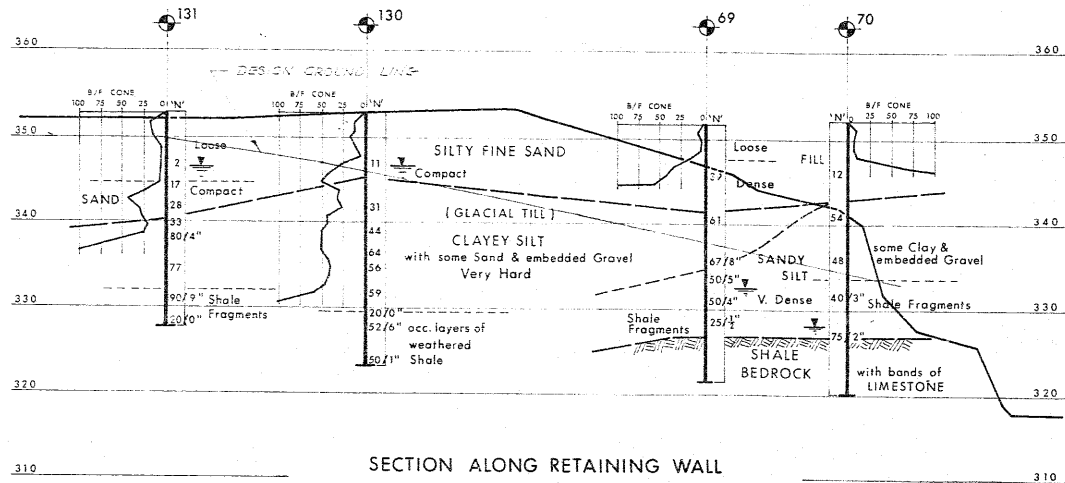
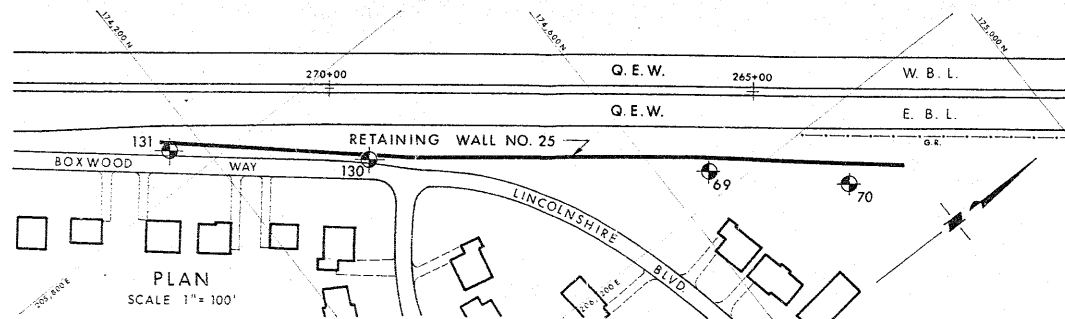
W.P. 275 - 64 - 4

JOB 66 - F - 47

DATE 15 JUNE 1966

APPROVED *[Signature]*

DRAWING NO. 66 - F - 47 H



#### LEGEND

- Bore & Cone Penetration Hole (Dominion Soil)
- Water Levels at time of investigation

REVISED 31 AUG. 1966



HIGHWAY NO. 27 & Q.E.W. INTERCHANGE  
RETAINING WALL NO. 25

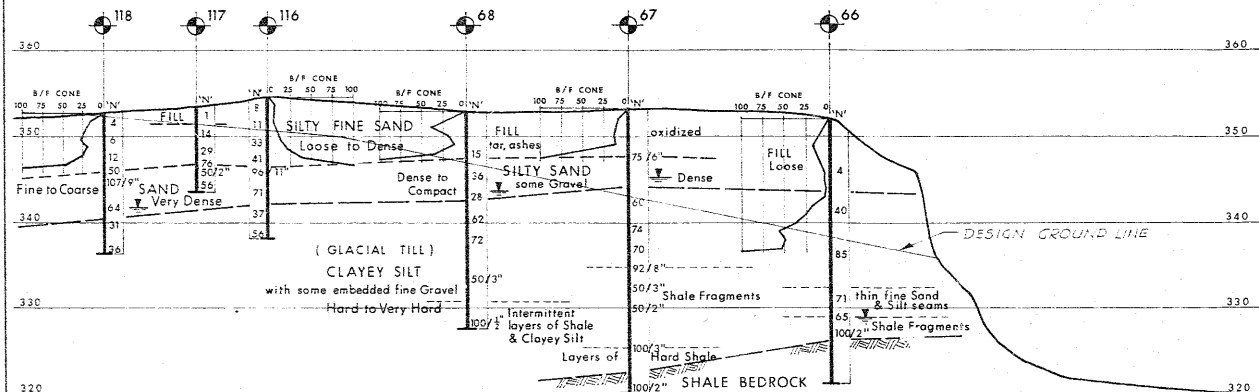
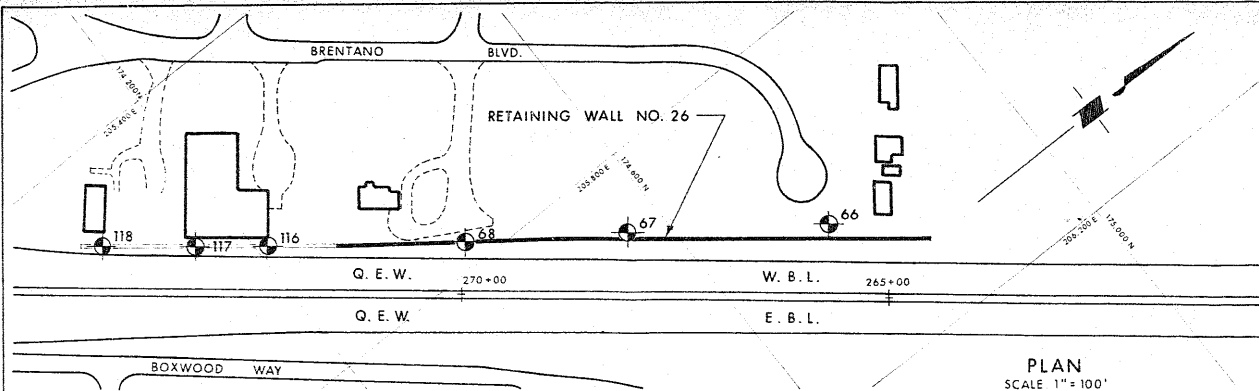
DATE 23 JUNE 1966

W.P. 274-64-4

APPROVED *Alto mag*

JOB 60-F-47

DRAWING NO. 66-F-47J



# LEGEND

- Bore & Cone Penetration Hole (Dominion Soil)
- Water Levels at time of investigation (June 2 & 15, 1966)



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 26

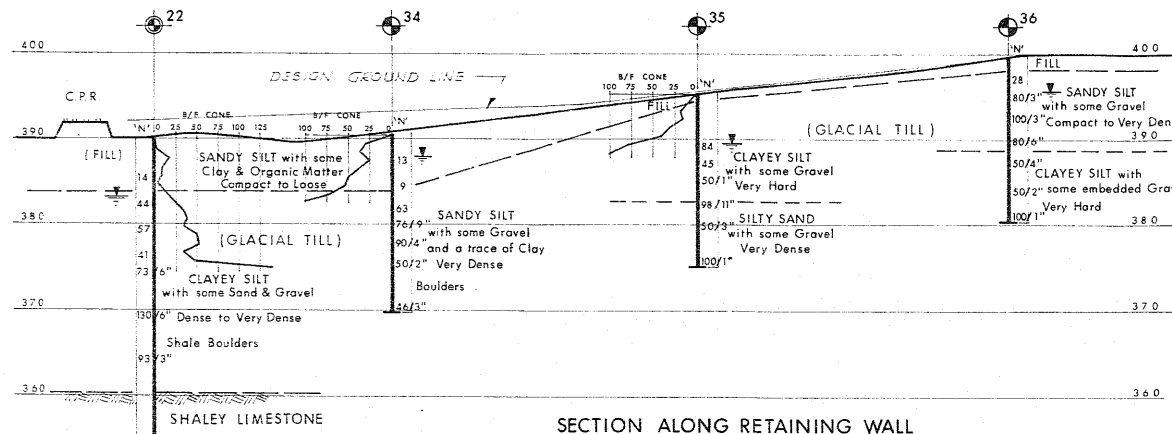
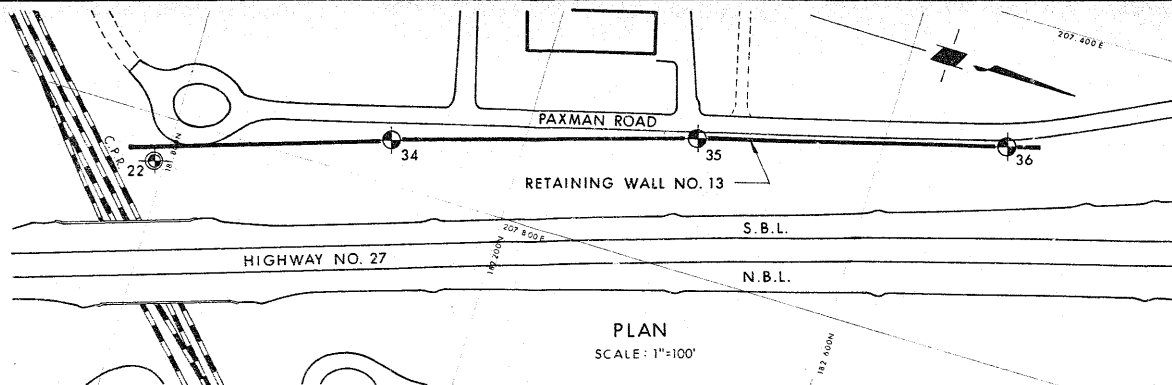
W.P. 275-64-4

JOB 66-F-47

DATE 22 JUNE 1966

APPROVED *[Signature]*

DRAWING NO 66-F-47 K

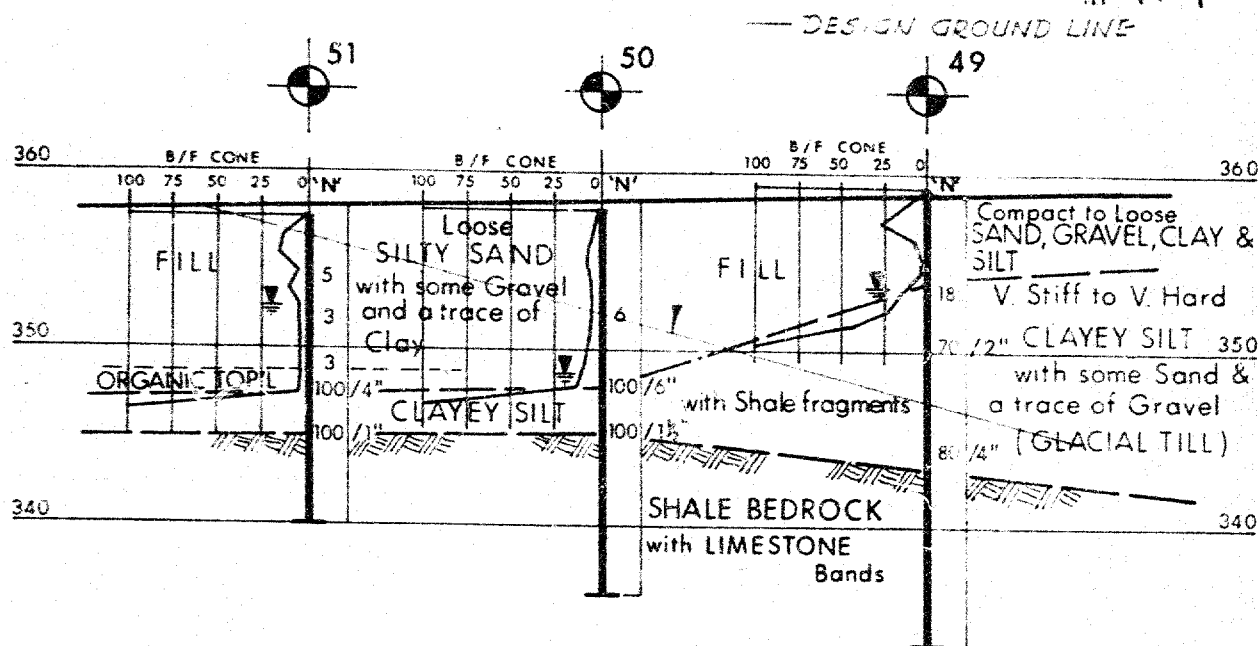
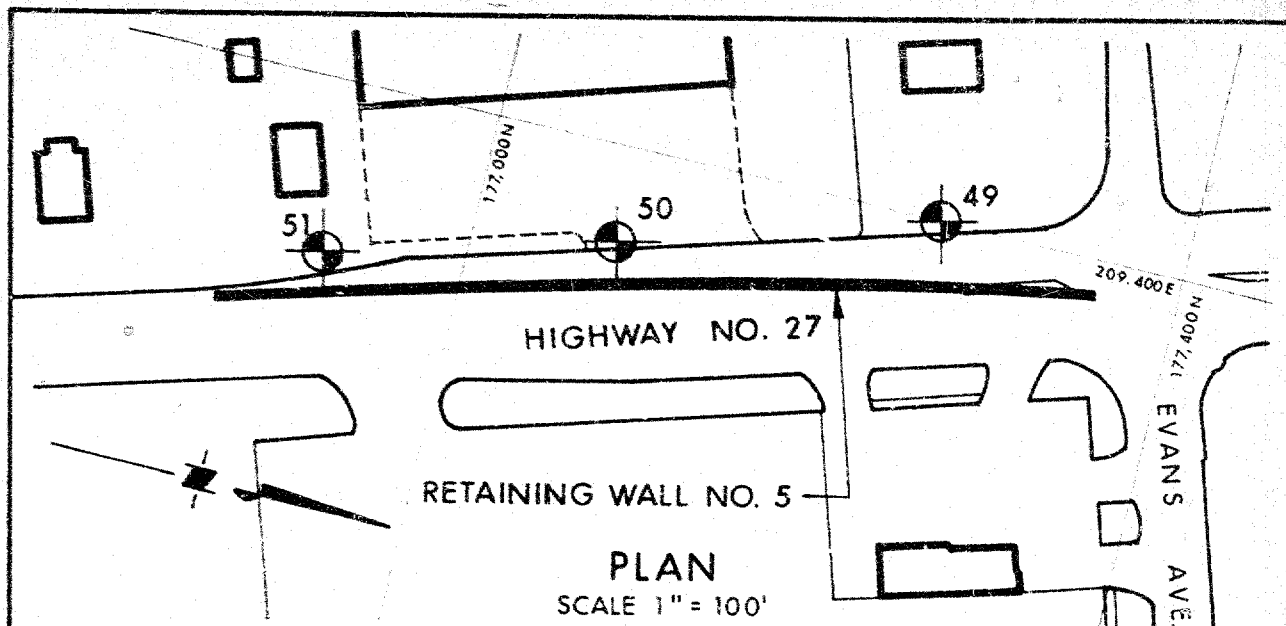


SCALE: Vert. 1" = 10'  
Horiz. 1" = 100'

- LEGEND
- Bore & Cone Penetration Hole (Dominion Soil)
  - " " " " (D.H.O. 65-F-104)
  - Water Levels at time of investigation

 DEPARTMENT OF HIGHWAYS MATERIALS and TESTING DIVISION ONTARIO	HIGHWAY NO. 27 & Q.E.W. INTERCHANGE	
	RETAINING WALL NO. 13	
DATE 27 JULY 1966	WP 275-64-4	JOB 66-F-47
APPROVED <i>[Signature]</i>	DRAWING NO. 66-F-47R	





## SECTION ALONG RETAINING WALL

SCALE: Vert. 1" = 10'  
Horiz. 1" = 100'



ONTARIO

DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 5

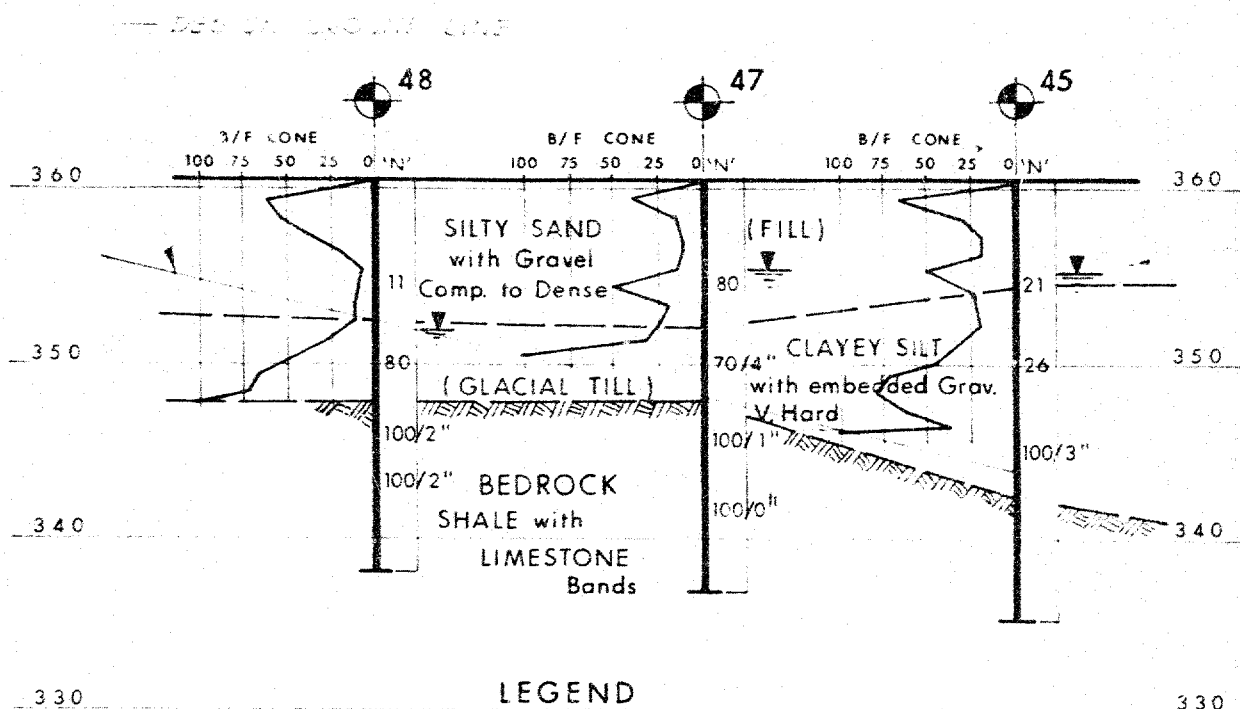
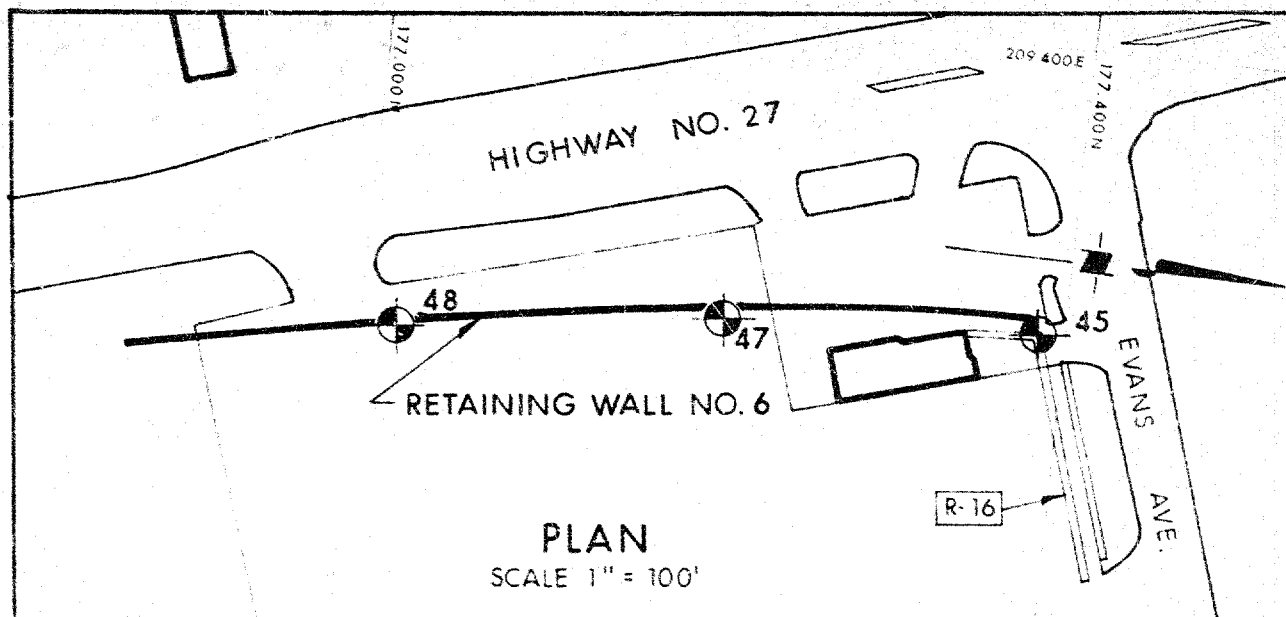
W.P. 275-64-4

JOB 66-F-47

DATE 26 JULY 1966

APPROVED *Alf...*

DRAWING NO. 66-F-47 T



### SECTION ALONG RETAINING WALL

Vert. 1" = 10'  
 SCALE: Horiz. 1" = 100'



ONTARIO

DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 6

W.P. 275-64-4

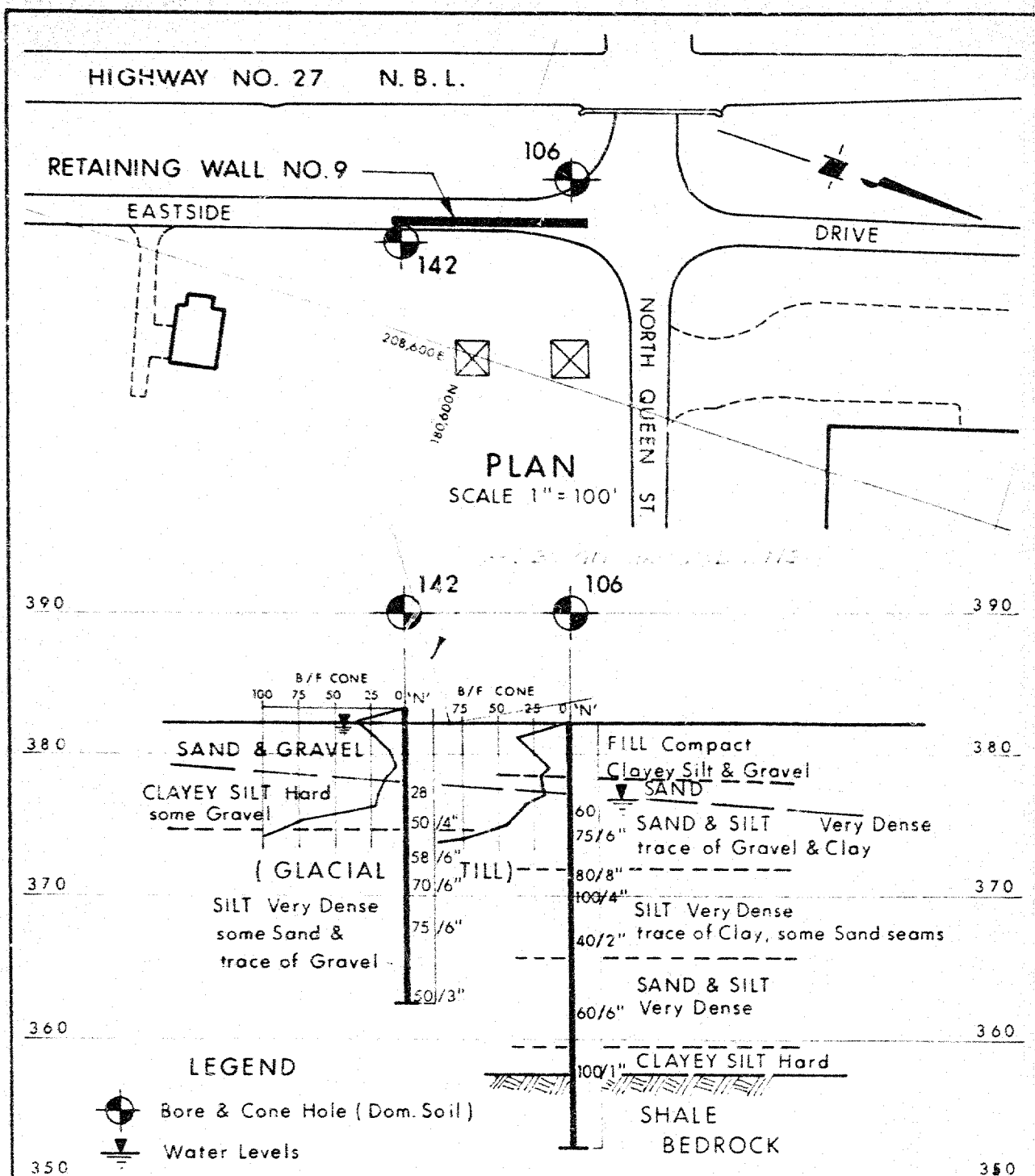
JOB 66-F-47

DATE 26 JULY 1966

APPROVED

DRAWING NO. 66-F-47 U





# SECTION ALONG RETAINING WALL

Vert. 1" = 10'  
SCALE: Horiz. 1" = 100'



ONTARIO

DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

HIGHWAY NO 27 & Q.E.W. INTERCHANGE

RETAINING WALL NO. 9

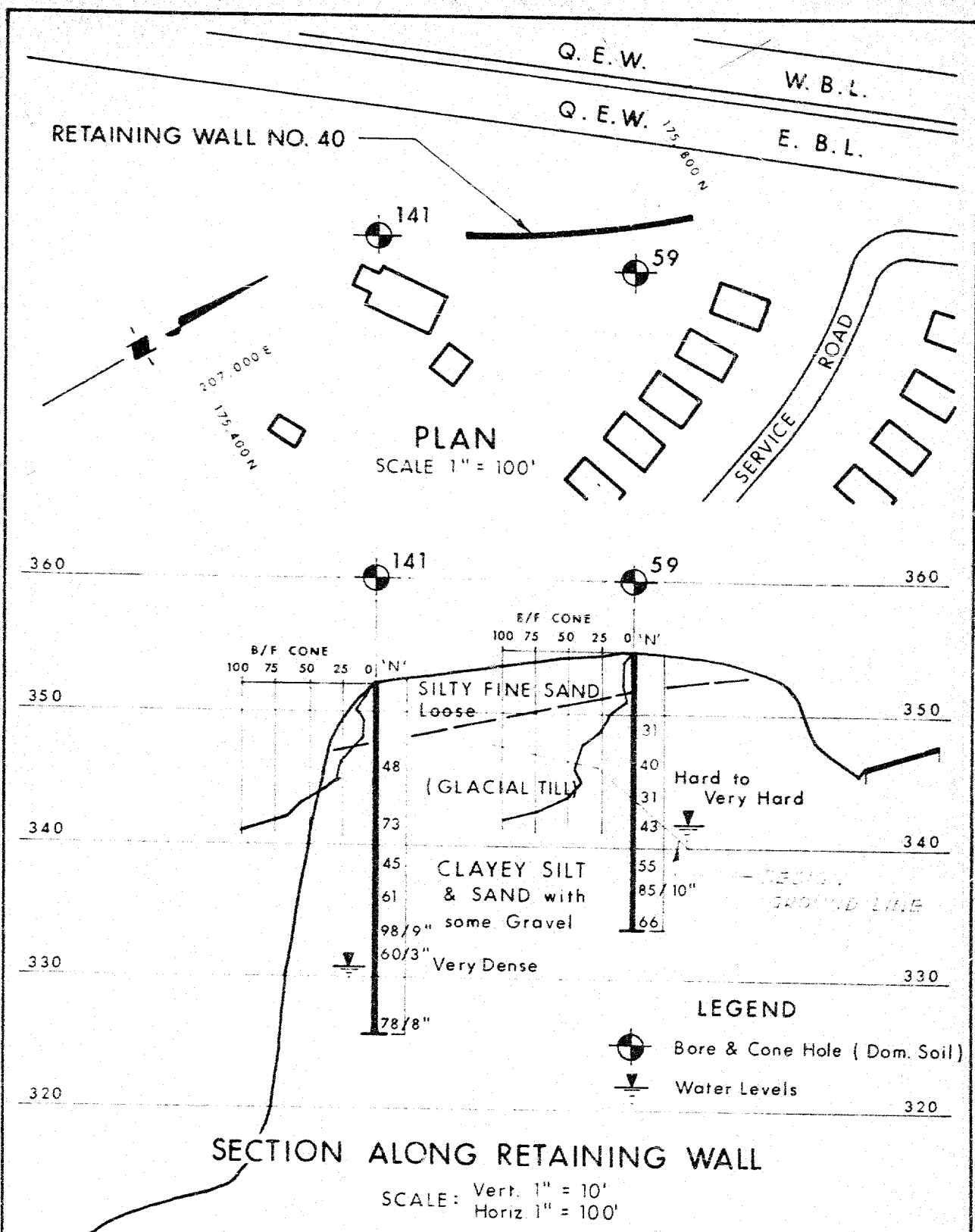
W P 275 - 64 - 4

JOB 66-F-47

DATE 1 SEPT. 1966

APPROVED

DRAWING NO. 66-F-47 V



ONTARIO

DEPARTMENT OF HIGHWAYS  
**MATERIALS and  
TESTING  
DIVISION**

HIGHWAY NO. 27 & Q.E.W. INTERCHANGE

**RETAINING WALL NO. 40**

W P 275-64-4

JOB 66-F-47

DATE 2 SEPT. 1966

APPROVED *[Signature]*

DRAWING NO. **66-F-47X**

MEMORANDUM

TO: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division.

FROM: Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. S. McCumbe

DATE: February 2, 1967

OUR FILE REF.

IN REPLY TO:

SUBJECT:

W.P. 275-64-4; Retaining Wall #7B,  
Q.E.W. and Hwy. #27 Interchange,  
District #6 (Toronto)

A memo by the Regional Bridge Location Engineer, dated January 5, 1967, was received by this Section. In the memo, additional soils investigation was requested at the site of the proposed Retaining Wall #7B extension.

Three additional boreholes were placed along the 300-ft. long extension. The borings were carried out by Dominion Soil Investigation Ltd., together with the preparation of the geotechnical data sheets.

A brief description of the subsoil and recommendations for the foundations for the entire revised structure is appended to this memo.

It is requested that Page #5 and Drawing #66-F-47C of the original report, #66-F-47, be destroyed and replaced by the enclosed new Page 5 and Drawing #66-F-47C (Revised). The attached three new borelogs should also be attached to the original report.

*K. G. Selby*

AKB/MdeF  
Attach.

cc: Messrs. B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
G. K. Hunter (2)  
F. Allen  
W. S. Melinyshyn  
T. J. Kovich  
B. A. Singh

Foundations Files ✓  
Gen. Files

K. G. Selby,  
SUPERVISING FOUNDATION ENGINEER  
For:  
A. G. Stermac  
PRINCIPAL FOUNDATION ENGINEER

Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

October 26, 1966

OCT 26 1966

FOUNDATION INVESTIGATION REPORT

For

Proposed Retaining Walls at  
Q.E.W. and Hwy. #27 Interchange  
District #6 (Toronto)  
M.J. 66-P-47 -- M.P. 275-64-4

The foundation report for the above project has now been completed and contains our final recommendations for the following Retaining Walls No's 10, 11, 7, 15, 1, 16, 18, 19, 25, 26, 13, 14, 9, 40, 5, and 6.

In order to expedite the work of the Bridge Office and Road Design Office, advance copies of partial reports for each individual wall were issued to these offices as soon as they were completed by us. Due to the fact that a number of revisions have taken place concerning the layout of the retaining walls, it has been necessary to revise some of the foundation recommendations for certain walls since the time that they were issued in the form of advance copies. You are, therefore, requested to destroy all advance copies of the partial reports pertaining to the retaining walls listed above.

ACS/ndef  
Attach.

*A. G. Sternac*  
A. G. Sternac,  
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. R. Davis (2)  
G. K. Hunter (2)

Foundations Office  
Gen. Files

# DOMINION SOIL INVESTIGATION LIMITED

17 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-8881



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

26th January 1967.

Mr. A.G. Stermac, P.Eng.,  
Principal Foundations Engineer,  
Materials Testing Division,  
Department of Highways, Ontario,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. A. Barsvary, P.Eng., Senior Engineer

Re: Q.E.W. and Highway #27 Interchange

Dear Sirs,

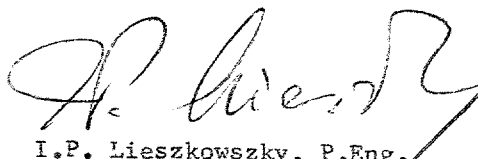
We have the pleasure of forwarding you fourteen copies of the records of boreholes No. 201, 202 and 203, pertaining to retaining wall No. 7 of the above project.

In view of the urgency on this project the samples were classified only visually without substantiating it by laboratory tests. However, if for purpose of reference you would like to have laboratory tests performed on some of the recovered samples we would be glad to oblige.

We trust that you will find the enclosed information and data in order.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED

  
I.P. Lieszkowszky, P.Eng.,  
Chief Engineer.

IPL/me  
Enclosures.

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3651



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

Our Ref. No: 6-5-39  
Your Ref: W.J. 66-F-47

5th October 1966.

Mr. A.G. Stermac,  
Principal Foundation Engineer,  
Materials and Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby P.Eng.

Re: Soil Investigation for Q.E.W. and Hwy. No. 27  
Interchange. Retaining Walls No. 1, 18 and 6.

Dear Sirs,

This letter accompanies fourteen copies of the records of  
Boreholes No. 132, 151, 152, 153, 154 and 171 put down in connection  
with the above structures.

We trust that you will find the records to your satisfaction.

Yours very truly,

DOMINION SOIL INVESTIGATION LTD.

I.P. Lieszkowszky P.Eng.  
Chief Engineer.

IPL/me  
Enclosures.

# DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 8-3351



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
84 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66886

Mr. A.G. Stermac, Principal Foundation Engineer,  
Department of Highways, Ontario,  
Materials & Testing Division,  
Downsview Avenue,  
Downsview, Ontario.

September 29, 1966

Attention: Mr. K. Selby, P.Eng.

Dear Sir,

We are pleased to enclose the following Borehole Logs and  
Grain Size Curves, that were requested by your Drafting department  
on September 28, 1966.

Borehole Nos. (23 to 58 inclusive, 60 to 70 inclusive, 102, 106,  
✓107, 116, 117, 118, 123, 130, 131, 141, 142), 7 copies ✓  
of each.

Borehole Nos. (147, 148, 149, 150,) 3 copies of each.

Borehole No. ✓59 - 22 copies.

Grain Size Curves. (23, 29, 30,) 34, 44, 47, (47, 49)  
(48, 50, 51,) (52, 54,) 55,  
(55, 56, 57,) (58, 57, 61,) 53,  
(66, 67, 68,) (66, 67,) 69 - 7 copies of each.

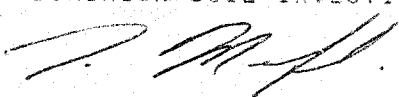
Grain Size Curves. (104, 106,) (104, 105, 106,) (107, 108,) ✓  
(107, 108, 109, 120,) 49, - 14 copies of each.

Grain Size Curves. 60, 64, - 3 copies of each.

We thank you for giving us this opportunity to be of  
service to you.

Yours Very Truly,

DOMINION SOIL INVESTIGATION LTD.

  
D. Mumford.

DM/mm

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
869 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 68896

Our Ref: 6-5-39  
Your Ref: W.J.66-F-47

28th September 1966.

Mr. A.G. Stermac,  
Principal Foundation Engineer,  
Materials & Testing Division,  
Department of Highways, Ontario,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P.Eng.

Re: Soil Investigation for Q.E.W. and Highway 27  
Interchange, Retaining Wall No. 1

Dear Sirs,

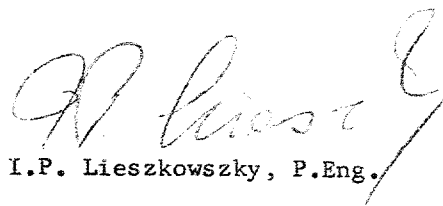
Enclosed are eleven copies of the records of boreholes No. 147, 148, 149 and 150 pertaining to the above structure.

The purpose of these additional boreholes was to establish, if possible, with more reliance the boundary between the weathered zone of the bedrock and the overlying glacial till deposit. What is believed to be the most likely boundary between these strata is indicated on the borehole logs.

We trust that you will find the forwarded information adequate for your purposes.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED

  
I.P. Lieszkowsky, P.Eng.

IPL/me  
Enclosures



# DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

## BRANCH

369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE 3-3881



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

August 29, 1966.

Our Ref. No. 6-5-39

Your Ref. No. W. J. 66-F-47

Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Materials and Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. & Hwy. # 27 Interchange,  
Retaining Walls No. 9, 25, and 40.

Dear Sirs:

This letter accompanies eleven copies of the records of boreholes No. 130, and 131 (Retaining Wall No. 25); borehole No. 141 (Retaining Wall No. 40); and borehole No. 142 (Retaining Wall No. 9).

Boreholes No. 130 and 131 supplement the information shown on the records of boreholes 69 and 70, reported to you on June 20th, 1966. These additional boreholes were made necessary by the extension of Retaining Wall No. 25 in the westerly direction.

Borehole No. 141 was put down at the west end of the proposed Retaining Wall No. 40. Information about the subsurface conditions at the east end of the same retaining wall can be obtained from boreholes No. 59 and 60 put down in connection with Retaining Walls No. 23 and 24. These were reported to you on July 6th, 1966.

For Retaining Wall No. 9 which is located on the east side of Highway No. 27, just south of the North Queen Street, only 1 borehole was put down. This borehole (borehole No. 142) is located at the south end of the proposed Retaining Wall. For further information, reference should be made to borehole No. 106 located near the north end of this retaining wall. Borehole No. 106 was put down in connection with Bridge No. 15 and was reported to you on July 18th, 1966. For the sake

D O M I N I O N   S O I L   I N V E S T I G A T I O N   L I M I T E D

Our Ref. No. 6-5-39

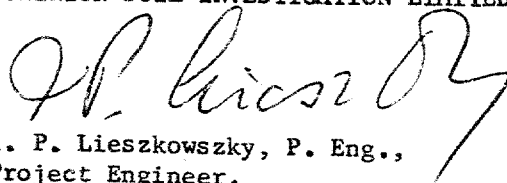
Page 2

of completeness however, the records of this borehole have been again reproduced and 11 copies are attached to this letter.

We trust that you will find the information shown on these borehole logs sufficient, however, should there be any questions please do not hesitate to call us.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

A handwritten signature in dark ink, appearing to read 'I. P. Lieszkowszky', is written over the typed name.

I. P. Lieszkowszky, P. Eng.,  
Project Engineer.

IPL/ds

**DOMINION SOIL INVESTIGATION LIMITED**  
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
865 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE 3-5351



**FOUNDATION ENGINEERS**

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

August 3, 1966.

Our Ref. 6-5-39  
Your Ref. V. J. 66-F-47

Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Materials and Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.,

Re: Soil Investigation for Q.E.W. & Hwy. #27 Interchange,  
Retaining Wall No. 15.

Dear Sirs:

This letter accompanies the records of borehole No. 123, which was put down at the south end of the extension of Retaining Wall No. 15. Results of the other boreholes pertaining to this structure were reported to you on June 1st, 1966.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

I. P. Lieszkowsky, P. Eng.,  
Project Engineer.

IPL/ds

**DOMINION SOIL INVESTIGATION LIMITED**  
12 BROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
569 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE 3-3851



**FOUNDATION ENGINEERS**

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

July 27, 1966.

Our Ref. 6-5-39  
Your Ref. W.J. 66-F-47

Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Materials & Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. and Hwy. #27  
Interchange, Retaining Walls No. 5 and 6.

Dear Sirs:

We are forwarding you herewith eleven (11) copies of the records of boreholes No. 47, 48, 49, 50, and 51 put down at the approximate locations of Retaining Walls No. 5 and 6. Please note that because of the traffic conditions on Hwy. #27 boreholes 49, 50, and 51 were relocated on the west side of the road about 30 to 40 feet from the proposed location of the structure.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

*I. P. Lieszkowszky*  
I. P. Lieszkowszky, P. Eng.,  
Project Engineer.

IPL/ds

DOMINION SOIL INVESTIGATION LIMITED  
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
269 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

July 22, 1956.

Our Ref. 6-5-39  
Your Ref. W.J. 66-F-47

Mr. A. G. Stermac  
Principal Foundation Engineer,  
Materials & Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. and Hwy. # 27  
Interchange Retaining Walls No. 13 and 14.

Dear Sirs:

Enclosed are eleven (11) copies of boreholes No. 34, 35, 36 and 31, 32, 33, pertaining to retaining walls No. 13 and 14 respectively.

We trust that you will find the records of these boreholes to your satisfaction.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

*I. P. Lieszkowski*  
I. P. Lieszkowski, P. Eng.,  
Project Engineer.

IPL/ds

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 68896

July 12, 1966.

Our Ref. No. 6-5-39  
Your Ref. W. J. 66-F-47

Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Materials & Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.,

Re: Soil Investigation for Q. E. W. and Hwy. #27  
Interchange, Retaining Wall No. 22.

Dear Sirs:

Please find enclosed eleven (11) copies of the records of Boreholes No. 64 and 65, and the result of the sieve analysis performed in connection with the proposed retaining wall No. 22.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

I. P. Lieszkowszky, P. Eng.,  
Project Engineer.

IPL/ds

DOMINION SOIL INVESTIGATION LIMITED  
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE 3-8851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 68896

July 6, 1966.

Our Ref. No. 6-5-39  
Your Ref. W. J. 66-F-47

Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Materials & Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.,

Re: Soil Investigation for Q. E. W. and  
Hwy. #27 Interchange for Retaining  
Walls No. 23 and 24.

Dear Sirs:

This letter accompanies the records of boreholes No. 59 and 60 put down at the proposed locations of retaining walls No. 23 and 24 respectively.

In the area of borehole No. 59, the subsoil immediately below the proposed foundation level is a clayey silt of low plasticity ( P.I. = 10 to 14) and very hard consistency. The undrained shear strength of the clayey silt, measured in the laboratory by unconfined compression tests, ranges between 9,500 and 12,700 pounds per square foot as shown on the Geotechnical Data Sheet of the borehole.

In borehole No. 60 the subsoil is a predominantly granular glacial till as indicated by the attached grain size distribution curves and the low plasticity Index (3.5) obtained in the Atterberg Test.

The observed ground water level ranges between elevations 341.5 and 345 ft.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

*I. P. Lieszkowsky*  
I. P. Lieszkowsky, P. Eng.,  
Project Engineer.

IPL/ds

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3651



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

June 29, 1966.

Our Ref. No. 6-5-39  
Your Ref. W. J. 66-F-47

Mr. A. G. Stermac,  
Principal Foundations Engineer,  
Materials and Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q. E. W. and Hwy. #27  
Interchange. Retaining Walls No. 20 and 21.

Dear Sirs:

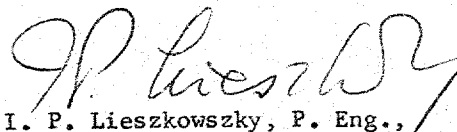
Enclosed herewith are eleven (11) copies of the records of boreholes No. 55,56,57, 58 and No. 61,62,63 pertaining to the above retaining walls.

The soil stratigraphy in the area of these retaining walls is similar to that reported earlier. A shallow stratum (2.5 to 9.5 ft.) of very fine sand is followed by the very hard or very dense clayey silt or sandy silt till deposits which in turn are underlain by the shale bedrock. The ground water level generally lies within the top silty sand stratum.

Particularly noteworthy is however, the artesian condition observed in borehole No. 62 between elevations 333 and 328 ft. only about 10 feet below the proposed foundation level. The total head is about 30 ft. (slightly above the ground surface) but since the pressure ceased after half an hour the source of water appears to be limited.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

  
I. P. Lieszkowszky, P. Eng.,  
Project Engineer.

IPL/ds



DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 9-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66886

June 20, 1966.

Our Ref: 6-5-39  
Your Ref: W.J. 66-F-47

Department of Highways, Ontario,  
Materials & Testing Division,  
Downsview St.,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. and Hwy. 27  
Interchange, Retaining Walls No. 25 and 26

Dear Sirs:

Enclosed are eleven (11) copies of the records of boreholes Nos. 66, 67, 68, 69, 70, 116, 117 and 118. Boreholes Nos. 116 and 118 inclusive were put down at the extension of retaining wall No. 26, in front of Watson's Apple Storage Ltd. The boreholes were put down approximately 4 ft. south of the south face of the existing structure.

Results of the laboratory tests performed on representative samples recovered from the above boreholes are shown on the Geotechnical Data Sheets for the boreholes or on separate enclosures also attached to this letter.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

I. P. Lieszkowszky, P. Eng.  
Project Engineer.

IPL/jvm  
Encls.

DOMINION SOIL INVESTIGATION LIMITED  
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

RANCE  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

June 15, 1966.

Our Ref: 6-5-39  
Your Ref: W.J. 66-F-47

Department of Highways, Ontario,  
Materials & Testing Division,  
Downsview St.,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. and Highway #27  
Interchange, Retaining Walls Nos. 18 & 19

Dear Sirs:

Boreholes Nos. 52, 53 and 54, pertaining to the above Retaining Walls, have been completed and records of the borings are enclosed herewith.

The soil conditions encountered are typical of the area. The surface of the shale bedrock was encountered between Elevations 345 and 350 feet. It is overlain by a very dense or very hard glacial deposit, covered by about 10 feet of silty fine sand. The ground water level which lies at an average elevation of 361 feet, was encountered within this silty sand stratum. In view of the permeable nature and the uniform grading of this sand, this may create some dewatering problems during construction. Typical grain size distribution curves are also enclosed.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

*I. P. Lieszkowszky*  
I. P. Lieszkowszky, P. Eng.,  
Project Engineer.

IPL/jvm

DOMINION SOIL INVESTIGATION LIMITED  
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

June 7, 1966.

Our Ref: 6-5-39  
Your Ref: W.J. 66-F-47

Department of Highways, Ontario,  
Materials & Testing Division,  
Hwy. 401 and Keele Street,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. & Hwy. 27  
Interchange, Retaining Walls No. 1 & 16

Dear Sirs:

Enclosed are eleven (11) copies of the records of boreholes No. 43, 44, 45 and 46 and of two grain size distribution curves.

To depths ranging between 5 and 8 feet below the ground surface, the site in the area of the proposed retaining walls No. 1 and 16 is underlain by silty fine sand (Sand: 70 - 85%; Silt: 15 - 30%) followed by clayey silt deposits of glacial origin. The bedrock was encountered between elevations 342 and 347 feet.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

I. P. Lieszkowszky, P. Eng.,  
Project Engineer.

IPL/jvm  
Encls.

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE ~~XXXXXXX~~ 751-6565

RANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

May 25, 1966.

Our Ref: 6-5-39

Your Ref: W.J. 66-F-47

Department of Highways, Ontario,  
Materials & Testing Division,  
Hwy. 401 & Keele St.,  
DOWNSVIEW, Ontario.

Attention: Mr. K. Selby, P.Eng.

Re: Soil Investigation for Q.E.W. & Hwy. #27  
Interchange, Retaining Walls No. 10 & 11

Dear Sirs:

Enclosed with this letter we are forwarding you eleven (11) copies of the records of the boreholes pertaining to the above two structures (B.H.'s No. 23 to 30 inclusive).

As shown, the site at these locations is underlain by very hard clayey or very dense predominantly silty glacial till deposits.

Atterberg tests indicate that the Liquid Limit of the clayey deposits ranges between 24 and 28% with corresponding Plasticity Indices of 8 to 12. Particularly noteworthy are the high shear strength values measured by unconfined compression tests performed on slightly disturbed split spoon samples. Taking the shear strength as one-half of the unconfined compressive strength most of the measured values fall generally between 15,000 and 20,000 P.S.F. These high shear strength values are substantiated also by the negative Liquidity Indices and the high standard penetration resistances.

Typical grain size distribution curves of the more sandy and silty till strata are shown on a separate enclosure

cont'd.

D O M I N I O N   S O I L   I N V E S T I G A T I O N   L I M I T E D

6-5-39

Page 2.

indicating a well graded mixture of particles ranging between the clay and gravel sizes (clay: 2 to 12%, silt: 35 to 45%, sand: 35 to 50%, gravel: 3 to 15%).

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,



I. P. Lieszkowszky, P.Eng.,  
Project Engineer.

IPL/is

- FOUNDATION INVESTIGATION REPORT  
For  
Proposed Retaining Walls at  
Q.E.W. and Hwy. #27 Interchange  
District #6 (Toronto)  
W.J. 66-F-47 - W.P. 275-64-4

1. INTRODUCTION:

A request for a foundation investigation at the sites of a number of retaining walls to be constructed as part of the proposed Q.E.W. and Hwy. #27 interchange was received by this Section on May 6, 1966. The request was made verbally by Mr. R. Strain, Direct Expenditures Supervisor, Program Division, and Mr. J. McAllister, Bridge Location Supervisor, Bridge Division.

Due to the urgency of the work, the investigations for each wall are reported separately as soon as the field work is completed, and according to a particular time schedule supplied to us by Mr. Strain. The individual walls are identified by number.

Field work, laboratory work, and the preparation of the Record of Borehole sheets, have been undertaken by Dominion Soil Investigation Ltd.

This report contains the results of the field and laboratory investigations, together with our recommendations pertaining to foundation design.

2. DESCRIPTION OF SITE:

The site is located in the general area of the intersection of Hwy. #27 and the Q.E.W. in the Twp. of Etobicoke, Metropolitan Toronto. The surrounding district is heavily built up both of light industry and residential buildings. The topography of this area may be described as flat to gently undulating.

2. DESCRIPTION OF SITE: (cont'd.) ...

Physiographically, the area is situated in the low-lying part of the region referred to as the Iroquois Plain which was formed during the late Pleistocene period by the body of water since designated Lake Iroquois. Soils in this part of the region are mainly heavy-textured shale and limestone tills.

3. SUBSOIL CONDITIONS:

Subsoil over the site area, consists generally of deposits of silty sand to sandy silt followed by clayey silt, sand and gravel (glacial till), followed by shaley limestone bedrock. Depth to bedrock ranges from about 4 feet (El. 365.0) at the south end of the project to about 30 feet (El. 350.0) at the north end. The boundaries between the different deposits are shown on the borelog sheets contained in the Appendix of this report. The estimated stratigraphical profiles shown on Drawings 66-F-47-A, B, C, etc., are based upon this information. Detailed descriptions of the subsoil conditions at each of the retaining wall sites investigated, are given separately in Section 4 below:

4. DISCUSSION AND RECOMMENDATIONS:

Seventeen retaining walls are included in this project. These are numbered 10, 11, 7, 15, 1, 16, 18, 19, 25, 26, 20, 21, 23, 24, 22, 13 and 14. Subsoil conditions and recommendations for the individual retaining wall foundations are discussed separately, as follows:

cont'd. /3 .....

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #10 -

1. Soil Conditions:

Four borings were carried out at the site of this wall. The borings are numbered: 23, 24, 25 and 26. Subsoil consists of from 1 to 4 feet of sandy silt to silty sand fill material, followed by about 22 feet of very stiff to hard glacial till, followed by limestone bedrock. The glacial till deposit consists of a heterogeneous mixture of clay, silt, sand and gravel in varied proportions, but is generally of a cohesive nature. Ground water level in the borings was found to range from just below the ground surface to about 7 feet below.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Drawing #66-P-47A.

2. Recommendations:

The proposed retaining wall may be supported on spread footings founded within the hard glacial till stratum. It is estimated that a safe net pressure of 3.5 t.s.f. can be achieved for footings located about 4 feet below present original ground level. In this event, the base of the footings would range from El. 377.0 at the south end of the wall, to El. 379.0 at the north end. For footings placed 6 feet below present original ground level, design pressures up to 4.5 t.s.f. may be assumed.

In computing the resistance to lateral movement on the footing bases, an adhesion value of 3000 p.s.f. may be assumed to act between the underside of footings and the subsoil.

For backfill to the retaining walls, you are referred to a memo from Mr. A. Rutka, Materials and Testing Engineer, to Mr. A. M. Toye, Bridge Engineer, dated March 27, 1963, the subject being: "Hwy. #401, Toronto Bypass Retaining Wall Backfill."

No dewatering problems are anticipated.

cont'd. /4 .....



4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #11 -

1. Soil Conditions:

Five borings were drilled at the site of this wall and are numbered: 20, 27, 28, 29 and 30. Subsoil consists of up to 6 feet of sandy silt to silty sand fill material, followed by 20 to 24 feet of hard glacial till, followed by limestone bedrock. The glacial till deposit consists of a heterogeneous mixture of clay, silt, sand and gravel in varied proportions, but is generally of a cohesive nature. Ground water levels in the borings were found to range from 1 to 4 feet below the ground surface.

The locations and elevations of the borings, together with the inferred soil stratigraphy, are shown on the accompanying Drawing #66-F-47B.

2. Recommendations:

The proposed wall may be supported on spread footings founded within the hard glacial till stratum. For footings founded some 4 feet below present original ground level, a safe net pressure of 3.5 t.s.f. may be assumed for design purposes. In this event, the base of the footings would range from El. 377.0 at the south end of the wall, to El. 383.0 at the north end. For footings placed 6 feet below present original ground level, design pressures up to 4.5 t.s.f. may be assumed.

In computing the resistance to lateral movement on the footing bases, an adhesion value of 3000 p.s.f. may be assumed to act between the underside of footing and the subsoil.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

No dewatering problems are anticipated.

cont'd. /5 .....

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #7 -

1. Soil Conditions:

Three borings were carried out at the site of this wall. The borings are numbered: 19, 37 and 38. Subsoil consists of from 2 to 4 feet of sandy silt fill material, followed by a very dense deposit of glacial till, followed by shaley limestone bedrock. The glacial till deposit extends for about 27 feet and consists generally of sandy silt with traces of gravel, changing to clayey silt with sand and gravel in the lower 10 feet. Groundwater levels in the borings ranged from 3 to 4 feet below the ground surface.

The locations and elevations of all borings, together with the inferred soil stratigraphy, are shown on the attached Drawing #66-F-47C.

2. Recommendations:

The proposed wall may be founded at approximately El. 375.0 in which case, allowable pressures up to 4.5 t.s.f. may be assumed for design purposes.

In computing the resistance to lateral movement on the footing bases, a friction coefficient of 0.5 may be assumed to act between the bottom of the footing and the subsoil.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

This type of subsoil is susceptible to conditions of unbalanced hydrostatic head. It is believed, however, that dewatering of the relatively shallow excavations should present no major problems.

cont'd. /6 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #15 -

1. Soil Conditions:

Seven borings have been carried out at the site of this retaining wall and are numbered: 20, 40, 41, 42, 106, 107, and 123. Subsoil consists of from 3 to 17 feet of sand and silt fill material, followed by a very dense deposit of glacial till, ranging in depth from 12 to 20 feet, followed by shaley limestone bedrock. The glacial till deposit consists generally, of fine sandy silt with traces of gravel. Pockets of hard clayey silt with some sand and gravel and shale fragments are also contained within the deposit. Groundwater levels were found to range from 2 to 9 feet below the ground surface in the boreholes, and corresponded closely to the elevations of the original ground surface.

The locations and elevations of the borings, together with the inferred soil stratigraphy, are shown on the accompanying Drawing #66-F-47D.

2. Recommendations:

At this location the proposed finished ground level on the low side of the retaining wall is approximately 5 to 18 feet higher than the present ground surface. In this case, three alternative types of foundation are proposed for consideration:

a) The proposed wall may be founded some four feet below the original ground surface, assuming a design pressure of 4.5 t.s.f. In this case, the base of footing will range from El. 367.0 at the south end of the wall, to El. 375 at the north end. A friction coefficient of 0.45 may be assumed to apply between the underside of footings and the soil. A dewatering scheme may be required since the soil is likely to 'boil' under conditions of unbalanced hydrostatic head.

cont'd. /7 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #15 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

b) The proposed wall footings may be placed within the fill material some four feet below the finished level and be supported on steel H-piles driven to bedrock, or to practical refusal in the glacial till overlying the rock. For design purposes, the maximum allowable load for the particular section used may be assumed.

c) The proposed walls may be founded on spread footings placed on well compacted G.B.C. Class 'A' fill material. The depth of the foundation should be not less than 4 feet below finished ground level. The G.B.C. Class 'A' material should extend for a minimum width of 3 feet on each side of the footings in the plane of the footing tops. It should then slope down at 1:1 to the existing ground level. All topsoil and loose existing fill material should be removed prior to placing the new granular fill. A safe net pressure of 2 t.s.f. may be assumed for design purposes.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

cont'd. /8 .....

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #16 -

1. Soil Conditions:

Two borings were drilled at the location of this wall. These are numbered: 45 and 46. Subsoil consists of about 5 feet of sandy silt to silty sand fill material, followed by 11 to 13 feet of very dense glacial till, followed by shaley limestone bedrock. The glacial till deposit consists of a heterogeneous mixture of clayey silt, sand and gravel, and is generally of a cohesive nature. Ground water level in the boreholes was found to range from 3 to 6 feet below the ground surface.

The locations and elevations of the borings, together with the estimated stratigraphical profile, are shown on Drawing #66-F-47F.

2. Recommendations:

The finished ground line on the low side of this wall ranges from approximate El. 344 at the west end to El. 363 at the east end. In this case, part of the wall at the west end will be founded, of necessity, in bedrock. The remaining portion of the wall should be founded 4 feet below the finished ground line, or 4 feet below the surface of the glacial till stratum shown on Drawing #66-F-47F, whichever is the lower elevation. For the portion of wall founded on rock, design loads up to 10 t.s.f. may be assumed. Elsewhere, allowable pressures up to 4 t.s.f. are recommended. Vertical expansion joints should be constructed between the parts of the wall founded on rock and on overburden. An adhesion value of 3000 p.s.f. may be assumed to act between the bottom of footings and the soil.

For backfill to the wall, recommendations for Wall #10 should be followed.

No dewatering problems are anticipated.

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #19 -

1. Soil Conditions:

Two borings were drilled at the location of this wall. These are numbered: 53 and 54. Subsoil consists of about 3 feet of sandy silt to silty sand fill material, followed by 4 to 7 feet of very dense silty fine sand, followed by about 10 feet of hard glacial till, followed by shale bedrock. The glacial till deposit consists of a heterogeneous mixture of clayey silt, sand and gravel, and is generally of a cohesive nature. Groundwater level in the boreholes was found to range from 4 to 5 feet below the ground surface.

The locations and elevations of the borings, together with the estimated stratigraphical profile, are shown on Drawing #66-F-47H.

2. Recommendations:

The finished ground line on the low side of this wall ranges from approximate El. 367.0 at the west end to El. 352.0 at the east end. It is recommended to found the wall on spread footings placed 4 feet below the surface of the original ground, or 4 feet below the finished ground line, whichever is the lowest elevation. In this event, the base of the wall will range from El. 360.0 at the west end to El. 347.0 at the east end. Allowable pressures of 4.5 t.s.f. may be assumed for design purposes. Dewatering problems may be encountered since part of the excavation will be in fine-grained granular soil. In this event, care must be taken to prevent 'boiling' of the excavation bases. A friction coefficient of 0.5 may be assumed to act between the bottom of footings and the soil.

For backfill to the wall, recommendations for Wall #10 should be followed.

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #25 -

1. Soil Conditions:

Boreholes #69 and #70 were drilled at the site of this retaining wall. Subsoil at the wall location consists of up to 6 feet of dense silty fine sand overlying about 15 feet of glacial till, followed by shale bedrock. The glacial till deposit ranges from a very dense sandy silt with some clay and gravel, to a hard clayey silt containing sand and gravel. The lower ten feet of the deposit contains numerous shale fragments. Groundwater level in the borings was found to be about 13 feet below the level of existing ground at the centre-line of the proposed wall.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Drawing #66-P-47J.

2. Recommendations:

The finished ground level on the low side of this wall ranges from El. 338.0 at the south end, to El. 332.0 at the north end. Since the depth to bedrock ranges from 10 to 5 feet below these levels, it may be the most economical solution to found the wall on spread footings placed directly onto the rock, utilizing a design pressure of 10 t.s.f. In any event, the wall may be founded wholly or partially on spread footings within the overburden at or below a depth of 4 feet below the finished ground level. In this case, footings within the overburden may be designed assuming an allowable pressure up to 4.0 t.s.f. Vertical expansion joints should be constructed between footings on rock and footings on overburden.

In computing the resistance to lateral movements, a friction coefficient of 0.45 may be assumed to apply between the footing bases and the subsoil below.

Due to the granular nature of the subsoil, it is possible

cont'd. /13 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #25 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

that dewatering problems will be encountered and, therefore, precautions should be taken to prevent 'boiling' of the excavation bases.

For backfill to the retaining wall, recommendations given for Wall #10 should be followed.

cont'd. /14 ...



4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #26 -

1. Soil Conditions:

Six borings were carried out at the site of this wall. These are numbered: 66, 67, 68, 116, 117 and 118. Subsoil consists of from 5 to 8 feet of loose to dense silty fine sand, followed by about 5 feet of compact to very dense fine to coarse sand to silty sand, followed by about 20 feet of hard glacial till. The hard glacial till deposit is underlain by shale bedrock and consists of clayey silt with some embedded fine gravel. Groundwater in the boreholes was found to range from 8 to 11 feet below the ground surface over most of the area.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Drawing #66-F-47K.

2. Recommendations:

The proposed wall may be founded on spread footings placed 4 feet below finished ground level. An allowable pressure of 3.0 t.s.f. may be assumed for design purposes. If higher pressures are required, 4.5 t.s.f. may be achieved at a depth of 6 feet below finished ground level. No major dewatering problems are anticipated since the groundwater level appears to be fairly low at the south-west half of the wall where the footings will be based in granular soil, and at the north-east half the bases will be in cohesive soil (see Drawing #66-F-47K).

In computing resistance to lateral pressures, a friction coefficient of 0.5 may be assumed for the footings on granular soil, and an adhesion value of 3000 p.s.f. may be assumed for the footings on cohesive soil.

Backfill to the retaining walls should be as recommended for Wall #10.

cont'd. /15 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #20 -

1. Soil Conditions:

Five boreholes were drilled at the site of this wall. These are numbered: 16, 55, 56, 57, and 58. Subsoil at the site from ground level downward, was found to consist of from 4 to 9 feet of compact to very dense silt and fine sand with gravel, followed by a hard clayey silt with some gravel and boulders - (glacial till). The thickness of this material was found to vary from 8 to 21 feet. At two borehole locations (56 and 57), the glacial till deposit is interbedded with a 3-to 6-foot thick layer of very dense sandy silt.

Calcareous shale and shaley limestone bedrock was encountered in all boreholes, following the clayey silt deposit.

Groundwater in the boreholes was found to range from 4 to 12 feet below ground level.

The locations and elevations of boreholes, together with the estimated stratigraphical profile, are shown on Dwg. #66-F-47L.

2. Recommendations:

The proposed retaining wall may be founded on spread footings, placed 4 feet below finished ground level. An allowable pressure of 3.5 t.s.f. may be assumed for design purposes. Some dewatering problems are anticipated since the excavation for the wall foundation will be carried into the sandy silt layer, which is suspected to be water-bearing.

In computing resistance to lateral pressures, a friction coefficient of 0.45 may be assumed for the footings on granular soil and an adhesion value of 3000 p.s.f. may be assumed for the footings on cohesive soil.

For backfill to the wall, recommendations for Wall #10 should be followed.

cont'd. /16 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #21 -

1. Soil Conditions:

Four borings were carried out at the site of this wall and are numbered: 7, 61, 62 and 63. Subsoil at the site was found to consist of up to 10 feet of compact to very dense silty fine sand to fine sand with traces of organics, followed by 14 to 25 feet of clayey silt, with some sand and silt seams, also containing some gravel and fragments of shale. This deposit (glacial till) is followed by shale and shaley limestone bedrock.

The depth to the groundwater level as observed in the borings, was found to vary from 6 to 11 feet below the ground surface.

The locations and elevations of the borings, together with the inferred subsoil stratigraphy, are shown on the accompanying Dwg. #66-F-47M.

2. Recommendations:

In view of the foregoing, it is recommended that the proposed retaining wall be founded on spread footings, some 4 feet below the finished ground line, where a safe design pressure of 3.5 t.s.f. may be achieved. No major dewatering problems are anticipated, but the presence of the sand and silt seams within the cohesive layer should be kept in mind.

In computing the resistance to lateral movements on the footing bases, an adhesion value of 3000 p.s.f. may be used for design purposes.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

cont'd. /17 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #23 -

1. Soil Conditions:

Two borings, #58 and #59, were carried out during the course of the field investigation to determine the subsoil conditions existing at the site of the proposed wall location. The subsoil was found to consist of up to 3 ft. of fine sand, followed by a very stiff to hard clayey silt with some gravel and boulders (glacial till), followed by shale bedrock at El. 324.5.

The locations and elevations of the borings, together with the estimated stratigraphical profile, are shown on Dwg. #66-F-47N.

2. Recommendations:

In view of the foregoing, spread footing type foundations are recommended for the wall at or below El. 349, where safe loads of up to 2.5 t.s.f. may be assumed for design purposes.

No dewatering problems are anticipated, since the depth to the groundwater level as observed in the borings, was found to be 5 to 8 feet below the base of the recommended excavation level.

In computing the resistance to lateral movements on the footing bases, an adhesion value of 2000 p.s.f. may be used for design purposes.

For backfill to the retaining walls, the recommendations given for Wall #10 should be followed.

cont'd. /18 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #13 -

1. Soil Conditions:

The soil profile along the proposed wall is based on 4 boreholes numbered: 22, 34, 35 and 36, and plotted on the attached Drawing #66-F-47R. In each borehole immediately below the ground surface, a fill stratum was observed. In boreholes 22 and 34, at the south portion of the wall, the fill is about 6 - 7 ft. thick, comprising sandy silt with some clay and organic matter. The layer has a loose to compact relative density. The fill below the north portion of the wall is only some 1 - 1.5 ft. thick, consisting mainly of sand and gravel.

Underlying the fill, a heterogeneous mixture of clayey silt and sandy silt with traces of some gravel (glacial till), was encountered. Portions of the deposit, being granular in nature, have relative densities of "dense to very dense," while the cohesive layers exhibit hard consistencies. In borehole #22, shaley limestone bedrock was proved by diamond drilling from elevation 361 ft. down to 355 ft.

Groundwater was encountered in each borehole at some 4 - 7 ft. below ground level.

Locations and elevations of the boreholes as well as the estimated soil profile, are plotted on the enclosed Drawing #66-F-47R.

2. Recommendations:

In view of the foregoing, the proposed retaining wall may be supported on spread footings at relatively shallow depths.

The recommended elevations of the footing at the borehole locations, are as follows:

cont'd. /19 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #13 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

No. of Borehole	Elevation of Base of Footing
22	381 ft. or below
34	381 ft. " "
35	390 ft. " "
36	395 ft. " "

At the above elevations, a safe bearing pressure of 4.5 t.s.f. may be assumed for design purposes.

Excavation for the footings, mainly at the south portion of the wall, will extend below the observed groundwater level. At these locations where the subsoil is of a granular nature, some "boiling" may occur under conditions of unbalanced hydrostatic head; consequently, a dewatering scheme may be necessary.

For calculations of resistance to sliding between the base of the wall and the soil, a coefficient of friction of 0.45 (for the granular sandy silts), or an adhesion value of 3000 p.s.f. (for the cohesive clayey silts), may be used.

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #14 -

1. Soil Conditions:

Four boreholes were carried out at the site of the proposed wall. The boreholes from south to north are numbered: 102, 31, 32 and 33. Soil in borehole #31 was found to be a clayey silt with some gravel (glacial till). This material is of a cohesive nature, having a consistency ranging from stiff to hard. In the rest of the boreholes the subsoil was observed to be sandy silt, silty sand and sand (glacial till). The latter deposits have characteristics of granular soils and they are all very dense. In borehole #102, which was drilled to a depth of 64 ft., from elevation 369.0 ft., numerous shale layers and sand seams were encountered, followed by weathered bedrock. Sound shale bedrock was proved from elevation 332 ft. down to elevation 327.0 ft.

Groundwater level was observed in each borehole. The depths of water level varied between 2 ft. and 9 ft. below ground level.

The locations and elevations of the boreholes, together with the stratigraphical profile, are plotted on the attached Drawing #66-F-47S.

2. Recommendations:

The proposed retaining wall may be supported on spread footings, within the hard and very dense glacial till deposit.

The bottom of footing should be placed some 5 - 7 ft. below present ground level.

Recommended footing elevations at the locations of the boreholes are tabulated as follows:

cont'd. /21 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #14 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

No. of Borehole	Elevation of Base of Footing
102	384 ft. or below
31	384 ft. " "
32	387 ft. " "
33	392 ft. " "

At the recommended elevation, a safe bearing pressure of 4.5 t.s.f. may be assumed for design purposes.

During the excavation, some groundwater may be encountered. The sandy silt layer appears to be susceptible to unbalanced hydrostatic head; nevertheless, it is believed that due to the anticipated shallow depths below the water level, major dewatering problems will probably not arise.

In computing the resistance of the wall against lateral earth pressure, a friction coefficient of 0.45 may be assumed to apply between the footing bases and the underlying soil.

Backfill to the retaining walls should be as recommended for Wall No. 10.

cont'd. /22 ...



4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #5 -

1. Soil Conditions:

Three boreholes - numbered 49, 50 and 51 - were carried out at the vicinity of the proposed wall.

Below the ground level, a fill material was observed, consisting of silty sand with gravel and traces of clay. The relative density of the fill is generally loose. The thickness of the layer increases toward the south, being 5 ft. at borehole #49 and 9 ft. at borehole #51.

The fill is underlain at each borehole by a glacial deposit of clayey silt with some sand and gravel. The stratum exhibits a hard consistency.

At el. 343 - 345 ft., shale bedrock with bands of limestone was encountered and proved by diamond drilling to a maximum depth of 20 ft.

Groundwater level was established in the borings between el. 348 ft. and 353 ft.

Locations and elevations of the boreholes, together with the estimated soil profile along the length of the wall are shown on Drawing #66-F-47T.

2. Recommendations:

Due to the increasing depth of excavation for the design ground line, and also on account of the inadequate strength of the fill to support the wall, recommendations for a uniform footing design cannot be given.

The north portion of the wall along an approximate length of 80 - 90 ft., may be supported on spread footings at 4 ft. below the proposed grade. The footings will likely be placed on sound bedrock, in which case, an allowable bearing capacity of 10 t.s.f. may be assumed for design purposes.

cont'd. /23 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #5 - (cont'd.)...

2. Recommendations: (cont'd.) ...

The next portion of about 200 - 250 ft. should also be founded on spread footings within the hard clayey silt stratum. The depth of the footing will vary between 4 - 7 ft. below the future grade. An allowable pressure of 4.0 t.s.f. is recommended for this section.

For the remaining length of the wall, three alternative solutions are suggested:

a) The portion in question may be supported on spread footings within the glacial till at or below el. 347 ft. The depth of the footing is estimated to be between 6 and 11 ft. below design grade. 4.0 t.s.f. design load may be employed for this foundation.

b) The wall may also be founded on a well compacted granular backfill, at some 4 ft. below the proposed grade. In this case, the loose sandy fill should be excavated down to the top of the hard glacial till (approx. el. 347 ft.) For the method of construction of the G.B.C. class A backfill, we refer to the recommendations (para. c) for Retaining Wall No. 15. A safe pressure of 2 t.s.f. may be assumed on the compacted backfill.

c) The footings for the section may be placed at four ft. below finished grade and be supported on short H-piles driven to bedrock (approx. el. 345 ft.), or to practical refusal within the glacial till.

The maximum allowable load for the section used may be assumed for design purposes.

cont'd. /24 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #5 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

For methods a) or b), it is to be noted that the silty sand fill is susceptible to conditions of unbalanced hydrostatic head. It is believed, however, that the bottom of the excavations will not "boil" after reaching the cohesive glacial till.

Vertical expansion joints should be incorporated between the portions of the wall supported on bedrock, glacial till and granular backfill.

In computing the resistance along the bottom of the footings against lateral earth pressure, an adhesion value of 3000 p.s.f. may be assumed in the clayey silt, and a friction coefficient of 0.45 for the granular backfill.

cont'd. /25 ...

File

66-F-47 correspondence  
a 7

Hwy. 401 & Keele St.,  
Downsview, Ontario.

Materials and Testing Division

January 16, 1967

Mr. S. Cumming, P. Eng.,  
Bridge Engineer,  
De Leuw, Cather & Company of Canada Ltd.,  
1127 Leslie Street,  
Don Mills,  
Toronto, Ontario.

Attention: Mr. D. Hazeman

Dear Sir:

Re: Roadway Protection at Hwy. 27 & Evans Ave.

With reference to your letter of January 13, 1967, and the attached drawing regarding the above subject, we wish to make the following comments:

The rock in the subject area is mainly shale in various stages of soundness. In view of this fact, it may happen that the rock could be somewhat weathered in certain areas.

As shown on the drawing, the embedment of the bearing piles after footing excavation will be in the order of  $\pm 2.5$  to 3.0 ft. Because of the above reasons, we would suggest that this depth be increased to 4 ft. minimum. In this way, the weakest point will be strengthened, and an added factor of safety achieved with comparatively little additional cost.

Sincerely yours,

*A. G. Sternac*

A. G. Sternac  
Principal Foundation Engineer

AGS/RdeF

cc: Foundations Files ✓  
Gen. Files

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

RETAINING WALL #6 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

bedrock; the south portion, however, will be in the hard clayey silt stratum. A safe pressure of 10 t.s.f. may be imposed on the portion of the footings supported on sound rock, and 4.0 t.s.f. on the portion supported within the clayey silt.

Vertical expansion joints should be constructed between the parts of the wall founded on rock and on the overburden.

No major dewatering problems are anticipated for the excavations.

An adhesion value of 3000 p.s.f. may be assumed for the calculation of the resisting forces against sliding along the bottom of the footing placed in the overburden.

CONSULTING ENGINEERS

January 13th, 1967.

Department of Highways of Ontario,  
Materials and Testing Division,  
Downsview, Ontario.

Attention: Mr A. Stermac, P.Eng.,  
Principal Foundation Engineer.

Dear Sir:

Re: Roadway Protection at Hwy. 27 & Evans Ave.

Further to your telephone conversation with our Mr. D. Hageman, enclosed please find the design assumptions and details of the above roadway protection for your information.

As discussed in our conversation we do not have the necessary space available for concrete deadman or a similar type of anchorage for the roadway protection. As you agreed that the rock formation in this location is suitable we have specified either grouted or mechanical rock anchors with a prestressing element as a tie-back for the roadway protection.

We have used an equivalent fluid pressure of 40 lbs./cu.ft. in our analysis. The bearing piles are predrilled to approximately  $2\frac{1}{2}$  or 3 feet below the excavation level and their bottoms encased with concrete to prevent horizontal displacement. This results in a horizontal load on the rock of about 4 tons/s.f.

Each of the stressing elements will be loaded to a test force of nearly twice the design load and a maintenance clause has been included in the special provisions, making the stressing contractor responsible for the installation for the duration of the contract, both of which should ensure a satisfactory rock anchorage.

We trust that the above information is satisfactory and would appreciate your comments.

Yours very truly,  
DE LEUW, CATHER & COMPANY OF CANADA LIMITED.

*for* *S. Hageman, P. Eng.*  
S. Cumming, P.Eng.,  
Bridge Engineer.

SC/DWH/da  
encl.

DOMINION SOIL INVESTIGATION LIMITED  
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BREDFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

3rd November 1966.

Notes on Bedrock encountered on Job No: 6-10-21

Bedrock was encountered in all eight boreholes, approximately at the elevations shown on the preliminary subsoil profiles.

The bedrock consisted of a brown to grey shale with layers of limestone and occasional clay seams. The upper surface of the shale in each borehole was weathered for approximately 2 to 4 feet. This weathered layer would be relatively easy to excavate by mechanical means.

Even below the weathered zone the shale exhibits numerous cleavage planes. Consequently it could be excavated without resorting to blasting techniques, although this would greatly expedite matters.

In a nearby excavation, it was observed that a large backhoe had penetrated about 5 feet into the shale. By questioning the work crew concerned it was found that the excavation had taken several days.

In summation: It is considered that mechanical excavation of up to 5 feet of bedrock is practical. The length of time taken for excavation can, however, not be estimated with any degree of accuracy.



Department of Highways Ontario

Copy for the information of

Mr. K. Selby, Supervising Foundation Engineer, Foundation Section, Room 107,  
Lab. Bldg.

Mr. C. Grebski,  
Bridge Design Engineer,  
Admin. Bldg.

Bridge Division,  
Downsview, Ontario.

Attention: Mr. W. McFarlane

August 26, 1966.

W.F. 275-66-4.  
Retaining walls, Contract No. 3,  
O.E.W. and Highway No. 27,  
District No. 6.

Ret. Wall No. 16

Due to difficulty of construction and the small amount of property involved it has been decided that wall No. 16 can be eliminated and paved slope guarded by pedestrian pipe rail, be substituted.

Ret. walls No. 5, 6, 17 and 19

The profile of the top of these walls will be raised by two inches (2") to meet the revised outside of curb caused by the revision to 8" curbs, over structures No. 1 and No. 6.

Wall No. 5

This will confirm that wall No. 5 will be built in two stages as previously indicated.

Wall No. 6 shall be built completely in the first contract for O.E.W. and Highway No. 27 Interchange.

JCNCA/aw

J. C. McAllister,  
for W. Melnychyn,  
Regional Bridge Location Engineer.

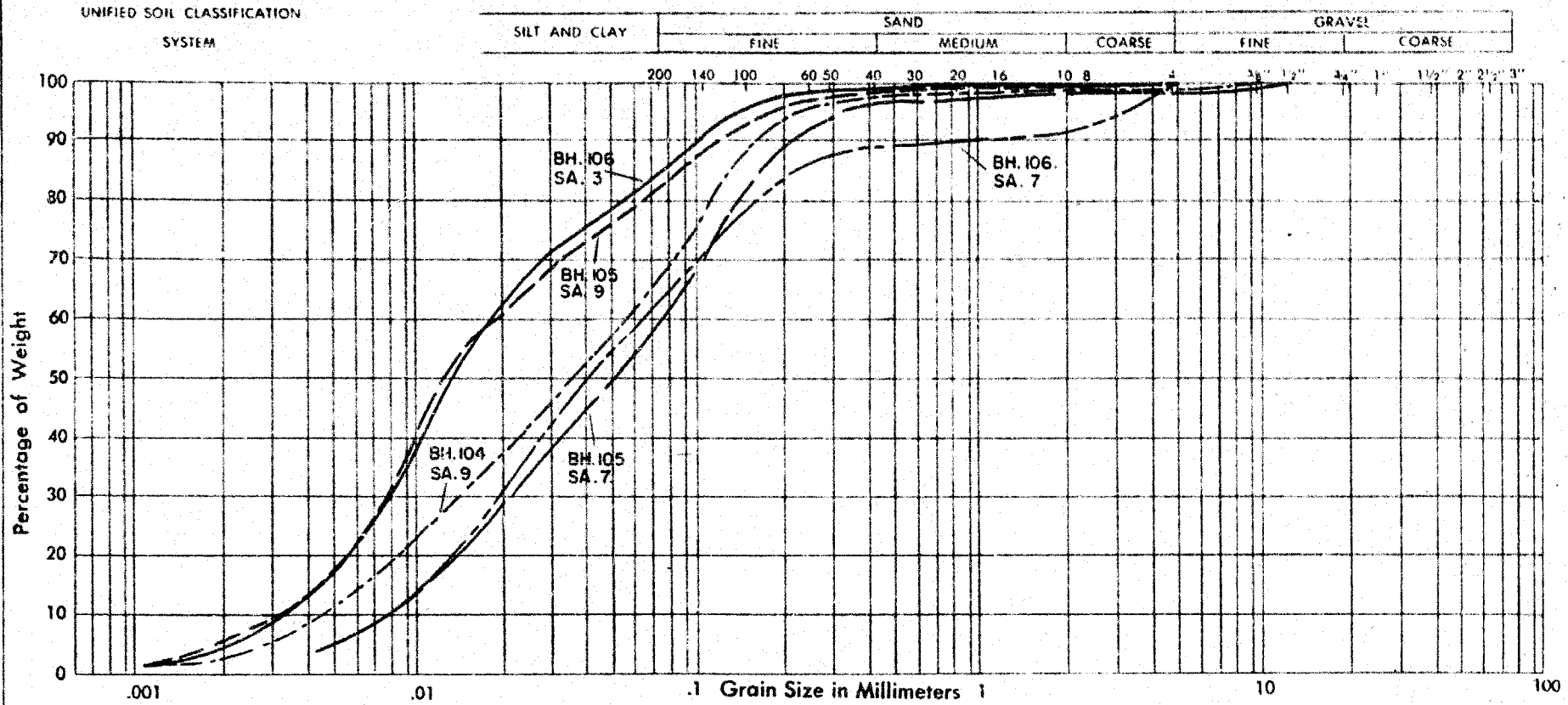
C.C. R. Strain  
K. McCabe  
W. Katarynczuk  
K. Selby



# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-24  
YOUR REF. No. W.P. 35-65



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: BRIDGE No. 15.

BOREHOLE NO.: 104; 105; 105; 106; 106

SAMPLE NO.: 9 7 9 3 7

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMITED % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

ACTIVITY ==

Classification of Sample and Group Symbol:

SILT with some SAND  
and a trace of CLAY

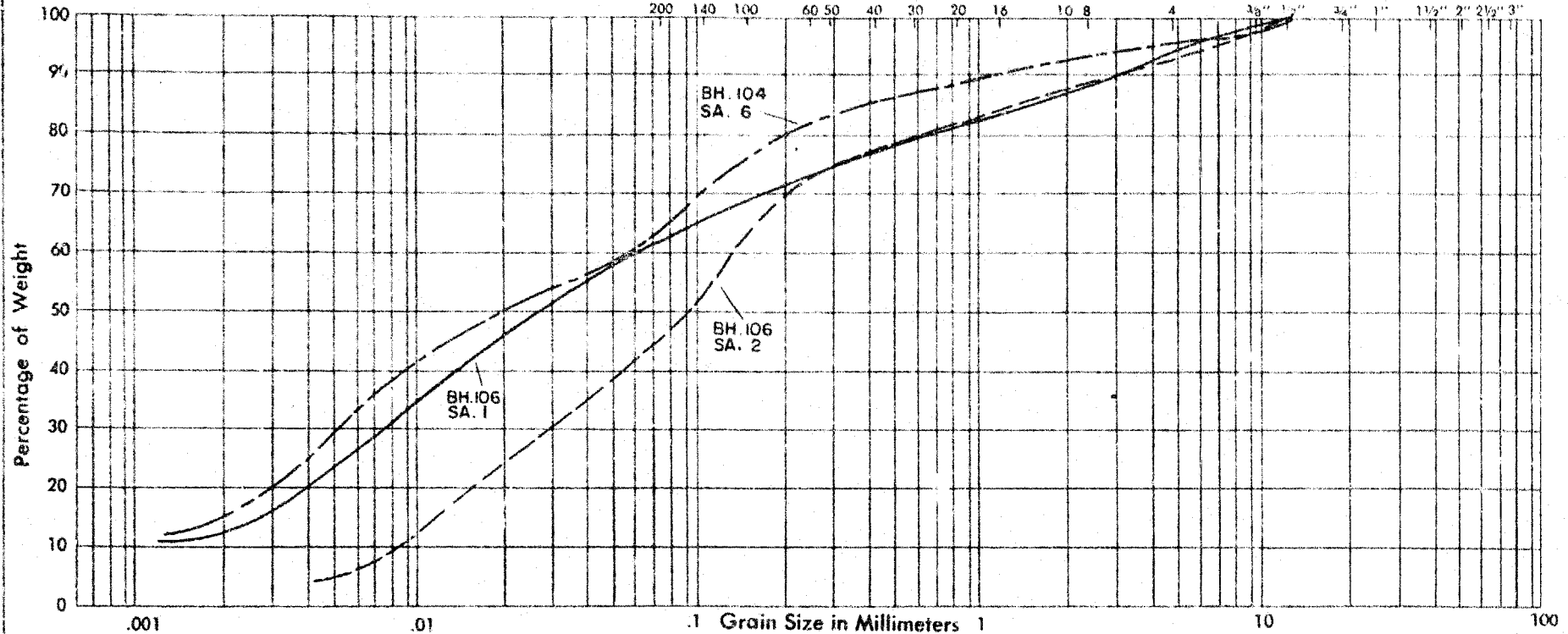
Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-24  
YOUR REF. No. W.P. 35-65

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: BRIDGE No. 15.

BOREHOLE NO.: 104 ; 106 ; 106

SAMPLE NO.: 6 1 2

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES.

LIQUID LIMITED % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

ACTIVITY =

**Classification of Sample and Group Symbol:**

SAND and SILT  
with a trace of GRAVEL and CLAY

Enclosure No.

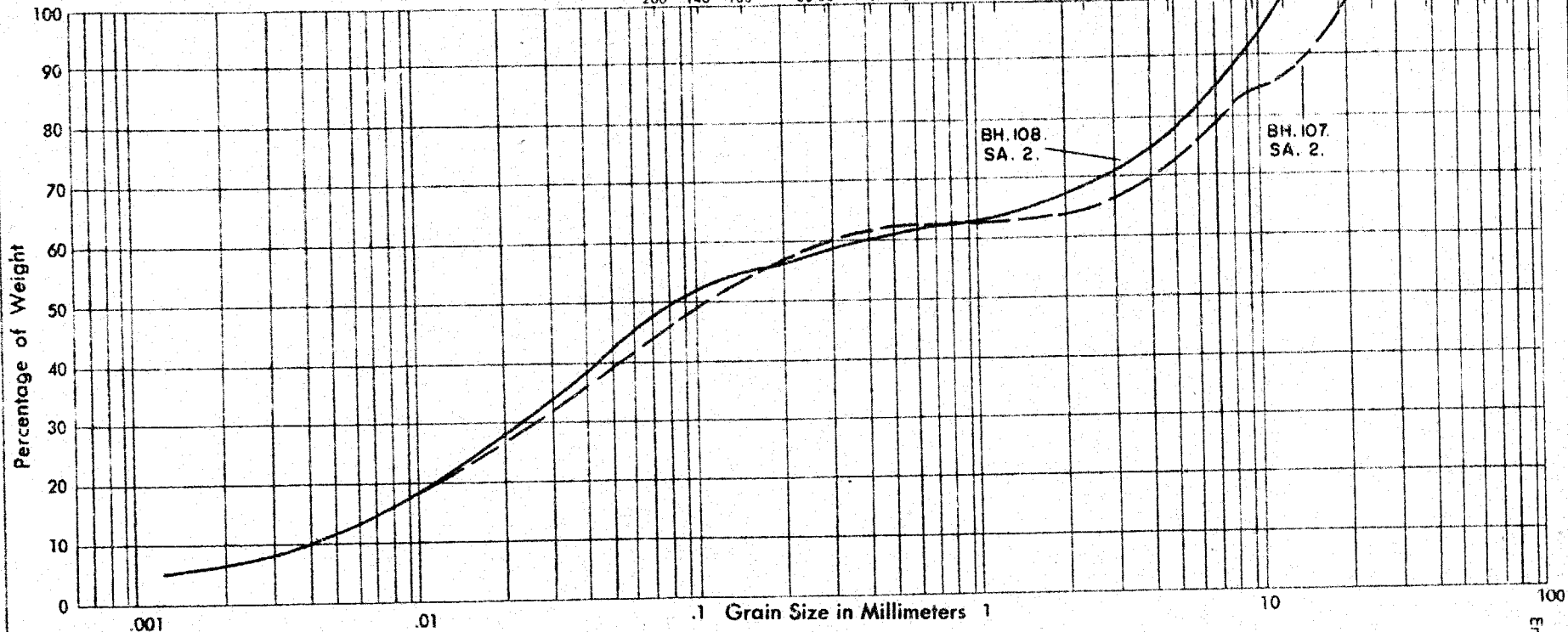
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-18  
YOUR REF. No. W.P. 238-61-5

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE  
LOCATION: BRIDGE No. 7.  
BOREHOLE NO.: 107 ; 108  
SAMPLE NO.: 2 2  
DEPTH OF SAMPLE:  
ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY  
COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**  
GRAVELLY, SANDY SILT  
with a trace of CLAY

PLASTIC PROPERTIES:

LIQUID LIMIT % =  
PLASTIC LIMIT % =  
PLASTICITY INDEX % =  
MOISTURE CONTENT % =  
ACTIVITY =

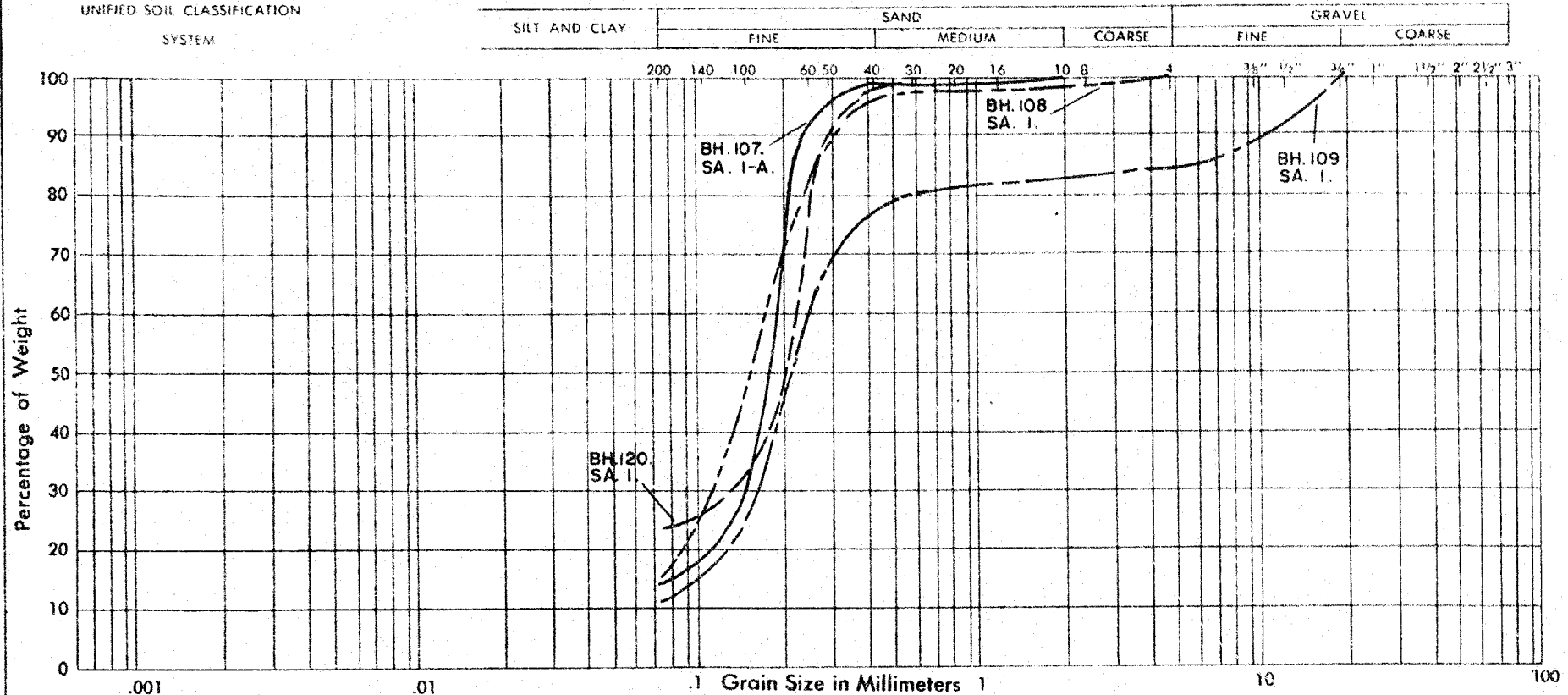
Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-18  
YOUR REF. No. W.P. 238-61-5

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE

LOCATION: BRIDGE No. 7.

BOREHOLE NO.: 107 ; 108 ; 109 ; 120

SAMPLE NO.: 1-A 1 1 1

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

FINE SAND  
with some SILT

PLASTIC PROPERTIES:

LIQUID LIMIT	%	==
PLASTIC LIMIT	%	==
PLASTICITY INDEX	%	==
MOISTURE CONTENT	%	==
ACTIVITY		==

Enclosure No.

Mr. T. J. Kovich,  
Regional Materials Engineer,  
Central Region (Toronto),  
Room 134-A, Lab. Bldg.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

August 19, 1966

Re: Elevation of Bedrock, Vicinity of Q.E.W.  
& Hwy. #27, W.P.'s #275-64-1, #275-64-2,  
#47-65-1, #275-64-3 and #275-64-4.

Regarding your memo of August 17th concerning the above subject and the information that there is likely to be a claim on behalf of the contractor on Contract No. 66-102 because of "wrong" elevations of bedrock, we wish to advise you of the following:

This Section has carried out directly or indirectly - (work done by a consultant), quite an extensive investigation in the area of the Q.E.W. - Hwy. 27 intersection. As a matter of fact, some of the investigations are still in progress - i.e., the field work has not yet been completed. The investigations are for structures (more than 30) as well as for retaining walls (about 40). Some of the retaining walls are several hundred feet long.

The field boring is done either by using an auger type machine or a diamond drill - depending on a number of considerations.

The distance between the boreholes is determined, based also, on a number of considerations. Often these distances are altered during the field investigation because conditions encountered, differ from those that were anticipated.

The boreholes are between 2 and 4 inches in diameter.

In view of the scope of the investigation and the methods used, it is quite possible that in places, the boundaries between geologically different but otherwise quite similar materials, are incorrectly established.

Three main reasons can be quoted for this discrepancy:

(1) The change of materials may have occurred between sampling which is usually done every 3 ft. This could already account for a difference of two feet.

cont'd. /2 ...

August 19, 1966

(2) Sometimes, it is not possible to determine the difference between two materials on the basis of the inspection of either the disturbed material from the borehole, or even the sample retrieved in the Standard Penetration sampler; and

(3) There is always the probability of sometimes quite considerable variations of the boundaries between two adjacent boreholes.

A very good illustration of the point in question has recently been encountered on Wall No. 4 (south side of the Q.E.W.), Contract No. 66-102.

We were advised by the Construction Division that a discrepancy in the bedrock elevations as shown in the foundation report and as found in the field, had been reported. We inspected the open excavation and established, beyond doubt, that in one of the boreholes (No. 5) an error of approx. 3.5 ft. in bedrock elevation determination had been committed. In other boreholes the agreement was very satisfactory (except B.H. 6 where the discrepancy was 1.5 ft.). Although the mistake was apparent, we were still not quite sure whether it was due to an oversight or to the exploration method used. Therefore, we brought in the same drilling equipment (Penn. drill) and drilled a hole 12 inches behind the face of the excavation where the stratigraphy was clearly distinguishable. To our surprise, neither the disturbed material coming out of the borehole, nor samples from the Standard Penetration sampler, enabled us to determine the boundary between the overlying till material and the underlying shale. The shale was weathered to such an extent that the drilling and sampling action produced a material that could not have been distinguished from the overlying till. It should be mentioned that both materials are of the same colour and often chips of shale are embedded in the till.

It would, therefore, appear that in spite of the very careful and conscientious material inspection, an error can be made.

It is probably quite appropriate on this occasion, to raise again the question of rock definition in the D.E.O. Contract Documents. The contractor (C. A. Pitts) on Contract No. 66-102, has used the same equipment to excavate the overlying till as he used to remove the weathered shale, and has in no way, incurred any additional cost. The fact, though, that part of the contractor's excavation was in what is geologically defined as "rock"

cont'd. /3 ...

Mr. T. J. Kovich,  
Regional Materials Engr.,  
Central Region (Toronto).

- 3 -

August 19, 1966

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entitles him to a different price for this part of his work.  
It is our opinion that some thought should be given to this  
problem.

AGS/MdeF

  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. A. Rutka  
G. A. Wrong

Foundations Office  
Gen. Files

## MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer.

From: T.J. Kovich.

Date: August 17th, 1966.

OUR FILE REF.

IN REPLY TO

## SUBJECT:

Re: Elevation of Bedrock, Vicinity of QEW  
& Hwy.#27, W.P.'s #275-64-1, #275-64-2,  
#47-65-1, #275-64-3 and #275-64-4.

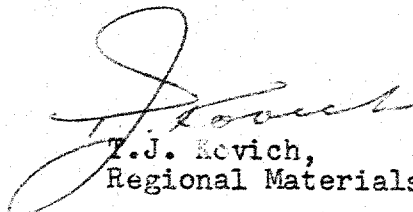
I have been advised by Engineering Audit that there will likely be a claim by the Contractor on Contract #66-102 (C.A. Pitts) with regards to the "wrong" elevation of the bedrock at the location of the retaining walls.

As you are likely aware, rock excavation prices are paid for on both solid and weathered rock, and the price for rock excavation for footings usually comes fairly high. Therefore, it is imperative that the elevation be established quite accurately.

I was wondering whether the information given by your office to the Designers may have misled them, i.e. top of solid rock instead of top of weathered rock was shown on your drawings. In discussing this with Ken Selby last week, he intimated this may have been so.

However, because of the extensive estimating work still to be done on the other projects in this area, I would suggest that your staff review this point quite carefully.

TJK/hd  
c.c. G.A. Wrong.

  
T.J. Kovich,  
Regional Materials Engineer.



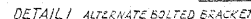
#66-F-47

W.P. #275-64-4

Q.E.W. :

Hwy. #27

INTERCHANGE



5. STEEL TIMBERS AND BEARING PILES SHALL BE C.S.A. 60/40 OR A.S.T.M. A36.
6. HIGH TENSION BOLTS SHALL BE A.S.T.M. A325. STUDS SHALL BE N.E.M.F.O.
7. NUTS OR EQUAL.
8. PRESTRESSING MATERIALS AND DESIGN SHALL BE TO C.S.A. SPECIFICATION 55-1966.
9. TIEBAR LAGGING SHALL BE 3" C. F.I.R. NO. 1 CONSTRUCTION GRADE, STRESS GROUP I B IN ACCORDANCE WITH THE CANADIAN INSTITUTE OF TIMBER CONSTRUCTION.
10. PRESTRESSING SYSTEM AND DESIGN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. PRESTRESSING ELEMENTS AND ANCHORAGES MUST BE PROTECTED FROM CORROSION BY GROUTING OR OTHER APPROVED METHODS.
12. MINIMUM ULTIMATE STRENGTH OF STRESSING ELEMENT 165,000 LBS.
13. TEST LOAD 130,000 LBS.
14. DESIGN LOAD (PERMANENT) 80,000 LBS.
15. CONSTRUCTION SEQUENCE:
  - a. BUILD RETAIN R.
  - b. INSTALL SCAFFOLD, PILING AND EXCAVATE TO CONVENIENT WORKING LEVEL FOR STRESSING (NOT MORE THAN 8'-0" FROM EXISTING GROUND).
  - c. PLACE TIEBAR LAGGING TO WORKING LEVEL AND INSTALL BRACKETS AND BOLTERS.
  - d. INSTALL STRESSING ELEMENTS, PLACE ROCK ANCHOR AND STRESS TO TEST LOAD SHOWN.
  - e. AFTER TEST LOADS HAVE BEEN HELD FOR 5 MINUTES, ANCHOR STRESSING ELEMENTS AT DESIGN LOAD.
  - f. COMPLETE EXCAVATION AND PLACING OF TIEBAR LAGGING.
16. EARTH EXCAVATION BY MACHINE SHALL BE DONE NO CLOSER THAN 1'-0" FROM FACE OF SOLDIER PILING.
17. TIEBAR LAGGING MUST BE REMOVED AFTER RETAINING WALLS AND BRIDGE ABUTMENTS ARE COMPLETED.
18. SOLDIER PILING MAY BE REMOVED OR CUT OFF 4'-0" BELOW FINAL GRADE.
19. ALL WELDING SHALL BE DONE IN ACCORDANCE WITH A.N.S.I. SPECIFICATION D2.48-64 TO A LOW HYDROGEN CLASSIFICATION.
20. MANUAL ELECTRODES SHALL BE E7015, E7016 OR E7018.

