

Ontario
Department of Transportation and Communications

XXXXXXXXXXXXXXXXXXXX

MEMORANDUM

To: Mr. T. C. Kingsland, (2)
Regional Bridge Planning Engineer,
Eastern Region,
Kingston, Ontario.

FROM: Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION: DATE: October 22, 1971.

OUR FILE REF. IN REPLY TO OCT 27 1971

SUBJECT:

3165-76

FOUNDATION INVESTIGATION REPORT
For

The Proposed Underpass Structure at the
Crossing of Hwy. #417 and Rev'n. Reg. *Kanata*
~~Rd. #9~~ - Line 'B', Twp.'s of Nepean & March
Reg. Mun. of Ottawa-Carleton
District No. 9 (Ottawa) /
W.O. 71-11049 -- W.P. 438-64-00

CONF 7576

Attached, we are forwarding to you our detailed
foundation investigation report on the subsoil conditions
existing at the above structure site.

We believe that the factual data and recommendations
contained therein, will prove adequate for your design
requirements. Should additional information be required,
please do not hesitate to contact our Office.

AGS/ao
Attach.

cc: Messrs. B. R. Davis

A. Rutka
D. W. Farren
S. J. Markiewicz
J. E. Callaghan
B. J. Giroux
E. R. Saint
G. A. Wrong
B. A. Singh

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER.

Foundations Files ✓
Documents

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FOUNDATION INVESTIGATION REPORT

For

The Proposed Underpass Structure at the
Crossing of Hwy. #417 and Rev'n. Reg. *Kanata*
Rd. #9 - Line 'B', Twp.'s of Nepean & March
Reg. Mun. of Ottawa-Carleton
District No. 9 (Ottawa) /

W.O. 71-11049

W.P. 438-64-00

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation for the aforementioned underpass structure, which will be located in the Regional Municipality of Ottawa-Carleton. The request was contained in a memo from Mr. T. C. Kingsland, Regional Bridge Planning Engineer, Eastern Region, dated April 21, 1971. An investigation was subsequently carried out by this Office at the proposed structure site, as well as in an adjacent area which is being considered as an alternate location for the structure. During this investigation the subsoil, bedrock and groundwater conditions in this area were determined.

This report contains the factual results obtained from the investigation, together with recommendations pertaining to the foundations of the proposed structure, as well as the stability and settlement considerations associated with the approach fills. In addition, the merits, from a foundation point of view, of adopting an alternate location for the proposed structure are discussed.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The area under investigation is located along Regional Road #9 at its junction with the Ottawa Queensway, approximately 1 mile north of Hwy. #7, in the Regional Municipality of Ottawa-Carleton. The site is located on the floor of a broad north-south trending valley. The floor of this valley, which is grass covered, is flat to gently undulating in relief between elevations 302 and 309.

2. DESCRIPTION OF THE SITE AND GEOLOGY: (cont'd) ...

Two north flowing tributaries of Watt's Creek traverse this area, one east and the other west of Regional Road #9. The tributary valleys vary from 75 to 300 feet in width and 15 to 18 feet in depth, with slopes that range from 2:1 to 3:1. The creek channel itself is 30 to 40 feet wide; the water was about 3 to 4 feet deep at the time of the investigation.

Regional Road #9 has two paved lanes while the Ottawa Queensway is a divided highway with two paved lanes in both the east as well as westbound direction.

This region has, in the past, been subjected to geologic disturbances giving rise to numerous folds and faults in the bedrock. From Ottawa westerly to Pembroke for instance a block, 35 miles in width, has been down dropped, forming a depression which is geologically known as the Ottawa-Bonnechere graben. The Ottawa River is situated in this down-dropped block. West of Ottawa the main fault passes through the hamlet of Hazeldean and forms the northern flank of the Carp Valley. It is not uncommon to have marked variations in the bedrock elevation from point to point in this general area.

The major portion of this valley is situated in the physiographic region known as the "Ottawa Valley Clay Plains." There extensive clay deposits are interrupted by ridges of sand and rock. The sensitive marine clay, which was deposited in the geologic past in the Champlain Sea, varies markedly in thickness over the area; in some localized zones it is known to extend to depths in excess of 200 feet. The clay is generally underlain by glacial till.

The overburden is underlain by gneiss bedrock of the Precambrian Period. This rock mass has been intruded by numerous dikes and sills, the bedrock encountered in such intrusions varies from diabase to granite.

The drainage in the area is controlled by the numerous rivers and creeks which eventually drain into the Ottawa River.

3. FIELD AND LABORATORY WORK:

Eight sampled boreholes were put down at the proposed structure site. In addition 15 sampled borings, as well as 27 dynamic cone penetration tests, were put down in an area which is being considered as a possible alternate location for the structure. This area is located immediately east of the proposed structure site. The borings and cones were advanced using diamond drill rigs adapted for soil sampling purposes.

Samples of the cohesive stratum, as well as the lower glacial till deposit, were obtained, at required intervals, in a 2 inch O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. This testing procedure was supplemented by obtaining some 2" and 3" I.D. Shelby tubes in the cohesive portion of the overburden. These tubes were either manually pushed into the soil or advanced using a fixed piston sampler. In addition, field vanes were carried out, where possible, to determine the undrained shear strength of the clay stratum.

Bedrock was proven in 15 of the boreholes by obtaining between 5 and 10 feet of either BX or AXT size rock core samples.

Groundwater level observations were carried out, during the period of the investigation, in the open boreholes. An artesian groundwater condition was encountered at one of the boring locations. The artesian flow, in the open borehole, was properly sealed at the source following the sampling and drilling operations.

The soil, bedrock and groundwater conditions, encountered at those borings put down at the proposed structure site, namely B.H.'s #1 to #8 inclusive, are presented on the Record of Borelog sheets appended to this report. The conditions existing at the remaining locations are summarized on Table No. 1 in the Appendix. The location and elevation of the boreholes were provided by personnel from the Eastern Region Engineering Surveys Section.

3. FIELD AND LABORATORY WORK: (cont'd) ...

The elevations in this report are referenced to a Geodetic datum.

The location of all the borings put down are given on Drawing No. 71-11049C; bedrock contours, inferred from the boring data is also plotted on this drawing. The location and elevation of the eight borings, put down at the proposed structure location, are presented separately on Drawing No. 71-11049A. Stratigraphical sections, inferred from the boring data, are also presented on Drawing No. 71-11049A and B.

All the samples were subjected to a careful visual examination in the field, and subsequently in the laboratory. Following this examination, laboratory testing was carried out on selected representative samples to determine the following engineering properties of the overburden.

- Bulk Density
- Natural Moisture Content
- Atterberg Limits
- Grain-Size Distribution
- Undrained Shear Strength
- Consolidation Characteristics

The results of the testing are plotted on the Record of Borelog sheets and summarized on Figures No. 1 to 5 inclusive; all contained in the Appendix of this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

The vertical and lateral extent of the overburden deposits, in the area under investigation, varies markedly. The predominant deposit is, however, composed of a silty clay stratum. In the vicinity of the intersection of existing Regional Rd. #9 and the Ottawa Queensway the thickness of the soft to very stiff silty clay ranges from 123 to 150 feet. This extensive stratum is underlain by a competent glacial till deposit which varies from 15 to 74.5 feet in thickness. This overburden sequence is followed by bedrock of Precambrian age.

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd) ...

4.1) General: (cont'd) ...

Visual observations made during the field investigation, as well as research into the geologically complex history of this area indicated that the bedrock surface could be expected to increase in elevation elsewhere, particularly east of existing Regional Road No. 9. A boring programme was carried out in this eastern area. It indicated that, between Stations 251+00 and 256+00 (Hwy. #417 chainage), the bedrock surface is located some 6 to 13 feet below existing ground surface. Beyond these chainages, however, the bedrock surface dips abruptly. The overburden in this area is the silty clay - glacial till sequence discussed in the previous paragraph.

The stratigraphy, encountered at the borings put down in the immediate vicinity of Regional Rd. #9 (B.H.'s #1 to 8), is plotted on the Record of Borelog sheets. Stratigraphical sections, inferred from this data, are plotted on Drawing No.'s 71-11049A and B. The stratigraphy encountered at the other boring locations is summarized on Table No. 1. A resumé of the subsoil and bedrock, encountered from ground surface downward in this area, is presented in the following sub-sections.

4.2) Surficial Deposits:

A few borings were put down along the shoulder of Regional Road No. 9. At these locations between 1 and 3 feet of sand fill was encountered. Standard penetration testing, carried out within the fill, indicate that it has been subjected to a moderate degree of compaction.

A deposit of firm to stiff ('N' values 4 to 15 blows/ft.) clayey silt with a trace of sand is present from the original ground surface downward. The thickness of this deposit ranges from 5 to 10 feet. Seams and layers of silt and sand, up to 12 inches in thickness, are located randomly throughout this cohesive subsoil.

The clayey silt deposit is periodically underlain by a 3 to 4 foot thick layer composed of a compact silty sand to sand.

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd) ...

4.3) Clayey Silt to Silty Clay (Sensitive):

The surficial deposits are underlain by the predominant stratum across the site, which is composed of a grey-brown to grey sensitive clayey silt to silty clay of marine origin. In the vicinity of the intersection of Regional Road No. 9 and the O.Q.W. the thickness of the cohesive stratum varies from 123.5 to 150 feet. The thickness of the cohesive stratum, however, decreases in all directions from this isolated location. Its minimum depth (ranging from 5 to 10 feet) was encountered east of Regional Road No. 9 between Stations 251+00 and 256+00. Elsewhere the thickness was found to vary between these two limiting ranges. Seams and layers of silty sand to sandy silt, up to 4 inches thick, are present throughout the stratum. The number and frequency of these granular zones generally increases with depth.

The properties of the cohesive stratum, as determined by field and laboratory testing, are summarized on Figure #1. A brief resumé, presented in tabular form, follows:

<u>Identity Tests</u>	<u>Range (Average)</u>
Bulk Density (γ) (p.c.f.)	95 - 128 (110)
Liquid Limit (W_L) (%)	25 - 48 (38)
Plastic Limit (W_P) (%)	15 - 26 (19)
Natural Moisture Content (W) (%)	20 - 62 (41)
Liquidity Index (I_L)	1.1 - 2.0 (1.4)
<u>Consolidation Characteristics</u>	
Initial Void Ratio (e_0)	0.9 - 1.7
Compression Index (C_c)	0.35 - 1.1
Degree of Preconsolidation ($P_c - P_o$) (p.s.f.)	400 - 2,000

....7

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd) ...

4.3) Clayey Silt to Silty Clay (Sensitive): (cont'd) ...

<u>Undrained Shear Strength (Cu)</u> <u>(p.s.f.)</u>	<u>Range</u> <u>(Average)</u>
1) Field Tests	400 - 2,000
2) Lab. Tests	380 - 1,600
<u>Sensitivity (St)</u>	3 - 13
<u>Standard Penetration Resistance Testing ('N')</u> <u>(Blows per ft.)</u>	1 - 12

The Atterberg limit tests are plotted on the Plasticity Chart, Figure #2. These results indicate that the cohesive subsoil is essentially inorganic with a plasticity that varies from low to intermediate. The natural moisture content is consistently above the liquid limit throughout the stratum; this is indicative of a sensitive material.

The results of the undrained shear strength testing carried out indicates that the consistency of the silty clay, where it is most extensive, varies from soft, in the upper portion of the stratum, increasing to very stiff with depth. The stratum has a firm consistency, however, in those areas where it is less than 30 feet thick.

The consolidation characteristics of the stratum were determined by carrying out eleven laboratory tests, the results of which are shown as Void Ratio vs. Pressure Plots on Figures #3, 4 and 5. The testing indicates that the clay stratum is preconsolidated by about 400 p.s.f. in excess of the existing overburden pressure, in the upper portion, increasing to about 2,000 p.s.f. with depth. The relatively high values for the initial void ratio (e_o) and the compression index (C_c) compare favourably with those of other cohesive deposits in this area, and are a further indication of the sensitive nature of the stratum.

4.4) Heterogeneous Mixture of Silt, Sand and Gravel,
Trace of Clay (Glacial Till):

The clay stratum is underlain by a basically non-cohesive glacial till deposit composed of a heterogeneous mixture of silt, sand and gravel with a trace of clay.

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd) ...

4.4) Heterogeneous Mixture of Silt, Sand and Gravel,
Trace of Clay (Glacial Till): (cont'd) ..

In the vicinity of the proposed structure site the thickness of the glacial till ranges from 15 to 74.5 feet. East of Regional Rd. #9, where the overburden is often less than 15 feet deep, the till thickness is often minimal (1 to 2 feet). The lower portion of the glacial till, where it is most extensive, is often bouldery in nature. The boulders encountered were up to 10 inches in size.

The Standard Penetration Tests, carried out within the glacial deposit, are plotted on the Record of Borelog sheets, as well as on Figure #1. This testing gave 'N' values which ranged from 15 blows/ft. to 200 blows for 3 inches, with the lower values being confined to the upper 3 to 5 feet. Based on these values it is estimated that the relative density of the upper "reworked" zone (where present) is compact, while the remainder of the deposit is very dense.

4.5) Gneiss Bedrock:

The glacial till is directly underlain by bedrock which was proven in 15 of the boreholes, by obtaining between 5 and 10 feet of either BX or AXT size rock core samples.

As discussed previously in this report, the elevation of the bedrock surface varies markedly across the site (refer to estimated bedrock contours on Drawing No. 71-11049C). In the vicinity of Regional Rd. #9 and the O.Q.W. (Station 245+00) it is at its lowest. Here the bedrock surface varies between elevations 98 and 141. This corresponds to depths below ground surface of between 164 and 204.5 feet. Moving away from this isolated area the bedrock surface begins to rise in all directions, particularly east of Regional Road #9. The surface reaches a maximum between Stations 251+00 and 256+00, between these chainages the bedrock is as high as elevation 290 (corresponding to depths of from 6 to 13 feet below existing ground surface).

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd) ...

4.5) Gneiss Bedrock: (cont'd) ...

The bedrock again dips steeply both in an easterly and northerly direction from these stations. This geological pattern results in a south-west to north-east trending bedrock ridge.

The bedrock is primarily composed of a grey granitic gneiss. At a number of boring locations, however, the bedrock was composed of either a pink granite or diabase underlain by quartzite. It is believed that the latter are intrusions in the original mass (refer to Section #2). In some localized areas the upper 3 to 5 feet of the bedrock is in a fractured and jointed condition. Below this upper zone (where present) the bedrock is sound as evidenced by the high percentage of core recovery.

5. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out, during the period of the investigation, in the open boreholes. The observations are presented on the individual borelog sheets as well as on Drawings No. 71-11049A and B. The results indicate that the groundwater level, in the surficial deposits and cohesive stratum, varies between elevations 296 and 304. These water levels correspond to depths below ground surface of from 2 to 6.5 feet.

An artesian groundwater pressure head was observed at B.H. #6. The artesian condition was encountered in the non-cohesive glacial till deposit which overlies the bedrock. Once the boring penetrated into this deposit water rose instantaneously in the casing. It eventually stabilized itself at elevation 306, which corresponds to a height of 3.5 feet above the existing ground surface. It is pertinent to note that the glacial till is relatively pervious with respect to the overlying silty clay stratum as well as the underlying bedrock. It is inferred that the glacial till, at this location, is acting as a confined aquifer which is being charged with groundwater from the surrounding terrain which is at a higher elevation.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct an 87 feet wide, two span (118' - 118') underpass structure at the crossing of Hwy. #417 and the revision of Regional Road No. 9 (Line 'B'), in the Townships of Nepean and March, Regional Municipality of Ottawa-Carleton.

The proposed details, relating to foundation design, are shown on Plan No. E-5211-1, dated May 6, 1971. It is understood that the profile grade of the E.B. and W.B. lanes of Hwy. #417, in the vicinity of the crossing, will be at about elevation 299, while the profile grade of Regional Road No. 9 will vary between elevations 318 and 319. The associated approaches will, therefore, have a maximum height of 19 and 14 feet in the longitudinal and transverse direction, respectively.

The subsurface investigation, at the proposed structure site (approximately Station 245+00), was started on May 25, 1971, and continued into June. An extensive compressible clay stratum was encountered at the site. As discussed previously, it was ascertained that the thickness of the compressible stratum decreased in all directions from this location, particularly to the east. In June, 1971, this office was requested to carry out an investigation east of the proposed site in order to determine the feasibility and advantages of relocating the structure in this area. This supplementary investigation was performed in July and early August of the same year. Following completion of the latter programme a meeting was held in the Regional Offices, Kingston, to review the results of the investigation, specifically in relation to the possibility of adopting an alternate site for the structure. Taking all the factors into consideration, it was concluded that it was unlikely that an alternate site would be adopted. This being the case the field investigation at the original site was completed in late August.

The predominant stratum, at the proposed structure site (approximate Station 245+00) is composed of a soft to very stiff grey silty clay, the thickness of which varies from 123 to 150 feet.

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

The cohesive stratum is underlain by a competent non-cohesive glacial till whose thickness ranges from 15 to 74.5 feet. The glacial till is followed by bedrock. From the proposed site, in all directions particularly in an easterly one, the overburden thickness becomes less extensive. Between Stations 251+00 and 256+00, for instance, only 6 to 13 feet of overburden was encountered above bedrock.

The presence, at the proposed structure site, of the extensive soft, compressible cohesive stratum, at a shallow depth below ground surface, is the governing factor from a foundation point of view, since it will be necessary to ensure that it is not overstressed by either the embankment or structure loadings. These aspects will be discussed in detail in this section of the report.

As discussed previously, the thickness of the soft, compressible cohesive stratum is less extensive east of the proposed structure site. There would, therefore, be advantages, from a foundation point of view, of locating the structure in this area. Aspects involved in adopting an alternate site are discussed in Section 7.

Three creek crossings in the area were also investigated; namely,

Crossings of Hwy. #417 (E.B.L. and W.B.L.) and Watts Creek -

Stations 236+00 to 240+00 (Hwy. #417 Chainages)

Crossing of Reg. Rd. #9 (Line 'B') and Watts Creek -

Stations 73+00 to 75+00 (Regional Rd. #9 Chainages)

Crossing of Reg. Rd. #9 (Line 'B') and Creek -

Stations 119+00 to 121+00 (Reg. Rd. #9 Chainages)

The foundation aspects of these crossings will be discussed in a separate report (No. W.O. 71-11077).

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

6.2) Approaches (Proposed Structure Site):

6.2.1) Stability Considerations:

The critical condition for stability of an embankment on normally or slightly over-consolidated cohesive soils, as is the case at this site, generally occurs during or immediately after construction. This being the case, a total stress stability analysis ($\phi = 0$) provides a suitable means of assessing the stability of the embankment section. In this method of analysis, stability is governed by the applied loads and by the stress-strain and undrained shear strength characteristics of the foundation and embankment soils.

Analyses have been carried out, therefore, in terms of total stresses making use of the electronic computer, to determine the stability of the approaches.

The following assumptions were made:

SOIL PROPERTIES

Elevation	Soil	Parameters		
		Bulk Density (p.c.f.)	Undrained Shear Strength (Cu p.s.f.)	Effective Angle of Internal Friction (ϕ)
318-304	Embankment Fill (Glacial Till Material-Slopes 2:1)	140	--	30°
304-301	Clayey Silt	125	1,000	--
301-297	Silty Clay	110	750	--
297-284	Silty Clay	100	450	--
284-274	Silty Clay	105	600	--
274-250	Silty Clay	110	900	--
250-230	Silty Clay	115	1,250	--
230-	Silty Clay	125	>1,500	--

NOTE: 1) Approximate Ground Water Level - Elevation 301.

2) Tension Crack - 7 Feet Deep.

The results of the computations indicate that:

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

6.2) Approaches (Proposed Structure Site): (cont'd) ...

6.2.1) Stability Considerations: (cont'd) ...

- i) Fills of the height contemplated in the transverse direction (maximum 14 to 15 feet) will be stable (F.S. = 1.3), providing standard 2:1 slopes are employed, and
- ii) A 25 foot long mid-height berm will be required in the longitudinal or forward direction, along both approaches, in order to ensure the stability in this direction. This will necessitate an increase in the span length of the structure. The berms should slope towards the toe of the slope at a grade of 20:1.

6.2.2) Settlement Considerations:

The underlying compressible clay stratum will settle due to the loading of the approach fills, over a long term period. The estimated consolidation settlements, due to embankment loading, are summarized in tabular form.

Consolidation Settlement Beneath Centre-Line of Approach

Fills (Max. Height, 15 feet - In Place Bulk Unit Weight, 140 p.c.f.)

<u>Time</u>	<u>Consolidation Settlements</u>
2 years	6 to 7 inches
7 years	11 to 12 inches
50 years	22 to 23 inches (max.)

Referring to the table it can be seen that a considerable percentage of the consolidation settlement will take place in the first few years after placement of the fills. In order to minimize post-construction maintenance costs, consideration should be given, if scheduling permits, to constructing the fills at least 18 to 24 months prior to the structure foundations. Further, final paving operations of the roadway should be delayed for as long a period as possible.

6.3) Structure Foundations (Proposed Structure Site):

The presence of the soft to very stiff compressible clay at a shallow depth below ground surface will dictate the necessity of supporting the structure abutments and centre pier on end-bearing piles.

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

6.3) Structure Foundations (Proposed Structure Site): (cont'd)...

6.3.1) Centre Pier (Refer to B.H.'s 4 and 5):

This pier can be supported on end-bearing piles located within the very dense portion of the granular glacial till stratum. Allowable loads will depend on the pile type and section chosen (e.g. 14 BP 74 steel H piles may be designed for 95 tons per pile).

The pile driving during construction should be controlled by employing the Hiley Dynamic Pile Driving Formula, in accordance with current Department Standards, in order to obtain the required loads. It is estimated these loads will be realized when the pile tips are located between elevations 135 and 140.

At least 4 feet of earth cover should be provided to the underside of the pile cap for frost protection purposes.

The base of the pile cap will be located at or slightly below the groundwater level recorded during the period of the investigation. The excavation will be carried out in the relatively impervious surficial clayey silt stratum. Therefore, no major dewatering problems are anticipated. There are, however, granular seams and layers within the cohesive stratum; if these are intersected, some minor seepage may occur. This could be readily handled by using standard techniques, such as pumping from sumps.

6.3.2) Abutments:

The abutments can be 'perched' within the approach fills and supported on end-bearing piles driven into the lower competent portion of the glacial till deposit or to the bedrock surface. The estimated pile tip elevations, at the north and south abutment locations are given below:

<u>Location</u>	<u>Estimated Pile Tip Elevation</u>
North Abutment (B.H.'s #6 and #7)	145
South Abutment (B.H.'s #2 and #3)	141

For piles driven into the glacial till stratum driving should be controlled by employing the Hiley Dynamic Pile Driving Formula, as discussed in detail in Sub-section 6.3.1.

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

6.3) Structure Foundations (Proposed Structure Site): (cont'd) ..

6.3.2) Abutments: (cont'd) ...

The allowable load will be dependent on the pile section chosen. In view of the anticipated settlements at the approaches and the consequent negative skin friction forces, it would be desirable to reduce the design loads by 25% of the maximum allowable load of the pile section selected. For example, 14BP74 steel H piles should be designed for a maximum load of 70 tons per pile rather than the usual 95 tons per pile. Consideration should also be given to supporting the extreme ends of the wing walls on piles to prevent any tilting of the abutments.

No bouldery or rock fill should be placed in areas where piles are to be driven.

7. FEASIBILITY OF ADOPTING AN ALTERNATE STRUCTURE LOCATION - EAST OF THE PROPOSED LOCATION:

As discussed previously, the subsoil and bedrock conditions are quite variable within the area under investigation. At the proposed structure site (Station 245+00 - Hwy. #417 Chainage) the overburden is composed of an extensive (up to 150 feet thick) soft to very stiff silty clay stratum underlain by glacial till, which in turn is followed by bedrock. The thickness of the overburden decreases in all directions from this location. East of the proposed location, between Stations 251+00 and 256+00, for instance, the bedrock surface is located some 6 to 13 feet below existing ground surface. As discussed in Sub-section 4.5) an elevated bedrock ridge exists in this area.

From a foundation point of view, it would be advantageous to select a site for the structure required at the crossing of revised Regional Rd. No. 9 and Hwy. #417 where the overall thickness of the compressible silty clay is generally least and the strength-compressibility characteristics of the stratum are as favourable as possible.

7. FEASIBILITY OF ADOPTING AN ALTERNATE STRUCTURE LOCATION - EAST OF THE PROPOSED LOCATION: (cont'd).

Taking the aforementioned into consideration, it is obvious that serious thought should be given to locating the structure east of the proposed site. In order to take full advantage of the bedrock ridge the structure should be located between Stations 252+00 and 253+00 (refer to bedrock contours plotted on Drawing No. 71-11049C). If the structure is located at the latter location then:

- i) berms will probably not be required in the longitudinal direction as is the case at the proposed location;
- ii) the consolidation settlement, induced in the underlying compressible cohesive stratum, by the approach fill loadings, will be markedly less than that predicted for the proposed site; and
- iii) the end-bearing piles, supporting the abutments will be relatively short when compared with the original location, where for instances, piles approximately 165 to 170 feet long would be required. Further, the centre pier could probably be founded on a spread footing.

It can be stated that the final decision on whether or not adoption of this alternate structure location is warranted will also be dependent on other related factors, such as alignment, property considerations, etc. It should be stressed that if such an alternate location is selected a final foundation investigation will be required to delineate the vertical and lateral extent of the overburden and bedrock deposits, when design details become available.

8. MISCELLANEOUS:

The field work for this project was carried out during the period of May 25 to August 30, 1971, under the supervision of Messrs. W. Hutton, Project Foundation Engineer, and M. Logan, Student Technician (field).

8. MISCELLANEOUS: (cont'd) ...

The drilling equipment was owned and operated by Dominion Soil Investigation Ltd. and the F. E. Johnston Drilling Company Ltd.

This report was written by Mr. B. T. Darch, Senior Foundation Engineer and reviewed by Mr. M. Devata, Supervising Foundation Engineer.

October, 1971.

APPENDIX I

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 71-11049

LOCATION Sta. 61 + 99 (Reg. Rd. #9) 0

ORIGINATED BY ML

W.P. 431-64-00

BORING DATE May 25, to 28, 1971

COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing; Cone Test

CHECKED BY

[illegible]

CHECKED BY

SOIL PROFILE		SAMPLES	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— W _L PLASTIC LIMIT ——— W _P WATER CONTENT ——— W	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT NUMBER TYPE BLOWS/FOOT	SHEAR STRENGTH P.S.F.			
			○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE			
			400 800 1200 1600 2000			
				W _p ——— W ——— W _L		
				WATER CONTENT % 20 40 60		
					P.C.F.	GR. SA. SI. CL.
306.7	Ground Level					
0.0	Clayey silt with sand partings & layers.	1 SS 12				
300.7	Very Stiff	2 SS 9				
6.0	Clayey silt to silty clay, trace of sand,	3 TW PM				
	organic mottlings (sensitive)	4 TW PM				
	Numerous seams of silty sand up to 4" thick throughout	5 SS -				
		6 TP PM				
		7 TP PM				
		8 TP PM				
		9 TP PM				
		10 TP PM				
		11 TW PM				
		12 TW PM				
		13 SS 8				
150.7	Het. mix. of silt, sand & gr., trace of clay (Glac. Mll) Very Dense	14 SS 63				
141.5		15 SS 47				
165.2	End of Borehole	16 SS 107				

JOB 71-11049

LOCATION Sta. 63 + 06 (Reg. Rd.#9) o/s 39' Rt.

ORIGINATED BY WH

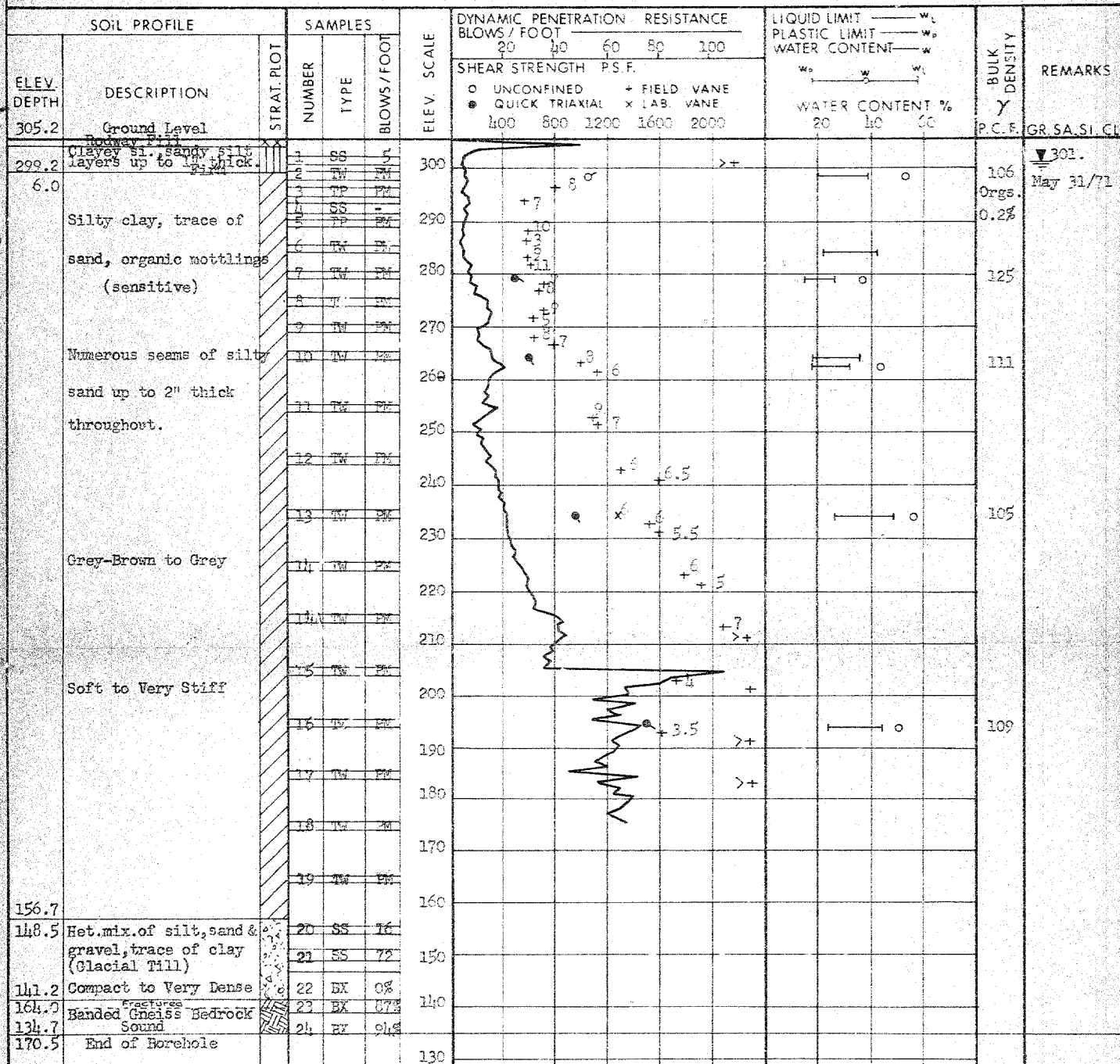
W.P. 431-64-00

BORING DATE May 25 - June 2, 1971

COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE Washboring-BX, BX, NX Casing; BX Rock Core: Cone

CHECKED BY *AK*

JOB 71-11049

LOCATION Sta. 64 + 00 (Reg. Rd. #9) 45' Lt.

ORIGINATED BY ML

W.P. 431-64-00

BORING DATE August 17 to 24, 1971

COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE Washboring, NX, BX, Casing, BX Rock Core

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS			
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		SHEAR STRENGTH P.S.F.		WATER CONTENT %						
						\circ UNCONFINED \bullet QUICK TRIAXIAL	$+$ FIELD VANE \times LAB. VANE							
305.0	Ground Level					400	600	1200	1600	2000	20	40	60	GR SA SI CL
302.0	Sand (Fill) Compact		1	SS	6									301.2
297.0	Clayey silt, layers of silty sand. Stiff		2	TM	TM									Aug. 24/71
294.0	Silty sand. Loose		3	SS	1									
11.0			4	TM	TM									
	Silty clay, trace of sand, organic mottlings (sensitive)		5	TM	TM									
			6	SS	-									
			7	TM	TM									
			8	SS	-									
			9	TM	TM									
			10	SS	-									
	Numerous seams of silty sand up to 2" thick throughout.		11	TM	TM									
			12	SS	-									
			13	TM	TM									
	Grey-Brown to Grey		14	SS	2									
			15	TM	TM									
	Soft to Very Stiff		16	SS	8									
			17	SS	7									
157.0			18	SS	15									
148.0	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till) Grey		19	SS	125/10"									
	Compact to Very Dense		20	SS	113									
	Boulder Zone (boulders up to 8" in size)		21	BK	26%									
			22	SS	175/6"									
			23	RE	100%									
			24	SS	100/4"									
			25	SS	97%									
			26	SS	130/6"									
			27	RE	10%									
	Very Dense		28	SS	200/6"									
			29	BK	17%									
100.5			31	BK	6%									
204.5	End of Borehole													

CHECKED BY

157.2	End of Borehole
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DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No.6

FOUNDATION SECTION

JOB 71-11049

LOCATION Sta. 65 + 30 (Reg. Rd.#9) o/s 42' Lt.

ORIGINATED BY ML

W.P. 431-64-00

BORING DATE August 9 to 16, 1971

COMPILED BY E

DATUM Geodetic

BOREHOLE TYPE Washboring, NX, BX AX Casing; AXT, BX Rock Core

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		SHEAR STRENGTH P.S.F.		WATER CONTENT %			
302.4	Ground Level					○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE 400 800 1200 1600 2000		w_p — w — w_L			
295.9	Clayey silt, with sand Stiff		1	SS	300						Artesian Head El. 306.0
6.5	Clayey silt to silty clay, trace of sand, organic mottlings (sensitive)		2	TM	290	+7					296.
			3	TM							WL in open BH Aug. 16/77
			4	TM							
			5	SS							
			6	TM							
			7	TM							
			8	SS							
			9	TM							
			10	SS							
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			207	TM							
			208	SS							

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 71-11049

LOCATION Sta. 66 + 35 (Reg. Rd. #9) @

ORIGINATED BY ME

W.P. 431-64-00

BORING DATE August 5 and 6, 1971

COMPILED BY E

DATUM Geodetic

BOREHOLE TYPE Washboring, NA, BY Casing

CHECKED BY *[Signature]*

[illegible]

TABLE NO. 1

SUMMARY OF SUBSOIL AND BEDROCK CONDITIONS - EAST OF REGIONAL ROAD NO. 9

B.H.#	Station	Off Set	Ground Elevation	Surficial Deposit	Silty Clay	Glacial Till
1A & 1C	247+77	108' RT (EBL)	305.1		0 - 43.5' Soft to Very Stiff	
9	242+55	88' RT (EBL)	308.7	0' - 5' Roadway Fill	5' - 139' Firm to Hard	139 - 150'+ Very Dense
14	250+00	500' LT (WBL)	288.6		0' - 110' Firm to Hard	110' - 133' Very Dense
15	257+70	110' LT (WBL)	306.8	0' - 2' Topsoil	2' - 21'8" Firm to Hard	
16	258+90	100' RT (EBL)	308.5	0' - 2' Topsoil	2' - 43' Firm to Stiff	43' - 50'6" Very Dense
17	258+00	110' LT (WBL)	307.0	Cone Test Only		
18	256+00	110' LT (WBL)	306.0	Cone Test Only		
19	252+00	110' LT (WBL)	305.0	Cone Test Only		
20	250+00	110' LT (WBL)	305.0	Cone Test Only		
21	250+00	100' RT (EBL)	305.0	Cone Test Only		
22	251+00	100' RT (EBL)	305.0	Cone Test Only		
23	252+00	100' RT (EBL)	305.0	Cone Test Only		
24	254+00	100' RT (EBL)	305.0	Cone Test Only		
25	256+00	100' RT (EBL)	306.0	Cone Test Only		

TABLE NO. 1

SUMMARY OF SUBSOIL AND BEDROCK CONDITIONS - EAST OF REGIONAL ROAD NO. 9

Set	Ground Elevation	Surficial Deposit	Silty Clay	Glacial Till	Bedrock (Elev.)
1' RT BL)	305.1		0 - 43.5' Soft to Very Stiff		255.1
1' RT BL)	308.7	0' - 5' Roadway Fill	5' - 139' Firm to Hard	139 - 150'+ Very Dense	
1' LT BL)	288.6		0' - 110' Firm to Hard	110' - 133' Very Dense	145.0
0' LT BL)	306.8	0' - 2' Topsoil	2' - 21'8" Firm to Hard		285.0
0' RT BL)	308.5	0' - 2' Topsoil	2' - 43' Firm to Stiff	48' - 50'6" Very Dense	257.3
0' LT BL)	307.0	Cone Test Only			254.7 (Probable)
0' LT BL)	306.0	Cone Test Only			300.4 (Probable)
0' LT BL)	305.0	Cone Test Only			272.8 (Probable)
0' LT BL)	305.0	Cone Test Only			175.0 (Probable)
0' RT BL)	305.0	Cone Test Only			294.4 (Probable)
0' RT BL)	305.0	Cone Test Only			298.0 (Probable)
0' RT BL)	305.0	Cone Test Only			298.5 (Probable)
0' RT BL)	305.0	Cone Test Only			288.6 (Probable)
0' RT BL)	306.0	Cone Test Only			270.6 (Probable)

TABLE NO. 1

SUMMARY OF SUBSOIL AND BEDROCK CONDITIONS - EAST OF REGIONAL ROAD NO.

B.H.#	Station	Off Set	Ground Elevation	Surficial Deposit	Silty Clay	Glacial Till
26	258+00	100' RT (EBL)	307.0	Cone Test Only		
27	257+00	100' RT (EBL)	306.0	Cone Test Only		
28	252+00	36' LT (EBL)	304.0		0' - 6'7"	
29	251+12	31' LT (EBL)	304.4		0' - 11'6"	
31	252+00	250' LT (WBL)	304.4	0' - 4' Topsoil	4' - 54.8' Soft to Firm	
32	254+00	250' LT (WBL)	305.0	Cone Test Only		
33	256+00	250' LT (WBL)	306.2	Cone Test Only		
34	258+00	250' LT (WBL)	307.1	Cone Test Only		
37	252+00	250' RT (EBL)	308.9	Cone Test Only		
38	254+00	250' RT (EBL)	310.3	0' - 3' Topsoil	3' - 21.5' Firm to Stiff	21.5' - 22.5'
39	256+00	250' RT (EBL)	309.6	Cone Test Only		
40	258+00	250' RT (EBL)	309.3	0' - 3' Topsoil	3' - 49' Firm to Stiff	49' - 55.7'
43	252+00	500' RT (EBL)	309.8	Cone Test Only		
44	254+00	500' RT (EBL)	311.7	Cone Test Only		
45	256+00	500' RT (EP ^r)	311.6	0' - 3' Topsoil	3' - 42' Firm to Stiff	

TABLE NO. 1

SUMMARY OF SUBSOIL AND BEDROCK CONDITIONS - EAST OF REGIONAL ROAD NO. 9

Set	Ground Elevation	Surficial Deposit	Silty Clay	Glacial Till	Bedrock (Elev.)
0' RT BL)	307.0	Cone Test Only			272.1 (Probable)
0' RT BL)	306.0	Cone Test Only			280.2 (Probable)
0' LT BL)	304.0		0' - 6'7"		297.0
0' LT BL)	304.4		0' - 11'6"		292.5
0' LT BL)	304.4	0' - 4' Topsoil	4' - 54.8' Soft to Firm		249.5
0' LT BL)	305.0	Cone Test Only			273.8 (Probable)
0' LT BL)	306.2	Cone Test Only			253.0 (Probable)
0' LT BL)	307.1	Cone Test Only			260.0 (Probable)
0' RT BL)	308.9	Cone Test Only			300.2 (Probable)
0' RT BL)	310.3	0' - 3' Topsoil	3' - 21.5' Firm to Stiff	21.5' - 22.5'	288.0
0' RT BL)	309.6	Cone Test Only			267.0 (Probable)
0' RT BL)	309.3	0' - 3' Topsoil	3' - 49' Firm to Stiff	49' - 55.7'	253.5
0' RT BL)	309.8	Cone Test Only			284.1 (Probable)
0' RT BL)	311.7	Cone Test Only			282.7 (Probable)
0' RT BL)	311.6	0' - 3' Topsoil	3' - 42' Firm to Stiff		270

TABLE NO. 1

SUMMARY OF SUBSOIL AND BEDROCK CONDITIONS - EAST OF REGIONAL ROAD NO. 1

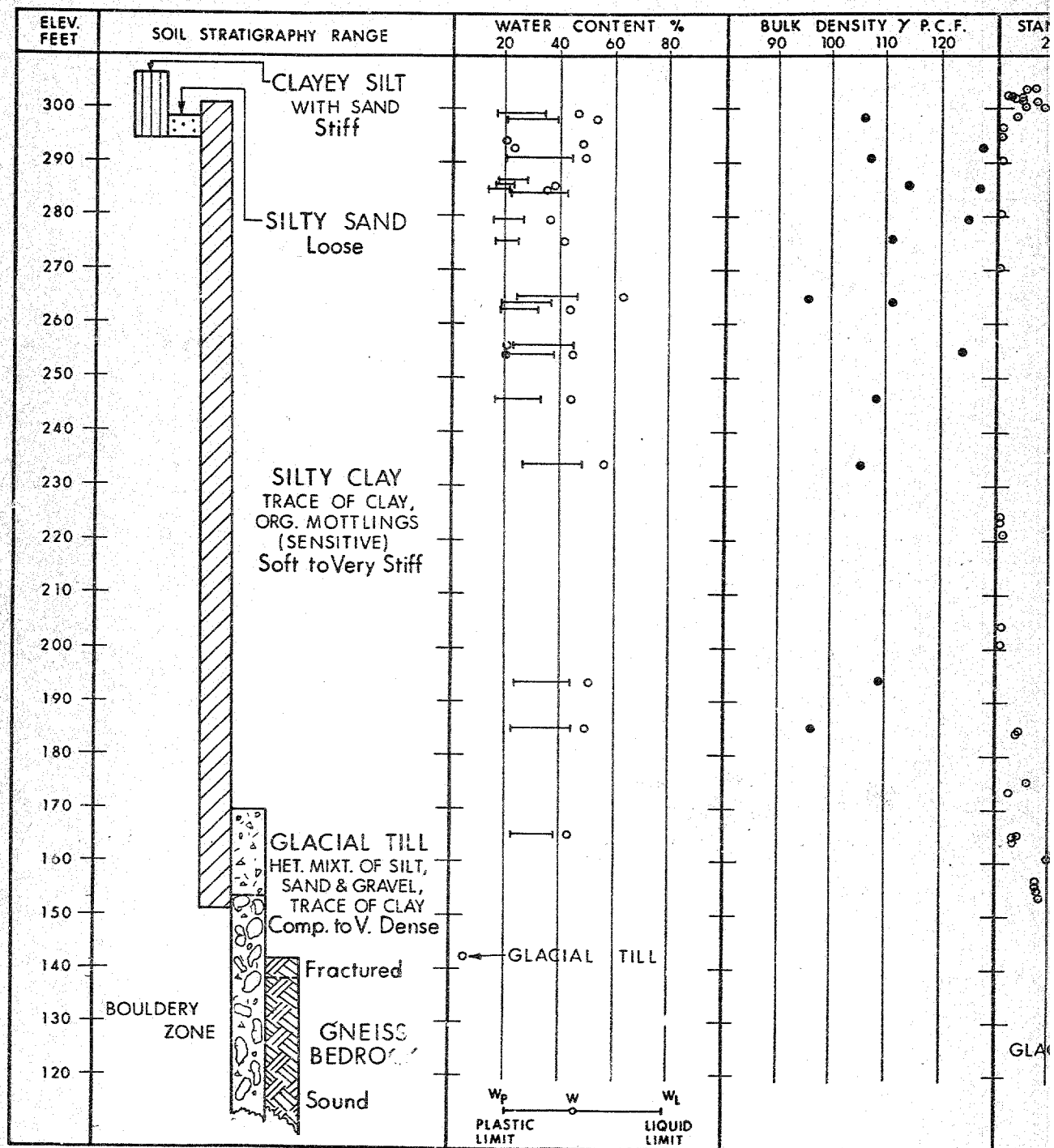
B.H.#	Station	Off Set	Ground Elevation	Surficial Deposit	Silty Clay	Glacial Till
46	258+00	500' RT (EBL)	311.1	Cone Test Only		
49	252+00	500' RT (WBL)	302.1	Cone Test Only		
50	254+00	500' LT (WBL)	302.9	0' - 2' Topsoil	2' - 80' Soft to Stiff	80' - 97'
51	256+00	500' LT (WBL)	302.8	Cone Test Only		
52	258+00	500' LT (WBL)	305.0	0' - 3' Topsoil	3' - 109' Very Soft to Firm	
54	252+00	Centre Line (WBL)	303.0	Cone Test Only		
55	254+00	Centre Line (EBL)	304.2	Cone Test Only		
56	256+07	30' LT (EBL)	305.2	Topsoil and Sand	5' - 20' - 7" Firm	
57	257+92	33' LT (EBL)	306.5	Cone Test Only		
58	254+00	Centre Line (WBL)	304.0	Cone Test Only		
59	256+00	Centre Line (WBL)	305.0	Cone Test Only		
60	258+00	Centre Line (WBL)	306	Cone Test Only		

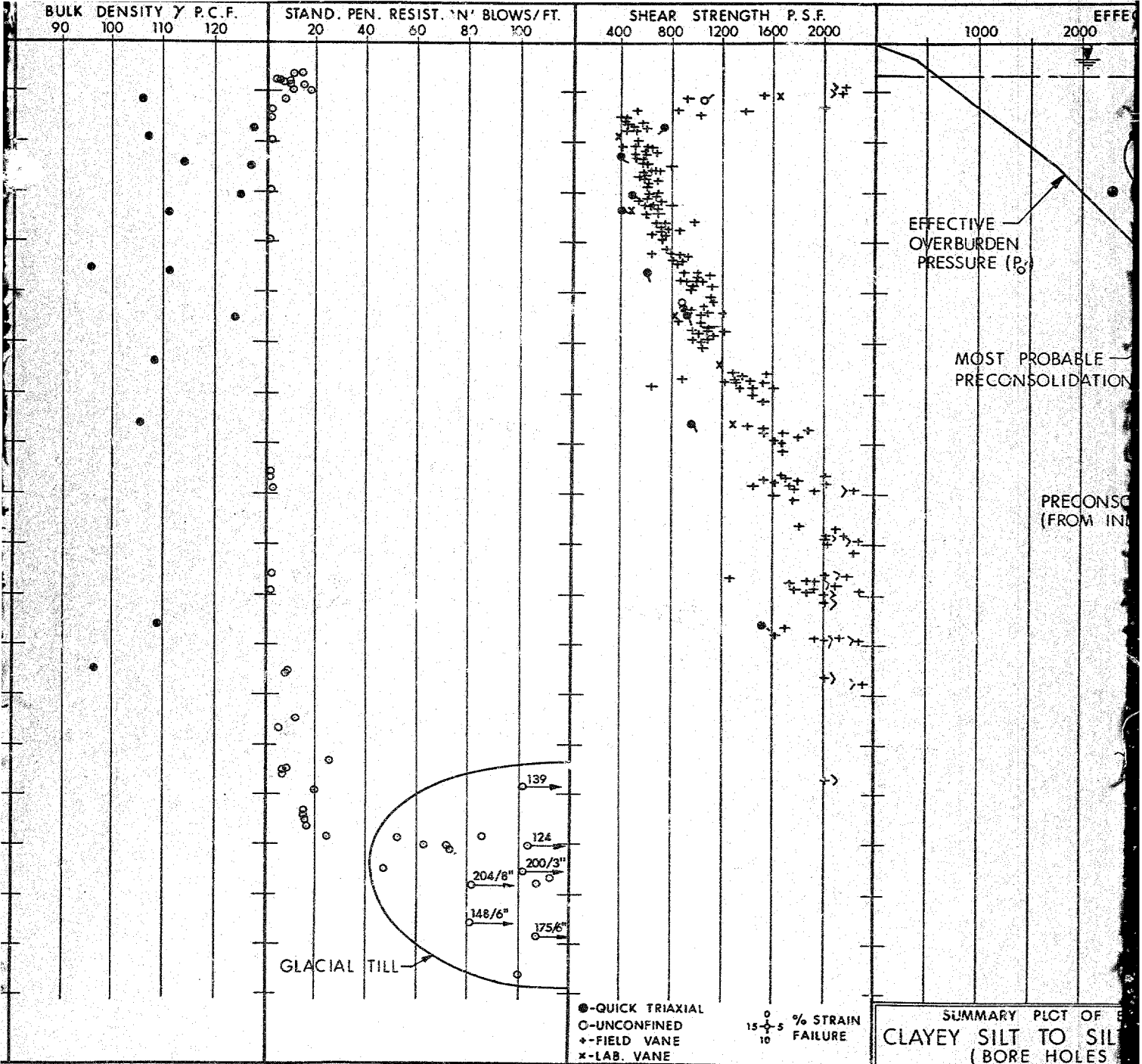
TABLE NO. 1

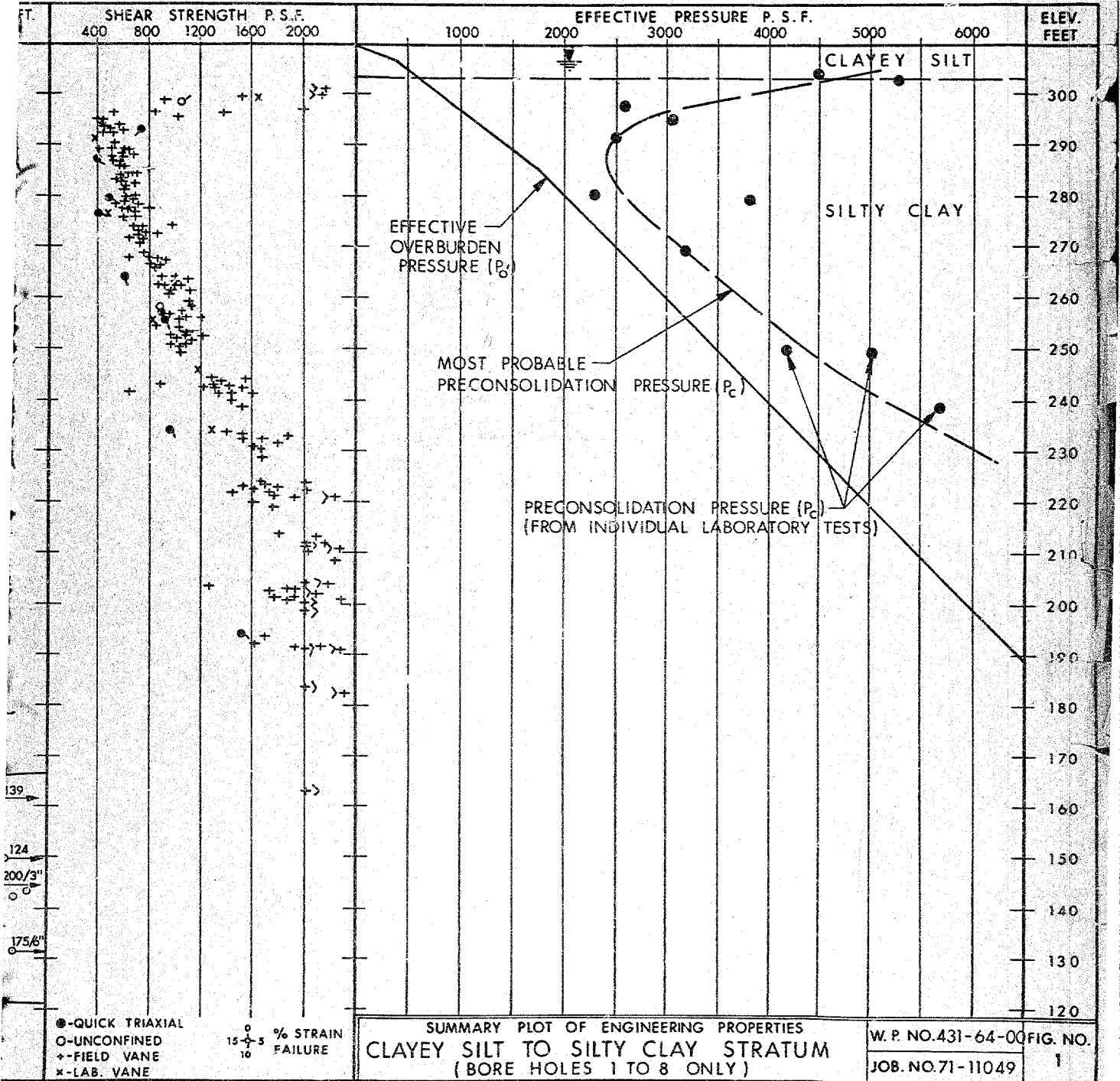
SUMMARY OF SUBSOIL AND BEDROCK CONDITIONS - EAST OF REGIONAL ROAD NO. 9

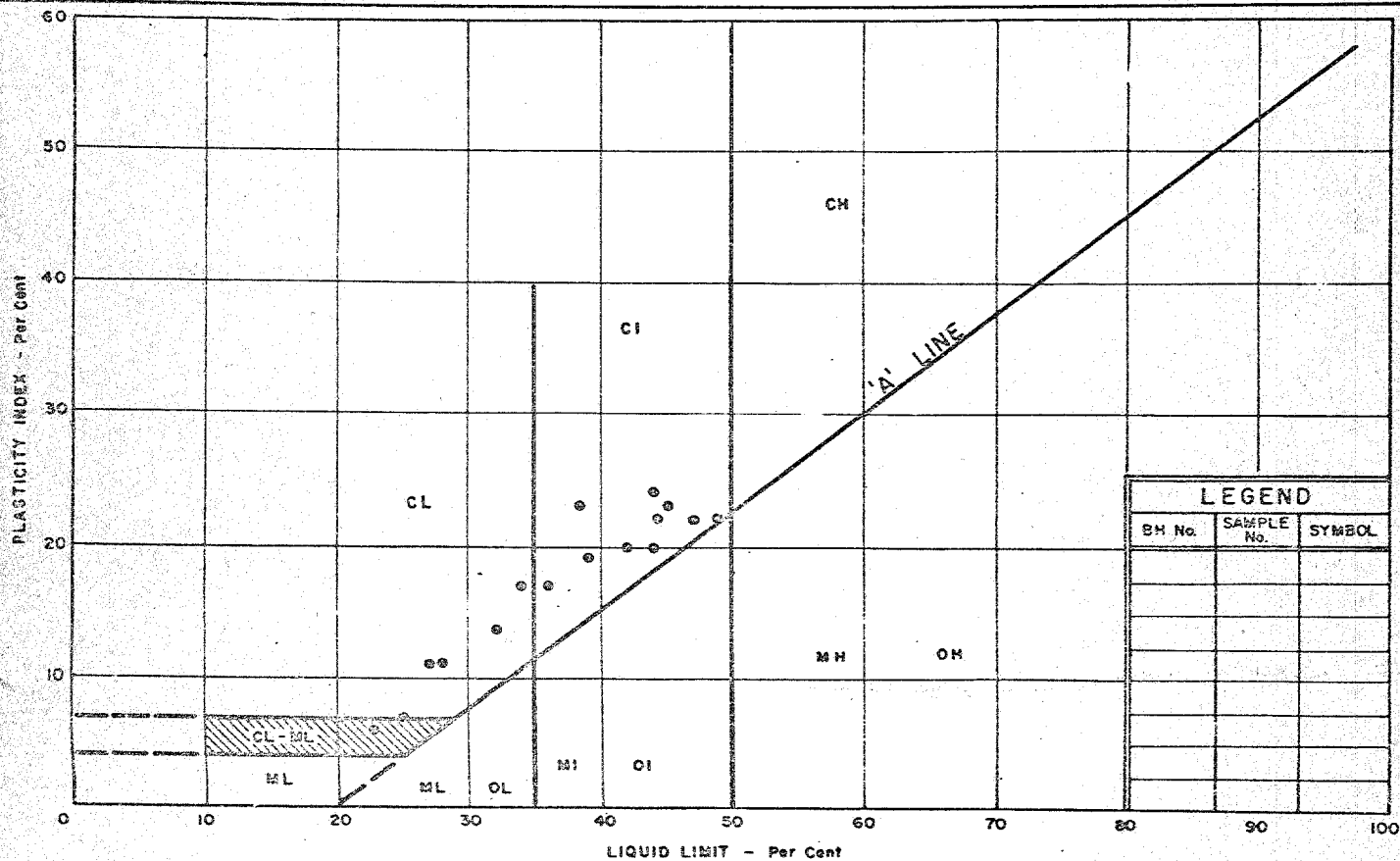
Test Set	Ground Elevation	Surficial Deposit	Silty Clay	Glacial Till	Bedrock (Elev.)
0' RT (BL)	311.1	Cone Test Only			259.8 (Probable)
0' RT (BL)	302.1	Cone Test Only			201.7 (Probable)
0' LT (BL)	302.9	0' - 2' Topsoil	2' - 80' Soft to Stiff	80' - 97'	205.8
0' LT (BL)	302.8	Cone Test Only			231.0 (Probable)
0' LT (BL)	305.0	0' - 3' Topsoil	3' - 109' Very Soft to Firm		195.0
Centre line (BL)	303.0	Cone Test Only			278.0 (Probable)
Centre line (BL)	304.2	Cone Test Only			293.3 (Probable)
0' LT (BL)	305.2	Topsoil and Sand	5' - 20' - 7"		284.8
0' LT (BL)	306.5	Cone Test Only			266.3 (Probable)
Centre line (BL)	304.0	Cone Test Only			287.5 (Probable)
Centre line (BL)	305.0	Cone Test Only			292.0 (Probable)
Centre line (BL)	306	Cone Test Only			239.5 (Probable)

W.P. 431-64-00
Job. 71-11049









DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART CLAYEY SILT TO SILTY CLAY STRATUM

WP No. 431 - 64 - 00

JOB No. 71 - 11049

FIG. 2

VOID RATIO - PRESSURE CURVES

JOB NO. 71-11049

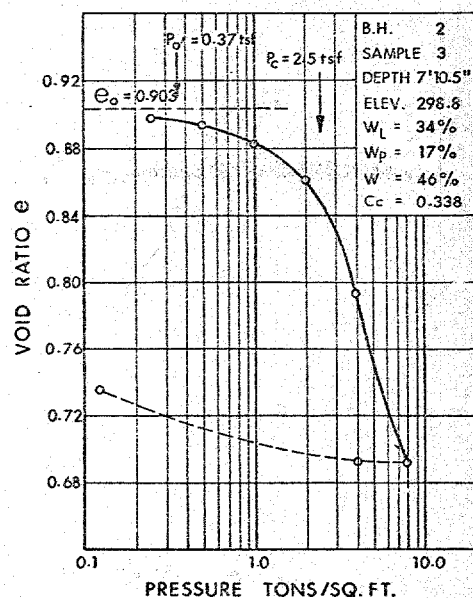
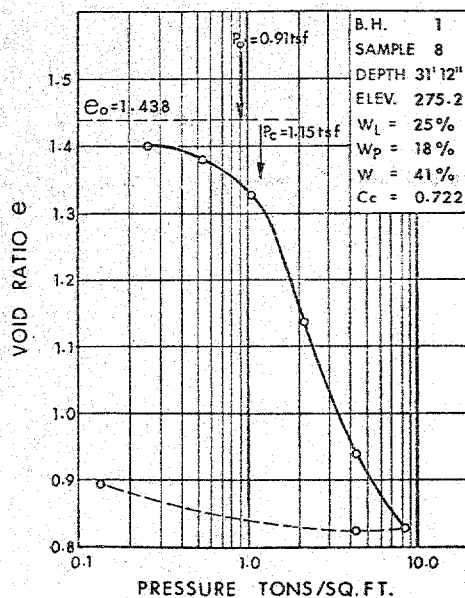
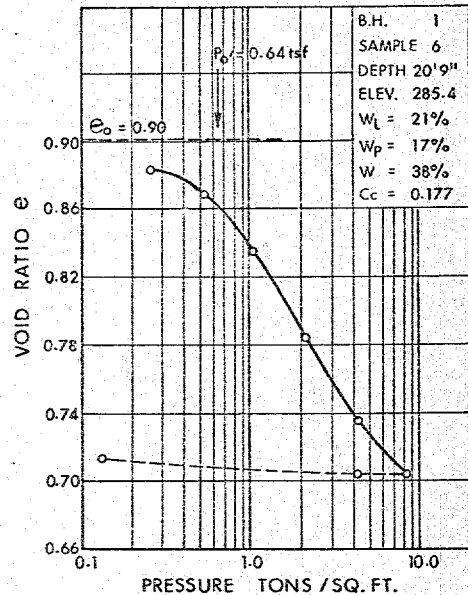
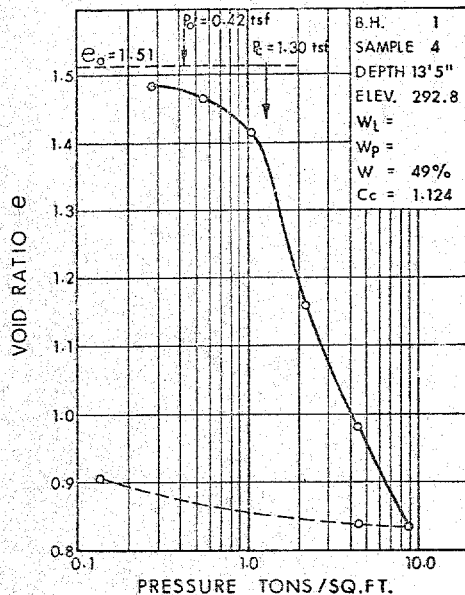


FIG. 3

VOID RATIO - PRESSURE CURVES

JOB NO. 71-11049

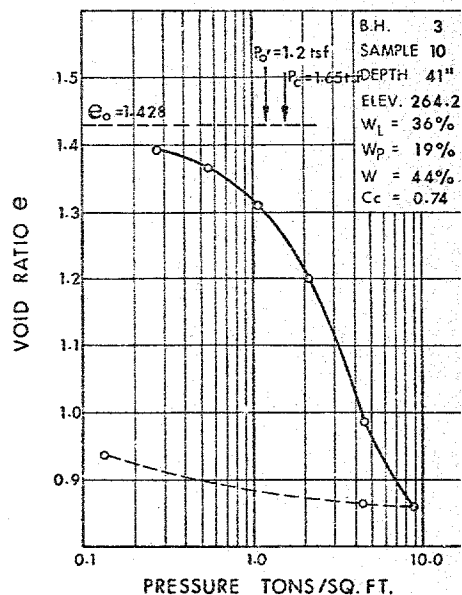
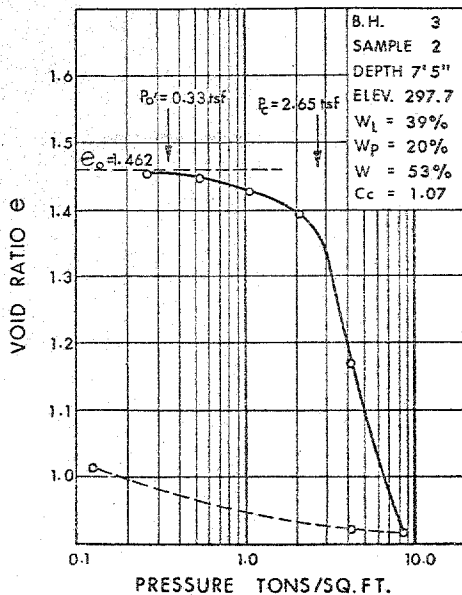
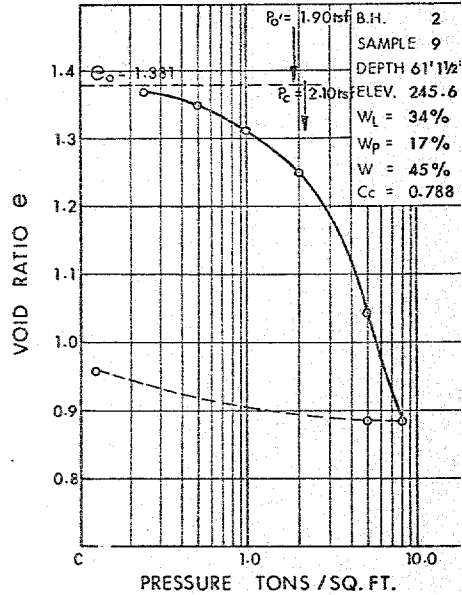
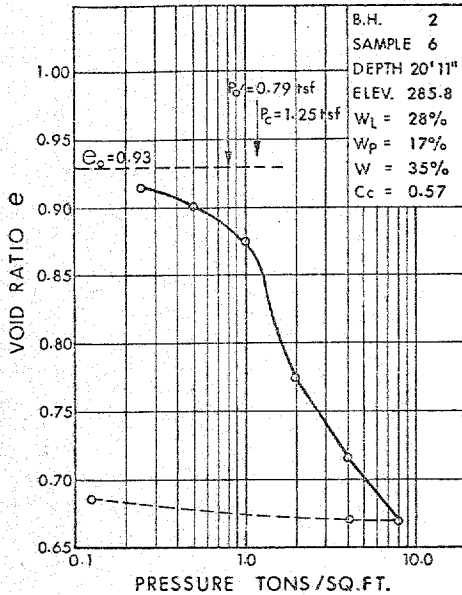


FIG. 4

VOID RATIO - PRESSURE CURVES

JOB NO. 71-11049

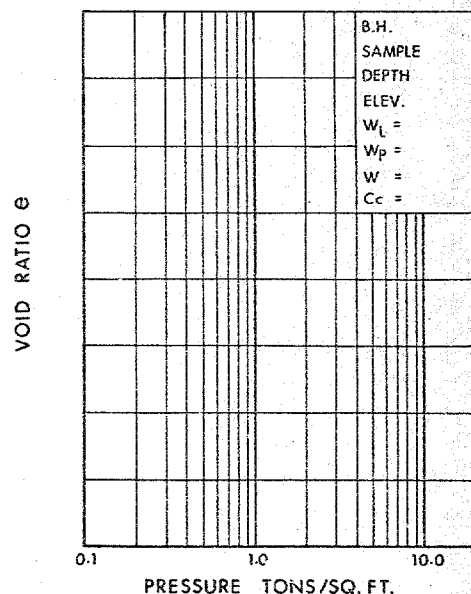
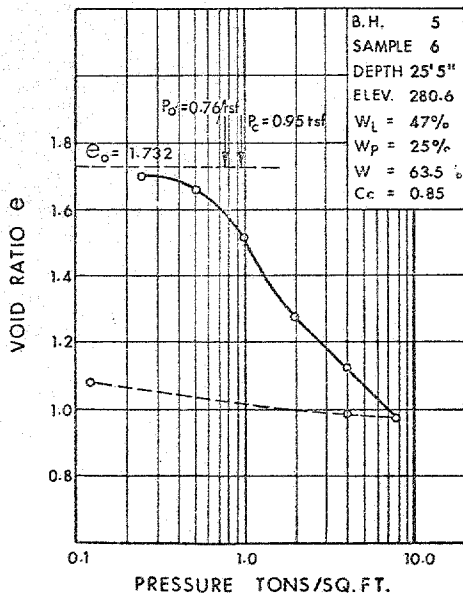
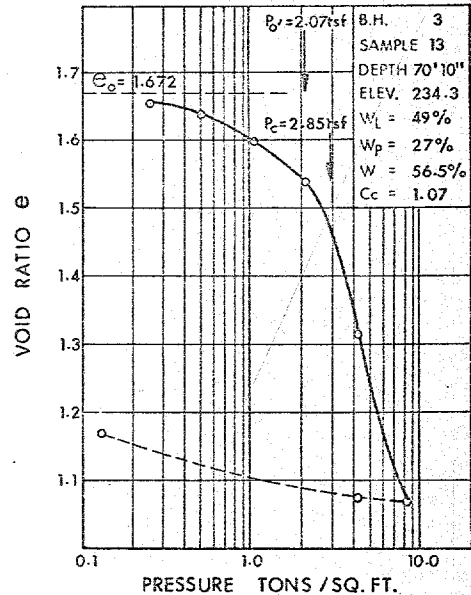
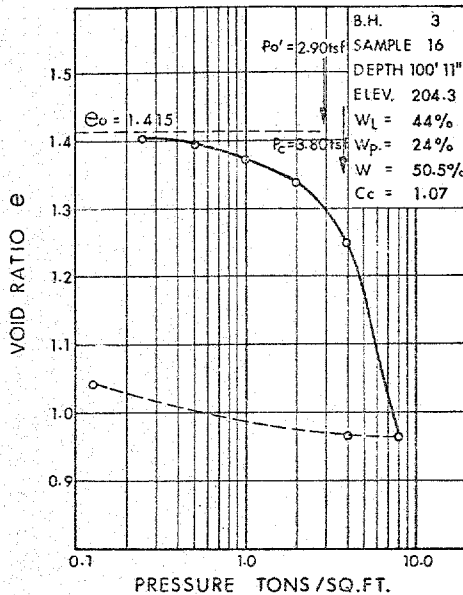


FIG. 5

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	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	DEGREE OF SATURATION
	LIQUID LIMIT
	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
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c _u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S _t	SENSITIVITY

GENERAL

π	= 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
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K _o	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
β	ANGLE OF SLOPE TO HORIZONTAL

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 :-

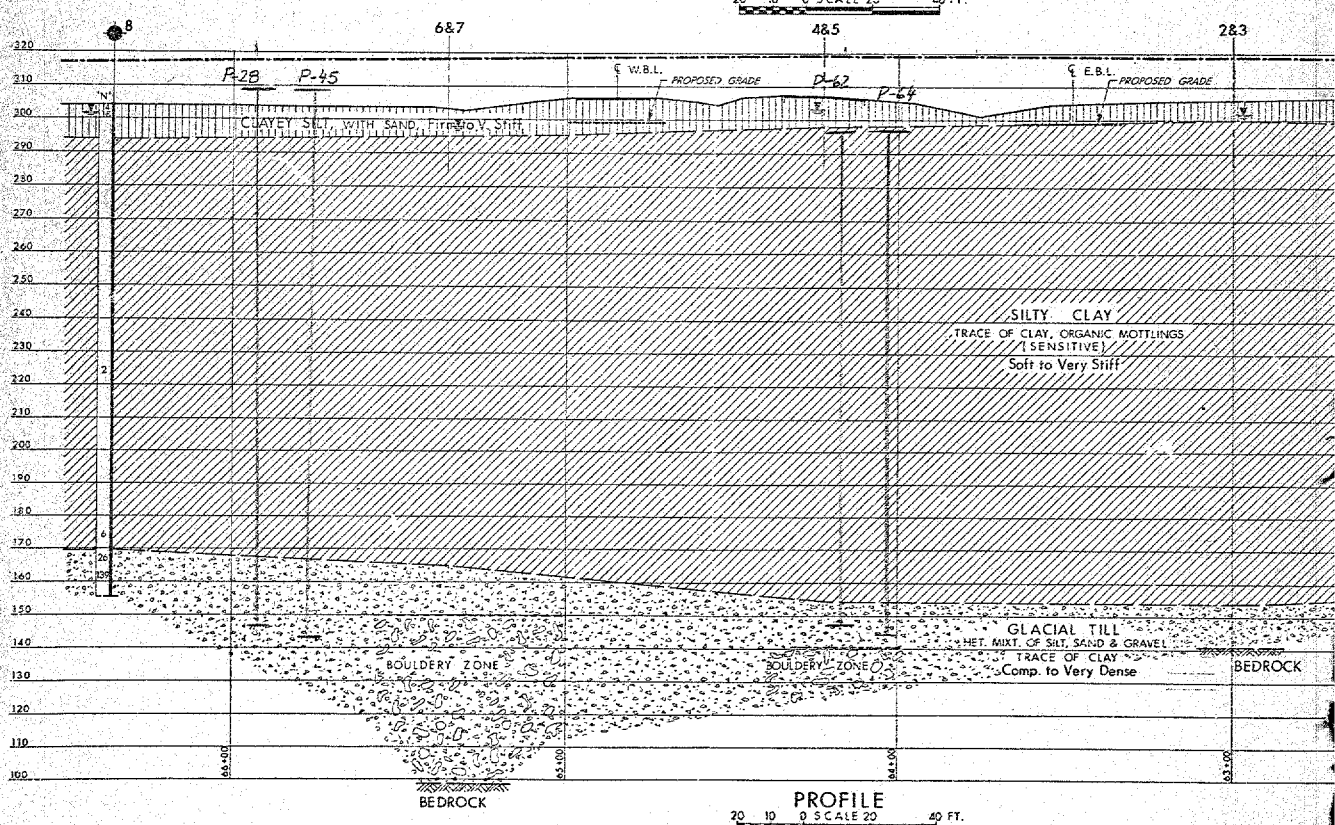
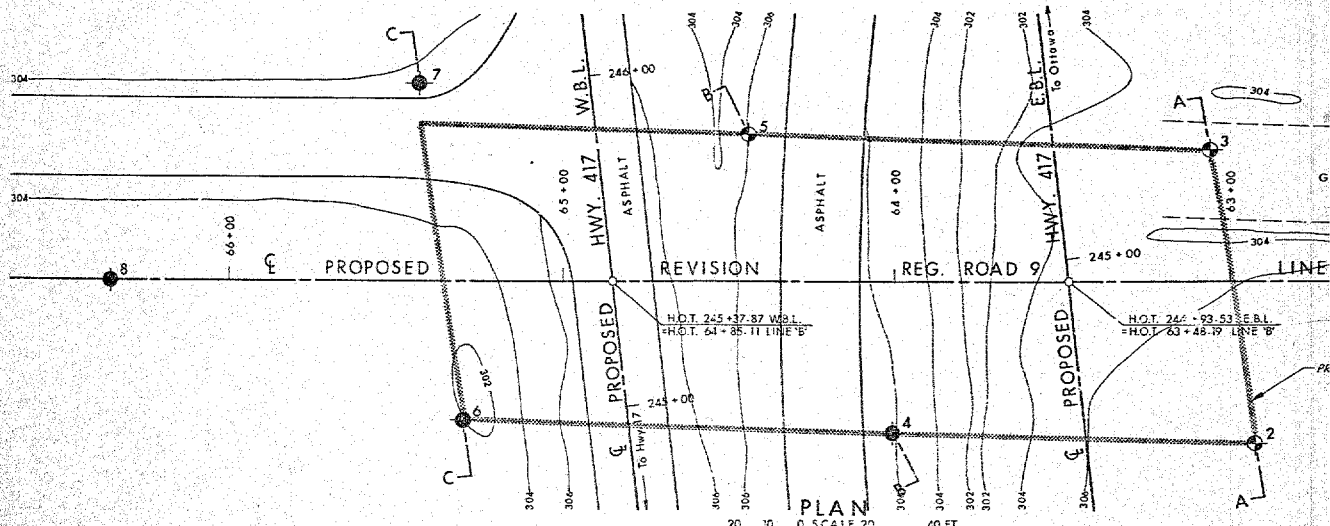
<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

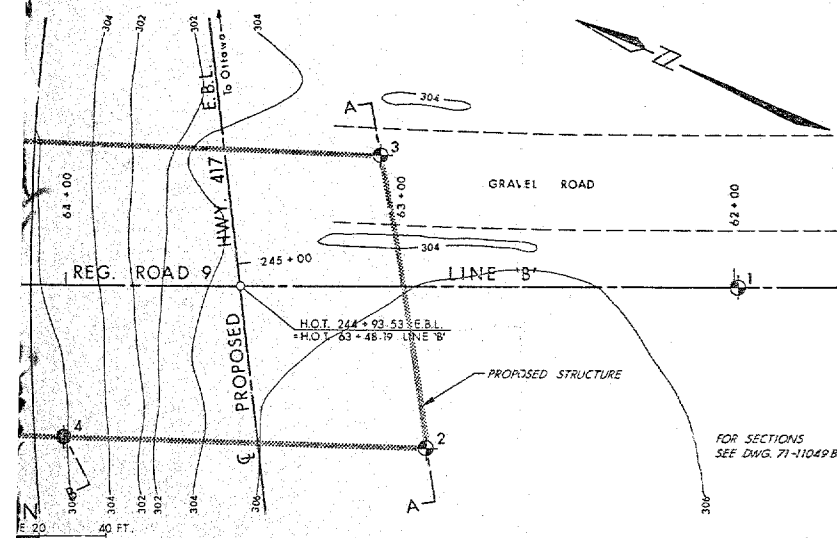
TYPE OF SAMPLE

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	

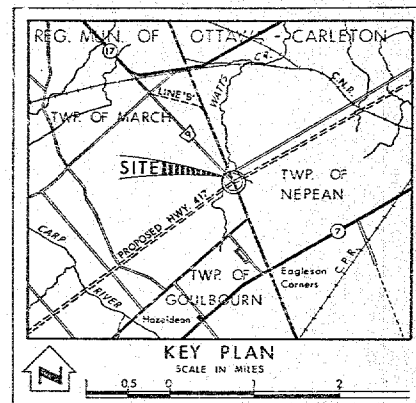
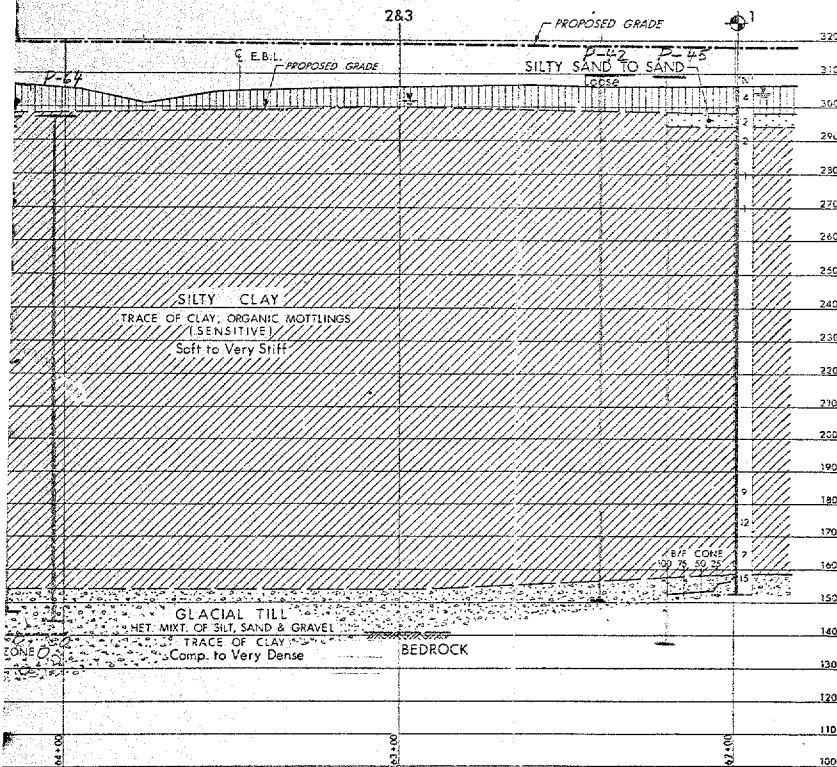
SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSO
Qd	DRAINED TRIAXIAL	S	SENSI Y





FOR SECTIONS
SEE DWG. 71-11049B



LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of field investigation, May, June & August 1971.
- Head
- Artesian Water Level
- Encountered

NO.	ELEVATION	STATION	OFFSET
1	306.2	61+99	€
2	306.7	62+93	48' LT.
3	305.2	63+06	39' RT.
4	305.0	64+00	45' LT.
5	306.1	64+44	44' RT.
6	302.4	65+30	42' LT.
7	305.0	65+43	60' RT.
8	304.2	66+35	€

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.

DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATION OFFICE


REGION ROAD 9 - LINE 'B'

HIGHWAY NO. 417 DIST. NO. 9
REG. MUNICIPALITY OF OTTAWA - CARLETON
TWP. MARCH & NEPEAN LOT 1 & 2 CON. II & IV

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. S.T.D. CHECKED	WP. NO. 431 - 64 - 00	DRAWING NO.
DRAWN S.R. CHECKED	JOB NO. 71 - 11049	71 - 11049A
DATE OCTOBER 4, 1971	SITE NO.	BRIDGE DRAWING NO.
APPROVED	CONT. NO.	

SEE DRAWING No. 71-11049A

**KEY PLAN**
SCALE IN MILES

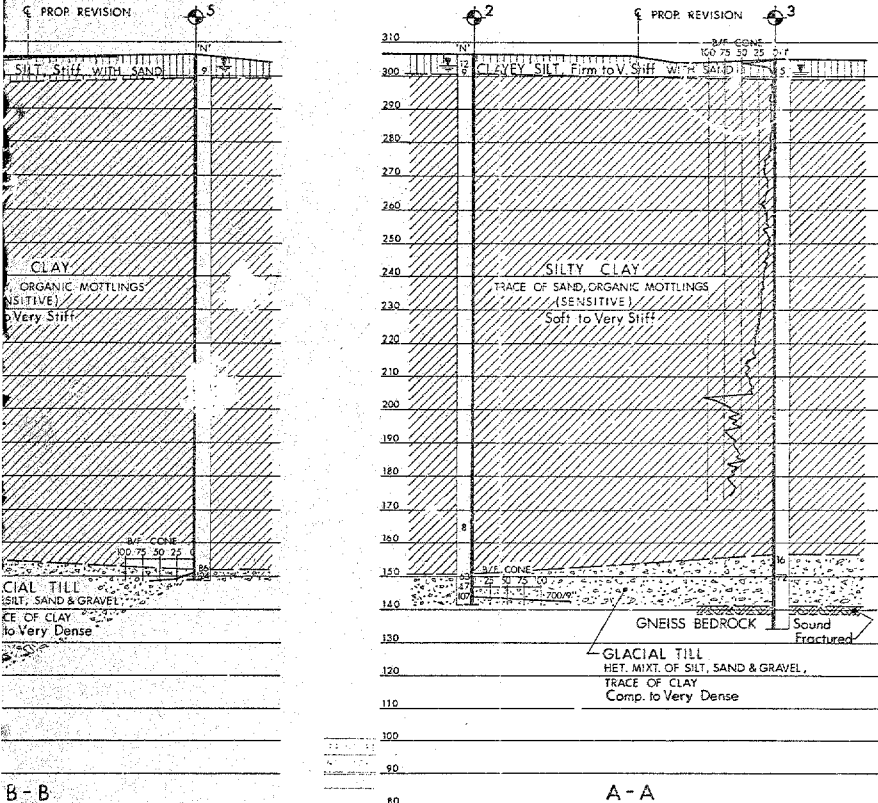
[illegible]

— 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.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS DESIGN SERVICES BRANCH—FOUNDATION OFFICE			
REGION ROAD 9 - LINE 'B'			
HIGHWAY NO. <u>417</u>		DIST. NO. <u>9</u>	
<u>REG. MUNICIPALITY OF OTTAWA - CARLETON</u>			
TWP. <u>MARCH & NEPEAN</u>		LOT. <u>1 & 2</u>	CON. <u>II & IV</u>
SECTIONS A-A, B-B & C-C			
SUBMD. B.T.D.	CHECKED: _____	W.P. NO. <u>431 - 64 - 00</u>	DRAWING NO. <u>71-11049 B</u>
DRAWN S.R.	CHECKED: _____	JOB NO. <u>71-11049</u>	
DATE <u>OCTOBER 4, 1971</u>		SITE NO. _____	BRIDGE DRAWING NO. _____
APPROVED: <i>William</i>		CONF. NO. _____	

 $\Delta - \Delta$

CTIONS
SCALE 20 40 FT

APPROVED *[Signature]*
 SENIOR MEMBER, BOARD OF DIRECTORS

REFER TO JOB 71-11077
W.P. 433-64-02

Flow

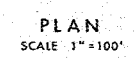
WATTS CREEK

6.4

B

ROAD

LINE 10



100

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUSRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 LBS
PILE DETAILS H.P. 12x74 (No. 5400) BATTER: STR.
PILE NO. 28 LOCATION S. ABUT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40	1	1	26	1		51	1		76	2	
	2	1	27	(NIL)		52	2		77	2	
	3	2	28	1		53	2		78	2	
	4	1	29	1		54	2		79	2	
	5	2	30	(NIL)		55	2		80	1	
	6	1	31	1		56	1		81	2	
	7	2	32	(NIL)		57	2		82	2	
	8	1	33	1		58	2		83	2	
	9	2	34	(NIL)		59	2		84	1	
	10	1	35	1		60	2		85	2	
	11	1	36	(NIL)		61	1		86	2	
	12	1	37	3		62	2		87	5	
	13	1	38	3		63	2		88	5	
	14	(NIL)	39	3		64	2		89	4	
	15	1	40	2		65	2		90	4	
	16	1	41	2		66	1		91	3	
	17	1	42	3		67	2		92	3	
	18	(NIL)	43	2		68	2		93	3	
	19	1	44	2		69	2		94	3	
	20	1	45	2		70	1		95	3	
	21	(NIL)	46	1		71	2		96	4	
	22	1	47	2		72	2		97	3	
	23	1	48	2		73	2		98	3	
	24	(NIL)	49	2		74	2		99	3	
	25	1	50	2		75	1		100	3	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND 'N INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 10/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUSRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lb
PILE DETAILS H.P. 12 x 74 (NO SHOE) BATTER: STR
PILE NO. 48 LOCATION S ABUT. ETC DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	1	26	1		51	2		76	1	
	2	1	27	(NIL)		52	2		77	2	
	3	1	28	1		53	2		78	3	
	4	1	29	(NIL)		54	1		79	2	
	5	1	30	1		55	2		80	2	
	6	1	31	(NIL)		56	2		81	1	
	7	1	32	(NIL)		57	2		82	2	
	8	1	33	1		58	1		83	2	
	9	1	34	(NIL)		59	2		84	2	
	10	1	35	(NIL)		60	2		85	1	
	11	1	36	1		61	2		86	2	
	12	1	37	3		62	2		87	6	
	13	1	38	3		63	1		88	5	
	14	1	39	3		64	2		89	4	
	15	1	40	2		65	1		90	4	
	16	1	41	2		66	2		91	3	
	17	1	42	1		67	2		92	3	
	18	1	43	2		68	1		93	3	
	19	1	44	2		69	2		94	3	
	20	1	45	2		70	2		95	2	
	21	1	46	1		71	2		96	3	
	22	1	47	2		72	1		97	3	
	23	1	48	2		73	2		98	3	
	24	1	49	2		74	2		99	3	
	25	(NIL)	50	1		75	2		100	4	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 10/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

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The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

2

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95 T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5 T. HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lb.
PILE DETAILS H.P. 12x74 (N= 5400) BATTER: STA.
PILE NO. 45 LOCATION S ABUT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	(NIL)		26	1		51	1		76	2
	2	1		27	(NIL)		52	2		77	2
	3	1		28	1		53	1		78	2
	4	2		29	(NIL)		54	2		79	2
	5	2		30	1		55	2		80	2
	6	1	Hammer	31	1		56	1	Hammer	81	2
	7	2	15 ST	32	1		57	2	15 ST	82	2
	8	1	DROP or	33	(NIL)	Stopped	58	1	DROP	83	2
	9	1	5'	34	1	10000	59	2	0800	84	2
	10	2	↓	35	(NIL)	10000	60	2	↓	85	2
	11	1	90'	36	1	10000	61	2	↓	86	2
	12	1		37	3	10000	62	2	130'	87	6
	13	1		38	3	10000	63	1		88	5
	14	1		39	3	10000	64	2		89	4
	15	1		40	2	800	65	1		90	4
	16	(NIL)		41	1	10000	66	2		91	4
	17	1		42	2	10000	67	2		92	4
	18	(NIL)		43	1		68	1		93	4
	19	1		44	2		69	2		94	3
	20	1		45	2		70	2		95	3
	21	1		46	1		71	2		96	3
	22	1		47	2		72	2		97	3
	23	(NIL)		48	2		73	2		98	3
	24	1		49	2		74	2		99	4
	25	(NIL)		50	2		75	2		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION

BLOWS PER INCH

MEASURED REBOUND IN INCHES

FINAL LENGTH OF PILE

FINAL CUT OFF ELEVATION

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE

ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT)

DATE

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

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Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

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The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUPRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DDOP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12X24 (No. 5400) BATTER: STR.
PILE NO. 42 LOCATION S. ABGT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	1		26	1		51	2		76	2
	2	1		27	1		52	1		77	2
	3	2		28	(NIL)		53	2		78	2
	4	2		29	1		54	2		79	2
	5	2		30	1		55	2		80	2
	6	2	HAMMER	31	(NIL)		56	2	HAMMER	81	2
	7	2	15 3T.	32	1		57	1	15	82	2
	8	1	DDOP 5'	33	(NIL)		58	2	5T.	83	2
	9	1	5'	34	1	STOPPED	59	2	DDOP 5'	84	1
	10	1	↓	35	(NIL)	AT	60	2	↓	85	2
	11	1	↓	36	1	12:00 (LUN)	61	2	↓	86	2
	12	1	90'	37	3	July 10/75	62	2	130'	87	5
	13	1		38	3		63	2		88	5
	14	1		39	3	START	64	1		89	4
	15	(NIL)		40	2	at	65	2		90	4
	16	1		41	2	9:30 AM	66	2		91	3
	17	1		42	2	July 14/75	67	2		92	3
	18	(NIL)		43	2		68	2		93	3
	19	1		44	2		69	2		94	3
	20	1		45	2		70	1		95	3
	21	1		46	2		71	2		96	3
	22	(NIL)		47	2		72	2		97	3
	23	1		48	2		73	2		98	3
	24	(NIL)		49	2		74	2		99	3
	25	1		50	2		75	1		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 10/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12x74 (No. 5402) BATTER: STR.
PILE NO. 41 LOCATION S. ABUT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	1	26	(NIL)		51	2		76	2	
	2	2	27	1		52	2		77	2	
	3	2	28	1		53	2		78	1	
	4	2	29	(NIL)		54	2		79	2	
	5	2	30	1		55	2		80	2	
	6	2	31	(NIL)		56	2		81	2	
	7	2	32	1		57	1	Hammer	82	2	5700
	8	2	33	(NIL)	STOPPED	58	2	15 5T.	83	1	at
	9	1	34	1	at	59	2	DROP	84	2	10-15
	10	1	35	(NIL)	2:00 PM	60	2	05 5'	85	2	10-15
	11	1	36	1	July 10/75	61	2	↓	86	2	10-15
	12	1	37	3		62	1	130'	87	6	
	13	1	38	3		63	2		88	5	START
	14	(NIL)	39	3		64	2		89	4	at
	15	1	40	3	START	65	2		90	4	2:00
	16	1	41	2	at	66	2		91	3	PR.
	17	(NIL)	42	2	10:00 AM	67	2		92	4	July 10/75
	18	1	43	2	July 10/75	68	1		93	4	
	19	1	44	1		69	2		94	3	
	20	1	45	2		70	2		95	3	
	21	(NIL)	46	2		71	2		96	3	
	22	1	47	2		72	1		97	3	
	23	(NIL)	48	1		73	2		98	3	
	24	1	49	2		74	2		99	3	
	25	1	50	2		75	2		100	4	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 10/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DR. P. HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 LBS
PILE DETAILS H.P. 12 X 74 (N. 51.2) BATTER: STA.
PILE NO. 49 LOCATION N. ABUT. ETC. DATE DRIVEN JULY 14/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	21.6	26	1		51	1		80'	76	2
	2	1	27	2		52	1			77	2
	3	1	28	2		53	2		122'	78	7
	4	1	29	1		54	1			79	5
	5	1	30	1		55	1			80	3
	6	1	31	2		56	1			81	3
	7	1	32	2		57	1			82	3
	8	2	33	1		58	1			83	3
	9	2	34	1		59	1			84	2
	10	2	35	1		60	1			85	3
	11	2	36	2		61	1			86	3
	12	2	37	3		62	1			87	3
	13	2	38	3		63	1			88	2
	14	2	39	3		64	1			89	3
	15	2	40	2		65	1			90	2
	16	2	41	2		66	2			91	3
	17	1	42	1		67	1			92	3
	18	2	43	1		68	1			93	2
	19	2	44	1		69	1			94	3
	20	1	45	1		70	2			95	2
	21	2	46	1		71	1			96	3
	22	1	47	1		72	1			97	3
	23	2	48	1		73	2			98	2
	24	1	49	1		74	1			99	3
	25	2	50	1		75	2			100	2

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED [Signature]
NAME (PRINT) D. S. DAVIES
DATE JULY 14/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 LBS.
PILE DETAILS H.P. 12x74 (No shoe) BATTER: STR.
PILE NO. 45 LOCATION N. ABUT. FTG. DATE DRIVEN July 15/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	NIL		26	1		51	1	80'	76	2
	2			27	1		52	1		77	2
	3	1		28	1		53	1	122'	78	5
	4	5		29	NIL		54	1		79	5
	5	2		30	1		55	1		80	3
	6	1		31	1		56	1		81	3
	7	2		32	1		57	1		82	3
	8	2		33	NIL	STOPPED	58	1		83	3
	9	2		34	1	at 3000'	59	2		84	3
	10	3		35	NIL	July 15/75	60	1		85	3
	11	2		36	1		61	1		86	2
	12	2	80'	37	3		62	1		87	3
	13	2		38	3	START at	63	1		88	3
	14	2		39	3	11:00 AM	64	1		89	2
	15	2		40	3	July 15/75	65	2		90	3
	16	1		41	2		66	2		91	3
	17	1		42	2		67	1		92	3
	18	2		43	2		68	1		93	3
	19	1		44	2		69	1		94	3
	20	1		45	1		70	1		95	2
	21	1		46	1		71	1		96	3
	22	1		47	1		72	1		97	2
	23	2		48	1		73	2		98	3
	24	1		49	1		74	1		99	2
	25	1		50	1		75	1		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 15/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 731-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12x74 (N. Shoe) BATTER: STR.
PILE NO. 42 LOCATION N. AB&T. FTG. DATE DRIVEN July 15/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	NIL	26	1		51	1		80'	76	2
	2	1	27	1		52	1			77	2
	3	1	28	(NIL)		53	1		122'	78	6
	4	2	29	1		54	1			79	6
	5	2	30	1		55	1			80	4
	6	2	31	1		56	1			81	3
	7	2	32	(NIL)		57	1			82	3
	8	2	33	1		58	1			83	3
	9	2	34	1		59	1			84	3
	10	2	35	(NIL)		60	1			85	3
	11	3	36	1		61	1			86	3
	12	2	80'	3		62	1			87	2
	13	2	38	3		63	1			88	2
	14	2	39	3		64	1			89	3
	15	2	40	2		65	2			90	3
	16	2	41	2		66	1			91	3
	17	1	42	2		67	1			92	2
	18	1	43	1		68	2			93	3
	19	2	44	1		69	1			94	3
	20	1	45	1		70	1			95	3
	21	1	46	1		71	1			96	2
	22	1	47	1		72	1			97	3
	23	2	48	1		73	2			98	3
	24	1	49	1		74	2			99	2
	25	1	50	1		75	1			100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 15/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DRUM HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12A74 (No. 54.e) BATTER: STR.
PILE NO. 28 LOCATION S. ABUT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
130'	1	3	190'	26	10		51	5		76	
	2	3		27	10		52	7		77	
	3	4		28	7	START	53	8		78	
	4	3		29	7	at	54	9		79	
	5	3		30	7	3:00 PM	55	8		80	
	6	3		31	6	July 23/75	56	16		81	
	7	3		32	6		57	33		82	
	8	3		33	6		58	25		83	
	9	3		34	6		59	37		84	
	10	3		35	6		60	30		85	
	11	3		36	6		61	42		86	
	12	2		37	6		62	35		87	
	13	3		38	6		63	41		88	
	14	3		39	6		64	43		89	
	15	3		40	6		65	50		90	
	16	3		41	6		66	STOP		91	
	17	3		42	5		67			92	
	18	3		43	5		68			93	
	19	3		44	5		69			94	
	20	3	STOP	45	5		70			95	
	21	2	at	46	5		71			96	
	22	3	10:00 AM	47	5		72			97	
	23	3	July 21/75	48	5		73			98	
	24	3		49	5		74			99	
	25	3		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	6	6	8	8
MEASURED REBOUND IN INCHES	1 1/4"	1 1/4"	1 1/4"	1"	1 1/4"	1"
FINAL LENGTH OF PILE	166' 7"			FINAL CUT OFF ELEVATION 308.50		

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 21/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DEERSON DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12x74 (No 560) BATTER: STR.
PILE NO. 41 LOCATION S. ABUT. F.Y.G. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
130'	1	4	170'	26	8		51	6		76	
	2	3		27	8		52	15		77	
	3	3		28	10	START	53	30		78	
	4	3		29	7	at.	54	35		79	
	5	3		30	8	10:15 am	55	25		80	
	6	4		31	6	July	56	42		81	
	7	3		32	6	12:45 pm	57	44		82	
	8	3		33	6		58	48		83	
	9	3		34	6		59	STOP.		84	
	10	3		35	6		60			85	
	11	3		36	6		61			86	
	12	3		37	6		62			87	
	13	3		38	6		63			88	
	14	3		39	5		64			89	
	15	3		40	5		65			90	
	16	3		41	6		66			91	
	17	2		42	6		67			92	
	18	3		43	5		68			93	
	19	3		44	5		69			94	
	20	3		45	5		70			95	
	21	2		46	4		71			96	
	22	3		47	5		72			97	
	23	3	STOP	48	5		73			98	
	24	3	at	49	5		74			99	
	25	3	2:15 PM July 21/75	50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	7	8	8	8
MEASURED REBOUND IN INCHES	1 1/4"	1"	1 1/4"	1 1/2"	1"	1 1/4"
FINAL LENGTH OF PILE	159' 2"					FINAL CUT OFF ELEVATION 308.50

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE TIP EL, 149.3
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 21/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUPRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12x74 (No shoe) BATTER: STR.
PILE NO. 42 LOCATION S. ABUT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
130'	1	4	170'	26	10		51	32		76	
	2	4		27	10		52	29		77	
	3	4		28	7	START	53	40		78	
	4	4		29	7	at	54	32		79	
	5	3		30	7	10:00 A.M.	55	35		80	
	6	3		31	6	July 21/75	56	40		81	
	7	3		32	6		57	45		82	
	8	3		33	6		58	STOP		83	
	9	3		34	6		59			84	
	10	3		35	6		60			85	
	11	3		36	6		61			86	
	12	3		37	6		62			87	
	13	2		38	5		63			88	
	14	3		39	5		64			89	
	15	2		40	5		65			90	
	16	3		41	5		66			91	
	17	3		42	6		67			92	
	18	3		43	5		68			93	
	19	3		44	7		69			94	
	20	3	STOP	45	8		70			95	
	21	2	at	46	6		71			96	
	22	3	7:15 AM.	47	7		72			97	
	23	3	July 21/75	48	8		73			98	
	24	3	70	49	9		74			99	
	25	3		50	16		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	6	6	6	8
MEASURED REBOUND IN INCHES	1"	1"	1"	1"	1"	1"
FINAL LENGTH OF PILE	158' 3"					FINAL CUT OFF ELEVATION 308.50

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 21/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 4'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12 x 74 (No Shoc) BATTER: STR.
PILE NO. 45 LOCATION S. ABUT. FTG. DATE DRIVEN July 10/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
130'	1	4	170'	26	8		51	6		76	
	2	4		27	10		52	6		77	
	3	3		28	8	START	53	6		78	
	4	3		29	8	at	54	7		79	
	5	3		30	7	2:00 PM	55	8		80	
	6	3		31	7	July 23/75	56	6		81	
	7	3		32	7		57	7		82	
	8	3		33	6		58	8		83	
	9	3		34	6		59	9		84	
	10	3		35	6		60	16		85	
	11	3		36	6		61	32		86	
	12	3		37	5		62	29		87	
	13	3		38	6		63	36		88	
	14	2		39	6		64	30		89	
	15	2		40	6		65	40		90	
	16	3		41	5		66	31		91	
	17	3		42	5		67	32		92	
	18	3		43	5		68	35		93	
	19	3		44	5		69	45		94	
	20	3	Stop at	45	5	3:00 PM	70	STOP		95	
	21	3	8:15 am	46	5	2' R"	71			96	
	22	3	July 21/75	47	5		72			97	
	23	3		48	5		73			98	
	24	3		49	6		74			99	
	25	3		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	6	6	6	7	9
MEASURED REBOUND IN INCHES	1"	1 1/2"	1 1/2"	1"	1 1/2"	1 1/2"
FINAL LENGTH OF PILE	171' 1"			FINAL CUT OFF ELEVATION 308.50		

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT) M. ST. JEAN

DATE July 21/75

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12X24 (No Shear) BATTER: STR.
PILE NO. 48 LOCATION S. A.B.T. ETC. DATE DRIVEN July 10/95

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
130'	1	3	170'	26	9		51	5		76	
	2	3		27	10		52	6		77	
	3	4		28	8	START	53	6		78	
	4	3		29	7	at	54	7		79	
	5	3		30	7	11:00 AM	55	6		80	
	6	3		31	6	July 23/95	56	7		81	
	7	3		32	7		57	8		82	
	8	3		33	6		58	8		83	
	9	3		34	6		59	14		84	
	10	3		35	6		60	35		85	
	11	4		36	6		61	38		86	
	12	3		37	6		62	40		87	
	13	3		38	6		63	42		88	
	14	3		39	5		64	45		89	
	15	3		40	6		65	48		90	
	16	3		41	6		66	STOP		91	
	17	3		42	6		67			92	
	18	3		43	5		68			93	
	19	3		44	5		69			94	
	20	2	STOP	45	6		70			95	
	21	3	at	46	5		71			96	
	22	2	9:30 AM	47	5		72			97	
	23	3	July 21/95	48	5		73			98	
	24	3		49	5		74			99	
	25	3		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	5	6	6	8
MEASURED REBOUND IN INCHES	1"	1"	1"	1 1/2"	1"	1 1/2"
FINAL LENGTH OF PILE	167' 0"			FINAL CUT OFF ELEVATION 308.5'		

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 21/95
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

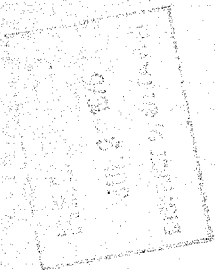
Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.



BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12x74 (No shoe) BATTER: STP
PILE NO. 41 LOCATION N. ABUT. FTG. DATE DRIVEN July 29/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	1		26	1		51	1	80'	76	2
	2	1		27	1		52	1		77	2
	3	1		28	1		53	1	122'	78	6
	4	2		29	(NIL)		54	1		79	5
	5	2		30	1		55	2		80	3
	6	2		31	1		56	1		81	3
	7	2		32	(NIL)	STOPPED	57	1		82	3
	8	2		33	1	at	58	1		83	3
	9	2		34	1	8:55 AM	59	1		84	3
	10	3		35	(NIL)	July 29/75	60	1		85	3
	11	2		36	1		61	1		86	2
	12	2		37	1		62	1		87	3
	13	2	80'	38	3		63	1		88	2
	14	2		39	3		64	2		89	3
	15	2		40	2	START	65	1		90	3
	16	2		41	2	at	66	1		91	2
	17	2		42	2	8:10 AM	67	1		92	2
	18	1		43	1	July 30	68	1		93	2
	19	1		44	1		69	1		94	3
	20	2		45	1		70	1		95	2
	21	1		46	1		71	1		96	3
	22	1		47	1		72	2		97	2
	23	1		48	1		73	1		98	2
	24	1		49	1		74	2		99	2
	25	1		50	1		75	1		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE July 29/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

EL. 145

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12x74 (N. 5600) BATTER: STR.
PILE NO. 28 LOCATION N. ABUT. FTY DATE DRIVEN July 29/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1	1		26	1		51	1	80'	76	2
	2	1		27	(NIL)		52	1		77	2
	3	1		28	1		53	2	122'	78	6
	4	2		29	1		54	1		79	5
	5	2		30	(NIL)	STOPPED	55	1		80	4
	6	2		31	1	at	56	1		81	3
	7	2		32	1	9:00 AM	57	1		82	3
	8	2		33	(NIL)	July 29/75	58	1		83	3
	9	3		34	1		59	2		84	3
	10	2		35	1		60	1		85	3
	11	2		36	1		61	1		86	3
	12	2	80'	37	3		62	1		87	2
	13	2		38	3		63	1		88	3
	14	2		39	2	START	64	1		89	2
	15	2		40	2	at	65	1		90	3
	16	2		41	1	7:15	66	1		91	2
	17	1		42	1	AM.	67	1		92	2
	18	1		43	1	July 30/75	68	2		93	3
	19	2		44	1		69	1		94	3
	20	1		45	1		70	1		95	2
	21	1		46	1		71	1		96	3
	22	1		47	1		72	1		97	2
	23	1		48	1		73	1		98	3
	24	1		49	1		74	2		99	2
	25	1		50	1		75	1		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONT. M10

SIGNED

NAME (PRINT) M. ST. JEAN

DATE July 29/75

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE WROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lb.
PILE DETAILS H.P. 12x74 (No Shoe) BATTER: STR.
PILE NO. 41 LOCATION N. ABUT. FTG. DATE DRIVEN July 27/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
122'	1	2	166	26	5	166	51	4		76	
	2	3		27	5		52	4		77	
	3	2		28	5		53	5		78	
	4	2		29	5		54	5		79	
	5	3		30	5		55	6		80	
	6	2		31	5		56	8		81	
	7	3		32	5		57	15		82	
	8	2		33	5		58	24		83	
	9	3		34	4		59	24		84	
	10	2		35	4		60	36		85	
	11	3			5		61	40		86	
	12	2			5		62	40		87	
	13	3		8	5		63	46		88	
	14	2	STOP AT	39	4		64	50		89	
	15	2	5:00 PM	40	5		65	46		90	
	16	3	Aug 5	41	5	166	66	STOP		91	
	17	3		42	5		67			92	
	18	3		43	5		68			93	
166	19	12	START	44	5		69			94	
	20	8	at	45	4		70			95	
	21	6	1:00	46	4		71			96	
	22	6	P.M.	47	5		72			97	
	23	6	Aug 12	48	4		73			98	
	24	6		49	5		74			99	
	25	5		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	6	6	6	8
MEASURED REBOUND IN INCHES	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
FINAL LENGTH OF PILE	165' 8"					FINAL CUT OFF ELEVATION 308.50

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE TIPEL. 192.8
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE Aug 6/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
 CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
 HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
 TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
 PILE DETAILS H.P. 12x74 (No. 5600) BATTER: STR.
 PILE NO. 45 LOCATION N. ABUT. FTG. DATE DRIVEN July 15/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
122'	1	3	166	26	5	166	51	5		76	
	2	3		27	5		52	5		77	
	3	2		28	5		53	5		78	
	4	2		29	5		54	5		79	
	5	3		30	5		55	4		80	
	6	3		31	5		56	4		81	
	7	2		32	5		57	5		82	
	8	3		33	5		58	10		83	
	9	2		34	5		59	15		84	
	10	3		35	5		60	21		85	
	11	2		36	5		61	24		86	
	12	2		37	5		62	26		87	
	13	3		38	5		63	35		88	
	14	3	stopped at	39	5		64	38	Aug 11	89	
	15	3	2:15 PM	40	5		65	42	9:30 AM	90	
	16	2	Aug 5	41	5	166	66	56	Aug 14	91	
	17	3		42	4	169'3"	67	STOP	9:30 AM	92	
	18	3		43	5		68			93	
166	19	8		44	4	splice	69			94	
	20	7	start at	45	5		70			95	
	21	6		46	4		71			96	
	22	5	Aug 11	47	4		72			97	
	23	5	9:30 AM	48	5		73			98	
	24	5		49	5		74			99	
	25	5		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	6	6	6	8
MEASURED REBOUND IN INCHES	1 1/4	1 1/4	1 1/2	1 1/4	1 1/4	1 1/2
FINAL LENGTH OF PILE	166'4"					FINAL CUT OFF ELEVATION 308.50

REPORT TO BE SENT TO :-

GEOTECHNICAL OFFICE
 ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
 MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
 DOWNSVIEW, ONTARIO

SIGNED M. H. K.
 NAME (PRINT) H. ST. JEAN
 DATE Aug 6/75
 ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 411-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DRP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12x74 (No shoe) BATTER: STR.
PILE NO. 42 LOCATION N. ABUT. FTG. DATE DRIVEN July 15/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
122'	1	3	166	26	5	166	51	4		76	
	2	3		27	5		52	4		77	
	3	2		28	5		53	9		78	
	4	2		29	5		54	8		79	
	5	3		30	5		55	9		80	
	6	2		31	5		56	9		81	
	7	3		32	5		57	13		82	
	8	2		33	5		58	17	Stop	83	
	9	3		34	4		59	19	at	84	
	10	2		35	5		60	20	16:50 AM	85	
	11	3		36	5		61	20	Aug 12	86	
	12	2		37	5		62	20		87	
	13	3		38	5		63	36		88	
	14	2	Stopped	39	4		64	42	Stop	89	
	15	3	at	40	4		65	55	at	90	
	16	3	8:15 AM	41	4	166	66	Stop	11:00 AM	91	
	17	2	Aug 6	42	5		67		Aug 12	92	
	18	3		43	5		68			93	
166	19	9	Point	44	5		69			94	
	20	8	at	45	4		70			95	
	21	6	10:00 AM	46	4		71			96	
	22	6	Aug 12	47	4		72			97	
	23	6		48	5		73			98	
	24	6		49	4		74			99	
	25	5		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION

BLOWS PER INCH

MEASURED REBOUND IN INCHES

FINAL LENGTH OF PILE

FINAL CUT OFF ELEVATION

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT) M. ST. JEAN

DATE Aug 6/75

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64.00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12x74 (N. 36.0) BATTER: STR.
PILE NO. 28 LOCATION N. ABT. FRC. DATE DRIVEN July 29/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
122'	1	3	166	26	5	166	51	4		76	
	2	2		27	5		52	5		77	
	3	3		28	5		53	12		78	
	4	2		29	5		54	16		79	
	5	3		30	5		55	24		80	
	6	3		31	5		56	29		81	
	7	2		32	5		57	32		82	
	8	2		33	5		58	40		83	
	9	3		34	4		59	44		84	
	10	2		35	5		60	44		85	
	11	3		36	5		61	52		86	
	12	2	Stopped	37	5	166	62	STOP		87	
	13	3	at	38	4		63			88	
	14	3	10:15 AM	39	4		64			89	
	15	2	day 7	40	5		65			90	
	16	3		41	5		66			91	
	17	3		42	5		67			92	
	18	2		43	5		68			93	
166	19	10		44	5		69			94	
	20	9	start	45	5		70			95	
	21	6	at	46	5		71			96	
	22	6	11:00 AM	47	4		72			97	
	23	6	Aug 12	48	5		73			98	
	24	5		49	5		74			99	
	25	6		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	6	6	8	8
MEASURED REBOUND IN INCHES	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
FINAL LENGTH OF PILE	162' 4"					FINAL CUT OFF ELEVATION 308.50

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE TYPE 1
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE Aug 8/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUPRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12x74 (No. 540) BATTER: STR
PILE NO. 49 LOCATION N. A34T. ETC. DATE DRIVEN Aug 14/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
122'	1	3	166	26	6	166	51	4		76	
	2	2		27	5		52	5		77	
	3	3		28	5		53	5		78	
	4	2		29	5		54	5		79	
	5	3		30	5		55	9		80	
	6	2		31	5		56	8		81	
	7	3		32	5		57	12		82	
	8	2		33	5		58	15		83	
	9	3		34	5		59	20		84	
	10	3		35	5		60	28		85	
	11	2		36	5		61	35		86	
	12	3		37	5		62	45		87	
	13	3		38	5		63	48		88	
	14	2		39	5		64	52		89	
	15	3	Stopped at	40	5		65	55		90	
	16	3		41	4	166	66	Stop.		91	
	17	2	11:15 A - Aug 7.	42	4		67			92	
	18	3		43	5		68			93	
166	19	10		44	5		69			94	
	20	8	Start at.	45	5		70			95	
	21	7		46	4		71			96	
	22	6	1:00 P.M. Aug 14.	47	4		72			97	
	23	6		48	4		73			98	
	24	6		49	5		74			99	
	25	5		50	5		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	6	6	6	8
MEASURED REBOUND IN INCHES	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"
FINAL LENGTH OF PILE	166'0"					FINAL CUT OFF ELEVATION 308.50

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE Aug. 8/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

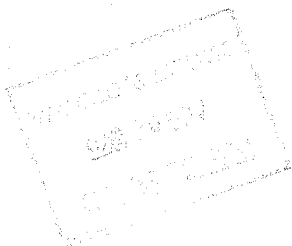
Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.



BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR OUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12x74 (No Shear) BATTER: Vertical.
PILE NO. 67 LOCATION PIER FTL. DATE DRIVEN Aug 21/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1			26	✓		51	✓		76	1
	2			27	✓		52	✓		77	1
	3			28	✓		53	✓	120'	78	4
	4			29	✓		54	✓		79	4
	5			30	✓		55	✓		80	4
	6			31	✓		56	✓		81	3
	7			32	✓		57	✓		82	3
	8			33	✓	STOP at	58	✓		83	4
	9			34	✓	10.20	59	✓		84	3
	10			35	✓	10.20	60	✓		85	3
	11		80'	36	✓	Aug 21	61	✓		86	3
	12			37	✓		62	✓		87	3
	13			38	✓	START?	63	✓		88	3
	14			39	✓	10.20	64	✓		89	3
	15			40	✓	10.20	65	✓		90	3
	16			41	✓	10.20	66	✓		91	3
	17			42	✓	Sept 2/75	67	✓		92	3
	18			43	✓		68	✓		93	3
	19			44	✓		69	✓		94	3
	20			45	✓		70	✓		95	4
	21			46	✓		71	✓		96	3
	22			47	✓		72	✓		97	3
	23			48	✓		73	✓		98	3
	24			49	✓		74	✓		99	2
	25			50	✓		75	✓		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE Aug. 21/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12274 (NO shoe) BATTER: Vertical
PILE NO. 64 LOCATION PIER FTG. DATE DRIVEN Aug 21/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1			26			51	1		76	1
	2			27			52			77	1
	3			28			53			78	4
	4			29			54	1		79	3
	5			30			55			80	4
	6			31			56			81	4
	7			32	1		57	1		82	4
	8	1		33		STOP	58	-		83	3
	9			34		1000 ft	59	1		84	3
	10			35		Aug 21	60			85	3
	11		80'	36	1		61			86	3
	12			37	-	START	62	1		87	3
	13			38	1	at	63			88	3
	14			39	-	1000 ft	64			89	4
	15			40	1	A.P.	65	1		90	3
	16			41		500 ft	66	-		91	3
	17			42			67	1		92	3
	18			43	1		68			93	3
	19			44			69			94	4
	20			45			70	1		95	3
	21			46	1		71	-		96	3
	22			47			72	1		97	3
	23			48			73			98	2
	24			49	1		74			99	3
	25			50	-		75	1		100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PROJECT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. Jean
NAME (PRINT) M. ST. JEAN
DATE Aug 21/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs
PILE DETAILS H.P. 12X74 (No Shoe) Single Vertical BATTER: STR.
PILE NO. 62 LOCATION PIER FTG DATE DRIVEN Aug 21/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
40'	1			26			51			76	1
	2			27			52			77	1
	3			28			53			78	4
	4			29			54			79	4
	5			30			55			80	4
	6			31			56			81	3
	7			32			57			82	3
	8			33		STOP at 3:00 P.M.	58			83	4
	9			34			59			84	4
	10			35		Aug 21	60			85	3
	11			36			61			86	3
	12		80'	37			62			87	4
	13			38			63			88	3
	14			39		START	64			89	3
	15			40		at	65			90	3
	16			41		10:00 AM	66			91	3
	17			42		Sept 4/75	67			92	3
	18			43			68			93	4
	19			44			69			94	3
	20			45			70			95	3
	21			46			71			96	4
	22			47			72			97	3
	23			48			73			98	3
	24			49			74			99	3
	25			50			75			100	3

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE						
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED AM St Jean
NAME (PRINT) M. ST. JEAN
DATE Aug. 21/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUPRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12X74 (No Shoe) Vertical BATTER: STA.
PILE NO. 62 LOCATION PIER FTG. DATE DRIVEN Aug. 21/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
120'	1	3		26	3		51			76	
	2	2		27	3		52			77	
	3	3		28	3		53			78	
	4	2		29	3		54			79	
	5	3		30	3		55			80	
	6	3		31	3		56			81	
	7	3		32	3		57			82	
	8	3		33	3		58			83	
	9	3		34	3		59			84	
	10	3		35	3		60			85	
	11	3		36	3		61			86	
	12	3	STOP	37	3		62			87	
	13	3	at.	38	3		63			88	
	14	2	11:15 A.M.	39	3		64			89	
	15	3	Sept 9/75	40	4		65			90	
155'	16	7		41	4		66			91	
	17	5	START. d.	42	4		67			92	
	18	4	Sept. 10/75	43	4		68			93	
	19	3	2:30 P.M.	44	5		69			94	
	20	3		45	4		70			95	
	21	3		46	12		71			96	
	22	3		47	14		72			97	
	23	3	155'	48	- Redundant		73			98	
	24	3		49			74			99	
	25	3		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	2	2	2	4	8	12
MEASURED REBOUND IN INCHES	1/2"	1/2"	1/2"	1"	1 1/2"	1 1/2"
FINAL LENGTH OF PILE	148' 2"					FINAL CUT OFF ELEVATION 296.00

REPORT TO BE SENT TO: -

GEOTECHNICAL OFFICE TIPEL, 147' 8"
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED M. St. JEAN
NAME (PRINT) M. ST. JEAN
DATE Sept 22/75
ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS H.P. 12x74 (No Shoe) BATTER: Vertical
PILE NO. 64 LOCATION PIER FIG. DATE DRIVEN Aug. 21/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
120'	1	3		26	3		51	28		76	
	2	3		27	3	155'	52	Refused		77	
	3	2		28	3		53			78	
	4	3		29	4		54			79	
	5	2		30	4		55			80	
	6	3		31	4		56			81	
	7	3		32	4		57			82	
	8	2		33	4		58			83	
	9	3		34	4		59			84	
	10	3		35	4		60			85	
	11	3		36	4		61			86	
	12	3		37	4		62			87	
	13	2		38	4		63			88	
	14	3	stop at	39	3		64			89	
	15	3	1:30 PM	40	3		65			90	
	16	3	Sept. 9/75	41	4		66			91	
155'	17	6		42	3		67			92	
	18	6	START	43	3		68			93	
	19	5	at	44	3		69			94	
	20	4	3:00 PM	45	3		70			95	
	21	3	Sept. 12/75	46	3		71			96	
	22	3		47	3		72			97	
	23	3		48	4		73			98	
	24	3		49	5		74			99	
	25	3		50	14		75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	2	2	4	4	6	10
MEASURED REBOUND IN INCHES	1/2"	1/2"	3/4"	1"	1"	1 1/4"
FINAL LENGTH OF PILE	151' 6"					FINAL CUT OFF ELEVATION 296.00

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE TIP EL.
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT)

DATE

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

File Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 75-72 STRUCTURE W.P. NO. 431-64-00
CONTRACTOR DUFRESNE DESIGN LOAD OF PILE 95T.
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 5T. HEIGHT OF FALL OR ENERGY 5'
TYPE OF ANVIL OR CAP STEEL CAP. WEIGHT OF ANVIL OR CAP 500 lbs.
PILE DETAILS AP 12x74 (No Shoe) BATTER: Vertical
PILE NO. 62 LOCATION PIER FTG. DATE DRIVEN Aug 21/75

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
120'	1	3	26	3		51	26		76		
	2	3	27	3		155'	52	26	77		
	3	3	28	3			53		78		
	4	3	29	3			54		79		
	5	3	30	3			55		80		
	6	3	31	3			56		81		
	7	3	32	3			57		82		
	8	3	33	3			58		83		
	9	3	34	3			59		84		
	10	3	35	3			60		85		
	11	3	36	3			61		86		
	12	2	37	4			62		87		
	13	3	38	4			63		88		
	14	3	39	3			64		89		
	15	3	40	3			65		90		
	16	3	41	3			66		91		
	17	3	42	3			67		92		
155'	18	8	43	3			68		93		
	19	5	44	3			69		94		
	20	4	45	3			70		95		
	21	3	46	4			71		96		
	22	3	47	4			72		97		
	23	3	48	6			73		98		
	24	3	49	10			74		99		
	25	3	50	15			75		100		

DETAILS FOR FINAL SIX INCHES OF PENETRATION

BLOWS PER INCH

1	2	3	4	5	6
2	2	4	4	6	8
3"	3"	3"	1"	1"	1 1/2"

MEASURED REBOUND IN INCHES

FINAL LENGTH OF PILE

FINAL CUT OFF ELEVATION

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE

ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT) M. ST. JEAN.

DATE

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTES:

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Piles driven vertically should be selected where possible.

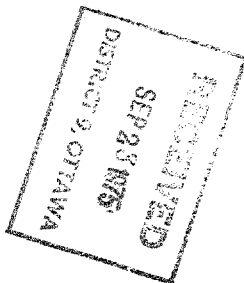
Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.



SUMMARY OF PILE DRIVING RECORDS

W.O. 71-11049 W.P. 431-64-00 CONT. 75-72 DIST. 9
SITE REGION RD # 9 - LINE B
DATE DRIVEN JUL. 10 - AUG 21/75 WEIGHT OF ANVIL 500 lb
HAMMER TYPE DROP HAMMER WEIGHT 5T ENERGY 50 000 Ft/L

LOCATION OF PILES	PILE				ESTIMATED TIP EL. (ft.)	DIFFERENCE Longer(+) Shorter(-) Than Estimated (ft.)	REMARK
	TYPE	NO.	LENGTH (ft.)	TIP EL. (ft.)			
NORTH ABUT.	HP 12x74	28	162.3	146.2		- 1.2	
" "	" "	41	165.7	142.8		+ 2.2	
" "	" "	42	165.6	142.9	145.0	+ 2.1	
" "	" "	45	166.3	142.2		+ 2.8	
" "	" "	49	166.0	142.5		+ 2.5	
SOUTH ABUT	HP 12x74	28	166.6	141.9		- 0.9	
" "	" "	41	159.2	149.3		- 8.3	
" "	" "	42	158.3	150.2	141.0	- 9.2	
" "	" "	45	171.1	137.4		+ 3.6	
" "	" "	48	167.0	141.5		- 0.5	
PIER	HP 12x74	62	148.2	147.8		- 0.4	
" "	" "	64	151.5	144.5	145.5	- 1.0	
" "	" "	67	151.1	144.9		- 4.9	

MEMORANDUM

TO: Mr. A. G. Stermac
Principal Foundations Engineer
Materials & Testing Office
Downsview

FROM: Materials and Testing Office
Kingston

ATTENTION:

DATE: February 16, 1971

OUR FILE REF.

IN REPLY TO 71-11049

SUBJECT: Hwy. 417, W.P. 433-64-02
From Ottawa Carleton Reg. Rd. W'ly. 6.6 Miles
District 9, Ottawa

A preliminary foundations investigation was carried out at the location of the proposed Hwy. 417 and Reg. Rd. 9 interchange and the report was submitted on May 24, 1966 under W.P. 905-64, Foundations No. 66F16.

The proposed fill height for the grade separation interchange is approximately 23 feet.

Stability of the proposed fills is discussed in the report.

In order to establish practical construction proposals, it is desirable that anticipated settlements be considered. Could you provide an approximate anticipated ultimate settlement depth and some approximate settlement rates for the proposed fill height using the investigation data contained in the fore-mentioned foundation report.

A. M. Batten

A. M. Batten
Senior Soils Supervisor

AMB:mgm

cc: P. D. Billings
J. E. Callaghan
G. A. Wrong
S. J. Markiewicz
R. Forrest
T. Kingsland

MEMORANDUM

TO: Mr. M. R. Ernesaks
Regional Functional Planning Engr.
Functional Planning Office
Kingston

FROM: Materials and Testing Office
Kingston

ATTENTION: Mr. B. Khojajian

DATE: February 16, 1971

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: Hwy. 417, W.P. 433-64-02
From Ottawa - Carleton Reg. Rd. 9
Westerly 6.6 Miles
District 9, Ottawa

71-11049

As discussed at the Planning review meeting in Kingston on February 15, 1971, it is desirable that preliminary foundation investigations be carried out for the proposed grade separations within Kanata, at the March Township Road (Approx. Sta. 89+40), at the Carp River crossing and at the Huntley/March Township Line road (Approx. Sta. 144+60) in order that possible stability and settlement problems may be properly assessed before establishing functional grades and construction scheduling. The area consists of a clay deposit and it is anticipated that foundation conditions will have considerable bearing on the fore mentioned items.

It is understood that you anticipate establishment of final Hwy. 417 alignment in this vicinity soon after a meeting with Kanata officials scheduled for February 22, 1971.

We have discussed these preliminary investigations with Mr. A. Stermac, Principal Foundations Engineer, who indicates that he will begin investigation work immediately after the final alignment has been established. A tentative date of March 1, 1971, has been suggested for the start of the investigation work.

In addition, the preliminary foundation investigation data and recommendations submitted May 24, 1966 under S.P. 905-64, Foundations No. W.J. 66-F-16, should be considered for establishment of the interchange design at the Hwy. 417 - County Road 9 interchange. An approximate 110' depth of clay was encountered at this location. We will ask our Foundations Section to provide some preliminary time-settlement figures for the proposed fills at this location.

AMB:mgm



A. M. Batten
Senior Soils Supervisor

cc: P. D. Billings
J. E. Callaghan
A. Stermac
G. A. Wrong
S. J. Markiewicz
R. Forrest
T. Kingsland

MEMORANDUM

TO: Mr. M. R. Ernesaks,
Regional Functional Planning Engineer,
Kingston, Ontario.

FROM: Bridge Section,
Kingston, Ontario.

ATTENTION: Mr. B. Khejajian

DATE: February 16, 1971.

OUR FILE REF.

IN REPLY TO

71-11049

SUBJECT: W.P. 433-64, Highway 417, Regional Road #9 Westerly,
District 9 - Ottawa

With reference to the field meeting held on Monday, February 15, 1971, to discuss the above project, I have the following comments to make.

Regional Road #9 Interchange Underpass

It is noted that speed change lanes will be located on the structure. This can be achieved in design if the crossfall on the speed change lane is kept constant across the bridge and is also kept numerically the same as the crossfall for the adjacent traffic lane.

The preliminary Foundation Report BA-2335 for this site requested by this office in 1966 indicated that due to the presence of a deep layer of marine clay any structure built here would require longitudinal and transverse berms at the abutments and approaches, or a long structure would be required with fill heights limited to 16 ft. Settlement problems should also likely be severe.

The additional bridges, which it is now possible will be required at this site, will also very probably have to be long structures or structures with berms due to the same poor soil conditions. The additional Highway 417 underpass structure would have to be about 550 ft. long, even excluding berms or fill height limitations. The four boreholes described in BA-2335 are not sufficient to accurately predict conditions at the locations of these additionally proposed structures and, therefore, the foundation investigation which is scheduled to be requested by this office for the above site in the immediate future will have to be extended to include additional borings at the newly proposed sites. Present information, however, indicates that we should avoid locating any additional structures in this area if at all possible.

Regional Road #9 Interchange Underpass (Cont'd)

I shall be glad to receive a copy of the intended profiles for all the structures at this site as soon as they are available in order that structure lengths with or without berms may be calculated and cost estimates may be prepared.

Possible Revision of Line Westerly from Regional Road #9:

It is understood that a proposed line shift in a southerly direction is to be discussed with Kanata on February 22nd. I shall require information on any decisions taken with regard to this revision as soon as it is available since several structures are involved including the Carp River bridge and four underpasses. Foundation investigations are scheduled to be requested for the structures presently sited on the existing alignment and additional field information will be required if alternative sites for these structures are to be considered.

The scheduled date for this office to request foundation investigations for all of the sites covered by this project is March 24, 1971. It may be necessary for me to request Foundation Section to advance the above date if additional field work is required. I shall be glad if you will let me know as soon as you have the information required to make a decision on this.



T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl

c.c. - ✓ A. G. Stermac - Att. M. Devata

B. R. Davis

C. S. Grebski - Att. K. Bassi

S. McCombie

J. E. Callaghan

P. D. Billings

S. J. Markiewicz

J. E. Gruspier

A. G. Boucher

H. Aron

L. Timson

J. S. Trew

R. Forrest

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. G. Stermac,
Principal Foundation Engineer,
Downsview, Ontario.

FROM: Bridge Section,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: April 21, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: 1) W.P. 431-64-00, Site 3-260, Reg. Rd. 9 Int. Underpass, 71-11049
2) W.P. 434-64-00, Site 3-289, Goulbourn Arterial Int. U'Pass,
3) W.P. 435-64-01, (EBL) Site 3-290, Carp River Bridges,
-02, (WBL)
4) W.P. 436-64-00, Site 3-291, March-Huntley Twp. Line U'Pass,
Highway 417 West of Ottawa, District 9-Ottawa

I am enclosing herewith two prints of Plan 9-FP-166 & -168, Profile 9-FP-169 and Site Plans E-5209-1 and 5210-1 on which we have marked the proposed locations of the above four structures. Also enclosed are two copies of the Field Reconnaissance Reports relating to the structures.

The above "E-Plans" refer only to the Carp River structure. The site plans for the other structures have not yet been drawn but they will be forwarded to you as soon as they are available. Later adjustment may have to be made to the stations relating to the Regional Road 9 structure.

We will be pleased if you will make arrangements for the necessary foundation investigation and to have your report, the scheduled date for which is June 30, 1971.

T. C. Kingsland

T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl

Encls.

c.c.

Mr. R. Forrest

Mr. S. McCombie

MEMORANDUM

TO: Mr. A. G. Stermac,
Principal Foundation Engineer,
Downsview, Ontario.

FROM: Bridge Section,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: May 11, 1971.

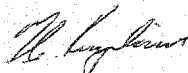
OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 431-64-00, Site 3-260,
Regional Road 9 Interchange Underpass,
Highway 417 West of Ottawa, District 9

71-11049

Further to my letter of April 21, 1971, I now enclose
two prints of Site Plan E-5211-1 for the above structure.



T. C. Kingsland
Regional Bridge Planning Engineer

TCK/h1
Encls.
c. c. (with encl.)
Mr. S. McCombie

MEMORANDUM

TO: Mr. A. G. Stermac,
Principal Foundation Engineer,
Downsview, Ontario.

FROM: Bridge Section,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: June 1, 1971.

OUR FILE REF.

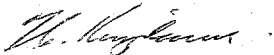
IN REPLY TO

SUBJECT: W.P. 431-64-00, Site 3-260,
Regional Road 9 Interchange Underpass,
Highway 417 West of Ottawa, District 9

Further to my request for foundation investigation for the above site dated April 21, 1971, I now enclose a print showing the location of possible additional structures in the vicinity of the interchange. I confirm that I would like additional bore holes to be made to determine the foundation conditions relating to these possible future structures.

Referring to my telephone conversation yesterday with Mr. Devata, a similar print has been sent to the site for the attention of Mr. Hutton. In addition to the bore holes for the possible additional structures I have also indicated on his print the locations of extra bore holes required by Regional M & T at the intersection of Watts Creek and Highway 417 westerly.

Thank you for your cooperation in this matter.



T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl

Encl.

c.c. - M. R. Ernesaks - Att. C.E. Pritchard
E. Saint
R. Forrest
S. McCombie

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

AGB
71-11049

TO: Mr. A. G. Stermac,
Principal Foundation Investigation Engineer,
Downsview, Ontario.

FROM: Bridge Section,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: July 20, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: 1) W.P. 431-64-00, Site 3-260, Reg. Rd. 9 Int. Underpass,
2) W.P. 434-64-00, Site 3-289, Goulbourn Arterial Int. U'Pass,
3) W.P. 435-64-01, (EBL) Site 3-290, Carp River Bridges,
-02 (WBL)
4) W.P. 436-64-00, Site 3-291, March-Huntley Twp. Line U'Pass,
Highway 417, District 9 - Ottawa

Referring to our recent discussions on the foundation investigations at the above sites, I confirm that I have discussed the dates with Mr. R. Forrest, Regional Schedule Co-ordinator, and we have agreed that the due dates for the foundation reports should be re-established at August 31, 1971, due to the various circumstances which have necessitated delaying the investigations.

With regard to the Regional Road 9 Interchange Underpass, we are presently considering whether to relocate the structure in the light of the results obtained from your extensive investigation at this site. The location of the structure will be finally decided within the next few days and I will then contact you to enable you to complete the investigation at this site.

The Carp River bridge has been issued to design from this office prior to the completion of the foundation investigation report on the basis of verbal information supplied by you and as further information becomes available at this site, I shall be glad if you will pass it on to Mr. K. Bassi since I shall be on vacation during the next three weeks.

T. C. Kingsland

T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl

C. C. -

C.S. Grebski - Att. K. Bassi

A.J. Percy - Att. C.E. Pritchard

E.R. Saint

S. McCombie

MEMORANDUM

To: A.G. Stermac,
Principle Foundation Engineer,
Downsview.

From: Functional Planning,
Kingston.

Attention: M. Devata

Date: August 5th, 1971.

Our File Ref.

IN REPLY TO

Subject: W.P. 433-64-02, Highway 417, From the Ottawa Queensway
Westerly; District #9 - Ottawa.

As discussed at our recent meeting, to discuss potential foundation problems in the vicinity of the County Road 9, Highway 417 interchange, I am attaching herewith a profile showing two grade lines for Highway 417. These grade lines are the upper and lower limits that we feel are acceptable from a planning viewpoint.

We have also indicated on the profile typical cross-sections for the areas of cut adjacent to the Watts Creek crossing which is immediately west of County Road 9.

In conjunction with the foundation investigation that you are presently preparing for this area, would you please comment on the stability of both the fill across Watts Creek and the backslopes of the cut sections on either side of the creek.



C.E. Pritchard
Project Planning Engineer.

CEP/ss
Att'd.
c. c. to: E. Saint
T. Kingsland.

MEMORANDUM

71-11049

448

TO: Mr. A. J. Percy,
Regional Functional Plan. Eng.,
KINGSTON, Ontario.

FROM: Materials & Testing Office,
KINGSTON, Ontario.

ATTENTION:

DATE: August 18th, 1971

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 433-64-02, Hwy. # 417, From Regional
Road # 9 Wily. 4.5 Miles

In view of the stability and settlement problems associated with the proposed interchange at Regional Road # 9, the Hwy. # 417 profile grade approximately between Station 225+ and Station 250+ is not yet fixed.

The functional grade set in May 1971 and issued by Engineering Surveys projects a 1' to 3' cut from Station 232+ to Sta. 237+ and a 3' to 7' from Station 240+ to Station 251+. On August 5th, 1971, a profile was submitted to Mr. A. Stermac from Regional Functional Planning showing a gradeline approximately 4' lower than the gradeline shown on the Engineering Survey's issue.

Materials in the fore-mentioned cut sections on both sides of the Watt's Creek crossings consist of an unacceptable wet to saturated silty clay. Cut construction may be anticipated to be extremely difficult due to the saturated and unstable condition of these cut materials. It is estimated that earth excavation of this material would cost approximately \$1.75 per C.Y. None of the cut material should be considered useful for fill purposes.

The pavement selection committee have approved a deep strength design of 11" asphalt plus 6" Granular 'A' for this project. In these proposed cuts required granular depths will probably be approximately 6" Granular 'A' plus 24" Granular 'B' in order to obtain grades stable enough to carry the construction equipment. In order to provide sub-base drainage granular will be placed full width or sub-drains will be installed on both sides of the sub-grade.

In order to allow surface drying of the clay subgrade prior to granular backfill, it is desirable to leave the properly shaped subgrade exposed 2 to 3 months prior to backfill. W.P. 433-64-02, Grading and Drainage is scheduled for 1972 and W.P. 441-64-02

Cont'd...

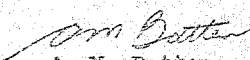
Granular Base and Paving is scheduled for 1973. It is understood that Hwy. # 417 is to be opened to Hwy. # 44 on or before 1974. In view of this, it may be advantageous to employ a lime stabilization treatment for the clay subgrade.

In view of these conditions, it is recommended that the gradeline be set as high as foundation conditions and related fill construction requirements permit. The cost of structure crossings for the Watt's Creek gullies should also be considered.

Using the 6:1 cut slope criteria (maximum 30' width) stability problems are not anticipated with either of the gradeline projections.

In the meantime, we will issue the soils design report excluding the section from Station 225 to the east limit of the project.

An addendum and revised soils profile will be issued when the final grade line and County Road # 9 interchange alignment is established.


A. M. Betten,
Senior Soils Supervisor

AMB/sgp

c. c. - P. D. Billings
J. E. Callaghan
A. E. Rutka
G. A. Wrong
A. G. Stermac
S. J. Markiewicz
R. J. Forrest
H. A. Meyer

Mr. C. S. Grebski,
Structural Design Engineer,
Downsview, Ontario.

71-11049

Bridge Section,
Kingston, Ontario.

Mr. K. Bassi

November 25, 1971.

W. P. 431-64-00, Site 2-260,
Former County Road 9 Interchange Underpass,
Highway 417, District 9 - Ottawa

I enclose a copy of the preliminary interchange layout plan and profile (9-FP-223 and 9-FP-224 respectively) for the proposed interchange at the above site.

All information necessary for the issue of the structure to design, including the Foundation Report, is now available with the exception of the survey drawings and latest indications are that these will not be available until January 1972.

T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl

Encls.

c. c. -

P. D. Billings

A. J. Percy - Att. C.E. Pritchard

A. G. Boucher

R. Forrest

✓M. Devata

C. S. Grebski

Department of Transportation and Communications
XXXXXXXXXXXXXXXXXXXXXX

Mr. K. G. Bessi,
Regional Structural Design Engineer,
Design Services Branch,
West Bldg., Downsview.

Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

February 9, 1972.

Proposed Overpass Structure at the Crossing of
Hwy. #417 and Regional Road #9 (Line B),
W.O. 71-11049 - W.P. 431-64-00

Further to your verbal request with regard to revised
embankment heights at the above-mentioned location, we
have carried out additional stability analyses (Refer to
page 13 of our report for soil properties). The berm
requirements for various heights are as follows.

<u>Height of Approach</u>	<u>Mid-Height Berm Length</u>
14 feet	Nil
18 feet	20 feet
22 feet	45 feet

MD/ao

cc: T. C. Kingsland
S. J. Markiewicz
E. R. Saint

M. Devata
M. Devata,
SUPERVISING FOUNDATION ENGINEER.

Foundations Files ✓
Documents

71-11049

GIFFELS, DAVIS & JORGENSEN LIMITED

CONSULTING ENGINEERS

SIXTY ADELAIDE STREET EAST, TORONTO 210, ONTARIO, PHONE (416) 864-1166

February 17, 1972

Mr. M. Devata, P.Eng.
Supervising Foundation Engineer
Foundations Office
Design Services Branch
Department of Transportation
and Communications
Downsview 464, Ontario

Re: W.P.431-64-00, Former
County Road 9 - Underpass
on W.P.433-64-02, Hwy.
417 from Former County Rd.
9 Westerly 4.5 Miles
Our Job Number C1024

Att: Mr. B.T. Darch

Dear Sir :

This is to confirm our telephone conversation of February 16, 1972.

We understand that mid-height berms will be required for 2:1 slopes on the sides of the Former County Rd. 9 approaches to the Hwy. 417 underpass, as follows:

<u>Fill Height</u>	<u>Berm Width</u>
14'	0'
18'	20'
19'	25'
22'	45'

We requested that you also provide us with the berm widths required should 4:1 slopes be used.

Yours very truly

GIFFELS, DAVIS & JORGENSEN LIMITED



G.R. Tilly, P.Eng.
Project Manager

grt-kas
cc: Mr. S.J. Markiewicz

Department of Highways Ontario

Copy for the information of

A. Stermac

T.C. Kingsland,
Reg. Bridge Planning Engr.,
Kingston Region.

Structural Office,
West Bldg., Downsview.

March 28, 1972.

Re: Former Co.Rd.9 Interch. U'Pass,
Approx. 1.25 Miles North of Hwy.15,
W.P. 431-64-00, Site 3-260,
Hwy. No. 417, District #9.

71-11-049

Attached herewith are prints of the Preliminary
Bridge Plan Drawing D-3-260-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is
\$800,000.00, which includes tender, materials, engineering and
sundry construction.

In view of the high cost of the structure, it is
suggested that all parties concerned should review the location
of this structure in order to obtain a minimum cost for the overall
project.

Any comments or revisions you may have should be
submitted within three weeks.

C.S. Grebski,
Structural Design Engineer.

CSG:sr
Attach.

c.c. A. McKim
B. Davis
A. Stermac (2)
J. Anderson
R. Forrest

NO comments

AR

25/4/72

On Dirata
25/4/72

Department of Highways Ontario
Copy for the information of
A. G. STERMAC

A. J. Percy,
Regional Functional Planning Engineer,
Kingston.

71-11049 *File M 13*
Structural Planning Branch,
Kingston.

March 28th, 1972.

W. P. 431-64-60, Site 3-260, Former County Road 9,
Interchange Underpass, Highway 417; District #3-Ottawa.

For your information, the Structural Office estimate
for the cost of the above mentioned structure is as follows:--

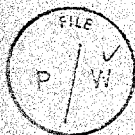
Tender & Materials	\$730,000.
Sundries & Engineering	<u>70,000.</u>
Total	\$800,000.

The cost of piling (included in the above total) is
\$170,000. The increased costs for this structure are due mainly
to the increased structure length due to revised berm requirements.
The difference in cost between the structure in its present location
and at an alternative location to the east is now estimated at
\$350,000.

T. C. Kingsland
Structural Planning Engineer.

TCK/ss
c. c. to:

P. D. Billings
C. Grebski
B. Davis
A. G. Stermac.



GIFFELS, DAVIS & JORGENSEN LIMITED

CONSULTING ENGINEERS

SIXTY ADELAIDE STREET EAST, TORONTO 210, ONTARIO, PHONE (416) 864-1166

STRUCTURE SITE NO. 3260

April 20, 1972

Mr. G. McMillan, P.Eng.
Regional Systems Design Section
Department of Transportation
and Communications
Postal Bag 4000
Kingston, Ontario

Re: W.P.431-64-00, Former
County Rd. 9, Interchange
Underpass on W.P.433-6402,
Hwy.417 fr. Former Co.Rd.
9 Westerly 4.5 Miles
Our Job No. C1024

Dear Sir :

In reply to your letter of April 13, 1972, we return herewith one print of the preliminary bridge drawing #3-260-P1 for the Former County Rd. 9 Interchange Underpass, approved except as noted in red.

We have revised the side slopes to 4:1 to conform with the general grading of this interchange. We have checked with the Foundation Section that no berms would be needed for 4:1 slopes up to an 18 ft. height of fill. You will shortly be receiving a confirming letter to this effect from Mr. B. Darch of the Foundation Section.

We consider that the 8' clearance is satisfactory next to slope paving but we changed it to 9' to conform with your requirements of shoulder plus half rounding.

If you require any further information, please let us know.

Yours very truly

GIFFELS, DAVIS & JORGENSEN LIMITED


G.R. Tilly, P.Eng.
Project Manager

grt-kas
enc.

RECEIVED

APR 24 1972

DESIGN SECTION

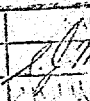
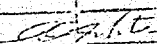
1 P.L.O. RE-6310X

Copies made for: (TCK/hl: 28/4/72)

K. Bassi

C. S. Grebski

M. Devata

CHECKED BY	NAME	DATE
Regional P.L. Design Eng.		Apr. 21/72
Sr. Proj. Design Eng.		
Proj. Design Eng.		
Office Proj. Design Eng.		
Sr. Proj. Engineering Est.		
Project & Util. Tech.		
Office Clerk		
File		

Mr. T.C. Kingsland,
Reg. Struct. Plan. Eng.,
Kingston.

District #9, Ottawa.

April 25, 1972.

W.P. 431-64-00, SITE 3-260,
FORMER COUNTY ROAD 9 INTERCHANGE U'PASS,
HIGHWAY 417, DISTRICT 9 - OTTAWA.

71-11049

We have the following comments upon Preliminary Bridge Drawing No. 3-260-P1 for the above structure.

- (1) It is noted that the berms shown in the drawing are not those recommended in the Foundation Investigation Report of October 1971. I understand from our telephone conversation, however, that you have received later recommendations from the Foundation Engineer following a grade revision which has increased the height of the approach fills.
- (2) It is suggested that the median backslopes at the structure be steepened, say to 2:1. This is apparently an acceptable slope on the abutment side of each roadway, and it would serve to prevent stray vehicles from hitting the pier. It would also have the advantage of permitting the pier pile cap to be set at a considerably higher elevation while still meeting the requirement of 4 feet of core to the underside, which would reduce the excavation required.
- (3) As I mentioned, the description "Approx. 1.25 mi North of Hwy 15" is erroneous, and should not be used.

LMP/mk
CC/ M. Devata.

L.M. Peverett,
Dist. Const. Eng.

Structural Planning Office, Postal Bag 4000, Kingston, Ontario

Your File: C1024

April 28, 1972

Giffels, Davis & Jorgensen Limited,
Consulting Engineers,
60 Adelaide Street East,
Toronto 210, Ontario.

Attention: Mr. G. R. Tilly, P. Eng.
Project Manager

Dear Sir:

SUBJECT: W.P. 431-64-00, Site 3-260,
Former County Road 9 Interchange U'Pass,
Highway 417, District 9 - Ottawa

71-11-049
(66-F-16)

I refer to a letter dated April 20, 1972, addressed to Mr. G. McMillan, Regional Systems Design Section, giving your comments on Preliminary Bridge Drawing 3-260-P1 for the above structure. Your comments will be passed on to the Designer.

With regard to the revision of side slopes to 4:1, I understand that Mr. McMillan will be taking this point up with Mr. Devata of the Foundations Section when he has received a note of this and other outstanding points from you.

The 8 ft. clearance shown on the drawing has been adopted as standard adjacent to speed change lanes under structures and we will require this dimension to remain unchanged.

Yours truly,

T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl

c.c. (n.i.o.o.)

G. McMillan

K. Bassi

C. S. Grebski

✓ A. G. Stermac - Att. M. Devata

GIFFELS, DAVIS & JOHNSON LIMITED

CONSULTING ENGINEERS

SIXTY ADELAIDE STREET EAST, TORONTO 210, ONTARIO, PHONE (416) 864-1166

May 2, 1972

Mr. G. McMillan, P.Eng.
Senior Project Design Engineer
Regional Systems Design Section
Ministry of Transportation
and Communications
Postal Bag 4000
Kingston, Ontario

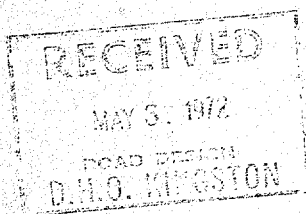
Re: W.P. 432-64-07, 433-64-02,
441-64-02, and 431-64-00
Hwy. 417 and Former County
Road 9 Interchange
Our Job Number C1024

Dear Sir :

Stability, settlement and bearing pressure problems which have arisen during the design of the above work have been discussed verbally with the Foundation Section, from time to time, as they have occurred and the assistance given to us in this urgent project has been excellent.

We however request that you arrange for the Foundation Section to review our completed design to ensure that we have not misunderstood any of their recommendations, as follows :-

1. Check stability of fills at ends of culverts for which foundation investigations were made. The distance from the embankment to the creek bed varies as does the height of the embankment. Therefore the location where stability is critical is not readily ascertainable by us. We are particularly concerned with the downstream end of Culvert No.1 and the upstream end of Culvert No. 2.
2. Check that the foundation material with 18 inches of granular below invert of culvert is satisfactory for the 2.3 Tons/sq.ft. bearing pressure expected for the 17.5 ft. of fill on Culvert No. 2. As required by note on Standard DD-812-E.
3. Check stability of the underpass fills between the second and third contracts when the sub-base for Hwy. 417 is exposed and being left to dry out as per recommendation 3.2, paragraph 2, of the soil report for W.P. 432-64-07LE



COFFER

Regional Eng.	J.G.M.	May 3/72
Sr. Eng.		
Prof. Eng.		
Office Proj. Eng.		
Sr. Pre-Engineering Est.		
Property & Util. Tech.		
Office Clerk		
File		

- ✓ 4. Check stability of the underpass fills when the storm sewer trench is being excavated along the median of Hwy. 417. We could specify that this sewer be excavated and backfilled before the Hwy. 417 excavation is done, if this is desirable. Alternatively, we could specify that it be constructed in short lengths at a time.

With regard to the stability problems in the vicinity of the Former County Rd. 9 Underpass, the following sequence of construction is envisaged :-

First Contract (W.P. 432-64-07 plus partial interchange)

- Construct earth embankments for future underpass to finished side and end slopes, up to elevation of future finished pavement.

Second Contract (W.P. 433-64-02)

- Excavate for Hwy. 417 down to sub-grade
- Construct storm sewer in Hwy. 417 median.
- Provide temporary drainage for Hwy. 417 excavations.

Third Contract (W.P. 441-64-02 and W.P. 431-64-00)

- Remove top of earth embankments on underpass approaches down to sub-grade.
- Remove earth embankments in vicinity of abutments down to bottom of footing.
- Drive piles and construct abutments and piers.
- Construct falsework and construct bridge.
- Excavate for and place subdrains for Hwy. 417 granular base.
- Place and compact Hwy. 417 granular base.

Note The last two items could probably precede the construction of falsework, if approved by the Engineer.

We enclose one set of the following drawings for the First Contract; Sheets Cover, 5, 6, 7, 15, 16, 17, 19, 20, 26, 27, 28, 30, 31, 34, 35, 38, 39 and 40. Other information necessary for the above reviews is still in the design state but details have been submitted to the Foundation Section in draft form. However, we should be pleased to discuss any points for which further information is required.

Yours very truly

GIFFELS, DAVIS & JORGENSEN LIMITED



G.R. Tilly, P.Eng.
Project Manager

grt-kas
encl.

GIFFELS, DAVIS & JORGENSEN LIMITED

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. A. G. Stermac
Principal Foundations Engineer
Foundation Office
DOWNSVIEW, Ontario

FROM: Systems Design Section
KINGSTON, Ontario

ATTENTION:
Mr. M. Devata

DATE: May 5th, 1972

OUR FILE REF.

IN REPLY TO

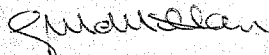
SUBJECT: W.P.'s 432-64-07 - Former County Road 9
433-64-02 - Highway 417 Grading - Former County Road 9
Westerly 4.5 Miles
441-64-02 - Highway 417 Paving - Former County Road 9
Westerly 4.5 Miles
District #9 Ottawa

Due to the urgency of this project, many of the requests for information have been verbal and also in many instances, our Consultant has been dealing with you directly rather than through the Region. We realise that this procedure is sometimes confusing, however, in the interests of expediency we have proceeded on this basis.

Now that the first contract is ready for Regional review, it would be appreciated if you would assess the adequacy of the design and also comment on some conditions that will be encountered in the following two contracts.

We are enclosing a copy of correspondence from G. Tilly which lists these points, also various sheets from our contract drawings. Mr. Tilly has previously forwarded other relevant design sheets to you. If you require any further information or drawings, please contact us.

We wish to thank you for your co-operation on this project and would further request that a representative from your office attend the Regional review for 432-64-07, to be held in the Kingston Offices at 10:30, Wednesday, 17th May.



G. McMillan
FOR: S. J. Markiewicz
SR. PROJECT DESIGN ENGINEER

GM/SJM/dak

c.c. - E. Saint
T. Kingsland
M. Peverett
R. Forrest
E. Pritchard
G. Tilly

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

71-11049

AgS
M 20

TO: Mr. A. G. Stermac,
Principal Foundation Engineer,
Downsview, Ontario.

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: May 18, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 431-64-00, Site 3-260,
Former Co. Rd. 9 Interchange Underpass,
Highway 417, District 9 - Ottawa

I enclose copy of Preliminary Bridge Drawing 3-260-P1 for the above-mentioned structure on which are marked in red alterations to the approach fill configurations as suggested by Mr. G. R. Tilley of Giffels, Davis & Jorgenson Limited.

Since the suggested modifications to the berms would not appear to be in line with the recommendations contained in the Foundation Report for the structure and your subsequent amended recommendations, I shall be glad if you will let me have your comments on Mr. Tilley's suggestions at your earliest convenience.

T. C. Kingsland

T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl
encl.

c. c. G. McMillan
L. M. Peverett
E. R. Saint
C. S. Grebski - Att. K. Bassi

Note: Discussed on the phone with Tom Kingsland and a letter ~~has been~~ prepared with our comments.

M. Devata
May 24/72

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO:	Mr. T. C. Kingsland, Regional Structural Planning Engineer, Structural Planning Office, Kingston, Ontario.	FROM:	Foundations Office, Design Services Branch, Central Bldg., Downsview.
ATTENTION:		DATE:	May 29, 1972.
OUR FILE REF.		IN REPLY TO	

SUBJECT: Stability and Settlement Considerations
Approaches to the Underpass Structure at the
Crossing of Hwy. #417 and Former Co. Rd. #9
Regional Municipality of Ottawa-Carleton
District No. 9 (Ottawa)
W.O. 71-11049 --- W.P. 431-64-00

Further to your letter of May 18, 1972, we have reviewed Preliminary Bridge Drawing 3-260-Pl, dated March, 1972, which shows the alterations to the approach fill configurations as suggested by Mr. G. R. Tilley, Giffels, Davis and Jorgenson Limited, Toronto. We would like to submit the following comments with regard to the stability and settlement considerations associated with the approaches.

1. Stability Considerations:

i) Longitudinal or Forward Direction

The clear height of the approaches, from the grade of the Hwy. #417 lanes to the crest of the approach fills, will be of the order of 23 feet. The north and south approaches will be stable in this direction, providing standard 2:1 slopes are employed and the berm lengths specified on the drawing are adhered to.

ii) Transverse Direction

Originally it was understood that standard 2:1 slopes would be used in the transverse direction. Computations carried out have indicated that berms would be required to ensure the stability in this direction once the height of fill exceeds 14 feet. Specific berm widths, for various heights of fill are summarized as follows:

FOR 2:1 SLOPES

<u>Fill Height</u>	<u>Berm Width - Mid-Height (Berm Sloping at 20:1)</u>
14'	Nil
18'	20'
19'	25'
22'	45'

It is understood that consideration is now being given to the adoption of flatter slopes in the transverse direction; specifically 4:1 slopes. Analyses have been carried out to determine the stability of the flattened slopes. The results indicate that fills, with 4:1 slopes, will be stable providing the height is 18 feet or less. For fills 19 to 20 feet in height (maximum contemplated at this site) the slopes would have to be flattened to 5:1.

The final selection of the geometric configuration of the slopes in the transverse direction should be based on economic, aesthetic and related considerations.

2. Settlement Considerations:

The underlying compressible clay stratum will consolidate due to the loading of the approach fills, over a long term period. This aspect was discussed in detail in Report No. W.O. 71-11049, dated October 22, 1971. In this report the maximum fill height contemplated would extend about 15 feet above the original ground surface. Under the revised scheme, however, this has been increased to about 19 feet. Further, the flattened slopes will induce significant stress increase to a greater depth than the bermed sections. Taking these two factors into consideration the magnitude of the settlement will be greater than that quoted in the report. A comparison of the estimated magnitudes is presented in tabular form.

Consolidation Settlement Beneath Centre-Line of Approach
Fills (In Place Bulk Unit Weight 140 p.c.f.)

<u>Time</u>	<u>Consolidation Settlements</u>	
	<u>15' Fill (Report W.O. 71-11049)</u>	<u>19' Fill (Revised Scheme)</u>
2 years	6 to 7 inches	8 to 9 inches
7 years	11 to 12 inches	15 to 16 inches
50 years	22 to 23 inches (max.)	28 to 30 inches (max.)

Referring to the Table it can be seen that a considerable percentage of the consolidation settlement will take place in the first few years after placement of the fills. In order to minimize post-construction maintenance costs, consideration should be given, if scheduling permits, to constructing the fills at least 18 to 24 months prior to the structure foundations. Further, final paving operations of the roadway should be delayed for as long a period as possible.

B. T. Darch

BTD/ao

cc: G. McMillan
L. M. Peverett
E. R. Saint

C. S. Grebski (Attn: K. Bassi)

G. R. Tilley (Giffels, Davis and Jorgenson Ltd.)

B. T. Darch,
Senior Foundations Engineer
For: M. Devata,
Supervising Foundations Eng

Foundations Files
Documents

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

71-11049

TO: FILE

FROM: Systems Design Section
KINGSTON, OntarioBTD
June 12/72

ATTENTION:

DATE: June 9th, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 432-64-07 - Highway 17 - From .4 Miles South of
Highway 417 Northerly 2.0 Miles Including Partial
Interchange Ramps at Highway 417 - District 9 Ottawa

Accompanied by Mr. G. Tilley and Mr. M. McLean of Giffels, Davis and Jorgensen, I met with Mr. B. Darch on June 2nd to discuss the addendum to the foundation report for the above project dated May 29th, 1972.

Our conversation centred on the stability in the transverse direction of the structure approaches and the limiting height of 18' with 4:1 slopes.

Mr. Darch explained that investigation and calculations of this nature are not an exact science and as such, in borderline cases, some flexibility can be afforded without jeopardizing the factor of safety, provided sufficient consideration is given to the subject. Mr. Darch further explained that his calculations and recommendations were based on fills being a specific height for some distance (say 50') and were not meant to reflect on a localized spot.

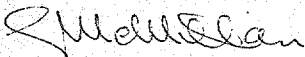
We then examined the cross sections in some detail to ascertain whether there were any problems anticipated.

The south approach fills do not exceed 18' and as such are O.K.

On the North approach, the fill height varies from 18' to 19' for about 30' adjacent to the abutment. The ramp on the west side overlaps the approach embankment reducing the height of fill and also acting as a type of berm.

The East side was considered to be the most critical spot, however, since the condition was localized and since it was transitioning here to the longitudinal direction, it obtained extra safety factors not included in the calculations.

Having completed this review of the sections, Mr. Darch stated that he considered the embankments stable and approved the design.



G. McMillan
PROJECT DESIGN ENGINEER

GM/dak

c.c. - E. Saint
B. Darch ✓
T. Kingsland
M. Peverett
G. Tilly

Department of Highways Ontario

Copy for the information of

A. STERMAC

Mr. F.C. Kingsland
Regional Bridge Planning Engineer
KINGSTON, Ontario

Structural Office - West Bldg.
DOWNSVIEW, Ontario

June 21, 1972

Farmer Co. Rd. 49 Interch. U'Pass
(approx. 1.25 miles W. of Eagleson Corners)
W.P. 431-64-00 - Site 3-260
Rwy. No. 417 - District 9

71-11-049

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-3-260-P2 for the above mentioned structure.

The estimated cost of the proposed structure is \$800,000 which includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSG/hvh
Encl.

C.S. Grobski
Structural Design Engineer

cc A. McKim
B. Davis
A. Stermac
J. Anderson
R. Forrest



Letter submitted to Bridge Office with my comments
M. Devada
July 5/72

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of Mr. A.G. Stermac ✓

Mr. A.J. Percy,
Regional Manager Systems Design
KINGSTON, Ontario.

File Please Mr. Stermac
71-11049
June 28/72 B.D.
Materials & Testing Office,
KINGSTON, Ontario.

Mr. S.J. Markiewicz
Sr. Project Design Engineer .

June 26th, 1972 .

W.C. 433-64-02, Hwy # 417 and Former
County Road # 9 W'ly,
DISTRICT # 9 - OTTAWA .

With respect to Mr. Tilley's letter to your office dated June 13th, 1972, it is agreed that the grading and drainage east of Watts Creek should be carried out in the second contract. We wish to comment as follows:

1. In view of stability problems associated with the embankment that will be constructed by the forward slopes of the Former County Road #9 approach fills and the proposed Highway # 417 cut slopes, excavation of the clay cut on Highway # 417 could follow excavation for the bridge abutment on Highway # 417. There is the additional advantage of the clay foundation material being strengthened by consolidation under the former County Road approach fills .
2. It seems desirable to excavate the Highway # 417 cut, prior to structure construction in view of the clearance between existing ground level and the under side of the proposed grade separation structure. This would minimize any damage that would be caused in the event of failure on the Highway # 417 cut slopes .
3. It is most desirable that the wet clay cut on Highway # 417 be excavated in one operation, as working on a grade constructed by stage excavation would likely be impossible due to unstable conditions .
4. Consideration should be given to utilizing the clay material from the Highway # 417 cut on the Highway 417 grading work west of Watts Creek. This material could be used outside the 1:1 slopes on fills less than 7' in height, provided that is restricted from use



4.-(Cont'd)

within 4' of profile grade. Restriction on super-elevated curves will require alteration to ensure drainage of the roadbed at 4' below the top of granular. The costs of partial fill construction and hauling the clay out material may favour wasting the clay material .

5. A suitable support for structure falsework will have to be designed. This can be constructed on the granular backfill over the clay subgrade material. It should be reviewed with the Foundations Office. It may be possible to utilize a different structure design to advantage. The Highway # 417 grade should be kept as high as possible .



A.M.Batten
Senior Soils Supervisor .

AMB/pab

c.c. C.A. Wrong
A.R. Rutka
A.G. Stermac
T. Kingsland
J.E.Callaghan

M. Devata
Supr., Foundations Eng
Design Service Branch

Mr. T.C. Kingsland,
Reg. Structural Planning Engineer,
Kingston.

District #9, Ottawa.

71-11-049

June 30, 1972.

W.P. 431-64-00, SITE 3-260,
FORMER COUNTY ROAD 9 INTERCHANGE UNDERPASS
HIGHWAY 417, DISTRICT 9 - OTTAWA

We have the following comments upon your revised Preliminary Bridge Drawing 3-260-P2 for the above structure.

- (1) We note that the steepening of the median slopes suggested in my memo of April 25, 1972, has not been incorporated in the revision.
- (2) It appears from drawings we have from Systems Design that the median ditch in this area is intended to be deeper than that shown on your drawing. I understand from conversation with Mr. Van Dalen that this will be checked with Systems Design.
- (3) We agree with point 5 of Mr. Batten's memo to Mr. A.J. Percy of June 26, 1972. Even if the falsework were founded on the granular backfill it seems likely that settlement would be trouble-some, and it appears to us that there would be major advantages in employing a type of structure which would not require falsework.

L.M. Peverett

LMP/ml
CC/ M. Devata,



L.M. Peverett,
Dist. Const. Eng.

Mr. C.S. Grabski,
Structural Design Engineer,
Structural Office,
Design Services Branch,
West Bldg., Downsview.

Foundations Office,
Design Services Branch,
West Bldg., Downsview.

July 3, 1972

Proposed Underpass Structure,
at the Crossing of Former Co. Rd. 49
and Hwy. #417

Twp's of Nepean and March
Reg. Municipality of Ottawa-Carleton
District No. 9 (Ottawa)
W.C. 71-11842 W.P. 631 54-00

We have reviewed preliminary Bridge Drawing No. 3-260-P2
(dated May, 1972) for this structure and submit the following
comment.

As recommended in the foundation report and shown on the
bridge drawing, the 12 U.P. 74 steel H-piles supporting the
abutments are to be designed using an allowable load of 78
tons/pile. This load allows for the development of a negative
skin frictional load on these piles. The 12 U.P. 74 piles
supporting the centre pier, however, will not be subjected to
negative skin frictional loading and thus can be designed
using the ultimate capacity of this pile section, namely 85
tons/pile. We suggest that the capacity at the pier location
be shown on the Final Bridge Drawings.

BTD/at

B.T. Darch,
B.T. Darch,
Senior Foundations Eng.,
For: M. Devata,
Supervising Foundations Eng.

c.c. Mr. T.C. Kingland ✓

Foundations Files
Documents

71-11049

A. B. Stumac
Principal Foundation

Em

Mr. A.J. Puroy,
Regional Manager,
Systems Design,
Kingston.

District #9, Ottawa.



July 3, 1972.

N.P. 433-64-02, HWY 417 AND FORMER CORBY ROAD & H'LN

I refer to Murray Dutton's memorandum of June 26, 1972, with which the District is in general agreement.

We are, however, concerned about the suggestion in point 4 that the clay material from the Highway 417 cut be used outside the fill slope on the lower part of the lower fills.

Our concern relates to the changes that will result in the contract if the material is shown to be used, and in the event proves unsuitable. We are of the opinion that the contract would be better set up to show the material wasted; if it turned out that it could be used, the consequences of the change would be less serious.

A handwritten signature in dark ink, appearing to read "L. F. Severett".

LSP/ml
cc/S.E. Saint,
G.A. Wong,
A.A. Ricks,
T.C. Kingland,
A.B. Stumac,
P.C. Allen.

L. F. Severett,
Dist. Const. Eng.

71-11049
AS8
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. A. G. Stermac,
Principal Foundation Engineer,
Downsview, Ontario.

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: July 11, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 431-64-00, Site 3-260,
Former County Road 9 Interchange Underpass,
Highway 417, District 9 - Ottawa

I enclose a copy of letter dated June 26, 1972, from Mr. A. M. Batten to Mr. A. J. Percy mentioning several points in connection with the above-mentioned structure location and in particular, the Highway 417 cut between the approach fills for the structure.

Given that it is in fact desirable to excavate the Highway 417 cut prior to building the structure, I should be glad to have your comments on the bearing capacity settlement considerations, etc. if the structure falsework has to be supported on the granular fill overlying the clay subgrade in the excavated area. In this matter, I refer you also to a letter dated June 30, 1972, addressed to me, from Mr. L. M. Peverett, a copy of which was sent to you by Mr. Peverett.

T. C. Kingsland

T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl
encl.

c.c. A. J. Percy
E. R. Saint - Att. A. M. Batten
K. Bassi
C. S. Grebski



Mr. T. C. Kingsland,
Regional Structural Planning Engineer,
Eastern Region,
Kingston, Ontario.

Foundations Office,
Design Services Branch,
West Bldg., Downsview.

July 18, 1972.

W.P. 431-64-00, Site 3-260, W.O. 71-11049
Former County Road #9 Interchange Underpass
Highway #417, District 9 (Ottawa)

71-11-049

Further to your memo dated July 11, 1972, we have reviewed the subsoil conditions and our recommendations regarding to the bearing capacity and settlement considerations of the structure false work which has to be supported on the granular fill overlying the clay subgrade in the excavated area are as follows.

A safe bearing capacity of 1 t.s.f. can be used to design the structure false work provided that the thickness of the well-compacted granular fill (subbase and base material) overlying the clay subgrade in the excavated area is in the order of three feet. Since the structure false work will be temporary in nature, consolidation settlement will be negligible in magnitude. However, instant (contact) settlement which will occur upon the application of the loading can be estimated using the following equation.

$$S = 0.1 B N_p$$

where S - instant settlement in inches

B - width of structure false work support in feet

N_p - Influence value

L - length of structure false work support

L/B	N_p
1.0	0.56
2.0	0.76
3.0	0.88
4.0	0.96
5.0	1.00

Mr. T. C. Kingsland

- 2 -

July 18, 1972.

We believe that the recommendations contained in this letter will prove adequate for your design requirements. Should you have any query, please do not hesitate to contact our Office.

C. S. Poon

C. S. Poon,
Project Foundations Engineer,
For: M. Devata,
Supervising Foundations Engineer.

CSP/ao

For:

cc: L. M. Peverett
E. R. Saint (Attn: A. M. Batten
K. G. Bassi
A. J. Percy

Foundations Files ✓
Documents

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of FOUNDATION OFFICE.

A. Stermac,
Principal Foundation Engineer,
Room 107, West Bldg.,

Structural Office,
West Bldg., DOWNSVIEW.

February 15th, 1973.

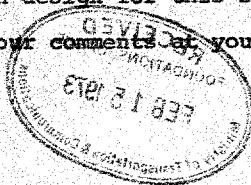
Former Co. Rd. #9,
Interchange U'Pass,
W.P.#431-64-00, Site #3-260,
Hwy. #417, District #9.

SEN

71-11-049

Attached herewith we are submitting the final bridge drawing
which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.



CSG:dp
Attach.

C.S. Grebski,
Structural Design Engineer.

cc. Foundation Office.

on comments
on 2
JB.

Desg. 71-11049-4/B Finalized
sent to Structural Office
19 June 73 dK

Mr. J. Childs,
District Engineer,
Ottawa.

Planning & Design Office,
Kingston.

Mr. W. Stewart

March 7th, 1975.

W. P. 431-64-00

Highway 417, Kanata Interchange;
District #9 - Ottawa

I hereby enclose a partial set of documents and contract drawings as prepared by Giffels, Davis & Jorgensen Ltd. Absent from the package are the structural drawings (previously sent on June 5, 1974) and the electrical drawings (hopefully available soon).

Please review the package in preparation for a Pre-Contract Review on March 19th, 1975, at 10:30 a.m., Boardroom 3, Kingston Regional Offices.

D. A. Lockie
D. A. Lockie
Project Manager

DAL/es

Encl.

c.c. to:

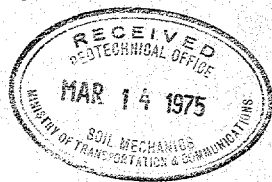
E. R. Saint
B. McKay
E. Giroux
T. C. Kingland
V. McCullough
R. J. Forrest
G. Tilly (Giffels, Davis & Jorgensen)

Copies made for: (TCK: 13/3/75)

K. Bassi

M. Stoyanoff

✓ M. Devoto



P.S. → Dismissed into T.C. Kingland
and R.C. Bassi had me
because ~~it~~ is not required
at this meeting. *on A*
March 13/75.





Ministry of
Transportation and
Communications

Memorandum

To: Mr. J. Wear,
Systems Design,
East Building,
Downsview.

Attention:

From: Structural Office,
West Building,
Downsview, Ontario.

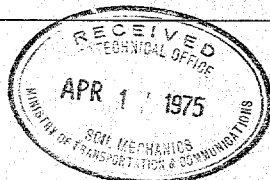
Date: April 16, 1975.

Our File Ref.

In Reply to

Subject:

Kanata Interchange Underpass
Hwy. 17, District #9
W.P. 431-64-00, Site 3-260



A meeting was held on the morning of April 16, 1975, in the West Building, Downsview, to review the problem of supporting the falsework for the structure.

In attendance were the following:

Messrs.	M. Devata	-	Soils Mechanics Section
	<u>A. Prakash</u>	-	Soils Mechanics Section
	A.E. McKim	-	Construction Office
	K. Bassi	-	Structural Design Section
	M. Stoyanoff	-	Structural Design Section

After considerable discussion, it was agreed that to properly support the structure falsework in excavated areas, a temporary padding minimum 36" deep would be required.

This padding could consist of 36" of well compacted granular material or a layer of lime stabilized base under a layer of compacted granular material, total depth 36".

It is recommended that the attached special provision replace the special provision submitted by Mr. G. Tilley April 18 on this matter.

M. Stoyanoff,
Structural Contract Engineer.

MS/ac
Attach.

c.c. All Present
A.J. Percy
T.C. Kingsland
J.M. Chilas



Memorandum

To: Mr. J.M. Childs
District Engineer, Ottawa

From: Materials & Testing Office
Kingston

Attention: Mr. W. Stewart

Date: 8 August 1975

Our File Ref.

In Reply to



Subject: Contract 75-72, Hwy # 417, Former Cty. Rd # 9 Interchange
and March/Huntley Town Line Overpass Structure Approaches

We are advised that the contractor has requested us to consider using shot limestone rock from a building foundation excavation for the approach fills to the proposed overpass structure at the March/Huntley Twp. Line.

It was discussed with G. Mullins that factors that relate to this decision may be assumed as follows:

- 1) The foundation condition under the approach fills involves an approximately 40' depth of sensitive clay material. Anticipated settlements are indicated in the Foundations Report (W.P. 436-64-00). It is understood that the proposal is for rock construction for the roadbed width and with side slopes at about 1½:1 with the final slope to be constructed at 2:1 utilizing earth material from the rock slope to the finished slope surface.
- 2) The rock and earth portions of the fills should be brought up simultaneously in view of foundation stability considerations. This may be done by constructing an initial 4' - 5' rock fill lift and subsequent 3' lifts. The earth portions would be brought up such that the level of the rock and earth portions would not be greater than 3' as the work progresses. The earth portions should be placed in compacted lifts as outlined in MTC Form 200.
- 3) Earth material will have to be utilized for fill within the structure abutment areas where future pile driving will be required. This fill should also be constructed as the adjacent rock is placed.
- 4) Assume a 115 lb/c.ft. density for estimating quantities of shot rock fill. This is based on pass specific gravity and bulking measurement where rock cut/fill operations are concerned.
- 5) It is presumed that the earth fill sections will consist of sandy loam or sand type material. A rock/earth transition should be constructed in accordance with DD-411-D to a 4 foot depth.

Should you have any further queries in this regard, please do not hesitate to contact the undersigned.

c.c. P.D. Billings
G.A. Wrong
C. Mirza
H.B. McKay
W.R. Bennett

AMB/jeb

A.M. Batten
A.M. Batten
Senior Soils Supervisor

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 3165-76

DIST. 9 REGION EASTERN

W.P. No. 431-64-00

CONT. No. 75-72

W. O. No. 79-11049

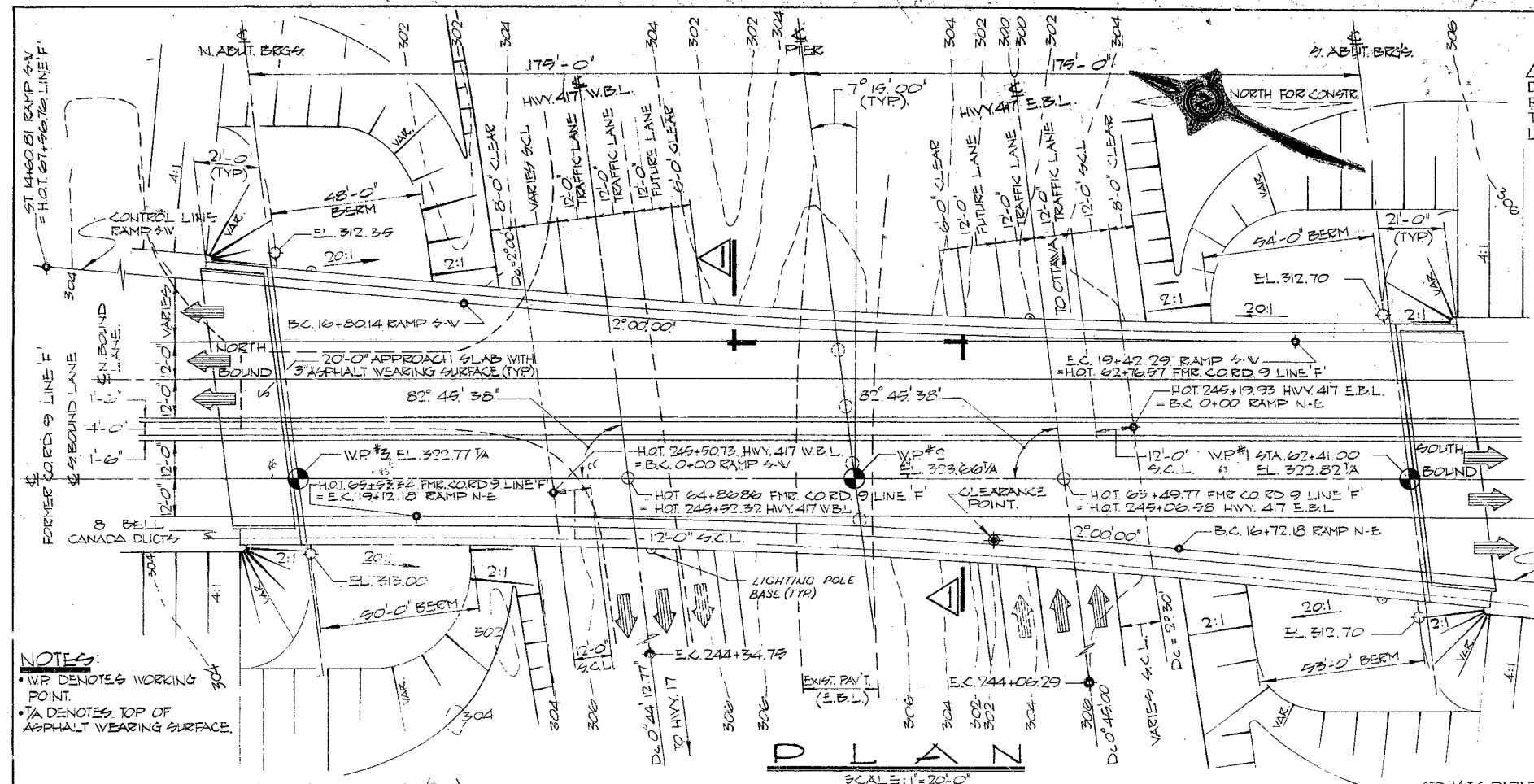
STR. SITE No. 3-260

HWY. No. 417

LOCATION UNDERPASS @ 417

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

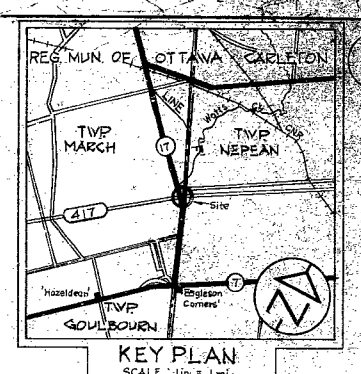
REMARKS: @ documents to be unfolded
before microfilming



RAMP CURVE DATA

LINE	PC	PT	PI	VC	VC	VC
N.E.	40' 48'	50' 14'	345'			
S.V.	2° 00'	2° 00'				
D	2864.79'	2864.79'				
R	120.07'	131.16'				
T	240.00'	262.15'				

- LIST OF DRAWINGS**
- 3-260-1 GENERAL LAYOUT.
 - 2 BOREHOLE LOCATION & SOIL STRATA.
 - 3 SECTIONS A-A, B-B & C-C.
 - 4 FOUNDATION LAYOUT PIER & FOOTING REINFORCEMENT.
 - 5 NORTH ABUTMENT I.
 - 6 NORTH ABUTMENT II.
 - 7 SOUTH ABUTMENT I.
 - 8 SOUTH ABUTMENT II.
 - 9 DECK DETAILS & BEARINGS.
 - 10 CABLE DETAILS.
 - 11 DECK REINFORCEMENT I.
 - 12 DECK REINFORCEMENT II.
 - 13 DECK REINFORCEMENT III.
 - 14 PARAPET WALL DETAILS.
 - 15 STANDARD STEEL PARAPET RAIL.
 - 16 DETAILS OF CONCRETE SLOPE PAVING.
 - 17 APPROACH SLABS.
 - 18 STANDARD DETAILS I.
 - 19 STANDARD DETAILS II.
 - 20 EMBEDDED DETAILS I.
 - 21 EMBEDDED DETAILS II.
 - 22 ELECTRICAL STANDARDS.

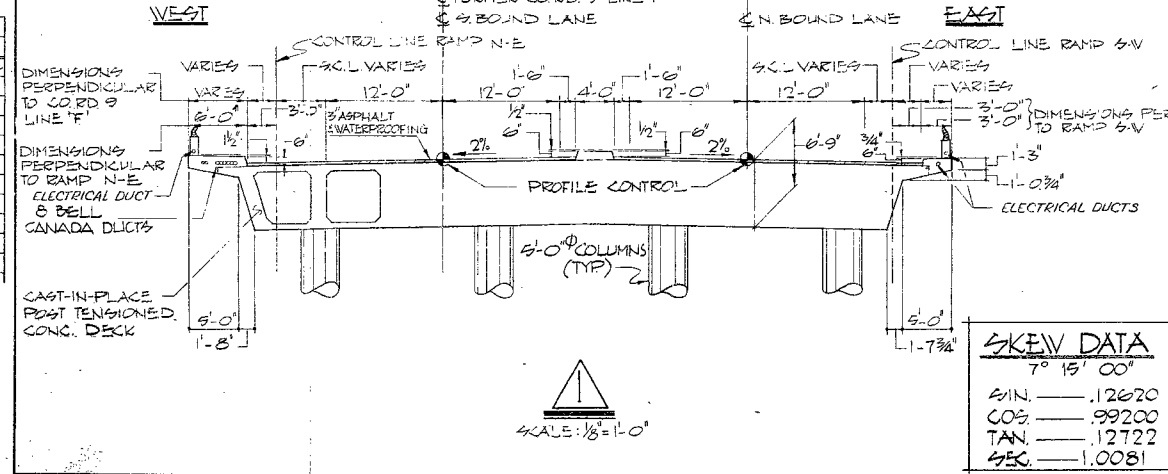
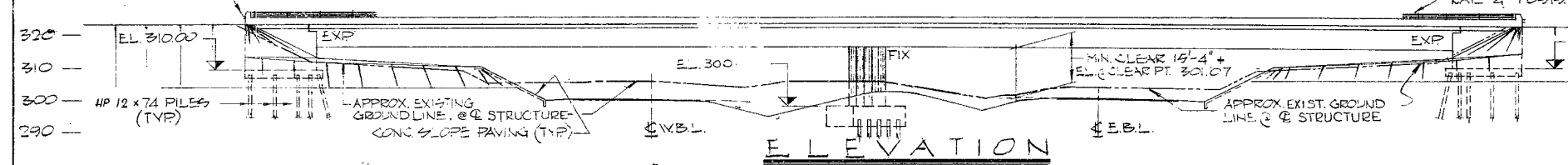


B.M. 302.59
GEODETIC DATUM
N. & V. IN N.W. CORNER OF 2.5' ELM.
4000' RT. OF 66+60.00

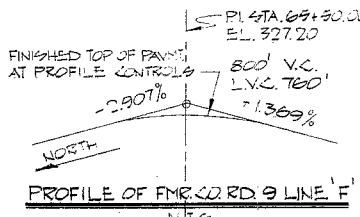
NOTES:
• W.P. DENOTES WORKING POINT.
• T.A. DENOTES TOP OF ASPHALT WEARING SURFACE.

GENERAL NOTES

CLASS OF CONCRETE
DECK, PARAPET WALLS, COLUMNS & PIER FOOTING 4000 P.S.I.
REMAINDER 3000 P.S.I.
CLEAR COVER TO REINFORCING STEEL
FOOTINGS, ABUTMENTS & WINGWALLS 3"
COLUMNS & DECK TOP 2"
DECK BOTTOM, VOIDS & PARAPET WALLS 1 1/2"
OR AS NOTED
CONSTRUCTION NOTES:
THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE ± 1/8". NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED STRESSED AND GROUTED.



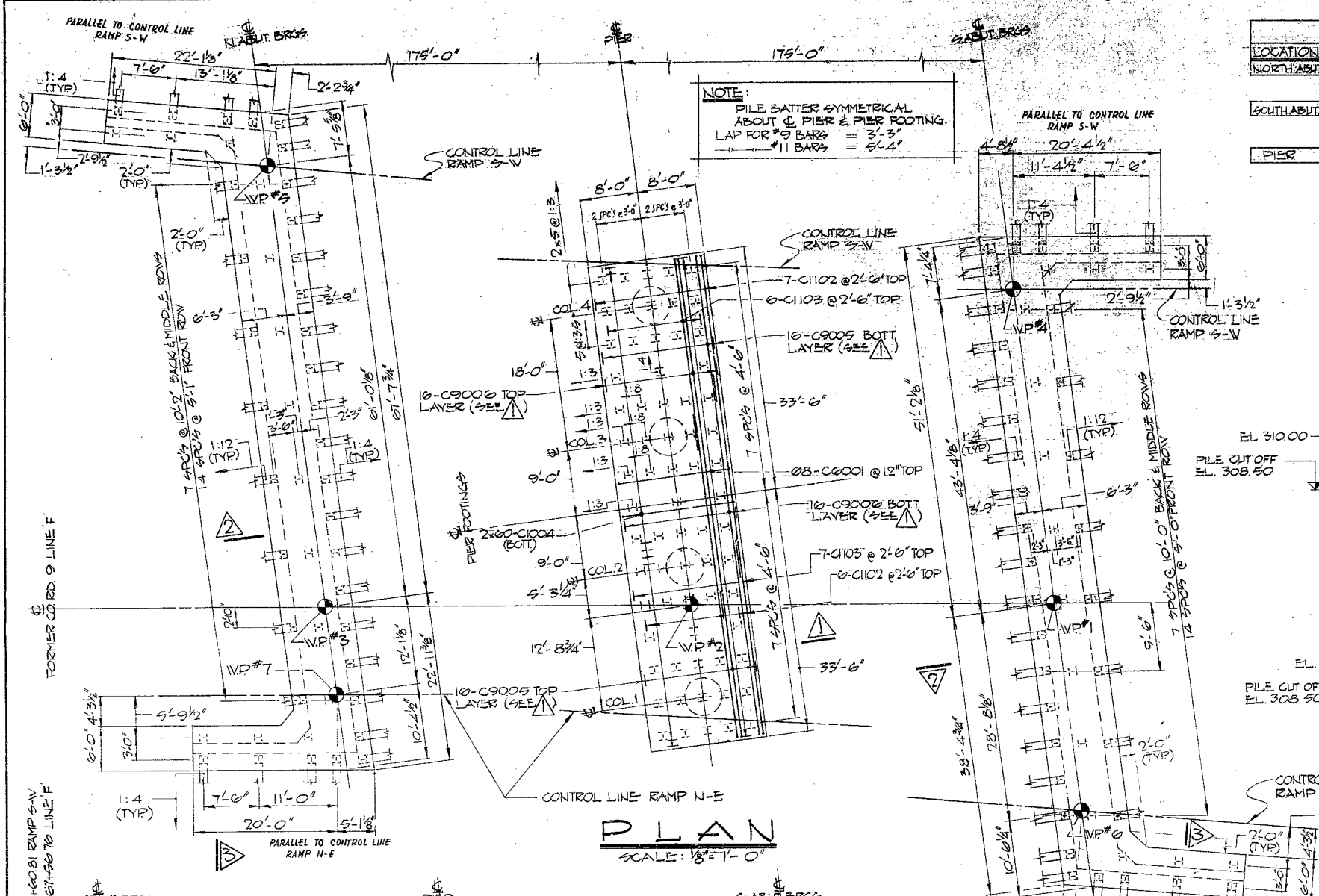
CONCRETE QUANTITIES
CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONCRETE TENDER ITEMS
CONCRETE IN PIER ABUTMENTS & WINGWALLS { 49 CY - 5000 P.S.I.
326 CY - 3000 P.S.I.
PRESTRESSED CONG. BRIDGE DECK 3427 CY - 5000 P.S.I.
CONCRETE IN PARAPET WALLS 49 CY - 5000 P.S.I.
CONCRETE IN APPROACH SLABS 101 CY - 3000 P.S.I.
CONCRETE IN SLOPE PAVING 51 CY - 3000 P.S.I.



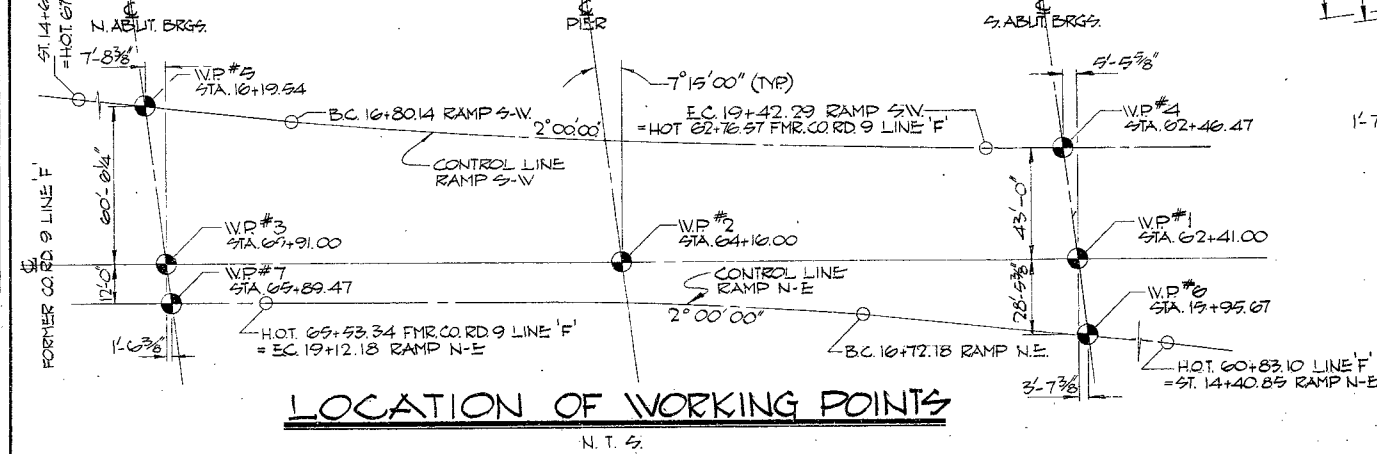
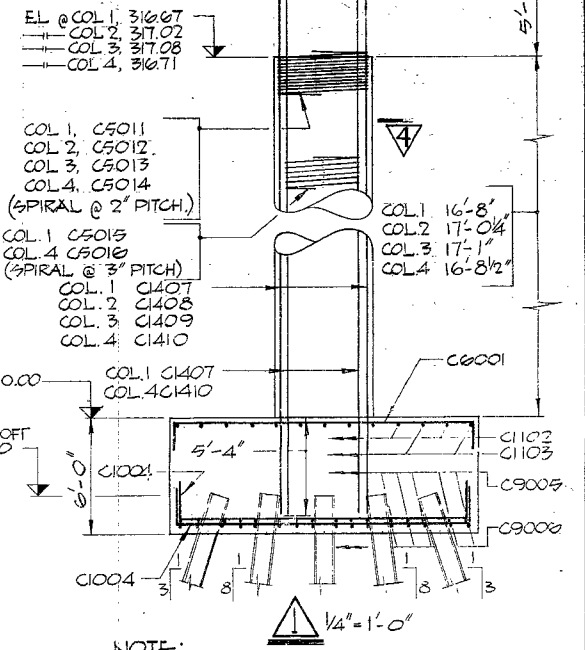
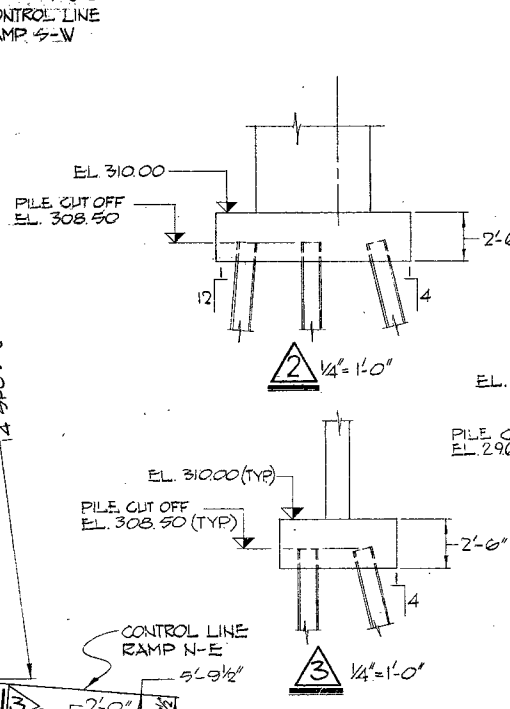
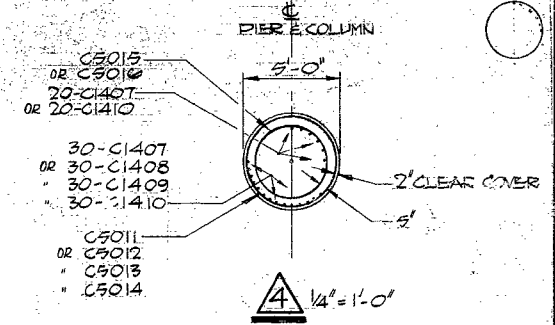
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS ONTARIO	
HWY 17 (KANATA) INTERCH. UNDERPASS (APPROX. 1/25 MILES NORTH OF EAGLESON CORNERS)	
KING'S HIGHWAY No. 417	DIST. No. 9
REG. MUN. OF OTTAWA-CARLETON	TWP. NEPEAN & MARCH LOT 1 & 2 CON. OTTAWA FRONT
GENERAL LAYOUT	
APPROVED [Signature]	SITE No. 3-260-1 W.P. No. 321-604-00
DESIGN [Signature]	CHECK [Signature]
DRAWING [Signature]	CHECK [Signature]
DATE: FEB. 73	LOADING [Signature]
CONTRACT No. 3-260-1	

PRINT RECORD

No.	FOR	DATE
1	6	11/19/73



PILE DATA				
LOCATION	NO.	BATTER	LENGTH	DESIGN LOAD
NORTH ABUT.	27	1:4	172'-0"	HP 12.74 99T/PILE
	14	STR.	168'-0"	
	8	1:12	168'-0"	
	27	1:4	176'-0"	
SOUTH ABUT.	14	STR.	170'-0"	
	8	1:12	172'-0"	
	38	1:3	164'-0"	
	10	1:3.5	162'-0"	
PIER	12	1:8	156'-0"	
	2	1:4	160'-0"	
	7	STR.	155'-0"	



REVISIONS	
DATE	DESCRIPTION
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS ONTARIO	
HWY. 17 (KANATA) INTERCH. UNDERPASS (APPROX. 1.25 MILES NORTH OF EAGLESON CORNER)	
KING'S HIGHWAY No. 417	DIST. No. 9
REG. MUNI. OF OTTAWA-CARLETON	CONTRACT No.
TWP. NEPEAN & MARCH	LOT 1 & 2
FOUNDATION LAYOUT, PIER & FOOTING REINFORCEMENT	
APPROVED	SITE No. 3-260
DESIGN R.S.E.	CONTRACT No.
DRAWING T.E.L.	DRAWING No. 3-260-4
DATE FEB. '73	LOADING 1950-44

