

73-F-24	10-69-20	BASLINE RD. & C.N.R.	3105-95 ✓
W.O.	W.P.	LOCATION	GEOCRES NO.

● DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: W.P. FILE

REMARKS

GEOCRES

INDEXING CARD FOR REPORTS NOT MICROFILMED

G1-20 AUG. 74

Mr. T. C. Kingsland

Copy made for: (2/5/73)

Mr. M. Devata

Systems Design Office, Postal Bag 4000,
Kingston, Ontario. K7L 5A5.

February 26th, 1973.

Mr. G. Wetherall,
Regional Roads Commissioner,
Regional Municipality of Ottawa-Carleton,
222 Queen Street,
Ottawa, Ontario.

Dear Sir:

RE: W.P. 10-69-18, Highway 417, Baseline Road
From Blake Road to Miley Road, 1.51 Miles
Excluding the C.N.R. Overhead and Approaches,
0.36 Miles; District 15 - Ottawa.

With reference to your request to include the C. N. R.
grade separation with the above noted project, please be advised
that approval has been obtained to carry out the design and
construction on your behalf.

The Ministry has assigned the following work project
numbers to the work:--

W. P. 10-69-19 - Approaches to C. N. R. Overhead on Baseline Road	
Length - 0.26 Miles, Estimated Value	\$433,000.00
W. P. 10-69-20 - C. N. R. Overhead Structure	
Estimated Value	\$242,000.00
Total:	\$675,000.00

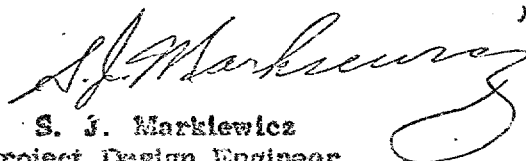
These costs are exclusive of design fees. We have assigned the work to M. M. Dillon as an extension to our existing agreement for Highway 417. The Consultant will bill the Ministry and we will in turn bill you for the costs of design and subsequently construction. The Regional Municipality will be required to apply for any Municipal subsidy, or subsidy from the C. T. C.

Our agreement with the Consultant is based on a cost plus a percentage of the cost of construction fee basis. Preparation of documents for submission to the C. T. C. for subsidy does not fall into this category. Since application to the C. T. C. for subsidy is the responsibility of the Regional Municipality, I suggest you deal directly with the Consultant for the preparation of submissions.

In regard to your query about soils investigation, we have carried out the research in connection with our proposed work on Baseline Road. We do not propose to bill you for this. However, this does not apply to the detailed Foundation Investigation for the structure.

I trust you are in agreement with these arrangements. Please confirm.

Yours truly,

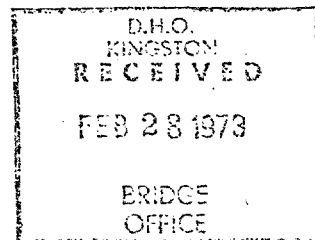

S. J. Markiewicz
Sr. Project Design Engineer

SJM/dal

c.c. - J. E. Callaghan
R. J. Forrest
E. J. Orr
T. C. Kingsland
E. Saint

Copies made for: (TCK: 1/3/73)

B. R. Davis
K. Bassi
C. S. Grebski



73-11024

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

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

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: 2 May 1973.

OUR FILE REF.

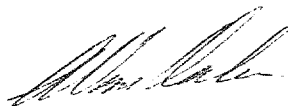
IN REPLY TO

SUBJECT: W.P. 10-69-20, Site 3-317,
Canadian National Railway Overhead at relocated Baseline Road,
District 9 - Ottawa

Further to our telephone conversation of this date, we confirm that the Consultant, M. M. Dillon Limited, will be requesting the foundation investigation for this structure. So as to expedite the procedure, we have arranged that a representative of your office will call on Mr. B. Dowsley, M. M. Dillon Limited, 280 Metcalfe Street, Ottawa, on Monday, May 7th, to pick up a marked-up copy of Bridge Site Plan E-5252-1, while a second copy will be sent to you with their Foundation Investigation Request.

Please have your representative telephone Mr. B. Dowsley ahead of time at No. 236-9569 (Ottawa) to ensure that plans are ready.

We also enclose copy of a letter which is self-explanatory dated February 26, 1973 to the Regional Municipality of Ottawa-Carleton from the Regional Systems Design Office.



For: A. Van Dalen
T. C. Kingsland
Regional Structural Planning Engineer

AV/TCK/hl
encl.

c.c. C. S. Grebski - Att. K. Bassi
A. J. Percy
R. Forrest

ESTIMATED COST: £ 3500

MDD. 18 July/73



Structural Planning Office, Postal Bag 4000, Kingston, Ontario
K7L 5A3

2 May 1973

M. M. Dillon Limited,
Consulting Engineers and Planners,
280 Metcalfe Street,
Ottawa, Ontario, K2P 1R7.

Attention: Mr. B. Dowsley

Dear Sirs: W.P. 10-69-20, Site 3-317
 Canadian National Railway Overhead
 at Relocated Baseline Road, District 9

Please find enclosed four (4) copies of Site Plan E-5252-1 relating to the above structure. I shall be glad if you will put your preliminary grade and preliminary structure outline showing centre lines of piers and abutments, with possible alternatives, on each of these drawings. Please forward one copy to Mr. M. Devata, Foundations Office, West Building, Ministry of Transportation and Communications, Downsview, Ontario, to assist him in the preparation of the Foundation Report for this structure.

As arranged by telephone, a representative of the Foundations Office will call on you on Monday, May 7th, and pick up a marked-up copy of the above drawing.

I would appreciate your sending me one marked-up copy of the drawing for my records.

Yours truly,

T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl
encls.

c.c. A. G. Stermac - Att. M. Devata
J. Anderson
A. J. Percy
R. Forrest
C. S. Grebski - Att. K. Bassi

73-11024
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

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

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: 2 May 1973.

OUR FILE REF.


IN REPLY TO

SUBJECT: W.P. 10-69-20, Site 3-317,
Canadian National Railway Overhead at relocated Baseline Road,
District 9 - Ottawa

Further to our telephone conversation of this date, we confirm that the Consultant, M. M. Dillon Limited, will be requesting the foundation investigation for this structure. So as to expedite the procedure, we have arranged that a representative of your office will call on Mr. B. Dowsley, M. M. Dillon Limited, 280 Metcalfe Street, Ottawa, on Monday, May 7th, to pick up a marked-up copy of Bridge Site Plan E-5252-1, while a second copy will be sent to you with their Foundation Investigation Request.

Please have your representative telephone Mr. B. Dowsley ahead of time at No. 236-9569 (Ottawa) to ensure that plans are ready.

We also enclose copy of a letter which is self-explanatory dated February 26, 1973 to the Regional Municipality of Ottawa-Carleton from the Regional Systems Design Office.


A. Van Dalen
For: T. C. Kingsland
Regional Structural Planning Engineer

AV/TCK/hl
encl.

c.c. C. S. Grebski - Att. K. Bassi
A. J. Percy
R. Forrest

ESTIMATED COST: \$ 3500

13-11024

M. M. DILLON LIMITED

consulting engineers and planners

280 METCALFE STREET, OTTAWA, ONTARIO, K2P 1R7 • 613-230-9569

OUR FILE: 6830-20

YOUR FILE:

10 May 1973

Ministry of Transportation
and Communications
Postal Bag 4000
Kingston, Ontario

Attention: Mr. T.C. Kingsland, P.Eng.
Regional Structural Planning Engineer

C.N.R. Overhead at Relocated
Base Line Road
W.P. 10-69-20, Site 3-317
District 9, Ottawa

Dear Sirs:

Please find enclosed two (2) prints of Site Plan E-5252-1 for the above structure, marked up as requested in your letter of 2 May 1973.

We have indicated two alternative preliminary profiles and structure outlines, one alternative being shown on each print. Choice of structure type will be made after the Foundation Report has been completed.

We are also forwarding under separate cover two (2) prints to Mr. M. Devata, P.Eng., along with a copy of this letter. Four (4) additional prints are ready in our office to be picked up by a Foundations Office representative.

Yours truly,

M. M. DILLON LIMITED

W.W. Irwin, P.Eng.
for B.P. Dowsley, P.Eng.
Project Manager

WWI:ls
Encls.
c.c. M. Devata, P.Eng.
(2 prints encl.)

MEMORANDUM

TO: Mr. T. C. Kingsland, (2)
Regional Structural Planning Eng.,
Eastern Region,
Kingston, Ontario.

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

ATTENTION:

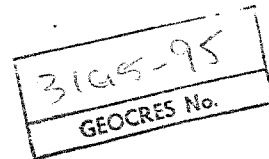
DATE: August 20, 1973.

OUR FILE REF.

IN REPLY TO SEP - 5 1973

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Overhead Structure at
The Crossing of Baseline Rd. and the C.N.R.
Twp. of Gloucester, Reg. Mun. of Ottawa-Carleton
District No. 9, Site 3-317
W.O. 73-11024 - W.P. 10-69-20



Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above-mentioned 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.

c.c. E. J. Orr
B. R. Davis
A. Rutka
A. J. Percy
J. M. Childs
B. J. Giroux
E. R. Saint
G. A. Wrong
D. A. Singh
M. M. Dillon & Co. Ltd. (Ottawa)

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

Foundations Files
Documents

TABLE OF CONTENTS

1. INTRODUCTION.
 2. DESCRIPTION OF THE SITE AND GEOLOGY.
 3. FIELD & LABORATORY INVESTIGATION.
 4. SUBSOIL & BEDROCK CONDITIONS.
 - 4.1) General.
 - 4.2) Surficial Granular Deposit.
 - 4.3) Silty Clay to Clay, Trace of Sand.
 - 4.4) Heterogeneous Mixture of Silt, Sand & Gravel, Traces of Clay (Glacial Till).
 - 4.5) Shale Bedrock.
 5. GROUNDWATER CONDITIONS.
 6. DISCUSSION & RECOMMENDATIONS.
 - 6.1) General.
 - 6.2) Proposed Scheme.
 - 6.2.1) Stability Considerations.
 - 6.2.2) Settlement Considerations.
 - 6.2.3) Structure Foundations.
 - 6.3) Alternative Scheme (Subexcavation of the Sensitive Silty Clay Stratum).
 - 6.3.1) Limits of Subexcavation.
 - 6.3.2) Structure Foundations.
 7. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
The Proposed Overhead Structure at
The Crossing of Baseline Rd. and the C.N.R.
Twp. of Gloucester, Reg. Mun. of Ottawa-Carleton
District No. 9, Site 3-317
W.O. 73-11024 - W.P. 10-69-12

1. INTRODUCTION:

The Foundations Office was requested to carry out a subsurface investigation for the overhead structure at the crossing of the C.N.R. and Baseline Rd. The request was contained in a memo from the Eastern Region, Structural Planning Office (Mr. T. C. Kingsland, Regional Structural Planning Engineer), dated May 2, 1973. An investigation was subsequently carried out by the Foundations Office to determine the subsoil, bedrock and groundwater conditions at the site.

This report contains the results of the investigation, together with recommendations pertaining to the foundations of the proposed structure as well as the stability and settlement of the approach embankments.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located at the crossing of Baseline Rd. and the C.N.R. in the Township of Gloucester, Regional Municipality of Ottawa-Carleton. The terrain is flat to gently undulating in relief. The land is being used for farming purposes.

The site is situated in the physiographic region known as "Ottawa Valley Clay Plains." In this region, extensive clay deposits are interrupted by ridges of sand and/or bedrock.

The sensitive marine clay, which was deposited in the geologic past in the Champlain Sea, varies markedly in thickness over the region. In the vicinity of the site, it is found to be less than 20 ft. thick. The clay is generally underlain by glacial till followed in turn by shale bedrock.

3. FIELD & LABORATORY INVESTIGATION:

Twelve sampled boreholes, each accompanied by a dynamic cone penetration test plus an additional sixteen dynamic cone penetration tests, were put down during the course of the field investigation. The borings were advanced by means of a C.M.E. machine adapted for soil sampling purposes.

Samples of the glacial till were obtained in a 2" O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for the Standard Penetration Test. The dynamic cone penetration tests were advanced using the same method. Samples of the cohesive stratum were obtained in 2" I.D. Shelby tubes which were manually pushed into the soil. In-situ vane tests were also carried out within this zone to determine the undrained shear strength and the sensitivity of the clay. Bedrock was proven at 3 of the boring locations by obtaining BXL rock core samples.

The groundwater level conditions across the site were determined by recording the water levels in the open boreholes during the course of the investigation.

The locations and elevations of all the boreholes are shown on Drawings No. W.O. 73-11024A. Estimated stratigraphical sections are also presented on respective drawings. The surveying was carried out by personnel from the Kingston Region, Engineering Surveys Office. All elevations are referenced to Geodetic datum.

All the samples were subjected to careful visual examination both in the field and in the laboratory. Laboratory tests were performed on selected samples to determine the engineering properties of the various soil types; namely,

Natural Moisture Content
Grain-Size Distribution

Atterberg Limits
Undrained Shear Strength
Consolidation Testing

The results of the laboratory testing are plotted on the "Record of Borehole" sheets and summarized on Figures No. 1 to 5, all of which are contained in Appendix I of this report.

4. SUBSOIL & BEDROCK CONDITIONS:

4.1) General:

The predominant stratum across the site is a sensitive soft to stiff silty clay to clay, with traces of sand. The thickness of this stratum varies from 9.5 to 21 feet. Underlying this silty clay to clay stratum is an extensive deposit of glacial origin, which is in turn, followed by shale bedrock. At certain locations, the silty clay to clay is covered by a surficial deposit of sand up to 4 feet thick.

The boundaries of the various deposits, as determined in the boreholes, are shown on the individual Record of Borehole sheets. The stratigraphical sections, shown on Drawings No. 73-11024A & B have been inferred from this data. From ground surface downward, the various soil and bedrock types encountered are described in the subsections to follow.

4.2) Surficial Granular Deposit:

At a number of boring locations, a surficial granular deposit of brown sand with some organic material is present, the thickness of which varies from 3.5 feet (B.H. #27) to 4 feet (B.H.'s #3 and #23). Standard penetration testing carried out within this deposit gave 'N' values which vary from 2 to 27 blows per foot, being generally in the 11 to 27 blows/ft. range. Based on these results, it is estimated that the relative density of the granular deposit varies from very loose to compact.

4.3) Silty Clay to Clay, Trace of Sand:

Directly beneath the surficial granular deposit, where

it exists, or a nominal topsoil cover (8 inches) is a 9.5 to 21 ft. thick sensitive grey silty clay to clay with a trace of sand. Occasional seams of fine sand up to 1 inch thick, were encountered randomly throughout this deposit. Grain-size distribution testing was carried out on several samples of this stratum and the results are shown on the Record of Borehole sheets and are plotted on Figure No. 3.

The engineering properties of the deposit, as determined by field and laboratory testing, are presented in the following table.

<u>Identity Tests</u>		<u>Range</u>	<u>Average</u>
Bulk Density (γ)	p.c.f.	104 - 111	108
Liquid Limit (W_L)	%	38 - 54	49
Plastic Limit (W_P)	%	23 - 35	25
Natural Moisture Content (W)	%	27 - 57	42
<u>Compressibility Characteristics</u>			
Initial Void Ratio (e_o)		1.268 and 1.302	} Tests
Compression Index (C_c)		0.806 and 0.805	
Degree of Preconsolidation (p.s.f.) ($P_c - Po'$)		3100 and 5190	
<u>Undrained Shear Strength (C_u)</u> p.s.f.			
In Situ Field Vane Tests		520 - 1540	
Laboratory Tests		460 - 1100	
Sensitivity (S_t)		10 - 28	

The Atterberg limit test results, given in the table, are also summarized on the Plasticity Chart, Figure No. 1. The testing indicates that the cohesive soil is inorganic with the plasticity in the intermediate to high range. The natural moisture content is generally at or above the liquid limit. These values are an indication of the very sensitive nature of the subsoil.

The field and laboratory undrained shear strength results are plotted on the Record of Borehole sheets. The

results indicate that the consistency of the silty clay varies from soft to stiff.

The consolidation characteristics of the stratum were determined by carrying out laboratory tests; the results are shown on Figure No. 5 as Void Ratio vs. Log of Pressure Plots. This testing indicates that the silty clay stratum is preconsolidated by 3100 p.s.f. in excess of the existing overburden pressure.

4.4) Heterogeneous Mixture of Silt, Sand & Gravel, Traces of Clay (Glacial Till):

Underlying the silty clay to clay stratum is a deposit of glacial origin consisting of a heterogeneous mixture of silt, sand and gravel, traces of clay, with numerous layers of silty fine sand and/or sand and gravel. Occasional zones of clayey silt with sand and gravel were also present throughout this deposit. The glacial till was fully penetrated at only three boring locations, where the thickness of the glacial till was found to be up to 43 feet (B.H. #4). Grain-size distribution testing was carried out on samples of the glacial till. The results are plotted on Figure No. 4.

Atterberg limits testing was carried out on samples of the cohesive portion of the glacial till. The results are plotted on the Record of Borehole sheets as well as summarized on Figure No. 2.

Standard penetration testing was carried out within this deposit. The results indicate that the 'N' values at the upper portion of this deposit vary between 4 and 41 blows/foot, gradually increasing to 100 blows/2 inches at the lower portion. It is estimated that the glacial till in the upper zone is in a loose to dense state while that in the lower zone is in general in a very dense state.

4.5) Shale Bedrock:

The glacial till deposit is directly underlain by shale bedrock, which was proven in three boring locations by

obtaining 4 to 5 feet of BXL size core samples. The surface of the bedrock was found to be at elevation 161 to 163 which correspond to depths below the existing ground surface of 48 ft. to 58 ft. The shale bedrock is in a sound condition, as evidenced by the high percentage recovery.

5. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out during the course of the field investigation by recording the water level in the open boreholes. The observations are recorded on the Record of Borehole sheets and summarized on Drawing No. 73-11024A. The results of the observation indicate that the groundwater level, within the overburden deposits, ranges from 1 to 11 feet below the existing ground surface which corresponds to elevations from 202 to 218.5.

6. DISCUSSION & RECOMMENDATIONS:

6.1) General:

It is proposed to construct an overhead structure at the crossing of relocated Baseline Road and the C.N.R. in the Township of Gloucester, Regional Municipality of Ottawa-Carleton. The present proposal calls for triple span structure (56'-70'-56').

The profile grade of Baseline Rd. in the vicinity of the structure will range from elevation 249 to elevation 253. The associated approach fills will, therefore, have maximum heights which vary from 32 ft. on the north approach to 36 ft. on the south approach.

The subsoil at the site consists of 9.5 to 21 feet of soft to stiff, stratum of silty clay to clay, which is underlain by a deposit of glacial origin. Underlying the overburden is dark grey shale bedrock.

Recommendations pertaining to the foundation design of the structure, as well as the stability and settlement considerations associated with embankment fills are presented in the subsections to follow.

6.2) Proposed Scheme:

A 9.5 to 21 foot-thick, compressible silty clay to clay stratum is present at a shallow depth below ground surface at this structure crossing. The cohesive stratum is underlain by a thick glacial till deposit.

The presence of the sensitive 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 the structure foundation loadings.

6.2.1) Stability Considerations:

The critical condition for stability of an embankment on slightly overconsolidated cohesive subsoils, as is the case at this site, generally occurs during or immediately following the construction period. This being the case, a total stress analysis ($\phi = 0$) provides a suitable means of assessing the stability of the embankment sections. 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 by the use of the electronic computer to determine the stability of the approaches, using the following assumptions:

Fill Material

Unit Weight (γ)	- 140 p.c.f.
Apparent angle of shearing resistance (ϕ)	- 30°
Tension Crack	- 1/3 Fill Height

Silty Clay to Clay

Unit Weight (γ)	- 110 p.c.f.
Undrained Shear Strength (C_u)	- 650 p.s.f.

The results of the analyses, including the heights of fill involved and berm requirements, are presented in the following table as well as on Figure No. 8. It should be noted that standard 2:1 slopes were used in the computations.

Height of Fill

Berm Requirements
(Mod. Height)

36 feet

45 feet

32 feet

35 feet

27 feet

25 feet

23 feet

15 feet

18 feet

Nil

It should be noted that a smooth transition should be effected between the berm requirements for varies heights.

Referring to the table, it can be seen that, if the profile grades proposed are adopted, then berms will be required in both the longitudinal and transverse direction in the immediate vicinity of the structure. The necessity of longitudinal berms will entail the lengthening of the structure by approximately 80 feet. From an economical point of view, this is not practical.

6.2.2) Settlement Considerations:

The sensitive clay stratum will undergo settlements due to consolidation, over a period of time, under the weight of the approach embankments. Settlement computations were, therefore, carried out.

It is estimated that the settlement of the approach fill could be of the order of 9 to 10 inches. The total amount of the predicted settlement, at both approaches, should take place within a period of three years. About 50% should, however, occur within 4 to 6 months.

Since predicted settlements will occur relatively quickly, it would be advantageous to place the fills prior to construction of the structure, in order to minimize post-construction maintenance. If scheduling permits, a period of at least six months should be provided for this purpose.

6.2.3) Structure Foundations:

At the proposed pier and abutment locations, compressible clay is located at a shallow depth below the ground surface. For

this reason, it is recommended that the piers and the abutments be supported on end-bearing piles driven to practical refusal within the very dense lower glacial till deposit. The estimated pile tip elevations at the various structural elements are tabulated below:

<u>Locations</u>	<u>Estimated Pile Tip Elevation</u>	<u>Refer to B.H.</u>
North Abutment	180	#27
North Pier	172	#4
South Pier	168	#7
South Abutment	168	#6

It is recommended that the pile driving in the field should be controlled by Hiley Formula in accordance with the current M.T.C. practice.

The allowable pile load will be dependent on the section chosen; for example, 14 BP 74 steel H-piles may be designed for 95 tons/pile.

At the abutment locations, however, the piles will be subjected to a negative frictional load due to consolidation of the cohesive foundation subsoil under the weight of the approach fills. In order to take this effect into consideration, it is recommended that the ultimate capacity of the pile section chosen be reduced by about 20 percent for design purposes. For example, 14 BP 74 steel H-piles can be designed for 75 tons/pile.

An earth cover of at least 4 feet should be provided to the underside of the pier pile caps for frost protection purposes.

Since the pier pile caps will be located in the relatively impervious cohesive stratum, no major dewatering problems are anticipated. Any groundwater seepage or surface runoff into the excavation could be handled by conventional pumping techniques.

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

6.3) Alternative Scheme (Subexcavation of the Sensitive Silty Clay Stratum):

6.3.1) Limits of Subexcavation:

If the compressible silty clay stratum is left in place, then:

- (a) Berms will be required in the longitudinal and transverse direction to ensure the stability of the embankment sections. Subsequently, the structure will have to be lengthened.
- (b) Consolidation settlements will be induced in the foundation subsoil by the fill loadings.

Because of the nominal thickness of this deposit, it is considered that it would be feasible to completely subexcavate the material and by so doing, eliminate the berm requirements as well as the consolidation settlement that would have been induced in the cohesive subsoil.

The cohesive subsoil should be completely subexcavated from within the plan limits of the proposed approach fills. The recommended geometry of the subexcavations is shown on Figure No. 6. The subexcavation should extend a minimum distance of 100 feet behind the abutments. Because of the space restrictions between the toe of the proposed south approach fills and the existing C.N.R. track, the slope of the subexcavation, in this area, may have to be steeper than 1:1 recommended. An appropriate railway track protection scheme will be necessary during sub-excavations of the clay stratum in this area. A scheme utilizing steel sheet piling driven to bedrock was used in a similar project in this general area and was found to be successful (Refer to Foundation Report W.O. 70-11064).

The subexcavations so formed should be backfilled with a granular type of material to a level extending at least 1 foot above the prevailing groundwater level. Any other acceptable earth fill could be used above this level.

6.3.2) Structure Foundations:

The piers may be supported on end-bearing steel H-piles

driven to practical refusal within the very dense lower glacial till deposit. The estimated pile tip elevations, together with the related recommendations are given in subsection 6.2.3).

If the compressible silty clay to clay stratum is sub-excavated the abutments may be supported on spread footings perched within the approach fills. The material, below the tops of the footings, should consist of well compacted granular 'A', and should extend to a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops. This portion of the fill should be constructed with side slopes no steeper than 1:1.

An allowable bearing value of 2.5 t.s.f. may be used in design.

Differential settlement will occur between the spread footing supported abutments and the adjacent piers on piles. The magnitude of this settlement should be within 1 in.

Alternatively, the abutments can be supported on end-bearing piles, as discussed under subsection 6.2.3).

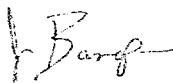
7. MISCELLANEOUS:

The field work was carried out between May 17, 1973, and June 1, 1973, under the supervision of Mr. J. T. Bangs, Project Foundations Engineer.

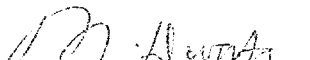
The equipment was owned and operated by Master Soil Investigation Ltd., Toronto.

This report was written by Mr. J. T. Bangs, Project Foundations Engineer.

This project was carried out under the general supervision of Mr. M. Devata, Supervising Foundations Engineer, who also reviewed this report.



J. T. Bangs, P. Eng.



M. Devata, P. Eng.

APPENDIX I

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 1

JOB 73-11024

LOCATION Sta. 155 + 96 92' Rt.

ORIGINATED BY JB

W.P. 10-69-26

BORING DATE May 17, 1973

COMPILED BY SR

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger - Cone Test

CHECKED BY MK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT —WL PLASTIC LIMIT —WP WATER CONTENT —W			BULK DENSITY Y	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	WP	WL		
211.5	Ground Level														
0.0	Silty clay Brown to clay, Grey traces of sand.		1	TW	PM	210								110	
			2	TW	PH									105	
	Stiff		3	TW	PH									111	
199.0	(Glacial Till)		4	TW	PH	200									16 47 27 10
12.5	Het. mix. of silt, sand & gravel, traces of clay		5	SS	4										8 46 38 8
	(with occ. fine sand seams, & zones of clayey silt with sand & gravel)		6	SS	9										
			7	SS	11	190									
			8	SS	10										
			9	SS	19	180									
	Loose to Very Dense Grey		10	SS	100 4"										7 41 38 4
173.3			11	SS	100 2"										7 42 33 18
38.2	End of Borehole					170									

OFFICE REPORT SOIL EXPLORATION

RECORD OF BOREHOLE № 2

FOUNDATIONS OFFICE

ORIGINATED BY JB

COMPILED BY SR

CHECKED BY 100

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT — w_L			BULK DENSITY	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	BLOWS / FOOT			PLASTIC LIMIT — w_p					
						20	40	60	80	100	WATER CONTENT — w			
						SHEAR STRENGTH P.S.F.			WATER CONTENT %					
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			w_p w w_L					
211.6	Ground Level					ELEV. SCALE								
0.0						210								
						200								
						190								
						180								
178.6														
36.0	End of Cone Test													
						170								

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 3

JOB 73-11024

LOCATION Sta. 151 + 50 121' Rt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE May 22, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger - Cone Test

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — WL			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT — WP		
219.2	Ground Level											WATER CONTENT — W		
0.0	Sand											WP — WL		
215.2	Loose Brown		1	SS	16									
4.0	Silty clay, trace of sand.		2	SS	12									0 22 35 43
	Stiff Grey		3	SS	9									0 2 57 41
205.7	(Glacial Till)		4	SS	8									
13.5	Het. mix. of silt, sand & gravel, traces of clay.		5	TW	PH									
	(with zones of clayey silt, sand & gravel)		6	SS	15									
	Grey		7	SS	11									
	Compact to Very Dense		8	SS	10									
178.7			9	SS	100.6"									35 17 35 13
40.5	End of Borehole		10	SS	100.6"									

OFFICE REPORT SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 4

JOB 73-1102h

LOCATION Sta. 152 + 28 13' Rt.

ORIGINATED BY JS

W.P. 10-69-20

BORING DATE May 23, 1973

COMPILED BY SR

DATUM Geodetic

BOREHOLE TYPE Cent. Flight Auger - Cone Test

CHECKED BY J.C.

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	P.S.F.	W _p	W _L		
219.3	Ground Level										
0.0	Brown Grey		1	SS	7						216.3
	Silty clay to clay, trace of sand.		2	TW	PH						
	Firm to Stiff		3	SS	10						0 10 44 16
204.1	Grey		4	TW	PH						
15.2	Silty sand, trace of gravel and clay.		5	SS	15						
	Compact to Dense		6	SS	41						8 48 38 6
195.3	Grey		7	SS	14						
24.0	(Glacial Till)		8	SS	8						
	Het. mix. of silt, sand & gravel, traces of clay		9	SS	24						
	(with zones of clayey silt, sand & gravel)		10	SS	31						
	Compact to Very Dense		11	SS	100 1/2"						
161.3	Grey		12	SS	100 1/2"						
58.0	Shale Bedrock		13	SS	100 1/2"						
156.8	Sound Grey		14	RC	90%						
62.5	End of Borehole										

OFFICE REPORT SOIL EXPLORATION

15 $\begin{matrix} 20 \\ \circ \\ 10 \end{matrix}$ 5 % STRAIN AT FAILURE

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 6

JOB 73-11024 LOCATION Sta. 153 + 86 1' Lt.

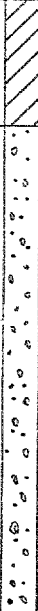

W.P. 10-09-20 BORING DATE May 24, 1973

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger, Cone Test

ORIGINATED BY JB

COMPILED BY SO

CHECKED BY JTS

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	20 40 60 80 100	PLASTIC LIMIT	WATER CONTENT		
212.5	Ground Level											
0.0	Silty clay, traces of sand.		1	TN	PM	210						
	Firm Grey		2	TN	PM							
202.5	(Glacial Till)		3	TN	PM							
10.0	Het. mix. of silt, sand & gravel, traces of clay		4	SS	15	200						
	(with zones of clayey silt, sand & gravel)		5	SS	9							
			6	SS	8	190						
			7	SS	10							
			8	SS	30	180						
			9	SS	12							
	Compact to Very Dense		10	SS	100 6"	170						
	Grey		11	SS	100 2"							
163.8												
48.7	Bedrock Shale		12	RC	86%	160						
159.5	Sound											
53.0	End of Borehole											

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 7

JOB 73-11024

LOCATION Sta. 153 + 27 8' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE May 29, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger, Cone Test & 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	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W _P	W	W _L	
214.6	Ground Level														
0.0	Silty clay, traces of sand.		1	TW	PH	210									213.6
	Firm Grey		2	SS	6										
203.6			3	TW	PH										
11.0	(Glacial Till)		4	SS	24	200									
	Het. mix. of silt, sand & gravel, traces of clay		5	SS	10										
	(with numerous layers of silty fine sand and/or sand & gravel)		6	SS	17										
			7	SS	6	190									
			8	SS	7										
			9												
	Loose to Very Dense		10	SS	100 2"										
	Grey		11	SS	100 3"	170									
164.6															
50.0	Bedrock Shale		12	RC	86%	160									
159.6	Sound Grey														
55.0	End of Borehole														

OFFICE REPORT SOIL EXPLORATION

RECORD OF BOREHOLE N° 8

FOUNDATIONS OFFICE

LOCATION Sta. 153 + 20 13' Rt.

ORIGINATED BY JS

BORING DATE May 31, 1973

COMPILED BY SC

BOREHOLE TYPE Cone Test

CHECKED BY

[illegible]

20
15 ϕ 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE NO 9

FOUNDATIONS OFFICE

LOCATION Sta. 153 + 37 25' Lt.

ORIGINATED BY JB

BORING DATE May 31, 1973

COMPILED BY SO

BOREHOLE TYPE Cone Test

CHECKED BY JB

[illegible]

20
15 ϕ 5 % STRAIN AT FAILURE
10

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 10

JOB 73-11024

LOCATION Sta. 154 + 00 30' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE May 31, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY JCC

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L	WATER CONTENT %	BULK DENSITY γ P.C.F. GR. SA. SI. CL	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT						
213.2	Ground Level										
0.0											
191.4											
21.8	End of Cone Test										

RECORD OF BOREHOLE N^o 11

JOB 73-11024

LOC. ON Sta. 154 + 21 78' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 1, 1973

COMPILED BY SG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger, Cone Test

CHECKED BY _____

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	SLOWS / FOOT			PLASTIC LIMIT				
						20	40	60	80	100	W _p		
213.1	Ground Level					SHEAR STRENGTH P.S.F.			WATER CONTENT %			γ	P.C.F.
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			20 40 60				
						500	1500	2500					
0.0	Brown Grey Silty clay, traces of sand.		1	SS	5	210							0 4 43 53 207.1
201.7	Firm		2	SS	3								
11.4	Silty fine sand.		3	SS	8	200							
	Compact		4	SS	26								
194.1	Grey		5	SS	15	190							
19.0	(Glacial Till) Het. mix. of silt, sand & gravel, traces of clay (with zones of clayey silt, sand & gravel) Loose to Very Dense		6	SS	8								
			7	SS	6	180							
			8	SS	13								
			9	SS	77								
167.6			10	SS	100	170							
45.5	End of Borehole					160							

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE Nº 12

FOUNDATIONS OFFICE

JOB 73-11021

LOCATION Sta. 15h + 58 145' Lt.

ORIGINATED BY JS

W.P. 10-69-20

BORING DATE June 1, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE					
213.3	Ground Level								
0.0									
175.4									
37.9	End of Cone Test								

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 13

JOB 73-11024

LOCATION Sta. 155 + 69 48' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 1, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY JMS

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT — WP		
							SHEAR STRENGTH P.S.F.					WP — W — WL		
							O UNCONFINED + FIELD VANE					WATER CONTENT %		
							X QUICK TRIAXIAL X LAB VANE							
212.0	Ground Level													
0.0														
						210								
						200								
						190								
182.0														
30.0	End of Cone Test													

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 14

JOB 73-11024

LOCATION Sta. 155 + 94 110' Lt.

ORIGINATED BY JD

WP 10-69-20

BORING DATE June 1, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger, Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L WATER CONTENT % 20 40 60	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT					
213.8	Ground Level									
0.0	Silty clay, traces of sand.		1	SS	9	210				
	Grey		2	SS	2	200				
195.8	Firm		3	TN	PM				132	
18.0	(Glacial Till)		4	SS	13	190				
	Het. mix. of silt, sand & gravel, traces of clay		5	SS	12					
	(with zones of clayey silt, sand & gravel)		6	SS	6	180				
	Grey		7	SS	19					
168.1	Loose to Very Dense		8	SS	19	170				
145.4	End of Borehole		9	SS	100	160				

OFFICE REPORT SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 15

JOB 73-11024

LOCATION Sta. 155 + 50 0

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 4, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger, Cone Test

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	BLOWS/FOOT		20	40	60	80	100	W _P	W	W _L		
213.2	Ground Level															
202.2	Brown Grey Silty clay, traces of sand.		1	SW	PH	210										208.7
11.0	Firm to Stiff Het. mix. of silt, sand & gravel, traces of clay. (Glacial Till)		2	SW	PH	200									109	
195.1	Very Dense		3	SS	100	6"										
18.1	End of Borehole					190										
182.7																
30.5	End of Cone Test					180					100/5"					

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 16

JOB 73-11024

LOCATION Sta. 157 + 50 E

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 5, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger, Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — W _L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT — W _P		
212.6	Ground Level												WATER CONTENT — W		
													W _P — W — W _L		
													WATER CONTENT %		
													20 40 60		
0.0	Brown Grey		1	TW	PH	210									0 32 59 9
	Silty clay to clay, traces of sand.														209.1
198.6	Firm			TW	PH	200									0 0 60 40
14.0	(Glacial Till)		3	SS	14										
	Het. mix. of silt, sand & gravel		4	SS	11										
	(with numerous layers of silty fine sand and/or sand & gravel)		5	SS	26										
	Compact to Dense		6	SS	32										
	Grey		7	AS											
170.1															
42.5	End of Borehole					170									

OFFICE REPORT SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 17

JOB 73-11024

LOCATION Sta. 157 + 50 70' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 5, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY MS

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	BLOWS / FOOT	RESISTANCE	PLASTIC LIMIT	WATER CONTENT	W _p	W	W _L		
213.1	Ground Level														
0.0															
182.2															
30.9	End of Cone Test														

OFFICE REPORT SOIL EXPLORATION

FOUNDATIONS OFFICE

JOB 73-11024

LOCATION Sta. 157 + 50 70' Rt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 5, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT	BLOWS / FOOT			PLASTIC LIMIT				
						20 40 60 80 100			W _p W _L				
						SHEAR STRENGTH P.S.F.			WATER CONTENT %				
215.9	Ground Level					O UNCONFINED + FIELD VANE * QUICK TRIAXIAL x LAB VANE			W _p W _L WATER CONTENT %			P.C.F. GR. SA. SI. C.	
0.0													
184.1													
31.8	End of Cone Test												

15 ²⁰ 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE NO 19

JOB 73-11024 LOCATION Sta. 150 + 50 70' Rt. ORIGINATED BY JB
W.P. 10-69-20 BORING DATE June 5, 1973 COMPILED BY SO
DATUM Geodetic BOREHOLE TYPE Cone Test CHECKED BY 1

[illegible]

20
15 ϕ 5 % STRAIN AT FAILURE
10

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 20

JOB 73-1102h

LOCATION Sta. 150 + 50 g

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 6, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger - Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w w_p — w — w_L	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT					
222.1	Ground Level									
0.0										
	Brown		1	SS	19					
	Grey		2	SS	17					
	Silty clay to clay, traces of sand.		3	SS	15					
	Firm to Very Stiff		4	SS	5					
200.8			5	SS	8					
21.3	End of Borehole									
190.4										
31.7	End of Cone Test									

RECORD OF BOREHOLE № 21

JOB 73-21024

LOCATION Sta. 150 + 50 70' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 6, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY: *h8*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	WATER CONTENT % w_p w w_L	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT							
223.6	Ground Level											
0.0						220						
						210						
199.6						200						
24.0	End of Cone Test					190						

20
15 ϕ 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE N° 22

JOB 73-11024

LOCATION Sta. 151 + 90 140' Lt.

ORIGINATED BY: JB

W.F. 10-69-20

BORING DATE June 6, 1973

COMPILED BY : SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

[illegible]

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 23

JOB 73-11024

LOCATION Sta. 151 + 90 70' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 7, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger - Cone Test

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	BLOWS/FOOT		20	40	60	80	100	W _P	W	W _L	
222.3	Ground Level														
0.0	Sand. Loose														
218.3	Brown		1	SS	11	220									219.3
4.0	Grey		2	SS	10										
	Silty clay, trace of sand.		3	TW	PM										
	Firm to Stiff					210									
205.3	(Glacial Till)		4	TW	PM										
17.0			5	SS	4										
	Het. mix. of silt, sand & gravel, traces of clay		6	SS	6	200									7 24 54 15
			7	SS	9										
	(with numerous layers of silty fine sand & occ. zones of clayey silt, sand & gravel)		8	SS	10	190									
			9	SS	31										
	Loose to Dense		10	SS	23	180									9 43 42 6
175.2	Grey		11	SS	10										44 31 20 5
47.1	End of Borehole Probably Shale Bedrock					170									

OFFICE REPORT SOIL EXPLORATION

FOUNDATIONS OFFICE

JOB 73-11024

LOCATION Sta. 152 + 40 16' Lt.

ORIGINATED BY JB

W.P. 10-69-20

BORING DATE June 7, 1973

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE					
219.5	Ground Level								
0.0									

15 $\frac{20}{10}$ 5 % STRAIN AT FAILURE

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE NO 25

FOUNDATIONS OFFICE

JOB 73-11024

LOCATION Sta. 151 +90 16' Lt.

ORIGINATED BY J.B.

W.P. 10-69-20

BORING DATE June 7, 1973

COMPILED BY S.O.

DATUM GEODETTIC

BOREHOLE TYPE CONE TEST

CHECKED BY TJS

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — W _L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	BLOWS / FOOT					PLASTIC LIMIT — W _p				
						20	40	60	80	100	WATER CONTENT — W				
						SHEAR STRENGTH P.S.F.					W _p — W — W _L			WATER CONTENT %	
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE									
221.1	GROUND LEVEL														
0.0															
200.2															
20.9	END OF CONE TEST														

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 26

JOB 73-1102L

LOCATION Sta. 151 + 90 161 Rt.

ORIGINATED BY J.S.

W.P. 10-69-20

BORING DATE June 7, 1973

COMPILED BY S.O.

DATUM GEODETIC

BOREHOLE TYPE CONE TEST

CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — w_L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT — w_p		
220.2	GROUND LEVEL					220									
0.0						210									
202.7															
17.5	END OF CONE TEST					200									

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE NO 27

FOUNDATIONS OFFICE

JOB 73-11024

LOCATION Sta. 151 + 90 C

ORIGINATED BY J.B.

W.P. 10-69-20

BORING DATE June 7, 1973

COMPILED BY S.O.

DATUM GEODETIC

BOREHOLE TYPE CONTINUOUS FLIGHT AUGER, CONE TEST

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	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W _P	W	W _L		
220.8	GROUND LEVEL															
0.0																
217.3	Sand Loose															
3.5	Silty clay Brown		1	SS	9											
	trace of sand Grey		2	SS	17											
	Soft to Very Stiff		3	SS	11											
			4	SS	4											
202.8			5	SS	3											
18.0	Silty Sand															
197.8	Compact Gre.		6	SS	22											
23.0	(Glacial Till)															
	Het. mix. of silt, sand		7	SS	17											
	& gravel, traces of															
	clay		8		31											
	(with occasional															
	sand layers)		9	SS	25											
	Compact to Very Dense															
179.8	Grey		10	SS	11											
41.0	END OF BOREHOLE															

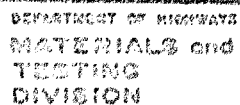
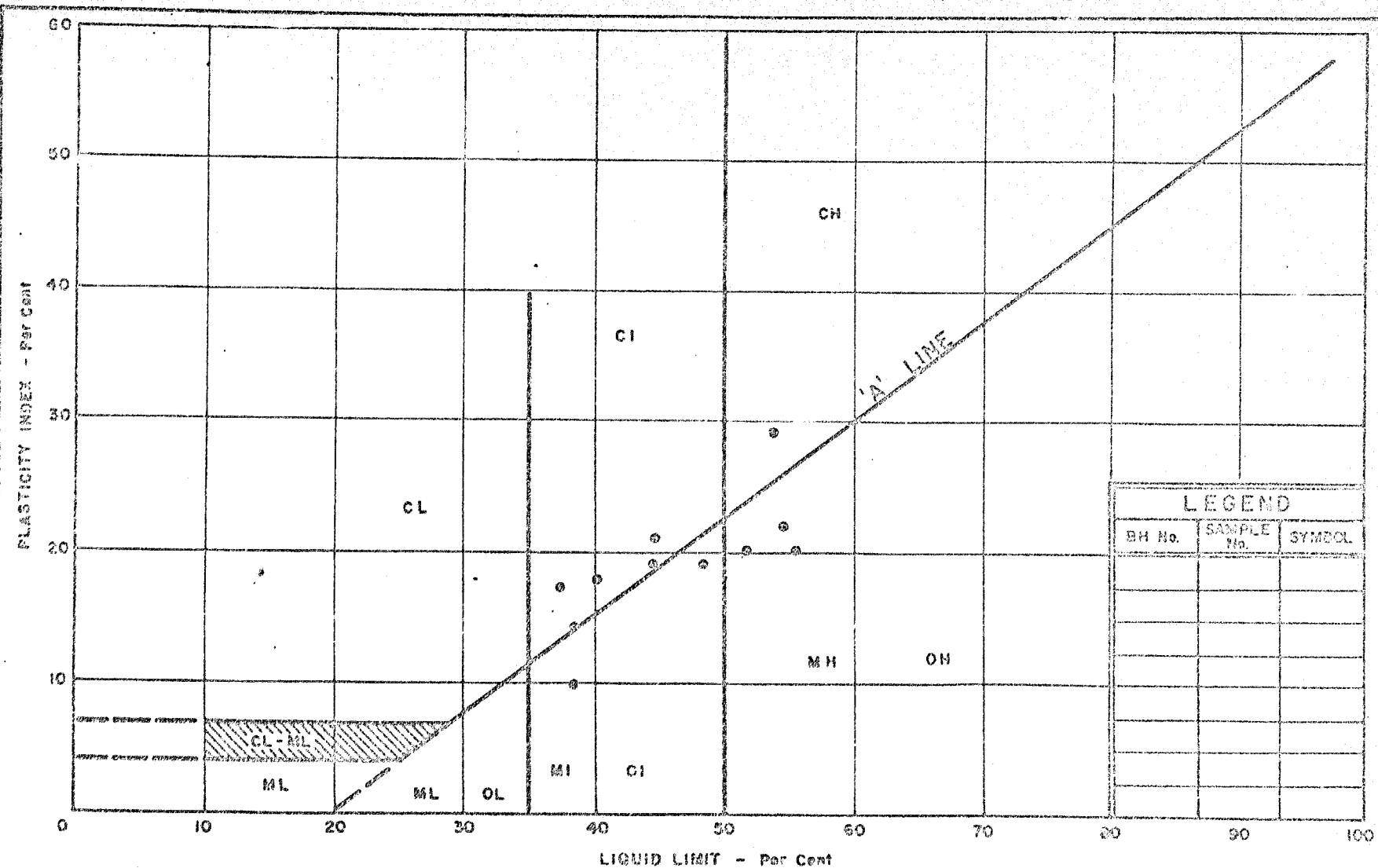
FOUNDATIONS OFFICE

ORIGINATED BY J.B.

COMPILED BY S.R.

CHECKED BY: PL

15 $\frac{20}{10}$ 5 % STRAIN AT FAILURE

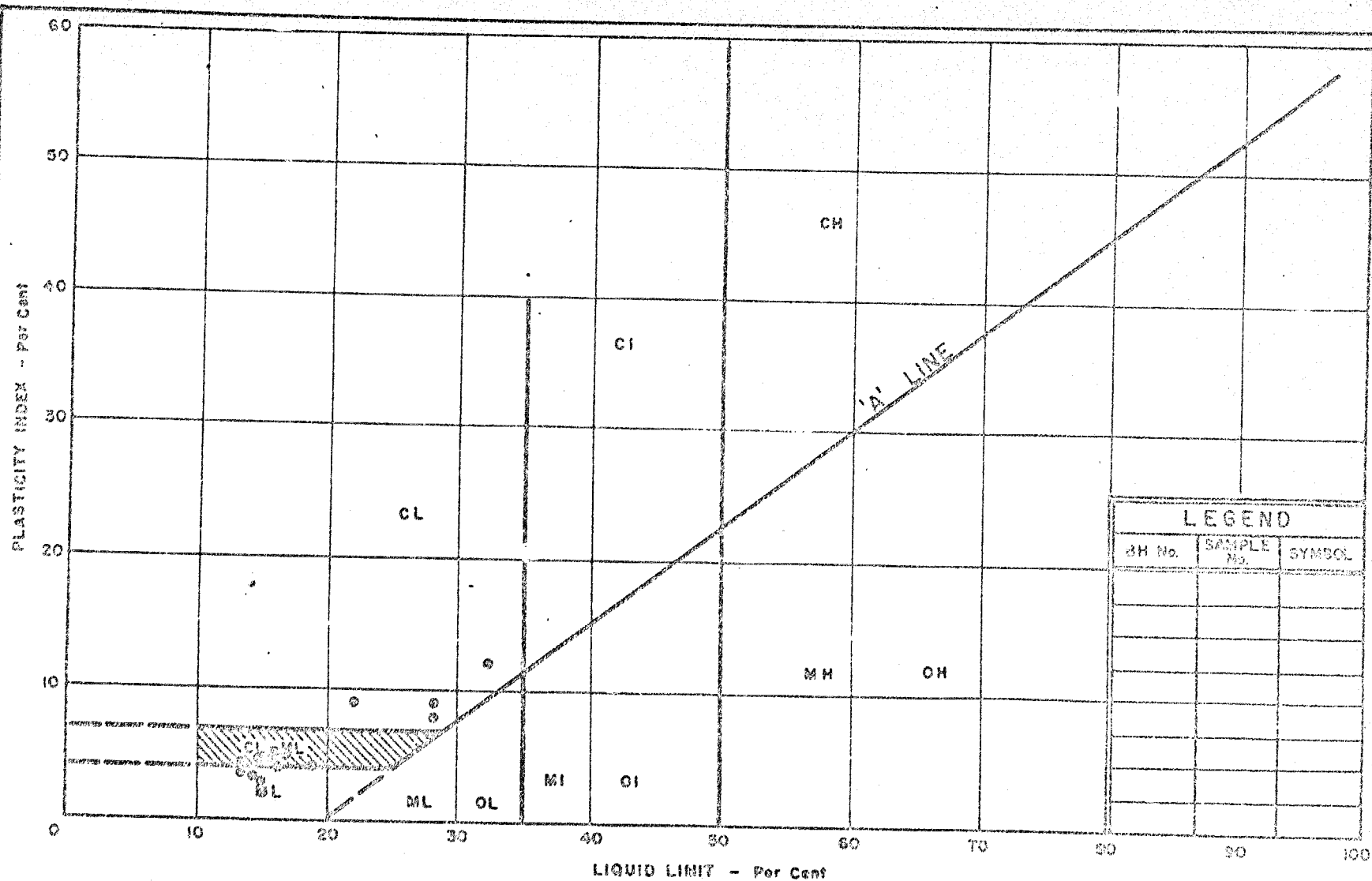


PLASTICITY CHART
SILTY CLAY TO CLAY
TRACES OF SAND

U.F. No. 10-69-20

JOB No. 73-11024

FIGURE 1



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

GLACIAL TILL

HET. MIXTURE OF CLAYEY SILT TO SILT, SAND & GRAVEL

W.P. No. 10-69-20

JOE No. 73-11024

FIGURE 2

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

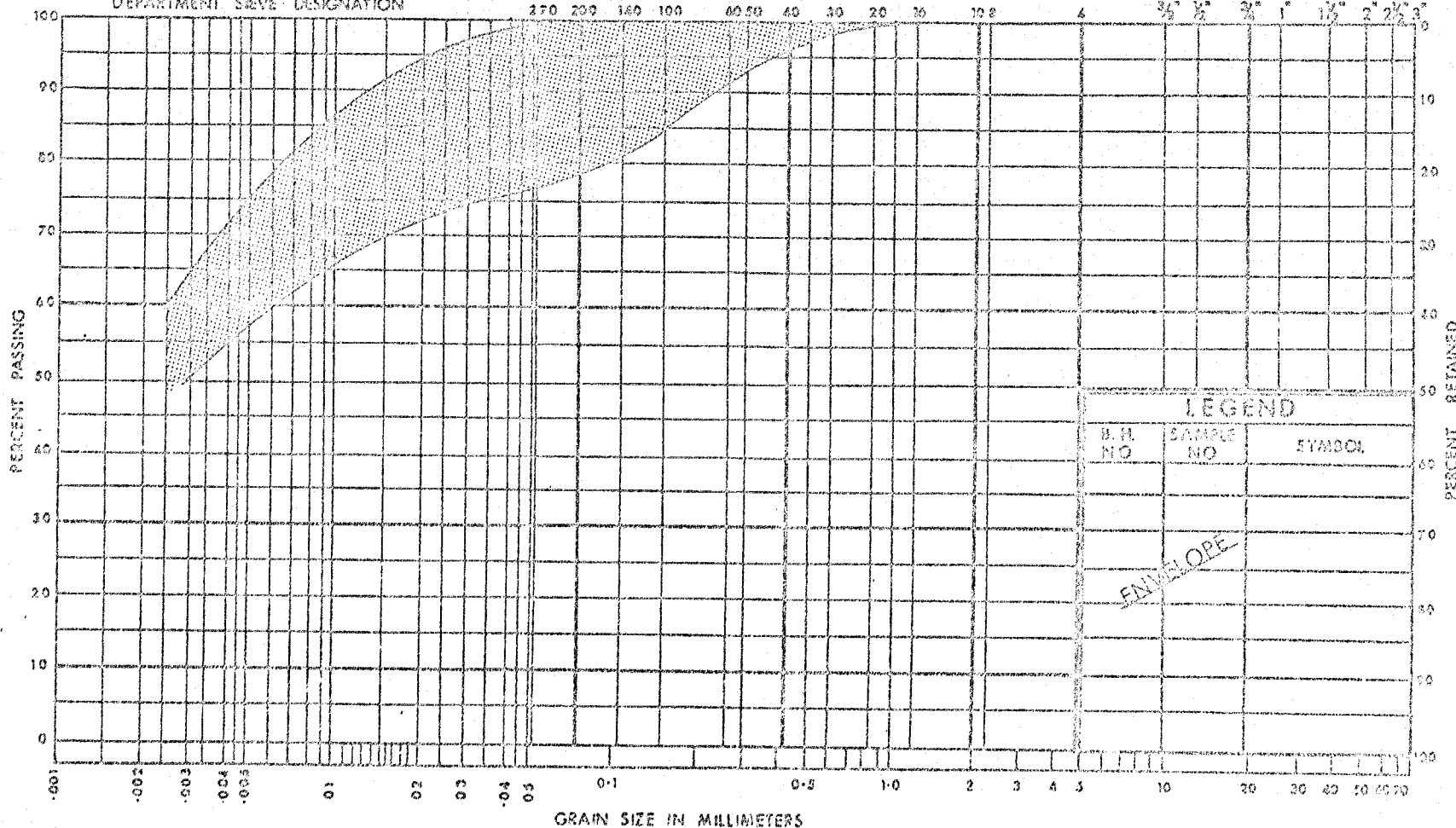
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 160 100 60 50 40 30 20 10 4 3/4" 3/8" 3/16" 1" 1 1/2" 2" 2 1/2" 3"



LEGEND

B.R. NO.	SAMPLE NO.	SYMBOL

ENVELOPE

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

GRAIN SIZE DISTRIBUTION
SILTY CLAY TO CLAY
TRACE OF SAND

W.R. No. 10-69-20

MSB No. 73-11024

FIGURE 3

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

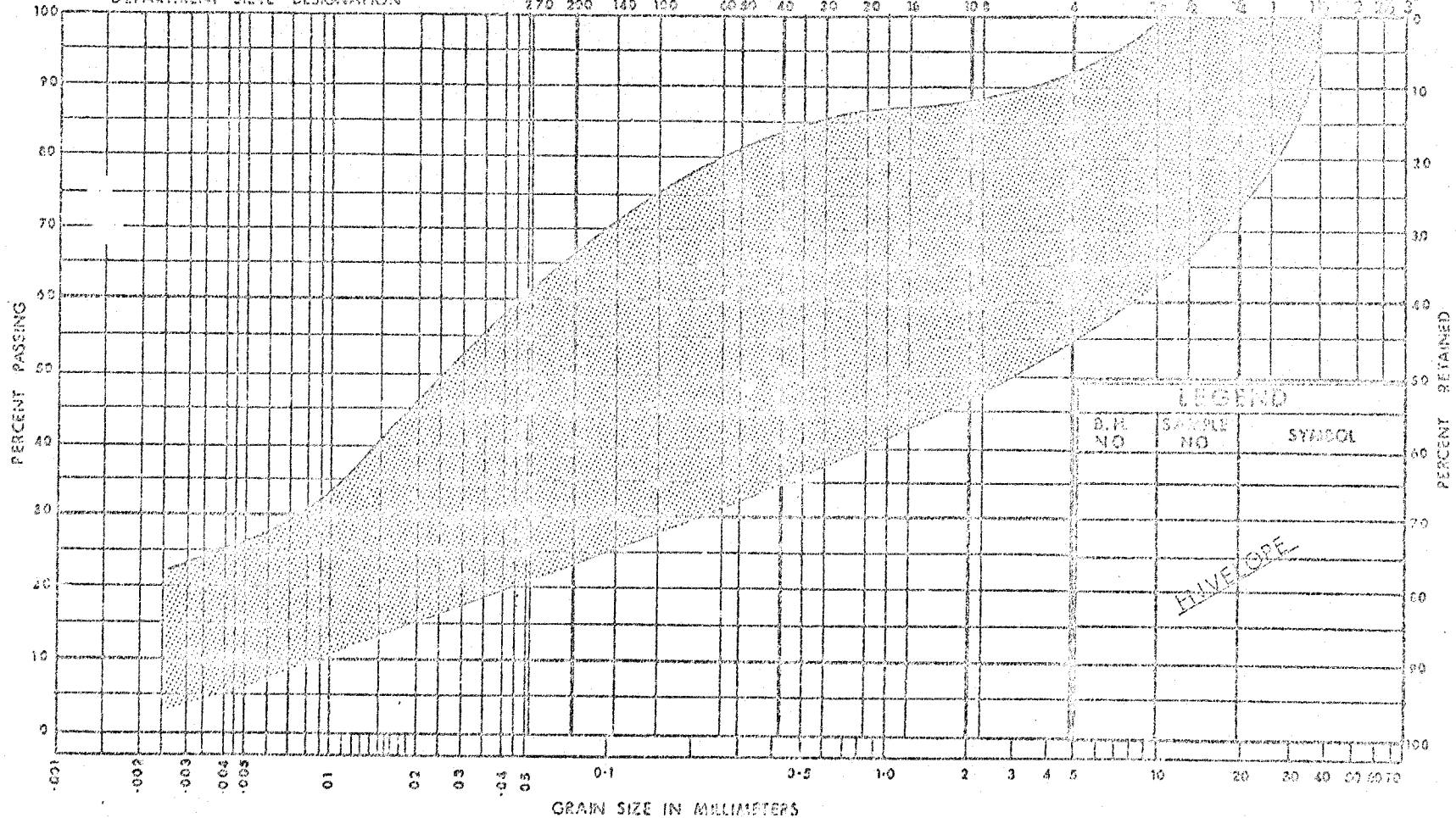
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 40 30 20 16 10 5 4 2 1 1/2 3/4 3/8 1/4 3/16 1/8 3/32 1/32

DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONSDESIGN SERVICES
BRANCHGRAIN SIZE DISTRIBUTION
GLACIAL TILL

HET. MIXTURE OF CLAYEY SILT TO SILT, SAND & GRAVEL

W.R. No. 10-69-20

JOB NO. 73-11024

FIGURE 4

VOID RATIO - PRESSURE CURVES

JOB NO. 73-11024

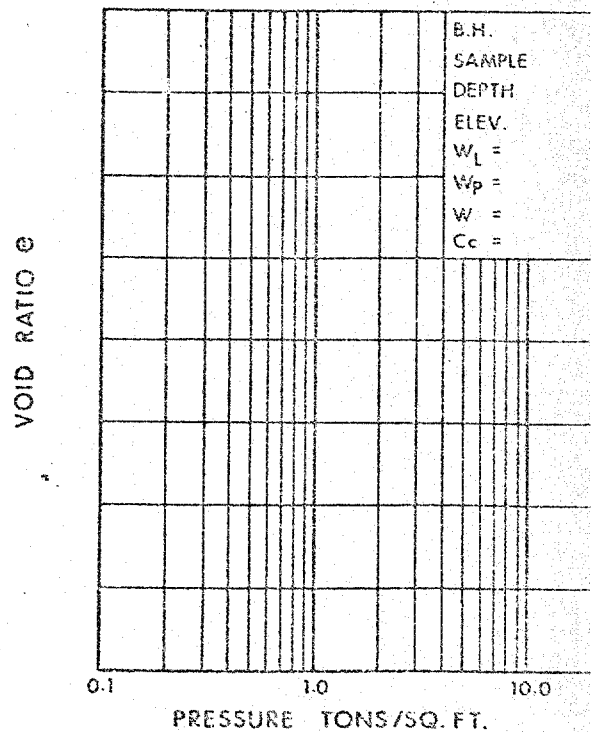
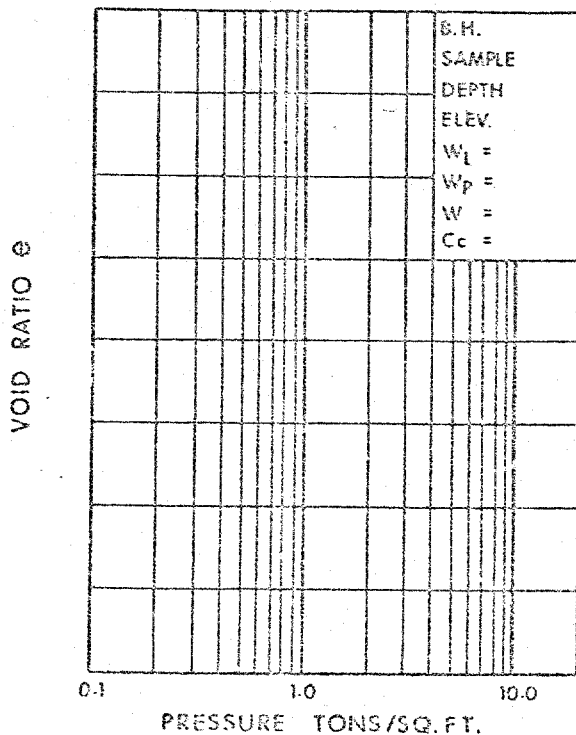
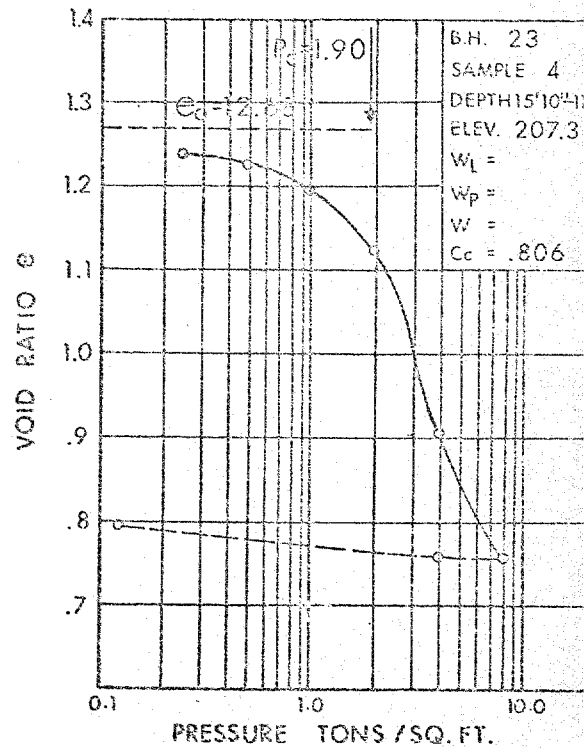
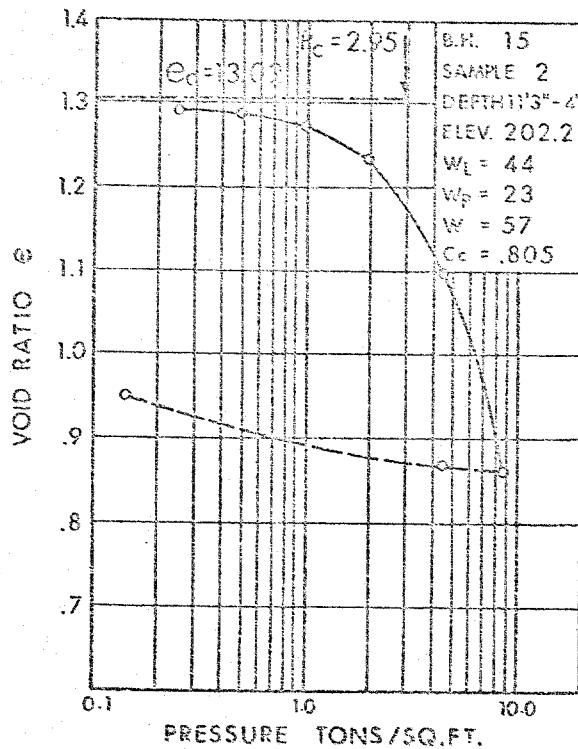
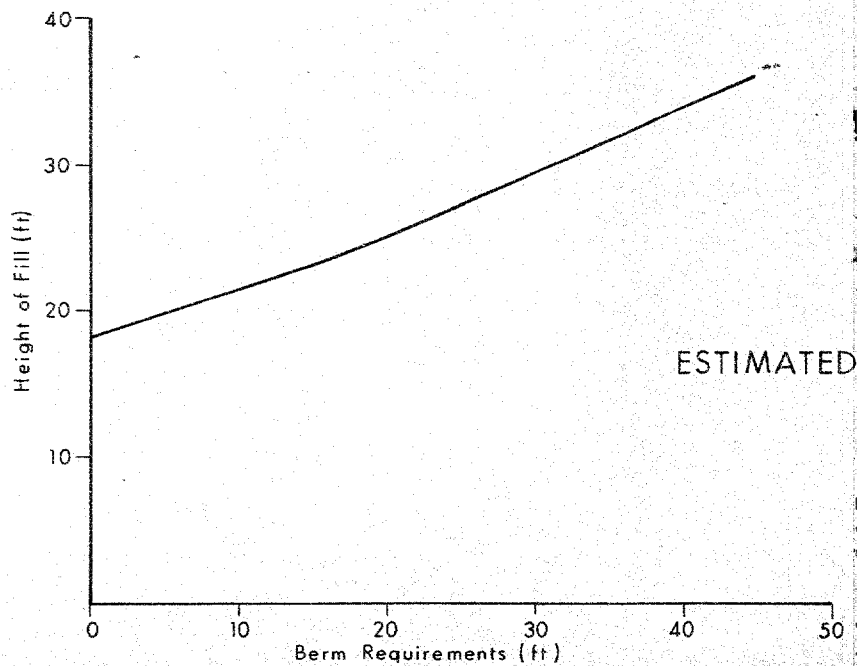
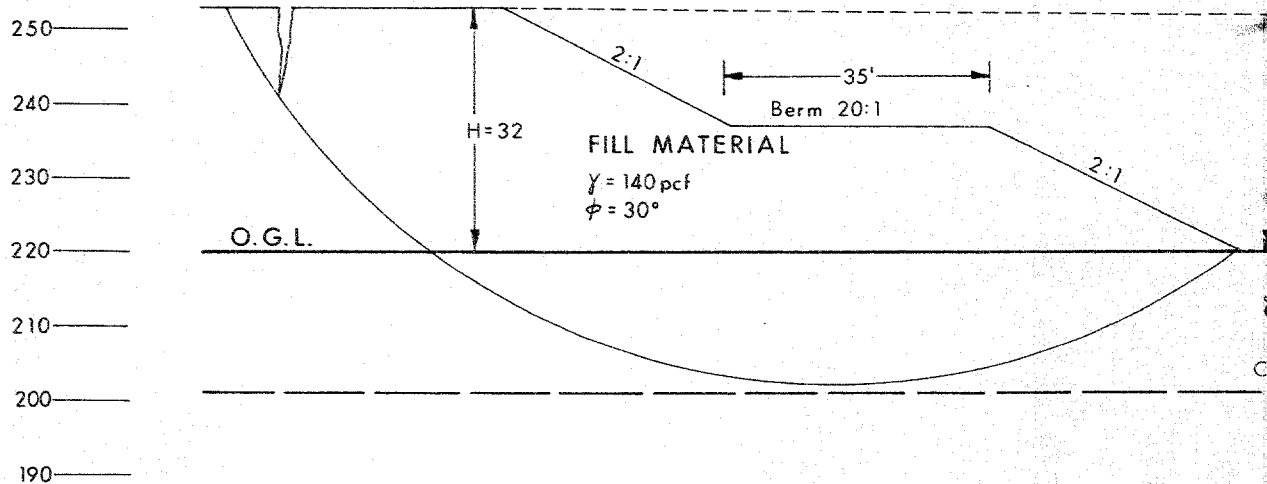


FIG. 5

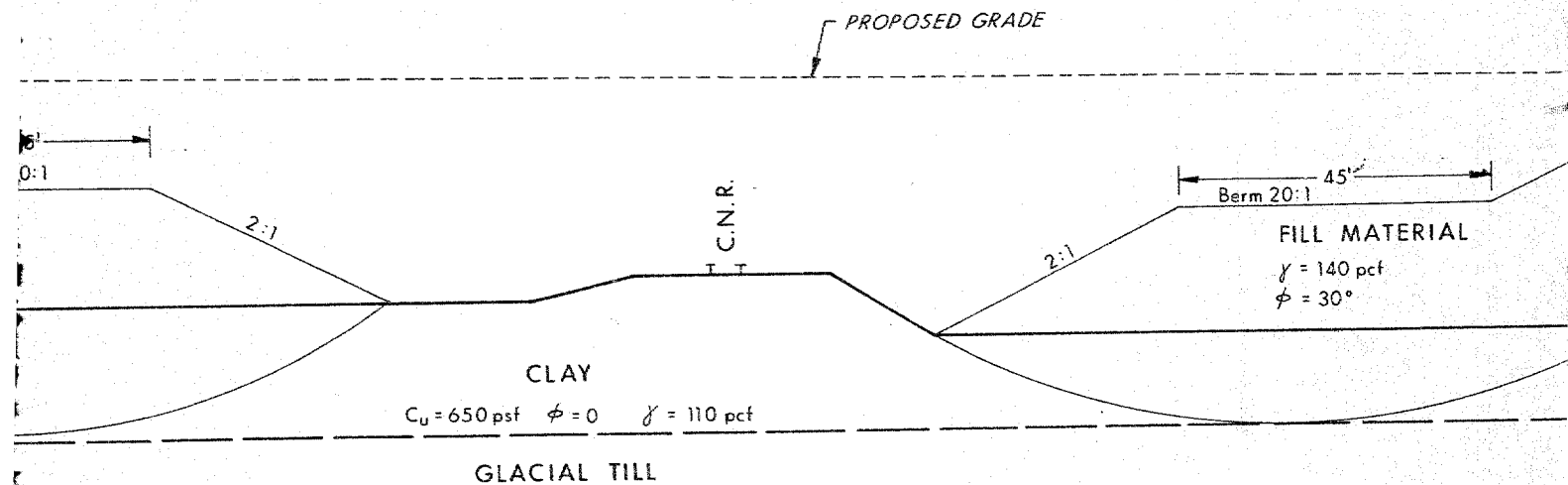
+ F.S.=1.3

NORTH APPROACH



F.S. = 1.3

F.S. = 1.3



CL PROFILE - BASE LINE ROAD

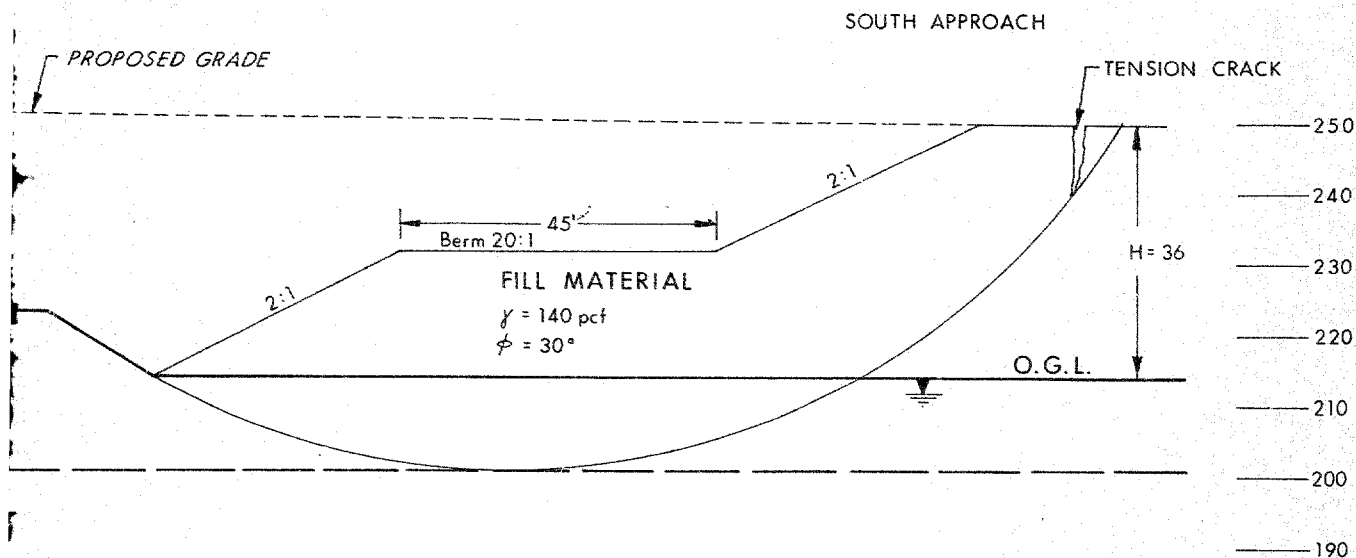
ESTIMATED BERM REQUIREMENTS

LEGEND

- + CRITICAL CIRCLE
- FS FACTOR OF SAFETY
- H HEIGHT OF FILL
- WATER LEVEL

30 40 50
 Requirements (ft)

F.S. = 1.3



LEGEND

- + CRITICAL CIRCLE
- FS FACTOR OF SAFETY
- H HEIGHT OF FILL
- ▬ WATER LEVEL



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
OFFICE

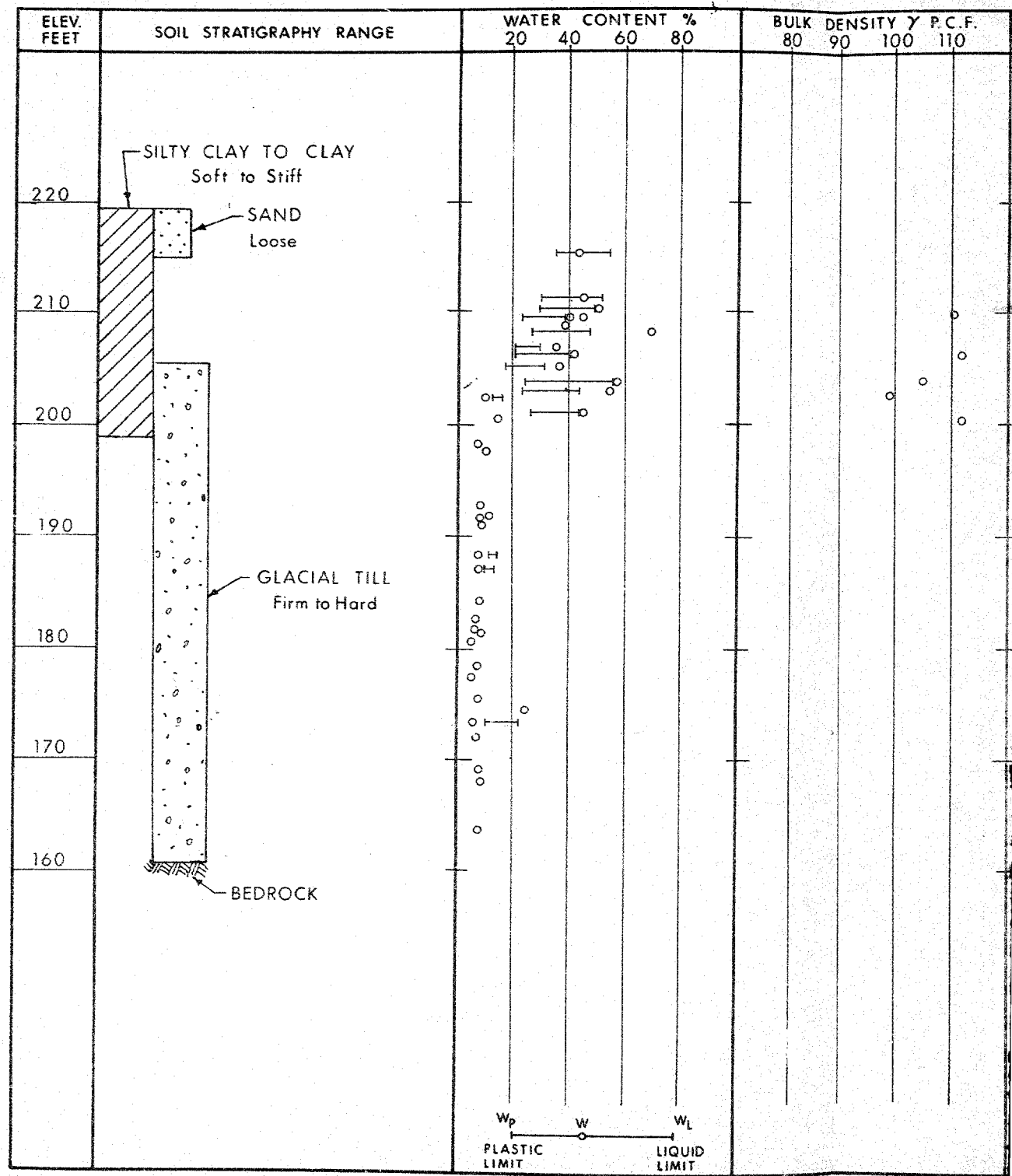
ONTARIO

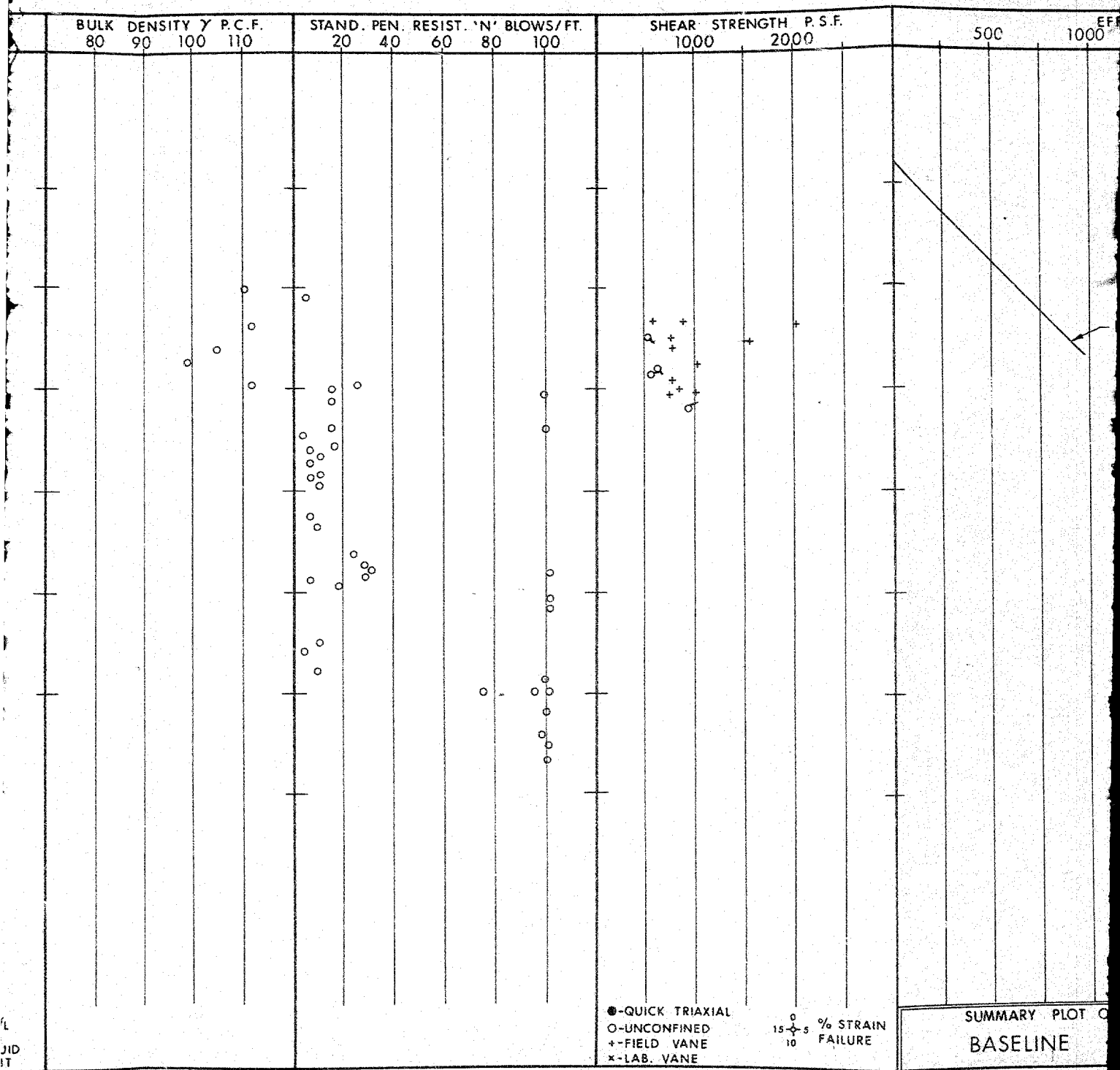
STABILITY ANALYSES
BASE LINE ROAD OVER C.N.R.

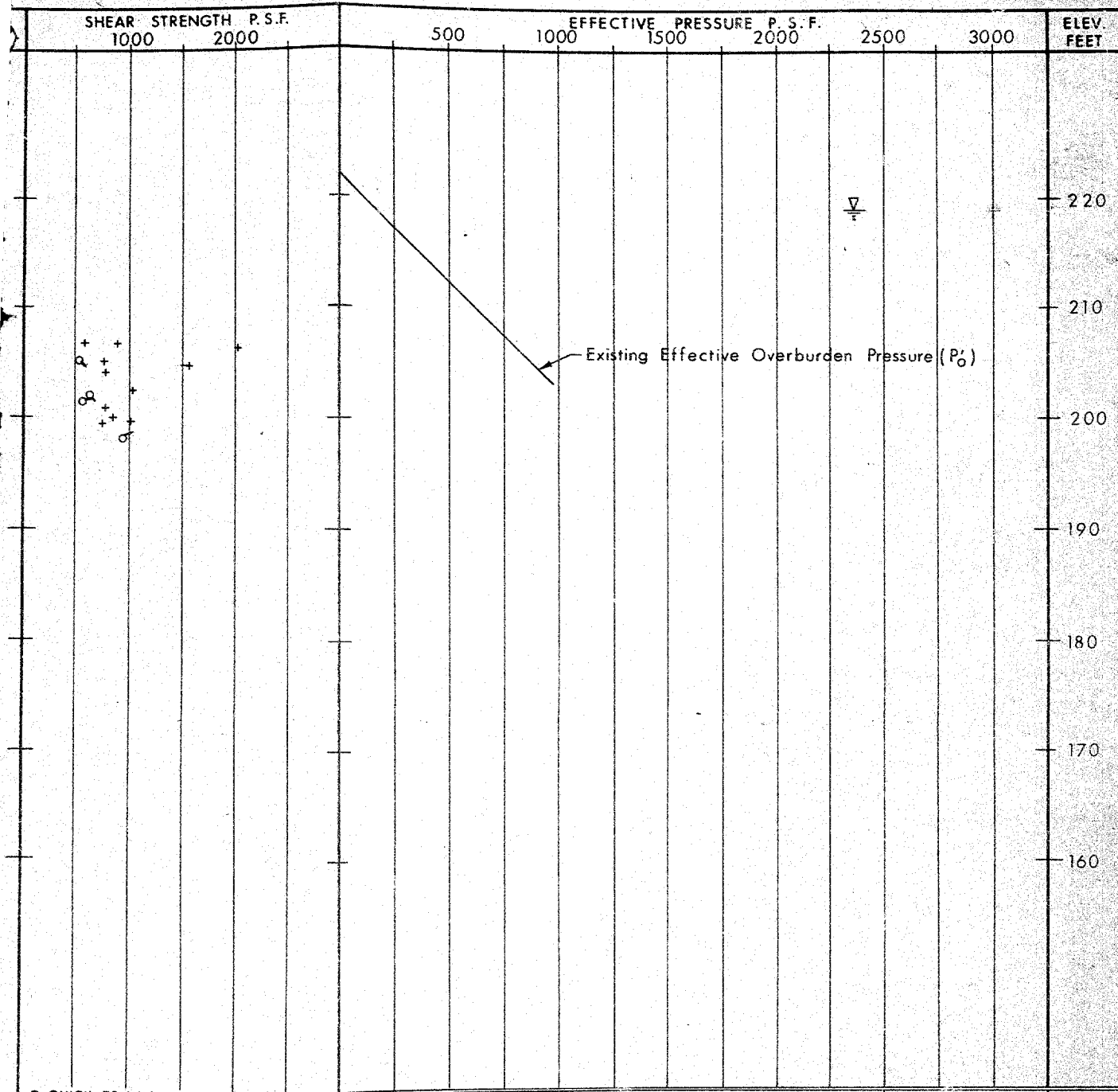
DATE AUGUST 21, 1973

W.O. NO. 73 - 11024

FIGURE NO. 8







●-QUICK TRIAXIAL
 ○-UNCONFINED
 +-FIELD VANE
 x-LAB. VANE

0
 15 5
 10 % STRAIN
 FAILURE

SUMMARY PLOT OF ENGINEERING PROPERTIES
 BASELINE RD. & C.N.R.

W.P. NO. 10-69-20 FIG. NO.
 JOB. NO. 73-11024 7

ABBREVIATIONS & SYMBOLS USED IN THIS REPORTPENETRATION RESISTANCE

'N' STANDARD PENETRATION RESISTANCE: - 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 FOO. 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>c LB/SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS: -

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S. SPLIT SPOON	T.W. THINWALL OPEN
W.S. WASHED SAMPLE	T.P. THINWALL PISTON
S.T. SLOTTED TUBE SAMPLE	O.S. OESTERBERG SAMPLE
A.S. AUGER SAMPLE	F.S. FOIL SAMPLE
C.S. CHUNK SAMPLE	R.C. ROCK CORE

R.H. SAMPLE ADVANCED HYDRAULICALLY

R.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U UNCONFINED COMPRESSION	L.V. LABORATORY VANE
UU UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V. FIELD VANE
CU CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C CONSOLIDATION
CID " " DRAINED "	S SENSITIVITY
CAU " ANISOTROPIC UNDRAINED "	
CAO " " DRAINED "	

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

SOIL PROPERTIES

γ	WEIGHT OF SOIL (BULK DENSITY)
γ_s	WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ_{sat}	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
w_s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_C	CONSISTENCY INDEX = $\frac{w_L - w_p}{I_p}$
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 INTERCEPT
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_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

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

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

73-11-024

00254

OCT 11 11:47

T
E
L
E
T
Y
P
E

T
E
L
E
T
Y
P
E

K

KINR DOWN 2 OCT 11/73 11:43A VR

M BATTEN - MTL'S AND TESTING OFFC

RE : BORE HOLES AT BASELINE AND CNR (OTTAWA)

ALL BORINGS CARRIED OUT BY THIS OFFICE AT BASELINE AND CNR WERE
BACKFILLED, HOWEVER, IT WAS NOTED AT THE TIME OF OUR INVESTIGATION
THAT PREVIOUS BORINGS BY SOMEONE ELSE WERE NOT BACKFILLED.

J BANGS - PROJECT FOUNDATIONS ENGR. FOUNDATIONS OFFC.

HCA

Try Foundation - West Bldg

73-11024

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. M. Devata
Foundations Office
West Bldg.

FROM: Structural Design Office
West Bldg.

ATTENTION:

DATE: November 15th, 1973

OUR FILE REF.

IN REPLY TO

SUBJECT:

C.N.R. Overhead - Base Line Road Relocation
W.P. 10-69-20, Site 3-317
District #9, Ottawa

Attached is a print of pre-preliminary plan for the above-noted structure. This plan shows that the Green Creek is not re-aligned west of the structure. However, if the creek can be relocated towards the north and parallel to the railway, savings of up to \$100,000 can be achieved by shortening the structure by an amount depending on the new location of the creek.

The new location of the creek will depend on N.C.C. property considerations and also on foundation considerations to ensure stability of the railway embankment.

We would appreciate if you could investigate the stability of the railway embankment with the creek parallel to it, and let us know how close to the track can the creek be relocated.



K.G. Bassi
Reg. Str. Design Engineer

KCB:AMF

Attached

c.c. Mr. T.C. Kingsland

P/V

STRUCTURE SITE NO. 3-317

November 23, 1973.

Mr. T. C. Kingsland,
Regional Structural Planning Engineer,
Structural Planning Office,
Postal Bag 4000,
KINGSTON, Ontario.
K7L 5A3.

Dear Sir:

Re: C.N.R. Overhead Structure on Baseline
Road. Proposed Creek relocation on
N.C.C. lands

This is in response to your letter of November 9th, 1973, and your subsequent meeting of November 23rd, 1973 with Messrs. Brooks and Page of the N.C.C. and your engineering consultants concerning creek relocation in the vicinity of the C.N.R. overhead structure, on Baseline Road.

The Commission agrees in principal to the relocation of Ramsay Creek on N.C.C. lands so that savings can be realized by shortening the railway and creek overpass structure. The re-routed creek should be as short as possible and should be finished with gabion mats to minimize down stream siltation problems.

Please forward your detailed proposal for Commission review and approval.

Yours truly,

Alan Fane
D. W. Pettit
Director

Copies made for: (TCK: 29/11/73)

M. M. Dillon Ltd.: Mr. W. W. Irwin Design Division

Mr. G. Wetherall: R.M. of O.C.

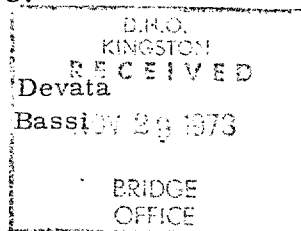
Mr. N. H. Orr : R.M. of O.C.

Mr. P. D. Billings

Mr. A. J. Percy

Mr. A. G. Stermac: Att. Mr. M. Devata

Mr. C. S. Grebski: Att. Mr. K. Bassi



E-5252-1
G-3365

100-00.00 (Mileage 71.94)
H.C. 152-90-14 C.N.R. RELOC. RELOC.

21.53 + 47.63

125° 01' 28"

57.

150

في

24° 60' 50" N

~~10:20~~
65-150

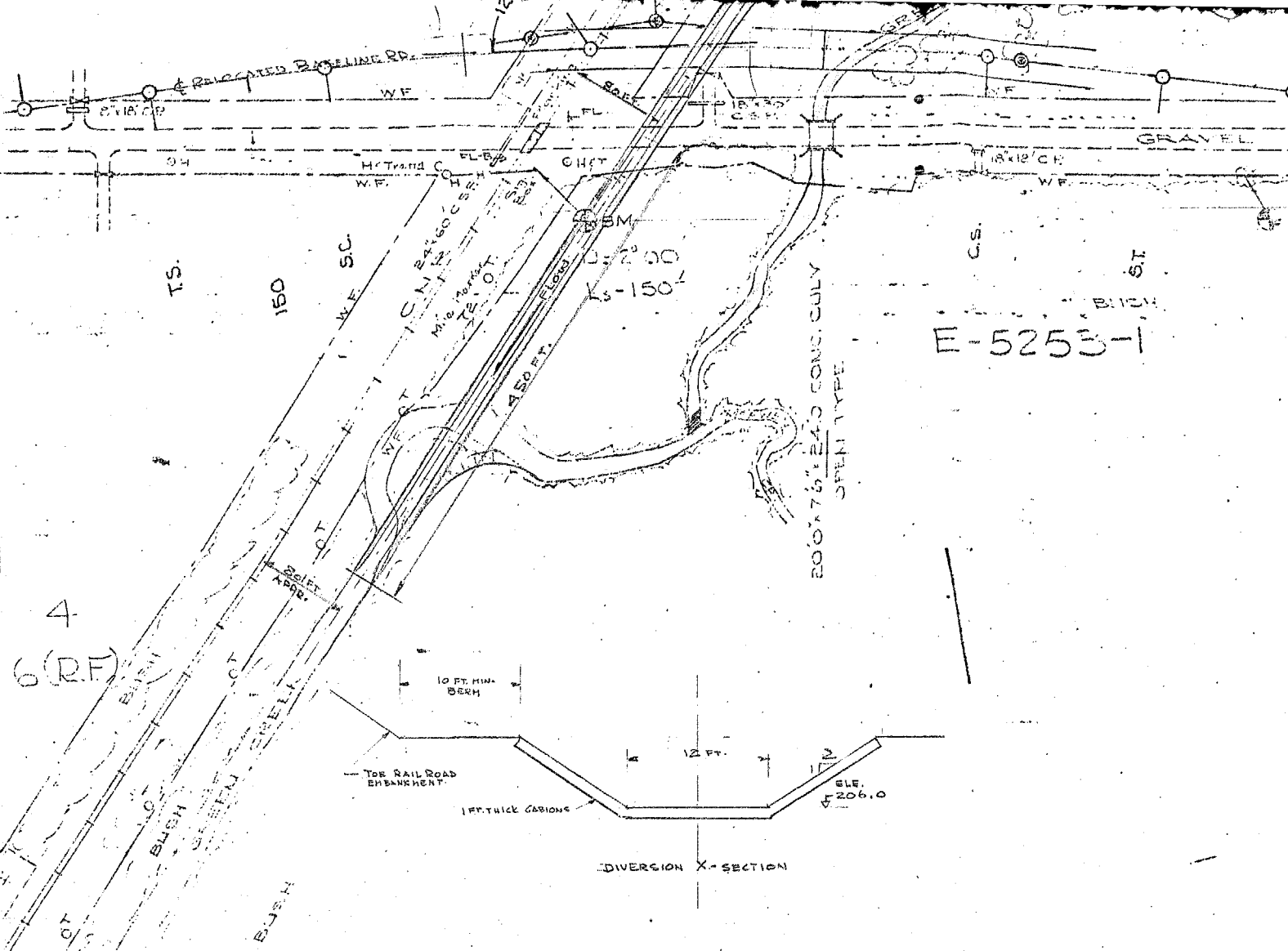
July

ف

5.7.

B11214

4
6(R.F.)



E-5253-1

SITE 3-317 W.P. 10-69-20
C.N.R. OVERHEAD

RELOCATED BASELINE RD.

DIST. 9-OTTAWA
SCALE 1" = 100 FT.

SKETCH I

E-5252-1
G-3365

100-00-00 C.N.R. RELOC. (Mileage 71.94)
H.O.C. 152-90-74

PL 153 + 47.63

125-01-28-28

52.

50.

في

2460 C 5.2 H
C 1.1 H
12.0

CHET

BM.

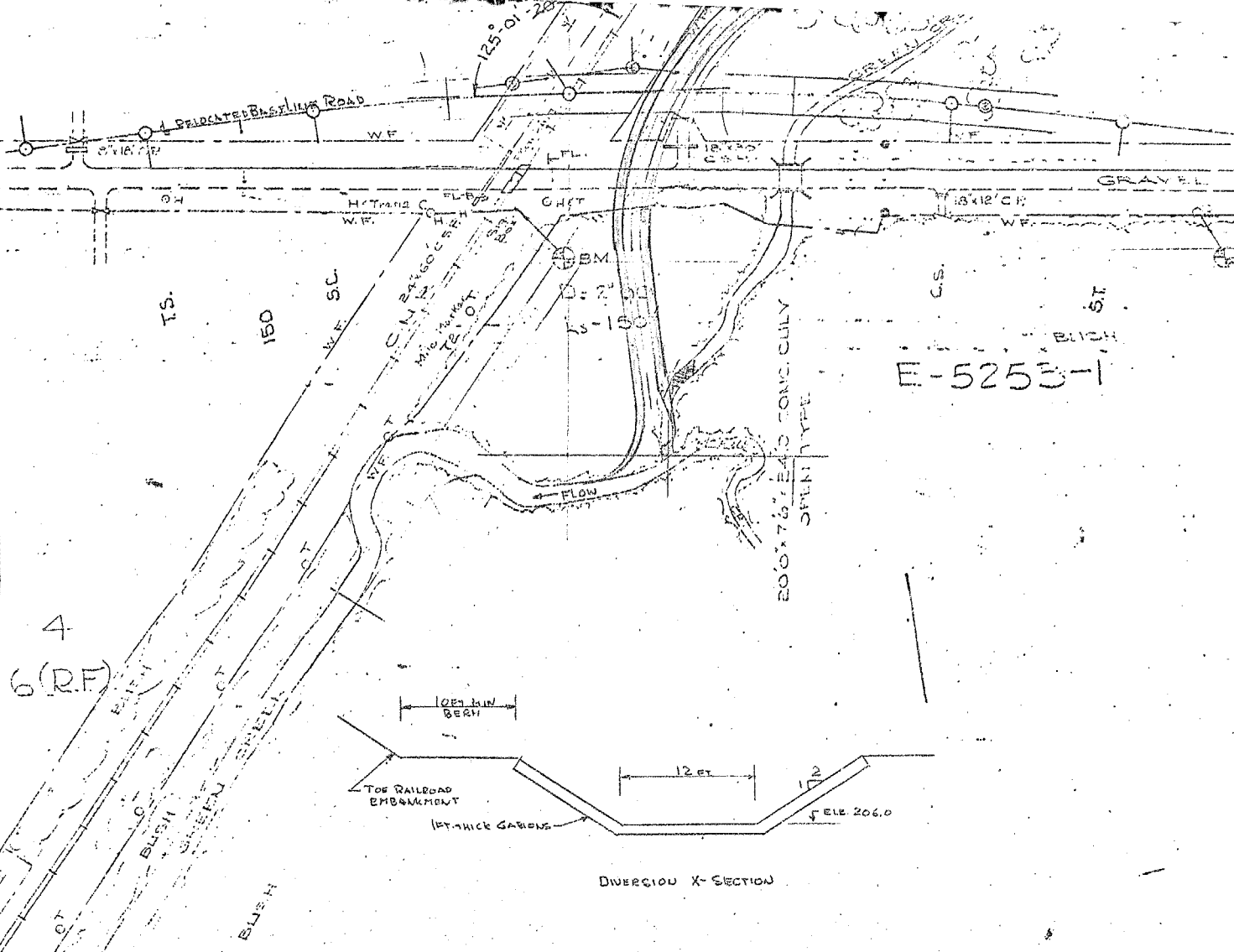
~~10-22-90~~
~~1-150~~

CULY

•

45
B1124

GRAV E. L.



SITE 3-317 WP.10-69-20
 C.N.R. OVER HEAD
 RELOCATED BASELINE RD.
 DIST. 9-OTTAWA
 SCALE 1 IN. = 100 FT

SKETCH II

K. G. Bassi,
Regional Structural Design Eng.,
Central Region.

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

November 27th, 1973.

CNR Overhead - Baseline Road Relocation
Site 3-317, District #9, Ottawa
W.O. 73-11024 -- W.P. 10-69-20

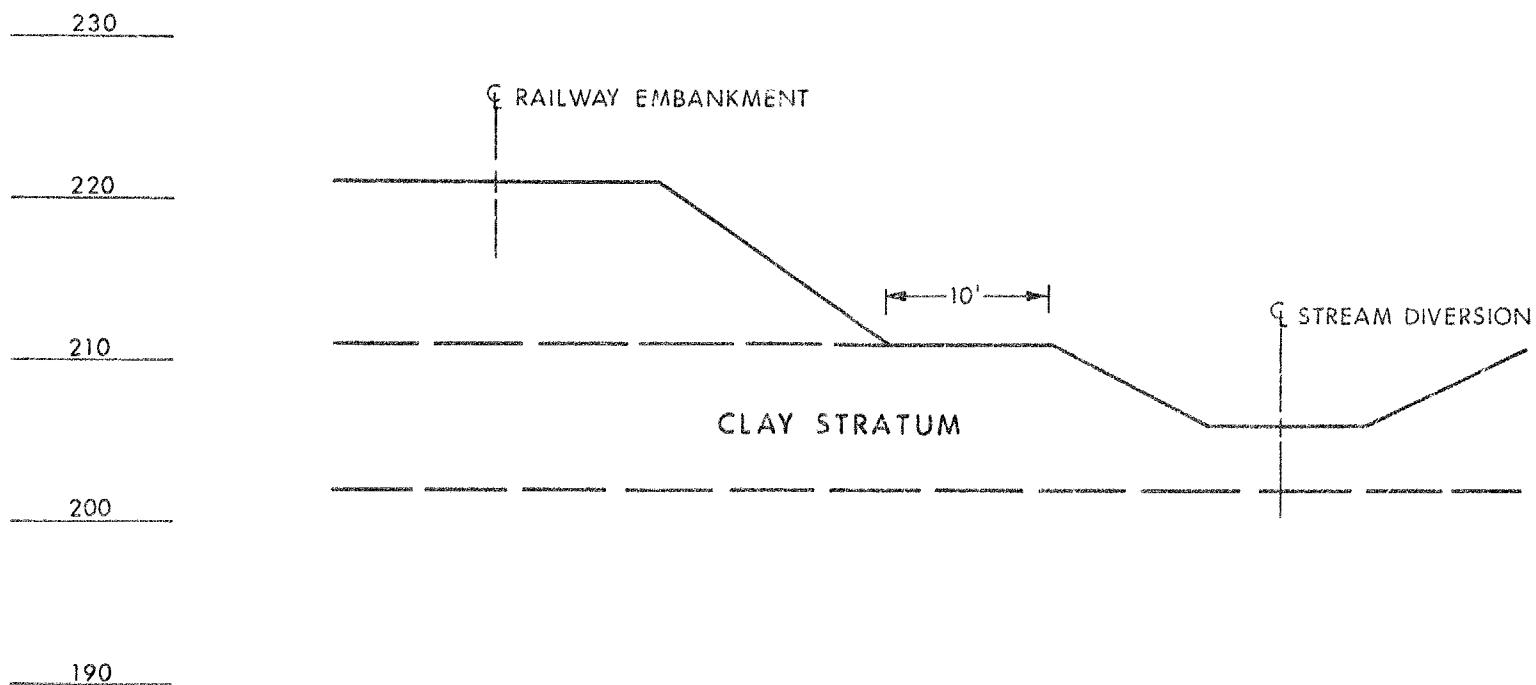
Further to your memo dated November 15th, 1973 regarding the stability of the railway embankment and the minimum distance required between the toe of the embankment and the top of the relocated creek bank, we have carried out the necessary stability analysis. The results indicate that the minimum distance between the toe of the railway embankment and the top of the creek bank is 10 feet in order to ensure the stability of the railway embankment. Enclosed is a sketch showing the recommended geometry for the creek relocation. It is our opinion that adequate scour protection measures be provided along the slopes of the relocated creek channel.

If you have any further queries, please do not hesitate to contact our Office.

JTB/ji
Enclosure

c.c. T.C. Kingsland
A.J. Percy
E.R. Saint
S. Markiewicz
J.A. Cruickshank
Foundations File
Documents

J. T. Bangs,
Project Foundations Engineer,
For: M. Devata,
Supervising Foundations Engineer.



PROPOSED CONSTRUCTION

W.O. 73 - 11024



Ontario

Ministry of
Transportation
and
Communications

Structural Planning Office,
Postal Bag 4000,
Kingston, Ontario, K7L 5A3
29 November 1973.

M. M. Dillon Limited,
Consulting Engineers and Planners,
280 Metcalfe Street,
Ottawa, Ontario,
K2P 1R7.

73-11-024

Attention: Mr. W. W. Irwin, Project Engineer

Dear Sirs:

SUBJECT: W.P. 10-69-20, Site 3-317
Canadian National Railways Overhead
Base Line Road Relocation
District 9 - Ottawa

I refer to our telephone conversation on November 27, 1973, regarding the proposed diversion of Green Creek under the above structure.

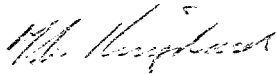
Enclosed herewith is a copy of a letter dated November 23, 1973, from the National Capital Commission giving approval for the diversion. I also enclose two preliminary sketches showing possible diversions. The scheme as shown in Sketch II would appear to be most in line with the requirements as outlined in the letter from the N.C.C. Other variations are of course possible and we would welcome your comments.

It is understood that you are at present looking into the hydraulics of this waterway, in particular into the question of the channel bed width and side slopes.

Recommendations from our Foundations Office regarding stability of the railway embankment will be forthcoming shortly. Verbal information indicates that a minimum 10 ft. berm is to be preserved between toe of embankment and edge of channel. Since any diversion should be outside the railway R.O.W., there appears to be no problem in fulfilling this requirement.

When you feel all information is available to decide on the final alignment, a meeting of all interested parties should be held before final design of the structure commences.

Yours truly,



T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl
encls.

c. c.

Mr. G. Wetherall: R.M. of O.C. (+encls.)

Mr. N. H. Orr : R.M. of O.C. (+encls.)

This copy for: Mr. M. Devata

73-11024
C.8P.

Structural Planning Office,
Postal Bag 4000,
Kingston, Ontario, K7L 5A3
14 February 1974.

M. M. Dillon Limited,
Consulting Engineers and Planners,
280 Metcalfe Street,
OTTAWA, Ontario,
K2P 1R7.

Attention: Mr. W. W. Irwin, P. Eng.
Project Engineer

Dear Sirs:

SUBJECT: W.P. 10-69-20, Site 3-317
C.N.R. Overhead
Base Line Road Relocation
District 9 - Ottawa

Thank you for your letter dated 8 February enclosing the revised preliminary Bridge Planning Report and the preliminary bridge drawing No. 3-317-P2 for the above-mentioned structure. Our comments are as follows:

- 1) Using C.N.'s criteria, track protection would not appear to be required on the north side of the track during construction of the north pier footing but only during subexcavation of unsuitable material. Even during subexcavation it is possible that only limited protection will be required depending upon the method used. In the case of a structure recently completed, subexcavation was carried out in strips perpendicular to the track. This necessitated only a short length of sheet piling at any one time. Our Soils Mechanics Section will be asked to comment on this point.
- 2) We query whether it will be necessary to remove the whole of the existing culvert. It would appear to be sufficient to remove the deck only.

- 3) Future tracks should be indicated on the elevation drawing.

Apart from the foregoing, we have no further comments on the preliminary drawing and Bridge Planning Report.

We shall be glad to receive further copies of the drawing in due course.

Yours truly,

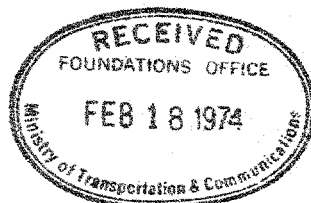
T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl

c.c. W. S. Beveridge: R.M.O.C.
K. G. Bassi

n.i.o.o.

A. J. Percy - Att. S. J. Markiewicz
✓M. Devata



MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: R. L. Ingham
Structural Planning Office
Kingston Regional Office

FROM: Structural Office
West 11th.
Ottawa

ATTENTION:

DATE: March 14th, 1974

OUR FILE REF:

IN REPLY TO

SUBJECT: C.N.R. Overhead
Mile 71.98 Alexandria Sub.
Base Line Rd. Relocation
W.P. 10-69-20, Site 3-317
District 9

73-11-024 ✓

Attached herewith are prints of the revised Preliminary Bridge Plan Drawing D-3-317-P2 for the above-mentioned structure.

The estimated revised cost of the proposed structure is \$286,000.00 which includes tender, materials, engineering, and sundry construction.

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

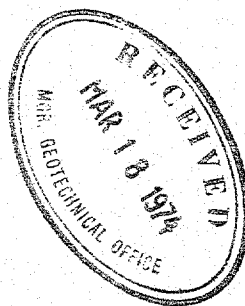
[Signature]

C.N. Gralski
Structural Design Engineer

USE 117

usage 117

C.C. Lewis
R. Birch
J. Leir
J. Charlton
J. Stoyanoff
J. Puck
G. Anderson
R. Forrest



no comments
done M.D.
April 1974

FOUNDATIONS OFFICEREVIEW OF DESIGN DRAWINGS:

W.P. 10-69-20

W.O. 73-11024

Foundation Report By:

Review of Design Drawings By:

Design Drawing No.'s:

..... J.T. Bangs
 C.S. Poon
 D-3-317-P2

1. Does footing design comply with our report or subsequent memos? *yes*
2. If answer to 1. is No, is present design acceptable?
3. Has sufficient field work been done? *As the structure changed to a 4-spanned bridge, the bays were drilled at south abutment. Soil conditions were uniform in the area. Soil conditions were OK. However, soil conditions were not uniform in the area. Soil conditions were not uniform in the area. Soil conditions were not uniform in the area.*
4. Are estimated pile lengths shown on Drawings correct? *no. Preliminary Drawing only.*
If not, make a new list.
5. If excavation of unsuitable soil is recommended, is this shown on Drawings? *yes.*
6. Are approaches designed in accordance with our report? Check slopes and berm lengths. *yes*
7. Do you anticipate any construction problems? *no*
i.e., dewatering, stability of temporary slopes or excavations.
8. Summarize your comments; on separate sheet if necessary.

no comments!

Drawings Received

March 18 19 *74*

Reviewed

April 3 19 *74*

Signed

C.S. Poon

OVERSIZED DRAWINGS

Pile Lengths

M. M. DILLON LIMITED

consulting engineers and planners

280 METCALFE STREET, OTTAWA, ONTARIO, K2P 1R7 • 613-236-9569

OUR FILE: 6830-20

YOUR FILE:

16 August 1974

Ministry of Transportation
and Communications
Structural Office
West Building
1201 Wilson Avenue
Downsview, Ontario

Attention: Mr. K.G. Bassi, P.Eng.

Base Line Road Relocation
C.N.R. Overhead
Site 3-317, W.P. 10-69-20
District 9, Ottawa

Dear Sirs:

We are pleased to submit the following documents on the above project.

1. Original tracings 3-317-1, 3-317-3 to 3-317-14 inclusive.
2. Two copies of draft D4 Estimate, special provisions, bearing data sheets and breakdown of lump sum items.
3. Computer input sheets for Program 40.
4. Two copies of pile length calculations.

We would like to make the following comments on this submission:

1. Pile lengths and quantities have been based on interpolation of elevations in the foundation report plus a 2-3 foot tolerance. Because the structure location was shifted after the foundation report was completed, we would appreciate it if the Foundations Office could review the pile length computations submitted.

...continued

LONDON

OTTAWA

TORONTO

WINDSOR

SUDBURY

WINNIPEG

GALT



Ministry of Transportation
and Communications
Att: Mr. K.G. Bassi

- 2 -

16 August 1974

2. Electrical drawings, D4 and special provisions will be submitted directly to your Illumination Engineer during the week ending August 23, 1974 and will include provision for the spare 4 inch duct on the west side.
3. All items pertaining to creek diversion, gabions, sub-excavation and backfill, and removal of existing pipes and structures will be covered in our Systems Design documents.

We trust that the submission is satisfactory. If you have any questions or comments regarding it please contact our Mr. B.P. Dowsley, P.Eng. or Mr. D.R. Harmer, Eng., prior to Sept. 3, 1974 or the undersigned after September 3, 1974.

Yours truly,

M. M. DILLON LIMITED



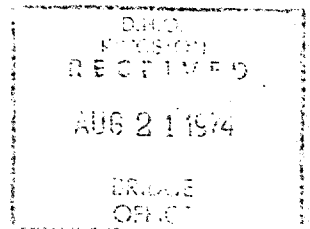
W.W. Irwin, P.Eng.
Project Manager

WWI:ls
Encl.

c.c. N. Zoltay, P.Eng.
T.C. Kingsland, P.Eng.

Copy made for: (TCK: 26/8/74)

✓ M. Devata
A. J. Percy - Att. S. J. Markiewicz



MEMORANDUM

TO: Mr. C. Mirza
Soils Mechanics Office
West Building

FROM: Structural Office
West Building

ATTENTION:

DATE: August 22, 1974

OUR FILE REF.

IN REPLY TO

SUBJECT: C.N.R. Overhead
Base Line Rd. Relocation
Twp. Gloucester
W.P. #10-69-20
Site #3-317
District #9

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

Kindly give us your comments at your earliest convenience.

CSG/sk
Encls.


C. S. Grebski
Structural Design Engineer



73-11024

Recoverable?

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. ...10-69-20.....

W.O. ...73-11024.....

Foundation Report By: J.T. Dwyer

Review of Design Drawings By: V. Korte

Design Drawing No.'s:

1. Does footing design comply with our report or subsequent memos? . Yes
2. If answer to 1. is No, is present design acceptable? yes
3. Has sufficient field work been done? - yes
4. Are estimated pile lengths shown on Drawings correct? - yes
If not, make a new list.
5. If excavation of unsuitable soil is recommended, is this shown on Drawings? - yes
6. Are approaches designed in accordance with our report? Check slopes and berm lengths. - yes
7. Do you anticipate any construction problems?
i.e., dewatering, stability of temporary slopes or excavations. - No
8. Summarize your comments; on separate sheet if necessary.

OK. letter sent to CS. Gribble

Drawings Received ...Aug. 22.....1974..

Reviewed ...Aug. 22.....1974.

FINALIZED
30 AUG. 74

Signed M. Korte

So.

MEMORANDUM

TO: Mr. M. Devata,
Supervising Foundations Engineer,
Soil Mechanics Office,
Downsview, Ontario.

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION:

DATE: 26 August 1974.

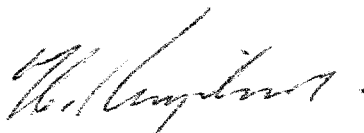
OUR FILE REF.

IN REPLY TO

SUBJECT: Base Line Road Relocation
C.N.R. Overhead
Site 3-317, W.P. 10-69-20
District 9 - Ottawa

Please find enclosed copy of a letter dated 16 August 1974 from Mr. W. W. Irwin of M. M. Dillon Limited relating to the above-mentioned structure.

We should be glad to have any further comments which you may feel to be applicable with respect to the second paragraph of Mr. Irwin's letter.



T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl
encl.

c.c. A. J. Percy - Att. S. J. Markiewicz
C. S. Grebski - Att. K. Bassi



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

Soil Mechanics Section,
Geotechnical Office,
West Bldg., Downsview.
September 4th, 1974.

RE: C.N.R. Overhead, Baseline Road
Relocation, Twp. of Gloucester,
W.P. 10-69-20, Site 3-317,
District #9, Ottawa.

We have reviewed the final drawings (3-317-1 and
3-317-3) submitted by your Office for the abovementioned project.

Our review indicates that the recommendations
submitted by this Office have been followed and as such we have
no further comments.

VK/mj

V. Korlu,
Project Engineer,
For: M. Devata,
Supervising Engineer.

Mr. D.R. Saint,
Regional Materials Engineer,
Eastern Region, Kingston.

Soil Mechanics Section,
Geotechnical Office,
West Building, Downsview.

Mr. A.M. Batten.

October 11th, 1974.

RE: Fill Investigation for Baseline Road
and the C.N.R., Twp. of Gloucester,
Regional Municipality of Ottawa-Carleton,
W.P. 10-69-12.20 W.O. 73-11024.

We have reviewed the stability of the approach fills for the above project using a unit weight of 150 p.c.f. for the rock fill material. The computer analysis carried out by us indicates that 2:1 slopes as shown on Sheet 1, Site No. 3-317 will be stable. However, because of the increased density of the fill the total superimposed loads on the subsoil will also be greater. This will result in somewhat greater settlements of the fill behind the abutments, which is not a problem in this instance, because they will occur immediately after the completion of the embankment construction.

We do not understand how the length of the structure would be reduced by using a selected subgrade material in the immediate vicinity of the overhead structure as suggested in your letter. The designed forward slopes using rock fill are 2:1. The underlying silty clay is relatively soft and unable to support the proposed height of embankment. This would normally require a berm in the longitudinal and transverse direction to ensure the stability of the embankment section, and would result in a longer structure. Therefore, in order to shorten the structure and reduce the consolidation settlements it was necessary to subexcavate the silty clay deposit underneath the embankment and backfill with granular material. The structure

Mr. E.R. Saint - RE: W.P. 10-69-12.

length cannot be further reduced by using a selected subgrade material, because 2:1 forward slopes cannot be made any steeper by using such material. We hope this would clarify the misconception of somehow being able to shorten the structure if a selected subgrade material is used.

A. Prakash, P. Eng.,
Senior Engineer
For: M. Devata, P. Eng.,
Supervising Engineer

AP/mj

c.c. P.D. Billings
T.C. Kingsland
G.A. Wrong
J.M. Childs
S.J. Markiewicz
K.G. Bassi

Files
Documents

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. C. Mirza
Head - Soils Mechanics Office
Downsview

FROM: Materials & Testing Office
Kingston

ATTENTION: Mr. M. Devata

DATE: September 30, 1974

OUR FILE REF.

IN REPLY TO

SUBJECT: Film Investigation Report for the Crossing of
Baseline Road and the CNR, Twp. of Gloucester,
Reg. Mun. of Ottawa-Carleton. W.O. 73-11024. W.P. 10-69-12. ²⁰

We have attempted to measure the density of compacted rock fill on the Highway 417 contracts within Ottawa, using Ottawa Sand in a plastic bag liner with approximately 1 cu.ft. test holes. We have also endeavoured to measure the densities with the Nuclear Density Road Logger apparatus. We anticipate further measurements using a water fill liner in test holes.

All of the measurements to date indicate that we are obtaining densities between 145 and 150 p.c.f.

For this reason, it is recommended that the stability considerations for the approach fills on the above noted project be reviewed using a unit weight of 150 p.c.f.

We are contemplating purchase of shale rock for these approach fills. We would be able to utilize a selected subgrade material in the immediate vicinity of the overhead structure in order to reduce the structure length similar with the railway overhead structure and approach fill designs on Hwy. 417 under Contract 73-190.

Your early attention to this would be appreciated. Should you have any queries, please do not hesitate to contact us.

c.c. P.D. Billings
T.C. Kingsland
G.A. Wrong
J.M. Childs
A.J. Percy. Att: S.J. Markiewicz

AMB/jeb

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



OVERSIZED DRAWINGS

2 Program Status Reports.

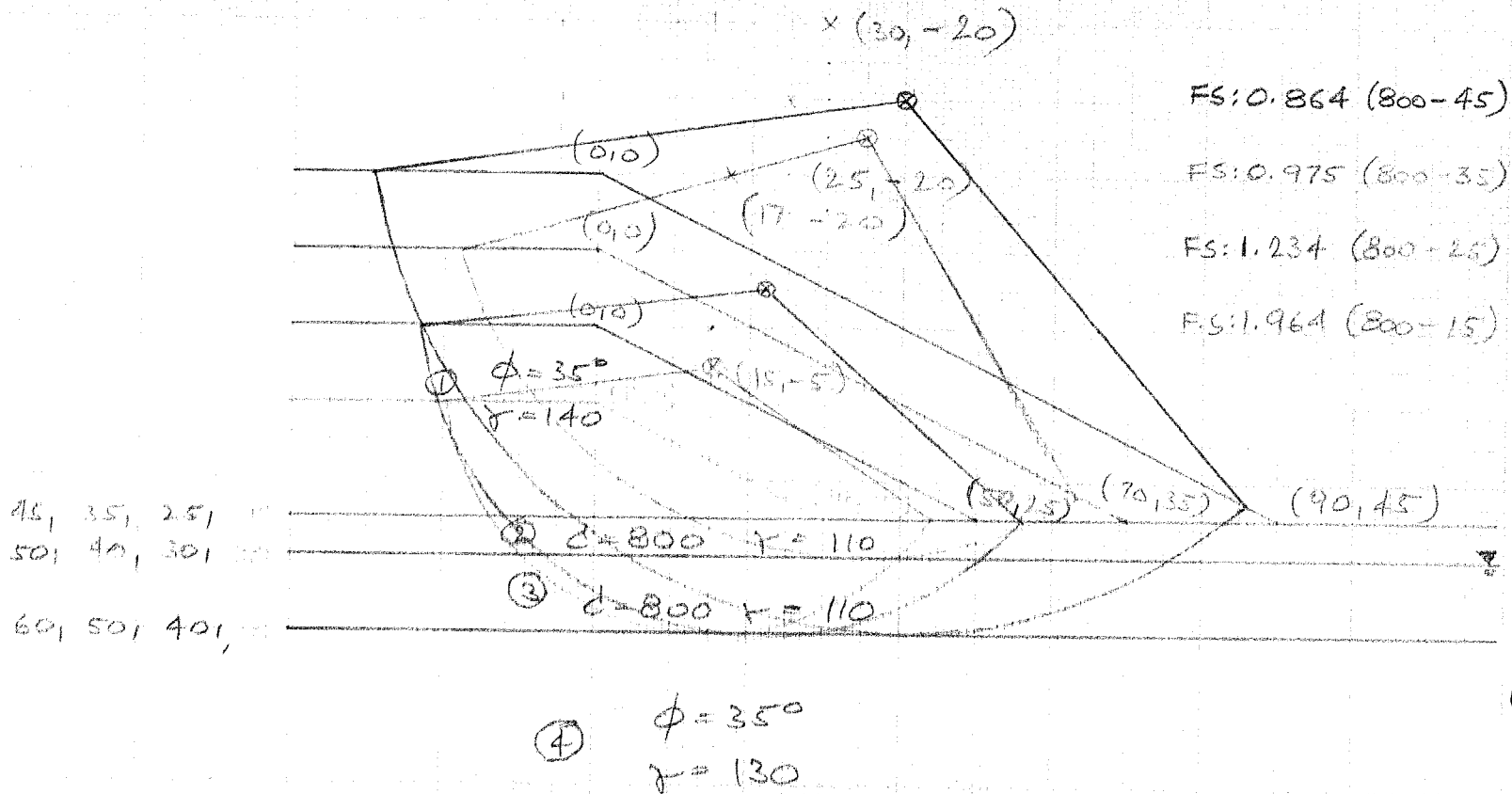
OVERSIZED DRAWINGS

General Layout
Found. " Reinforcement

SAFE HEIGHT

 $c = 800 \text{ PSF}$

73-11024



1000

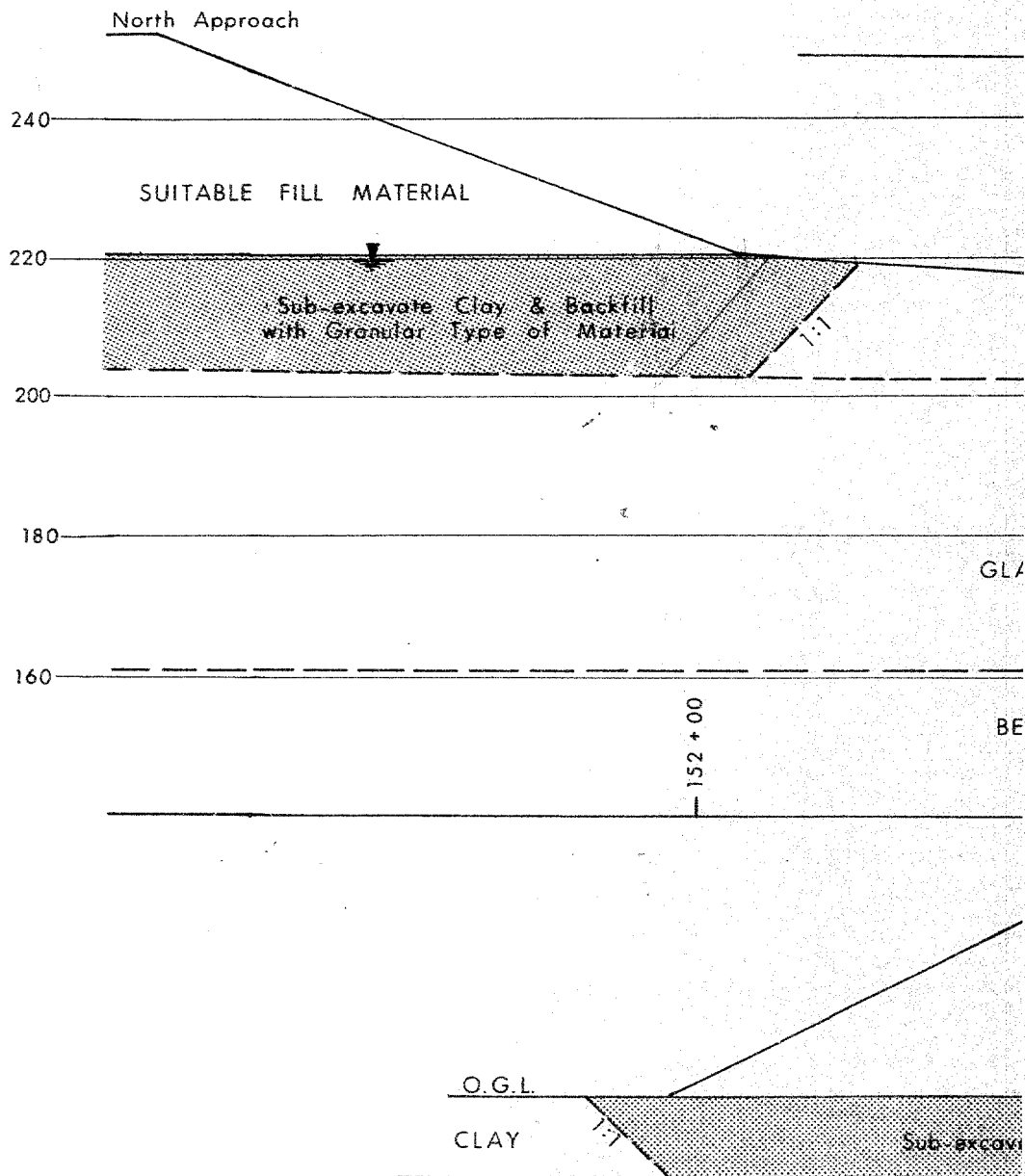
Feb 21/74

Phos. Feb. 1891

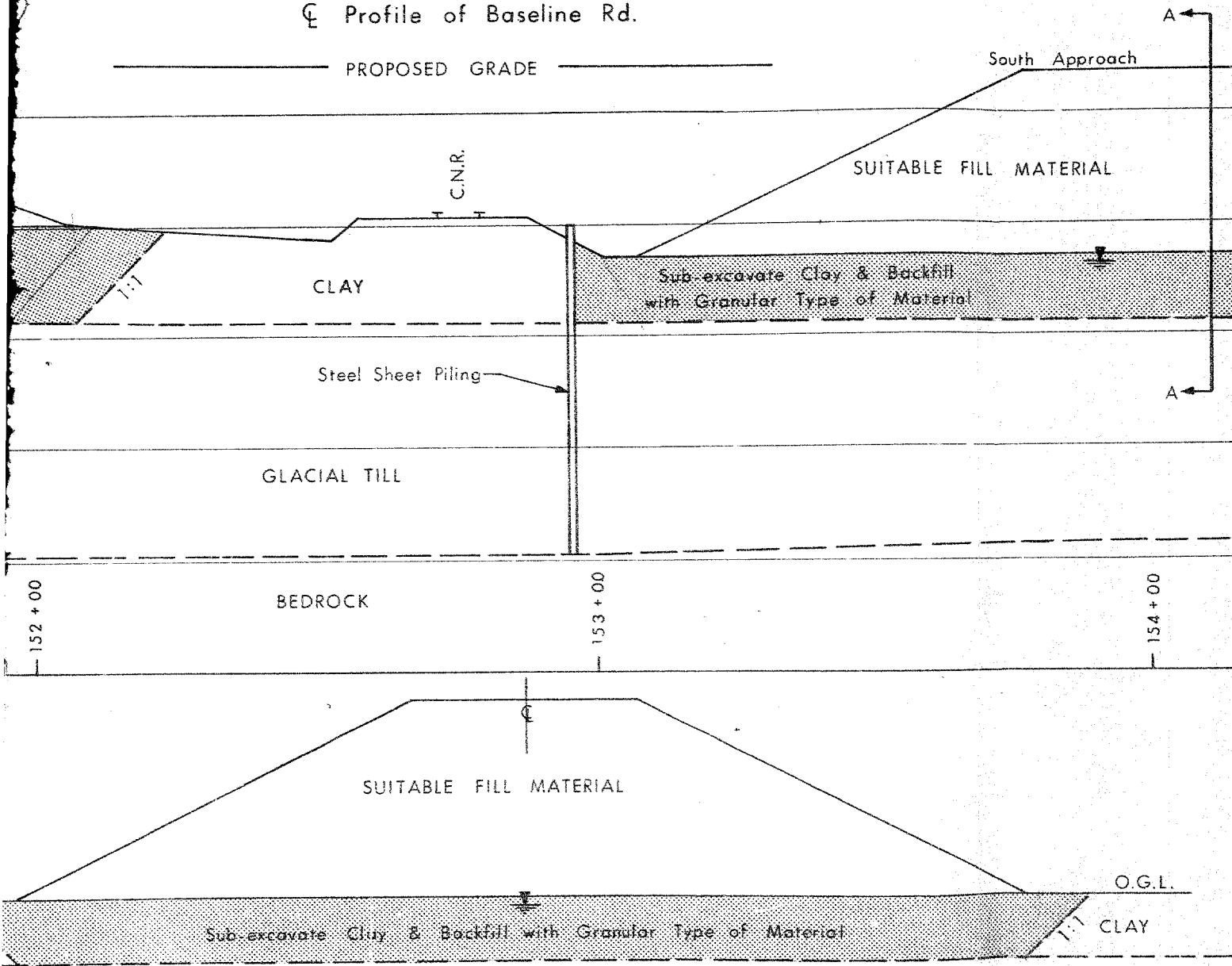


If $1\frac{1}{2}$ is used (Between elevations 220.5 and 202, F. of S. becomes 1.5 (acceptable). This information was given to W. Irvine of M.M. Dillion of Ottawa Feb. 25, 1974.

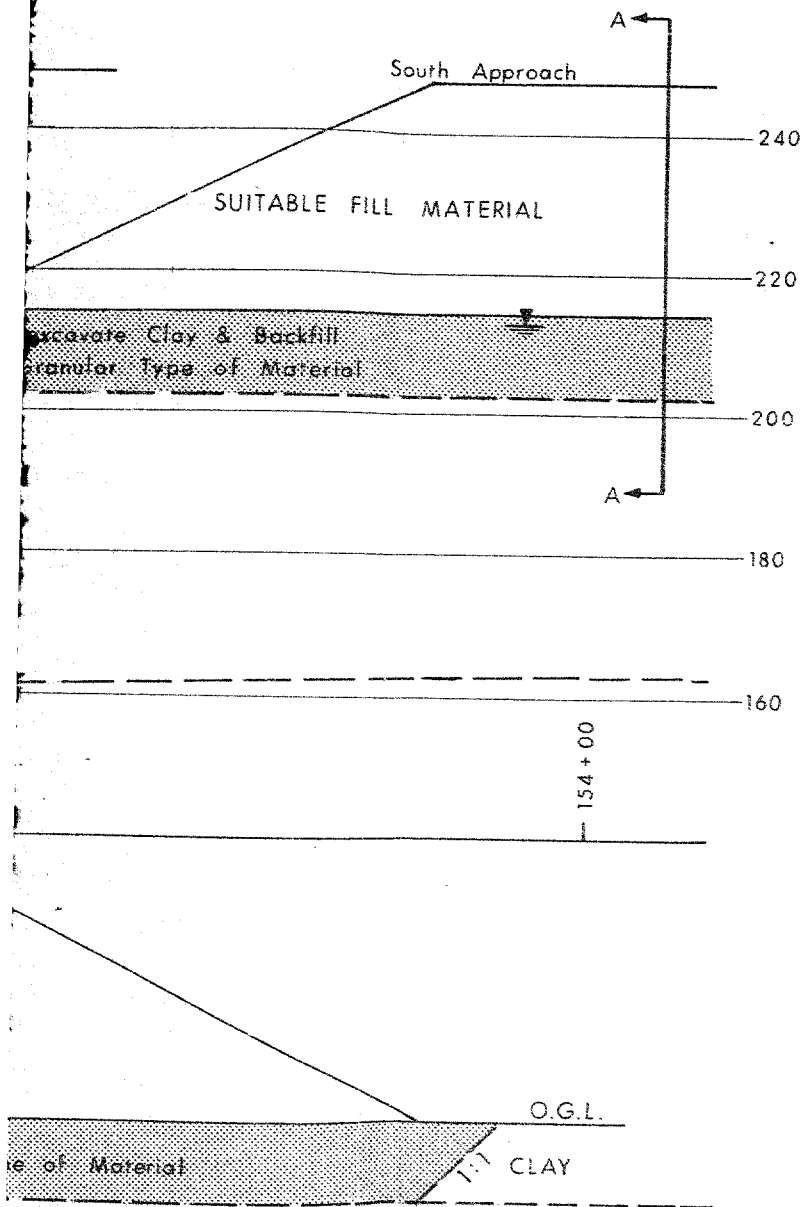
C. F. Bour



Profile of Baseline Rd.



A-A
Typical Section



ONTARIO

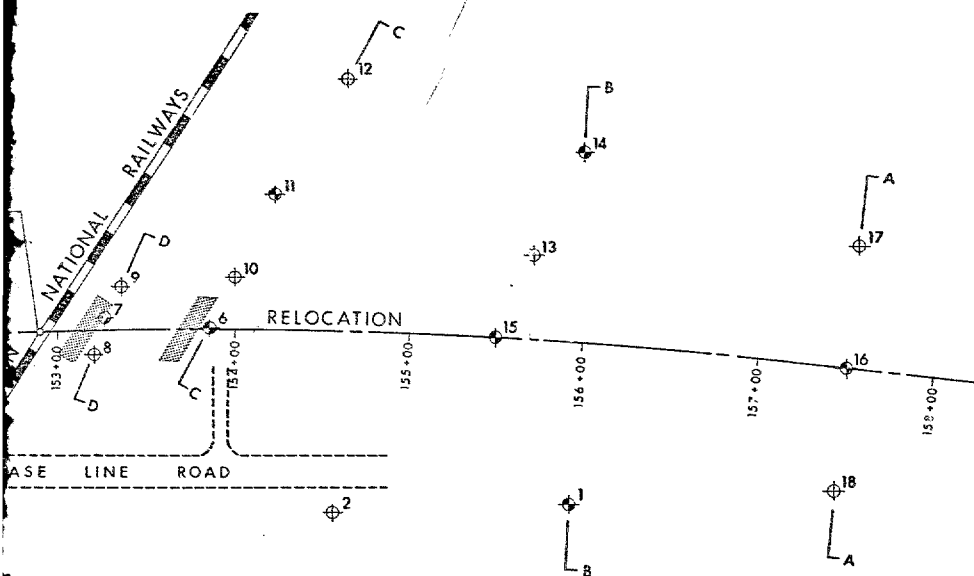
DEPARTMENT OF HIGHWAYS
**MATERIALS and
 TESTING
 OFFICE**

SUB-EXCAVATION OF SOFT CLAY STRATUM
 BASELINE RD. OVER C.N.R.

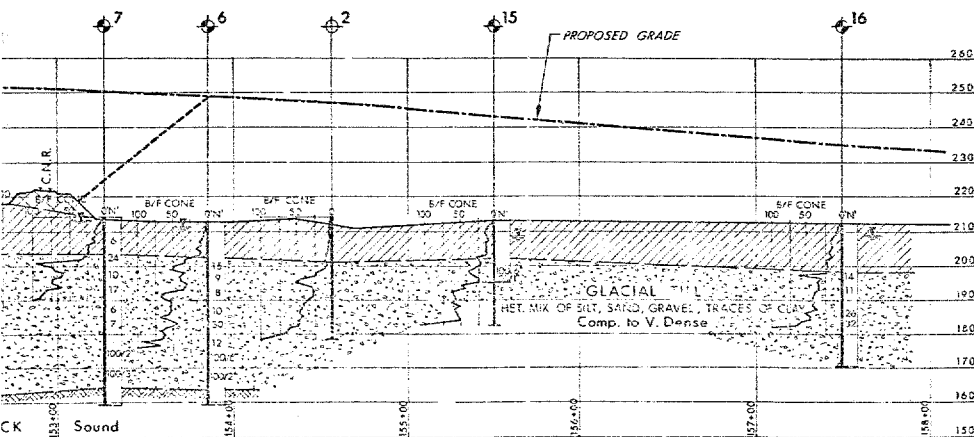
DATE AUG. 14, 1973

W.O.NO. 73-11024

FIGURE NO. 6

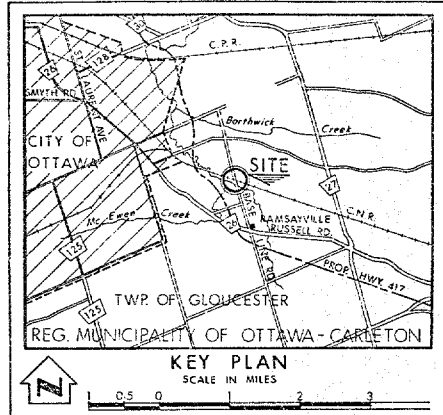


PLAN
0 SCALE 40 80 FT.



PROFILE
0 SCALE 40 80 FT.

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.



LEGEND

- Bore Hole
- ⊕ Cone Penetration Test
- ⊕ Bore Hole & Cone Test
- ⊕ Water Levels established at time of field investigation, May & June 1973.

NO.	ELEVATION	STATION	OFFSET
1	211.5	155+98	92' RT.
2	214.6	154+57	103' RT.
3	219.2	151+50	121' RT.
4	219.3	152+28	13' RT.
5	219.1	152+19	31' RT.
6	212.5	153+36	1' LT.
7	214.6	153+27	8' LT.
8	214.0	153+20	13' RT.
9	214.2	153+37	25' LT.
10	213.2	154+00	30' LT.
11	213.1	154+21	78' LT.
12	213.3	154+58	145' LT.
13	212.0	155+69	48' LT.
14	213.8	155+94	110' LT.
15	213.2	155+50	G
16	212.6	157+50	G
17	213.1	157+50	7' LT.
18	213.9	157+50	70' RT.
19	223.1	150+50	70' RT.
20	227.1	150+50	G
21	223.6	150+50	70' LT.
22	222.2	151+90	140' LT.
23	222.3	151+90	70' LT.
24	219.5	152+40	16' LT.
25	221.1	151+90	16' LT.
26	220.2	151+90	16' RT.
27	220.8	151+90	G
28	220.1	148+50	10' LT.

CONTRACT DOCUMENT NOTE
The complete soil investigation report for this structure may be examined at the Structural Office and the Foundations Office, Downsview, and at the Ottawa District Office.

DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
DESIGN SERVICES BRANCH—FOUNDATIONS OF—CF

CANADIAN NATIONAL RAILWAYS
AND
BASE LINE ROAD RELOCATION

HIGHWAY NO. 10 DIST. NO. 9
REG. MUNICIPALITY OF OTTAWA—CARLETON

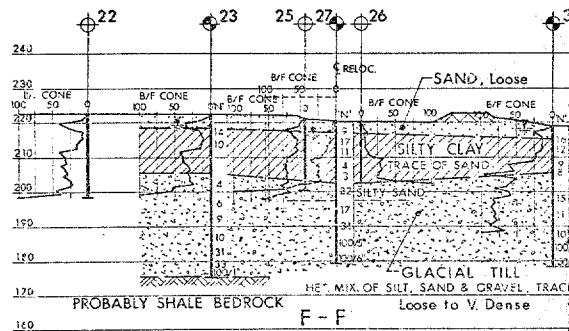
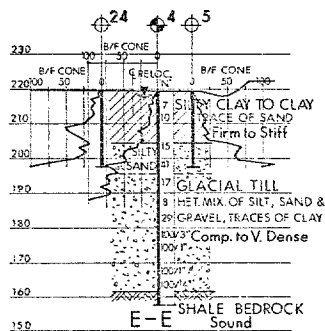
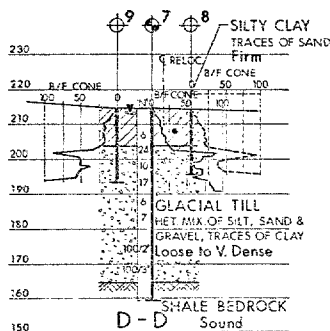
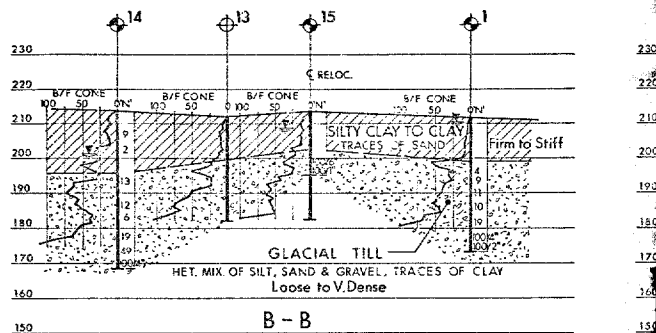
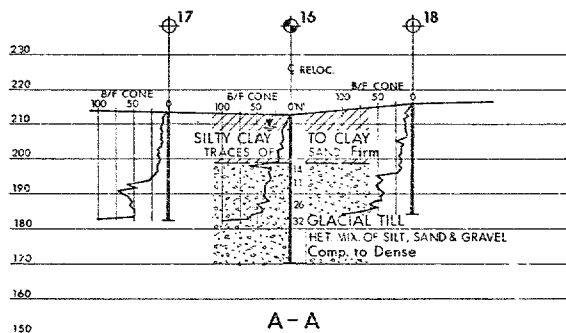
TWP. GLOUCESTER LOT CON

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD J.B. [CHECKED] WP NO. 10-69-20 DRAWING NO. 73-11024A
DRAWN S.R. [CHECKED] WD NO. 73-11024

DATE AUGUST 16, 1973 SITE NO. BRIDGE DRAWING NO.

APPROVED [Signature] CONT. NO. ENGINEER



SECTIONS

HORIZ. 40 20 0 SCALE 40 80 FT.
VERT. 20 10 0 20 40 FT.

SEE DWG. No: 73-11024 A

KEY PLAN SCALE IN MILES

LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of field investigation.

NO. ELEVATION

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
DESIGN SERVICES BRANCH—FOUNDATIONS DIVISION

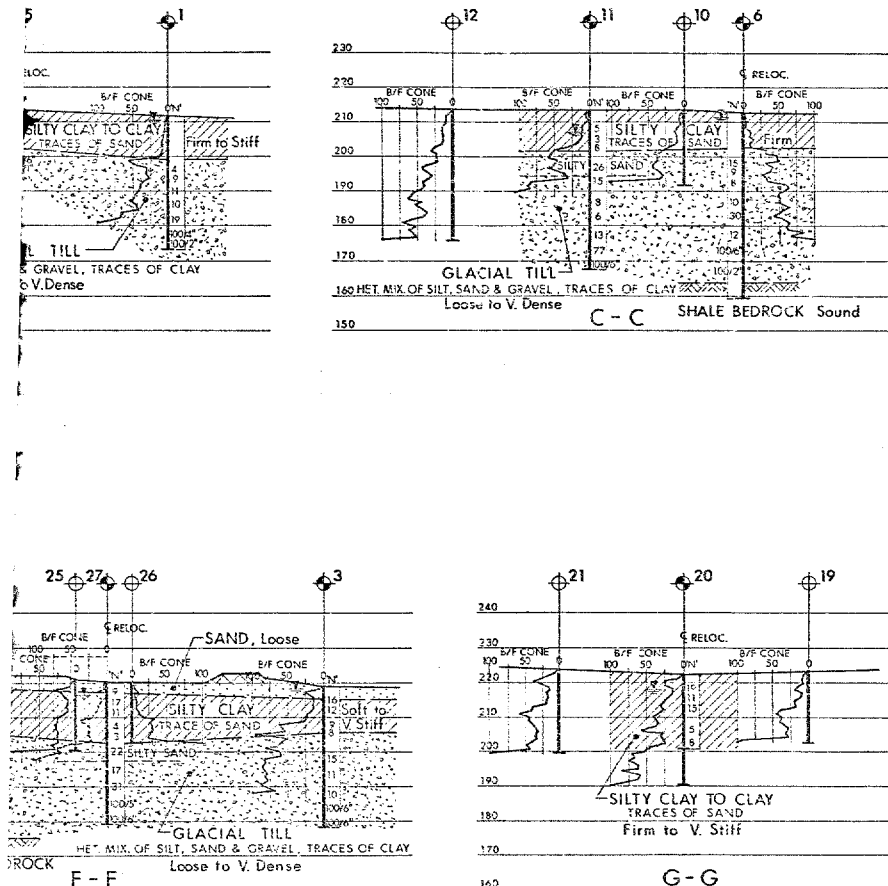
CANADIAN NATIONAL RAILWAYS AND

BASE LINE ROAD RELOCATION

HIGHWAY NO. 9 DIST. NO. 9
CO. REG. MUNICIPALITY OF OTTAWA - CARLETON
TWP. GLOUCESTER LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. J.B.	CHECKED	W.P. NO. 10-69-20	DRAWING NO.
DRAWN S.R.	CHECKED	W.O. NO. 73-11024	73-11024 B
DATE AUGUST 16, 1973	SITE NO.	SKETCH DRAWING NO.	
APPROVED	CONT. NO.		



ONS

0 40 80 FT.
0 20 40 FT.

G.I.-30 SEPT. 1976

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31G5-95

DIST. 9 REGION EASTERN

V. P. No. 10-69-20

CONT. No. 76-23

W. O. No. 73-F-24

STR. SITE No. 3-317

HWY. No. 417

LOCATION BASLINE RD. AND C.N.R.

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 5

REMARKS: DOCUMENTS TO BE UNFOLDED

BEFORE MICROFILMED

Max length within ϕ = 50' (obtained by ϕ from M.T.C.
14 Nov. 1974)

BASELINE TO PROPOSED
CUT OFF

§195-95
- GEOCRIS No. 1

PILE LENGTHS

	NORTH ABUTMENT	PIER #1	PIER #2	PIER #3	SOUTH ABUTMENT
TOP OF FTA.	240.50	215.50	212.50	206.00	233.50
BOT. OF FTA.	238.00	211.75	208.75	202.25	231.00
PILE CUT OFF	233.00	212.75	209.75	203.25	232.00
BORE HOLE REF.	#27	#4	#7	#6	NIL
ESTIMATED PILE TOP	180.00	172.00	166.00	168.00	131.00*
VERTICAL LENGTH	59.0 / <u>62</u>	40.75	41.75	35.25	51.0 / <u>54</u>
1:3.5	51.2 / <u>54</u>				53.0 / <u>56</u>
1:4		42.0 / <u>44</u>	43.0 / <u>45</u>	36.3 / <u>39</u>	
1:8		41.1 / <u>44</u>	42.1 / <u>45</u>	35.5 / <u>38</u>	
1:10	57.3 / <u>62</u>				51.3 / <u>54</u>
NOTE: UNDERLINED NUMBERS ARE SUGGESTED LENGTHS					
<u>SUMMARY</u>					
SUGGESTED LENGTH	6 @ 62'	12 @ 44'	12 @ 45'	12 @ 39'	6 @ 54'
TO BE SUPPLIED	6 @ 64'				6 @ 56'

checked
G.S. 1/10

* INTERPOLATION BETWEEN PRACTICAL REFUSAL AT B.H. #15



Ministry of
Transportation and
Communications

Ontario
10-69-180 10-69-190
W.P. 10-69-200

PRIORITY DEVELOPMENT BRANCH PERSONAL & CONFIDENTIAL

PROGRAM STATUS REPORT

NOV-8 1974

DIST. 9 HWY. Loc. TYPE OF WORK G.D.G.B. P. & Str.

DESCRIPTION See below

PRESENT PROGRAM YEAR 1975

DATE INITIATED Nov. 4/74

There are a number of problems that are likely to delay these projects.
As a result the following projects have been deferred to the 1976 Program.

W. P. No.	Group No.	Type of Work	Description	Est. Val.
10-69-190	10-69-19	G. D. G.B. P.	Baseline Rd.; Approx. to C. N. R. O'Head, recoverable from Reg. Munic. of Ottawa- Carleton - 0.4 mi.	\$548,000
10-69-180	10-69-19	G. D. G.B. P.	Baseline Rd.; from Walkley Rd. E'ly to Blake Rd., excl. 0.4 mi. at C. N. R.	\$548,000
10-69-200	10-69-19	Str.	Baseline Rd., C. N. R. O'Head recoverable from Reg. Munic. of Ottawa - Carleton	\$400,000
Group Total \$1,496,000				

JG/gm

REMARKS:

3165-95
GEO-R.

PRE-CONTRACT ENGINEERING SCHEDULE

1. STATUS REPORT	21. STRUCT. QUANT'S COMPLETE
2. FEASIBILITY STUDY REPORT	22. STR. PLANS & D4 TO S.D.O.
3. TRAFFIC ISSUED	23. N.W.P.A. APPL'N SUBM'D.
4. PRE-DESIGN PHOTOGRAMMETRY	24. N.W.P.A. APPROVAL REC'D.
5. DRAINAGE STUDY ISSUED	25. SOILS DESIGN REPORT
6. DESIGN CRITERIA	26. 40' TO 1" PLANS ISSUED
7. TITLE SEARCH REQUEST	27. CO-ORDINATED ALIGNMENT
8. PRE-DESIGN REPORT	28. STRUCTURE SITE GEOMETRICS
9. FINAL ALIGNMENT REQUEST	29. INTERSECTION DESIGN COMP.
10. DESIGN X-SECTIONS REQ'T.	30. FINAL PROPERTY REQUEST
11. DESIGN X-SECTIONS ISSUED	31. R.T.C. APPL'N SUBM'D.
12. PLANS & PROF. TO S.D.O.	32. R.T.C. APPROVAL REC'D.
13. PLANS & PROF. ISSUED	33. DETAIL DESIGN REPORT
14. E & G PLANS ISSUED	34. ILLUMINATION DESIGN COMP.
15. ENG. & TITLE RECORDS	35. SYSTEMS DESIGN CONSULTS.
16. FOUNDATION REPORT REQ'D.	36. PLRCENT COMPLETE S.D.O.
17. FOUNDATION REPORT ISSUED	37. STRUCT. DESIGN CONSULTS.
18. STRUCT. PLANNING REPORT	38. PERCENT COMP. STR. DESIGN
19. PRELIM. STRUCTURE PLANS	39. DOCUMENTS IN SCRUTINY
20. STRUCTURE DESIGN COMPLETE	40. PROPERTY CLEARANCE

PROGRAM STUDIES ENGINEER

REGIONAL DIRECTOR

SCHEDULING ENGINEER

DATE

DATE

DATE



Ministry of
Transportation and
Communications

PERSONAL & CONFIDENTIAL
PRIORITY DEVELOPMENT BRANCH
PROGRAM STATUS REPORT
FEB 27 1976

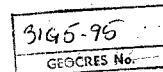
W.P. 10-69-190 et al DIST. 9 HWY. Loc. TYPE OF WORK G.D.G.B.I. & Str.
DESCRIPTION See below

PRESENT PROGRAM YEAR 1976 DATE INITIATED Feb. 19/76

Until such time as the Regional Municipality of Ottawa-Carleton have acquired property and made application to the Railway Transport Committee for a Board Order, the following projects are to be deferred to the EX Program.

W. P. No.	Group No.	Type of Work	Description
10-69-180	10-69-19	G.D.G.B.P.	Baseline Rd.; from Walkley Rd. Easterly to Blake Rd., excl. 0.4 Mi. at C.N.R. - 1.1 Mi.
10-69-190	10-69-19	G.D.G.B.P.	Baseline Rd.; Apprs. to C.N.R. Overhead recoverable from Reg. Munic. of Ottawa-Carleton - 0.4 Mi.
✓ 10-69-200	10-69-19	Str.	Baseline Rd.; C.N.R. Overhead recoverable from Reg. Munic. of Ottawa-Carleton

JG/GM/me



REMARKS:

W.P. No. 10-69-180 Cost Centre 4341
W.P. No. 10-69-190 Cost Centre 4341 - Client No. 1300 - 92% recoverable
W.P. No. 10-69-200 from R.M.O.C.

*File (if available)
of mt. section*

PRE-CONTRACT ENGINEERING SCHEDULE

1. STATUS REPORT	21. STRUCT. QUANT'S COMPLETE
2. ROUTE PLANNING STUDIES	22. STR. PLANS & D4 TO S.D.O.
3. TRAFFIC ISSUED	23. N.W.P.A. APPL'N SUBM'D.
4. PRE-DESIGN PHOTOGRAMMETRY	24. N.W.P.A. APPROVAL REC'D.
5. DRAINAGE STUDY ISSUED	25. SOILS DESIGN REPORT
6. DESIGN CRITERIA	26. 40' TO 1" PLANS ISSUED
7. TITLE SEARCH REQUEST	27. CO-ORDINATED ALIGNMENT
8. PRE-DESIGN REPORT	28. STRUCTURE SITE GEOMETRICS
9. FINAL ALIGNMENT REQUEST	29. INTERSECTION DESIGN COMP.
10. DESIGN X-SECTIONS REQ'D.	30. FINAL PROPERTY REQUEST
11. DESIGN X-SECTIONS ISSUED	31. R.T.C. APPL'N. SUBM'D.
12. PLANS & PROF. TO S.D.O.	32. R.T.C. APPROVAL REC'D.
13. PLANS & PROF. ISSUED	33. DESIGN SYNOPSIS REPORT
14. E & G PLANS ISSUED	34. ILLUMINATION DESIGN COMP.
15. ENG. & TITLE RECORDS	35. SYSTEMS DESIGN CONSULTS.
16. FOUNDATION REPORT REQ'D.	36. PERCENT COMPLETE S.D.O.
17. FOUNDATION REPORT ISSUED	37. STRUCT. DESIGN CONSULTS.
18. STRUCT. PLANNING REPORT	38. PERCENT COMP. STR. DESIGN
19. PRELIM. STRUCTURE PLANS	39. DOCUMENTS IN SCRUTINY
20. STRUCTURE DESIGN COMPLETE	40. PROPERTY CLEARANCE

[Signature]
PROGRAM MANAGEMENT ENGINEER

Feb 23/76
DATE

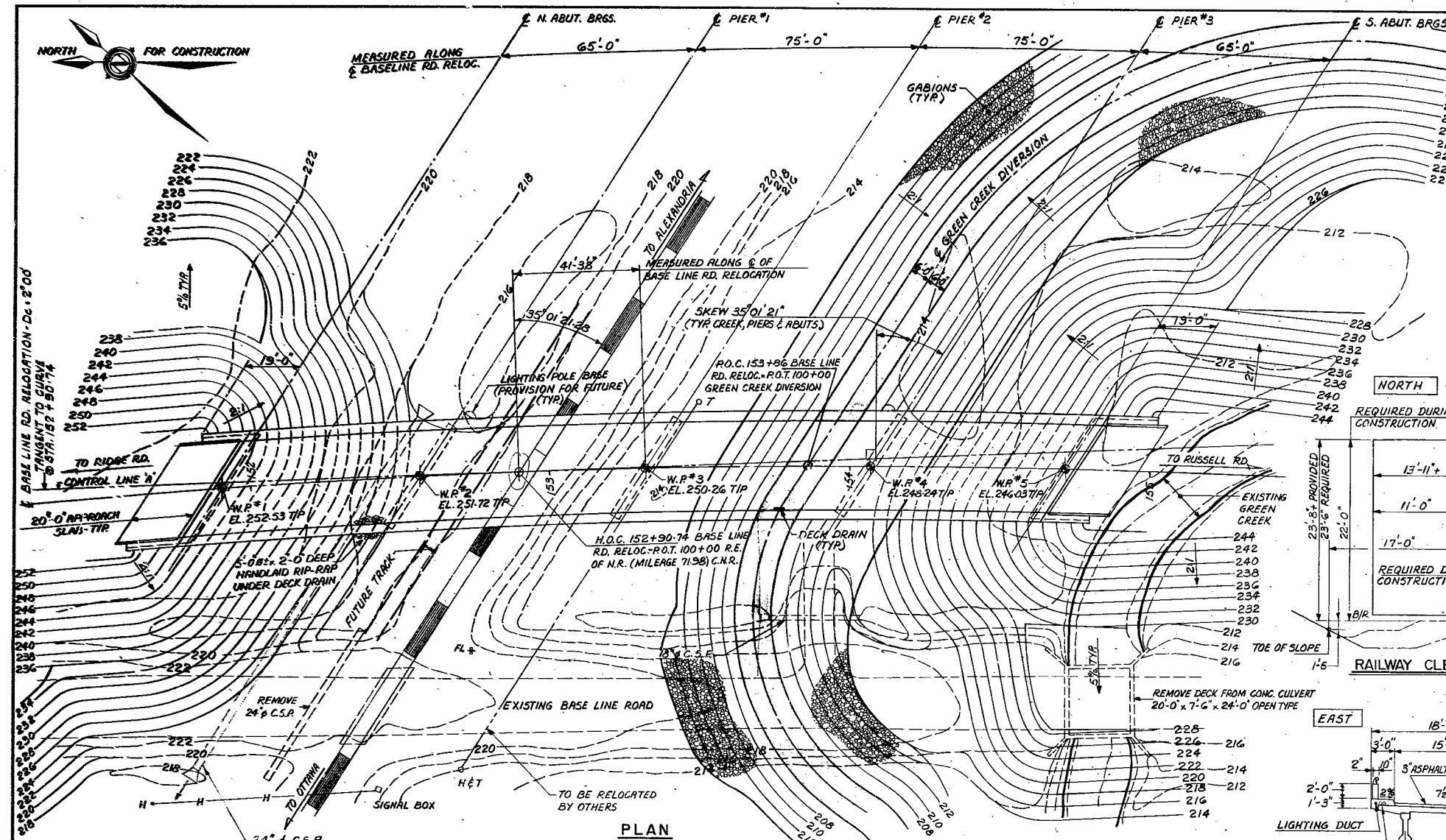
[Signature]
PROGRAM CONTROL ENGINEER

Feb 23/76
DATE

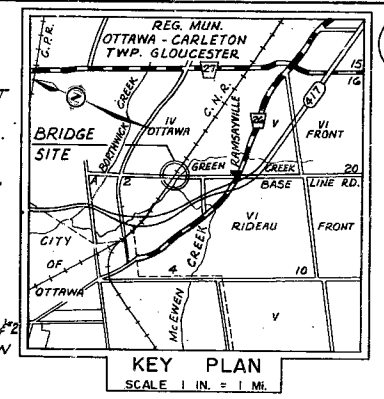
[Signature]
REGIONAL DIRECTOR

Feb 27/76
DATE





- LIST OF DRAWINGS**
- 3-317-1- GENERAL LAYOUT
 - 2- BORE HOLE LOCATION & SOIL STRATA
 - 3- FOUNDATION LAYOUT & REINFORCEMENT
 - 4- NORTH ABUTMENT
 - 5- SOUTH ABUTMENT
 - 6- PIERS
 - 7- PRESTRESSED GIRDERS & BEARINGS
 - 8- DECK
 - 9- PARAPET WALL DETAILS
 - 10- STANDARD STEEL PARAPET RAIL
 - 11- 20 FT. APPROACH SLAB
 - 12- STANDARD DETAILS - I
 - 13- STANDARD DETAILS - II
 - 14- TRACK STRUCTURE PROTECTION-PIERS #1 & 2
 - 15- ELECTRICAL - PLAN & TYPICAL SECTION
 - 3-317-16- ELECTRICAL - DETAILS



REFERENCE BENCH MARK
B.M. 221.71
GEODETIC DATUM
TOP BOLT ON N.E. CORNER OF SIGNAL BOX
101' RT. OF STA. 152+36

NOTES:
ABBREVIATIONS:
W.P. DENOTES WORKING POINT
TIP DENOTES TOP OF PAVEMENT
CLASS OF CONCRETE:
DECK, CURBS AND PARAPET WALLS - 4000 P.S.I.
PRESTRESSED GIRDERS - 5000 P.S.I.
REMAINDER - 3000 P.S.I.

CLEAR COVER ON REIN. STEEL:
FOOTINGS, ABUTMENTS & PIERS - 3"
TOP OF DECK & PARAPET WALLS - 1 1/2"
BOTTOM OF DECK - 1"

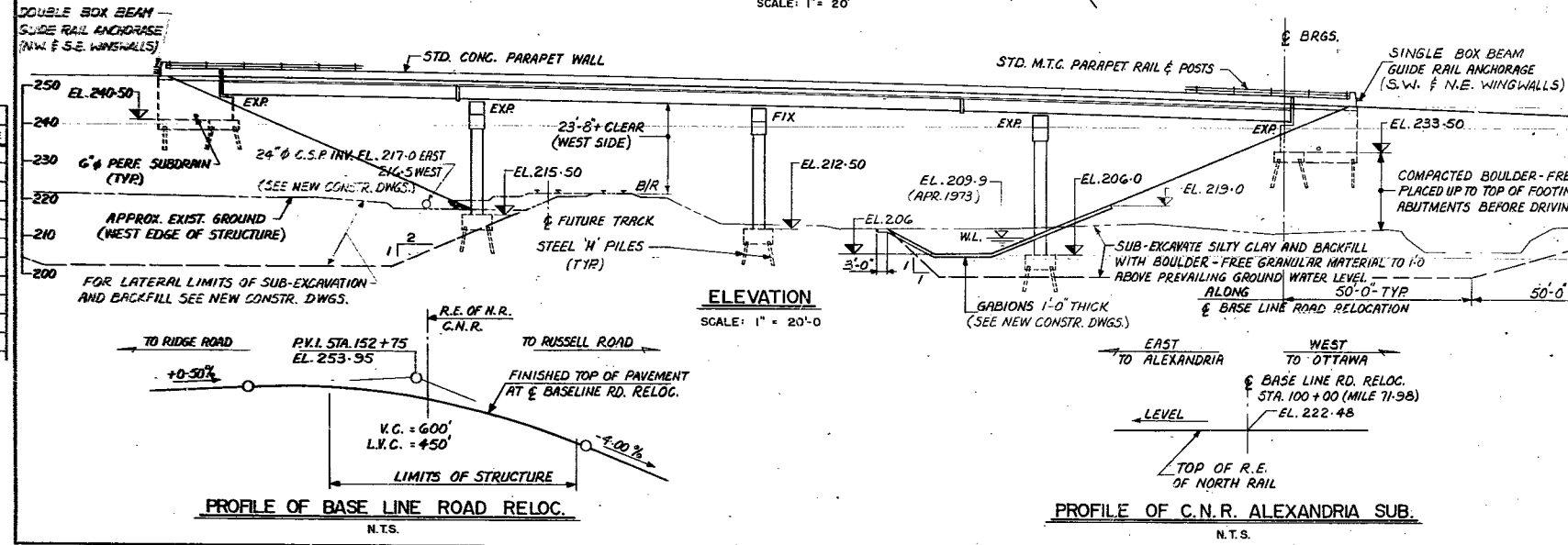
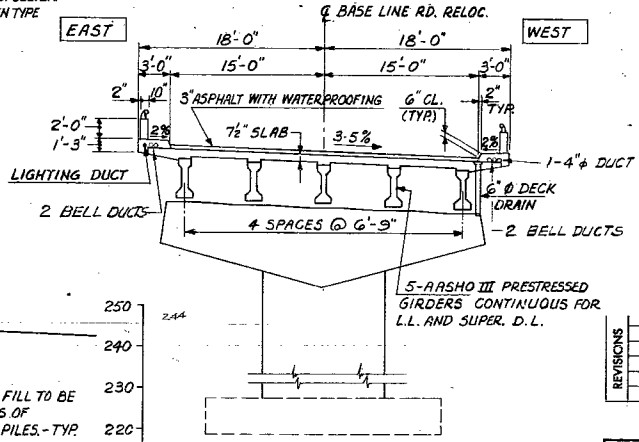
CONSTRUCTION NOTES:
• THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITHIN A TOLERANCE OF 1/8"
• NO CONCRETE IS TO BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

SKEW DATA - 35° 01' 21"
SIN. - 0.57389807
COS. - 0.81872674
TAN. - 0.70079293
SEC. - 1.2211045
CURVE DATA - BASE LINE RD. RELOC.
Δ - 14° 11' 40"
D - 2° 00' 00"
T - 431.73'
L - 559.72'
E - 22.45'

RAILWAY CLEARANCE REQUIREMENTS

NOTE: CLEARANCES SHOWN ARE PERPENDICULAR TO TRACKS

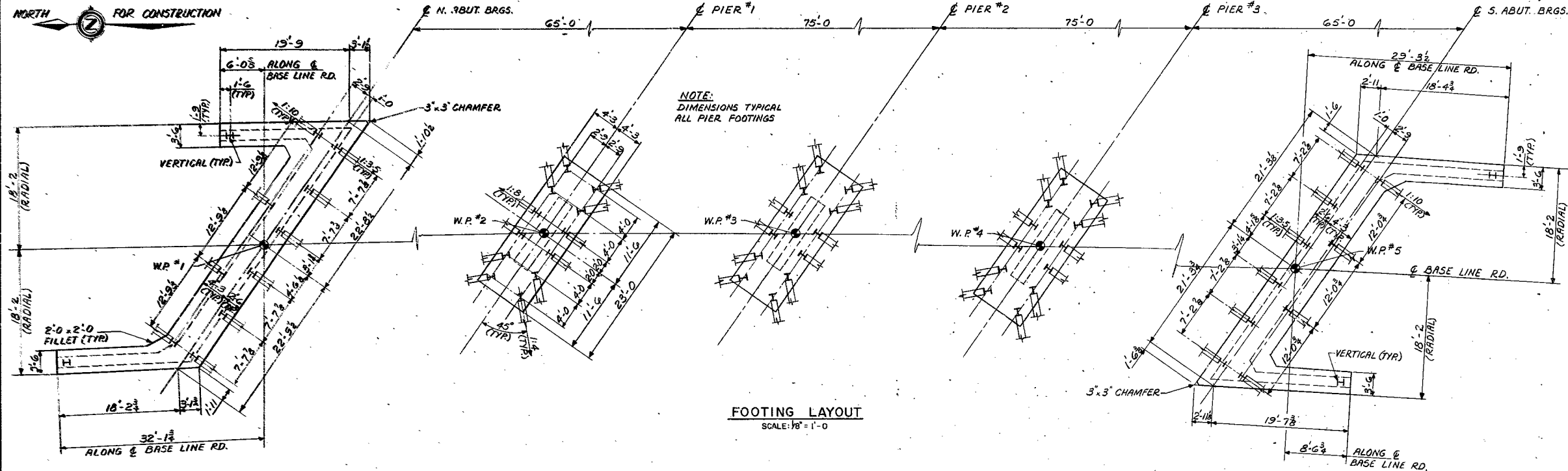
	EXIST. TRACK	FUT. TRACK	
13'-11"	14'-0"	29'-7"	PROVIDED
11'-0"	14'-0"	11'-0"	REQUIRED
17'-0"	REQUIRED & PROVIDED		
REQUIRED DURING CONSTRUCTION			8'-6" 8'-6"



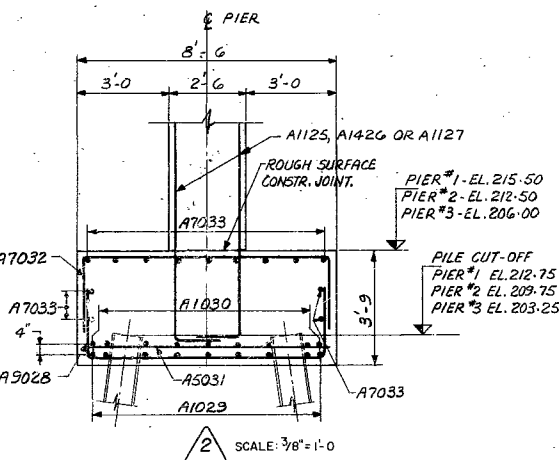
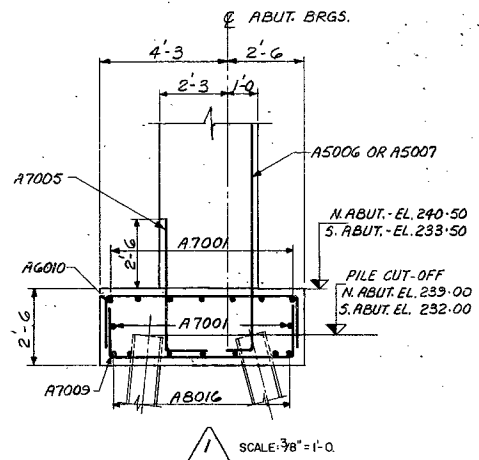
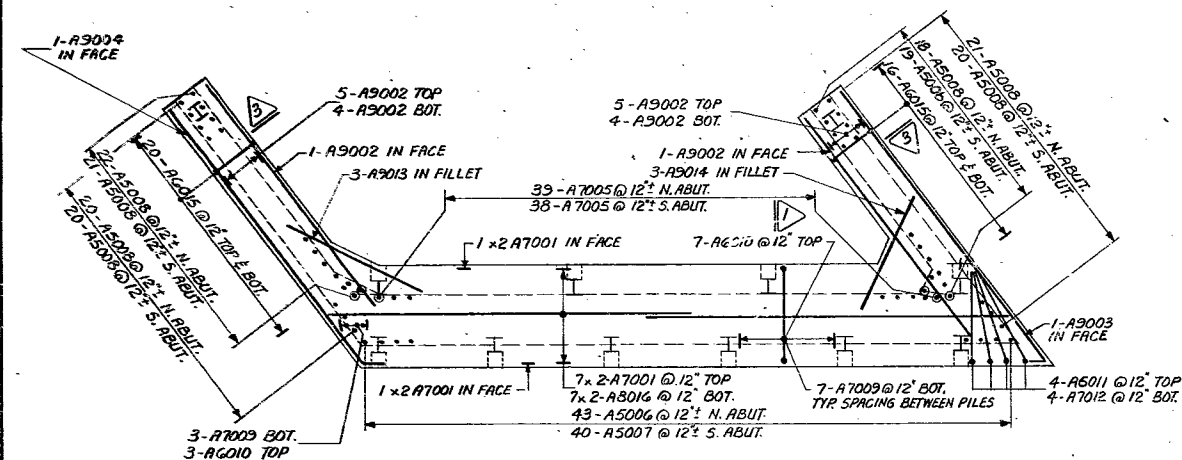
REVISIONS

DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO
Consulting Engineers & Planners
C.N.R. OVERHEAD
MILE 71.98 ALEXANDRIA SUB.
BASE LINE RD. RELOCATION
KING'S HIGHWAY No. DIST. No. 9
CO. REG. MUN. OTTAWA-CARLETON
TWP. GLOUCESTER LOT 20 CON. IV
GENERAL LAYOUT
APPROVED: [Signature] CONTRACT No. 10-69-20
DESIGN: [Signature] CHECK: [Signature] W.P. No. 10-69-20
DRAWING: A.G.Y. CHECK: C.M.G.
DATE: AUG. 74 LOADING: H520-44 SITE No. 3-317 SHEET 1



STEEL 'H' PILE DATA				
LOCATION	BATTER	No.	LENGTH	TYPE
NORTH ABUT.	VERT.	2	62'	HP12x74
	1:10	4	62'	
	1:3-5	6	64'	
PIER #1	1:4	8	44'	
	1:8	4	44'	
	1:4	8	45'	
PIER #2	1:8	4	45'	
	1:4	8	39'	
	1:10	2	54'	
PIER #3	1:4	8	54'	
	1:3-5	6	56'	
	VERT.	2	54'	



NOTES:
PILES TO BE DRIVEN IN ACCORDANCE WITH STD. BD.82-7
USING A DESIGN LOAD OF 95 TONS PER PILE.
SPACING OF PILES TO BE MEASURED AT
UNDERSIDE OF FOOTINGS
BOTTOM REIN. TO BE SPACED TO AVOID PILES

3165-95
GEOTECH. No.

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO			
Consulting Engineers & Planners			
C.N.R. OVERHEAD			
MILE 71-98 ALEXANDRIA SUB.			
BASE LINE RD. RELOCATION			
KING'S HIGHWAY No.	DIST. No.		9
CO. REG. MUN. OTTAWA - CARLETON			
TWP. GLOUCESTER	LOT 20	CON. IV	
FOUNDATION LAYOUT & REINFORCEMENT			
APPROVED	STRUCTURAL ENGINEER	CONTRACT No.	
DESIGN	CHECK	W.P. No.	10-69-20
DRAWING	A.G.Y. CHECK	C.Y.	
DATE	AUG. 74	LOADING	HS20-44
SITE No. 3-317		SHEET 3	

