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G.I.-30 SEPT. 1976

GEOCRES No. 3IF-66

L:ST. 9 REGION Eastern

W.P. No. 3-67-05

CONT. No. 76-18

W. O. No. 73-11029

STR. SITE No. 29-197

HWY. No. 17 & 17N

LOCATION Proposed CUR.

Overhead at Junction of Existing
Hwy 17 & 17N

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARKS: documents to be unfolded
before microfilming

FOUNDATION INVESTIGATION REPORT

For

Hwy. 17N, CPR Overhead

W.P. 3-67-05

INTRODUCTION

This report contains results of a foundation investigation carried out at the following site:

W.P. 3-67-05

CPR Overhead

SITE DESCRIPTION AND GEOLOGY

The site is located about 1 mile north of the Town of Petawawa. At the site the Canadian Forces Base of Petawawa is on either side of the highway. The area is generally flat with a slight rise to the west. The land use is mainly for military training. There is a small military aerodrome on the east side of the highway. The west side is somewhat heavily treed with evergreens.

Geologically the area belongs to the physiographic region known as the Petawawa Sand Plain. In origin, it is a delta built in the Champlain Sea by the Petawawa, Barrow, Indian, and Ottawa Rivers during the fossil stage of Lake Algonquin.

SUBSURFACE CONDITIONSGeneral

The subsoil at this site consists of a deep deposit of generally granular material. From the surface down the layers are sand, some silt, sandy silt to silty sand, clayey silt some sand, and sand some gravel and silt. The boundaries of the various deposits, as determined in the boreholes, are shown on the Record of Borehole Sheets which are contained in the Appendix

to this report. The locations and elevations are shown on Drawing No. 29-197-2 of the Contract Drawings. Estimated stratigraphical profiles and sections are shown also. A description of soil types encountered is as follows:

Sand, Some Silt

This layer was found from ground surface down and consists of fine to medium sand ranging in thickness from 47 to 52 ft. The upper 10 ft. contains a higher percentage of silt than the rest of the deposit, which in places consists of 98 to 99% sand. Grain-size distribution curves are plotted in an envelope form on Fig. 1.

The natural moisture content of the sand layer above the water table ranges between 4 and 16% and below the water table it varies from 21 to 28%.

The Standard Penetration Tests gave 'N' values which range from 5 to 81 blows/ft. with an average of 20 blows/ft. These values correspond to a relative density of loose to very dense.

Sandy Silt to Silty Sand

Underlying the brown sand is a grey, 17 to 35 ft. thick layer of sandy silt to silty sand between approximate elevations of 442 and 401. Grain size distribution curves for this material are plotted in an envelope form on Fig. 2.

The natural moisture content ranges from 21 to 28%.

The Standard Penetration Tests gave 'N' values which range from 21 to 58 blows/ft. with an average of 41 blows/ft. These values correspond to a relative density of compact to very dense.

Clayey Silt, Traces of Sand

In certain locations, the clayey silt stratum occurs beneath the sandy silt to silty sand deposit, between elevations 420 and 398, i.e. some 67 to 72 ft. below the ground surface. This layer consists of clayey silt interspersed with seams and pockets of silt. The physical properties of the cohesive portion of the deposit are as follows:

Natural Moisture Content	31 to 35%
Liquid Limit	27 to 28%
Plastic Limit	19%

Grain size distribution curves for this stratum are plotted in an envelope form on Fig. 3.

The Standard Penetration Tests gave 'N' values between 4 and 100 blows/ft., generally decreasing with depth. It is estimated that the consistency varies from soft to hard.

Sand, Some Gravel and Silt

This layer is a deposit of sand, some gravel and silt.

Grain size distribution curves for this layer are plotted in an envelope form on Fig. 4.

The natural moisture content varies from 14 to 18%.

The Standard Penetration Tests gave 'N' values between 42 to 64 blows/ft. which correspond to a relative density of dense to very dense.

Groundwater Conditions

Groundwater level observations were carried out, during the period of the investigation, in the open boreholes. The observations are presented on the Record of Borehole Sheets, as well as on Contract Drawing No. 29-197-2. The results indicate that the groundwater level varies between elevation 471 & 473 which corresponds to 13 to 17 ft. below ground surface.

M. Devata
M. Devata, P. Eng.
Supervising Engineer



MD/bp
June, 1976

APPENDIX

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

WP 3-67-05 LOCATION Sta. 292 + 27.5 17' Rt. of Hwy. 17N ORIGINATED BY PK
 DIST 9 HWY 17N BORING DATE June 20 & 27, 1973 COMPILED BY PK
 DATUM Geodetic BOREHOLE TYPE Auger, Washboring and Cone Test CHECKED BY 0

SOIL PROFILE		STRAT PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS	
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L			
485.6	Ground Level																
0.0	Sand, traces of silt. Brown Loose to Dense		1	SS	10												
			2	SS	17												2 91 (7)
			3	SS	26												
			4	SS	23												
			5	SS	11												
			6	SS	5												0 98 (2)
			7	SS	12												
			8	SS	12												
			9	SS	6												
			10	SS	7												
438.6	Silt with sand Grey Dense to Very Dense		11	SS	40											0 93 (7)	
47.0			12	SS	55												
			13	SS	36												
			14	AS	-												0 31 (69)
			15	SS	36												
413.6	Clayey silt, some sand. Hard Grey		16	SS	100												
72.0			17	SS	40												0 16 64 20
397.6	Sand with silt, traces of gravel and clay. Dense		18	SS	42												7 60 27 5
88.0																	
393.1	End of Borehole																
92.5																	
						390											

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
 ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 3

WP 3-67-05 LOCATION Sta. 292 + 91 17' Rt. of Hwy. 17N ORIGINATED BY PK
 DIST 9 HWY 17N BORING DATE June 26, 1973 COMPILED BY PK
 DATUM Geodetic BOREHOLE TYPE Auger CHECKED BY

SOIL PROFILE		STRAT PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT				LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT Y	REMARKS % GR SA SI CL	
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w			w_L
489.9	Ground Level															
0.0	Sand, some silt. Brown Compact to Dense		1	SS	30											
			2	SS	20											0 85 (15)
				3	SS	17	480									
				4	SS	23										
				5	SS	10	470									0 95 (5)
				6	SS	11										
				7	SS	13	460									
				8	SS	41										
				9	SS	12	450									0 82 (18)
				10	SS	17										
441.9																
48.0	Silt with sand. Grey															
439.4	Very Dense		11	SS	54	440									0 29 (71)	
50.5	End of Borehole															
						430										

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 4

WP 3-67-05 LOCATION Sta. 293 + 27 17' Lt. of Hwy. 17 N ORIGINATED BY PK
 DIST 9 HWY 17N BORING DATE June 27, 1973 COMPILED BY PK
 DATUM Geodetic BOREHOLE TYPE Cone Test CHECKED BY [Signature]

SOIL PROFILE		SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE					
489.6	Ground Level								
0.0									
452.6	End of Cone Test								
37.0									

20
15 \diamond 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
 ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 6

WP 3-67-05 LOCATION Sta. 293 + 82 17' Lt. of Hwy. 17N ORIGINATED BY PK
 DIST 9 HWY 17N BORING DATE June 21 and June 25, 1973 COMPILED BY PK
 DATUM Geodetic BOREHOLE TYPE Auger CHECKED BY PK

SOIL PROFILE		SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT				LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS	
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		'N' VALUES	20	40	60	100	w_p	w			w_L
488.0	Ground Level														
0.0	Sand, some silt. Brown Loose to Very Dense		1	SS	14										
				2	SS	16									0 66 (34)
				3	SS	10									
				4	SS	9									
				5	SS	7									
				6	SS	8									0 99 (1)
				7	SS	16									
				8	SS	24									
				9	SS	14									
				10	SS	16									
				11	SS	57									
436.0	Sandy silt to silty sand. Grey Compact to Very Dense		12	SS	55									0 98 (2)	
52.0			13	SS	37										
				14	SS	30									0 54 (46)
				15	SS	58									0 24 69 7
401.0	Sand, some gravel, traces of silt. Dense		16	SS	28										
87.0			17	SS	48									17 73 (10)	
392.5	End of Borehole														
95.5															

20
 15 \diamond 5 % STRAIN AT FAILURE
 10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
 ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 7

WP 3-67-05 LOCATION Sta. 294 + 48 17' Lt. of Hwy. 17N ORIGINATED BY PK
 DIST 9 HWY 17N BORING DATE June 25 to 26, 1973 COMPILED BY PK
 DATUM Geodetic BOREHOLE TYPE Auger, Washboring and Cone Test CHECKED BY

SOIL PROFILE		STRAT. PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — W _L PLASTIC LIMIT — W _P WATER CONTENT — W			UNIT WEIGHT Y	REMARKS
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	'N' VALUES		20	40	60	80	100	W _P	W	W _L		
487.6	Ground Level															
0.0																
	Sand, some silt.		1	SS	18											
			2	SS	18											
			3	SS	19											0 84 (16)
			4	SS	13											
	Brown		5	SS	11											
			6	SS	12											
	Compact to Very Dense		7	SS	19											
			8	SS	23											
			9	SS	81											0 93 (7)
			10	SS	35											
			11	SS	32											
439.6																
48.0	Sandy silt to silty sand.		12	SS	21											0 50 (50)
	Grey															
	Loose to Very Dense		13	SS	56											
420.6																
67.0	Clayey silt, traces sand.		14	SS	37											0 10 71 19
	Firm to Hard															
	Grey		15	SS	4											
401.6																
86.0	Sand, some gravel.		16	SS	47											23 46 25 6
	Dense to Very Dense															
387.1																
100.5	End of Borehole		17	SS	64											

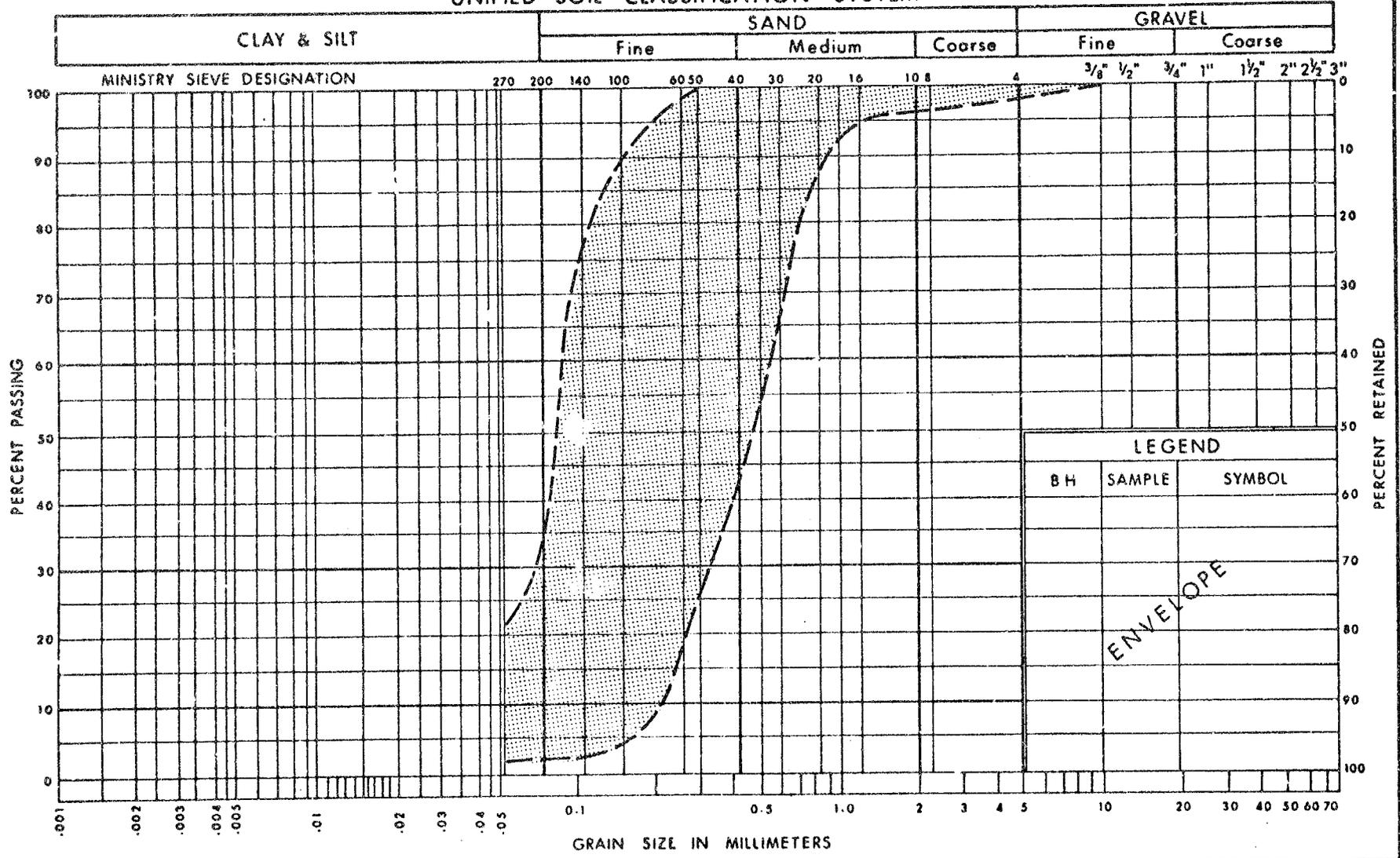
20
 15 \diamond 5 % STRAIN AT FAILURE
 10

RECORD OF BOREHOLE NO 8

WP 3-67-05 LOCATION Sta. 294 + 14 17' Rt. 6 Hwy. 17N ORIGINATED BY PK
 DIST 9 HWY 17N BORING DATE June 22, 1973 COMPILED BY PK
 DATUM Geodetic BOREHOLE TYPE Cone Test CHECKED BY [Signature]

SOIL PROFILE		SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT	LIQUID LIMIT w_L	UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		'N' VALUES	20 40 60 80 100		
						SHEAR STRENGTH		WATER CONTENT %	
						○ UNCONFINED + FIELD VANE		w_p — w — w_L	
						● QUICK TRIAXIAL x LAB VANE			
487.7	Ground Level								
0.0									
480									
470									
460									
450									
440									
436.9									
50.8	End of Cone Test								140/9"

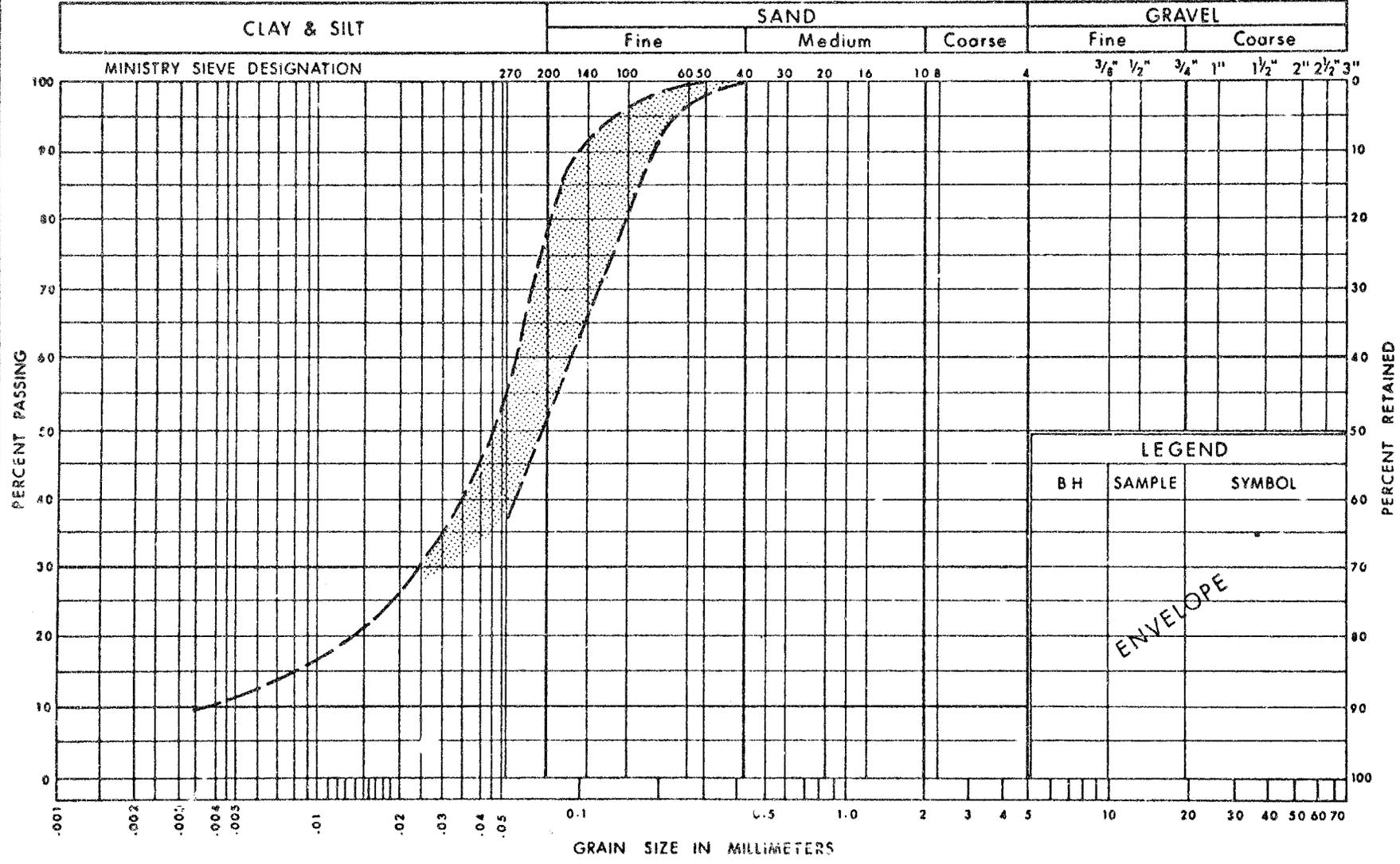
UNIFIED SOIL CLASSIFICATION SYSTEM



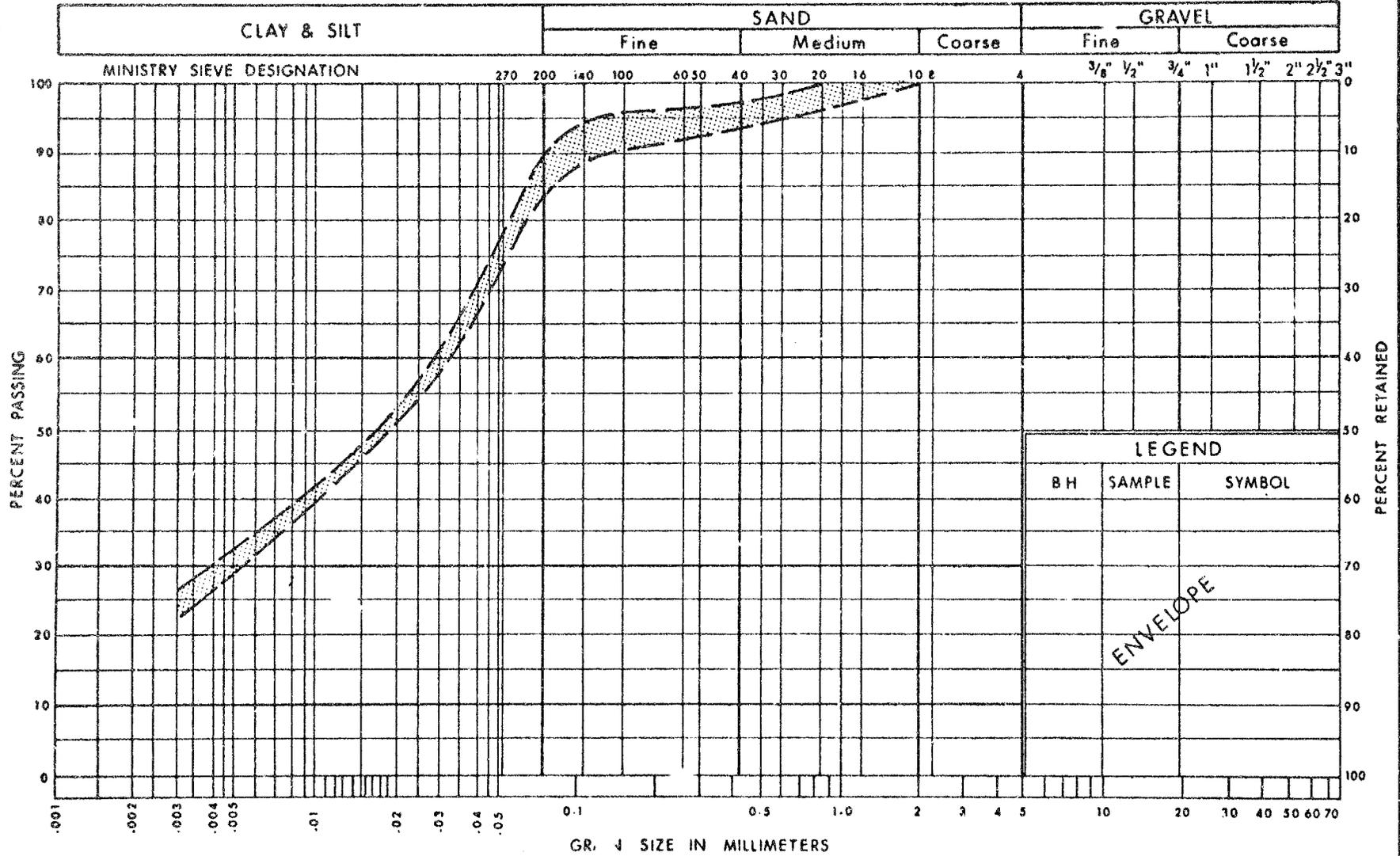
LEGEND		
BH	SAMPLE	SYMBOL

ENVELOPE

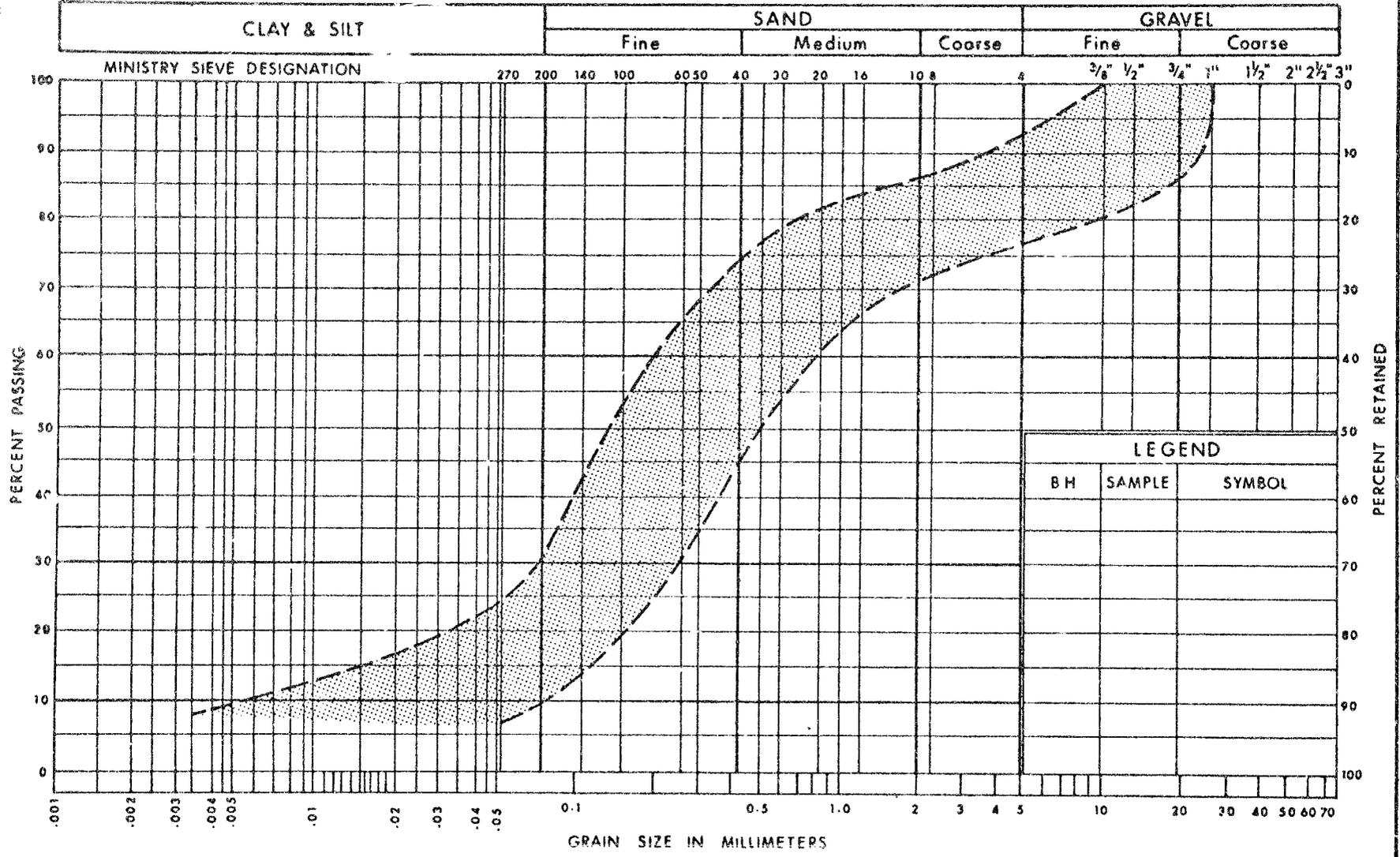
UNIFIED SOIL CLASSIFICATION SYSTEM



UNIFIED SOIL CLASSIFICATION SYSTEM

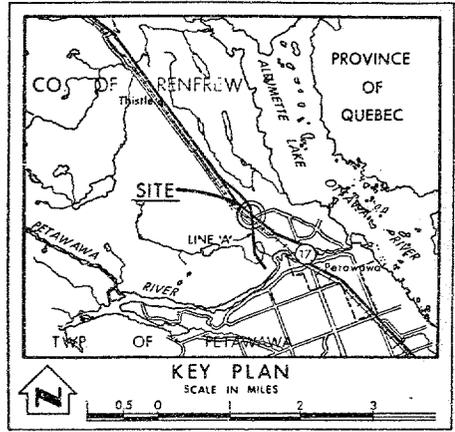
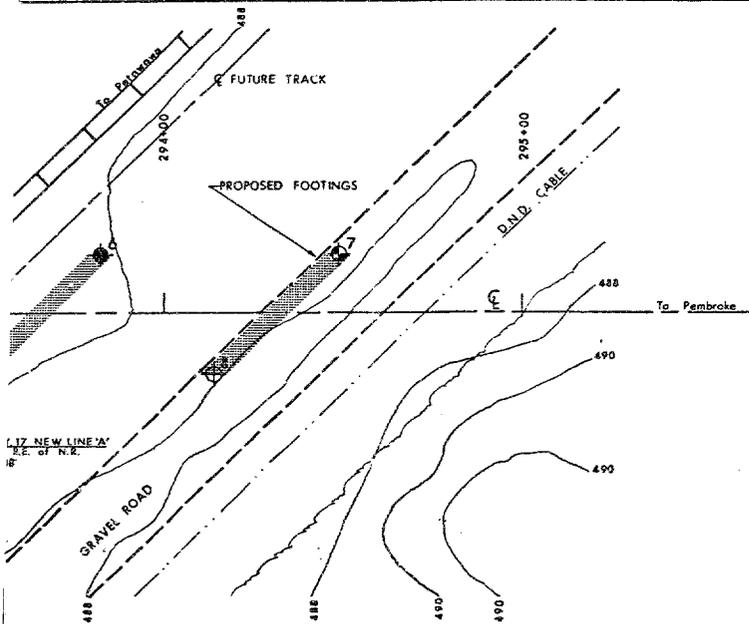


UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION
SAND
 SOME GRAVEL, TRACE OF SILT

FIG No 4
 W P 3-67-05



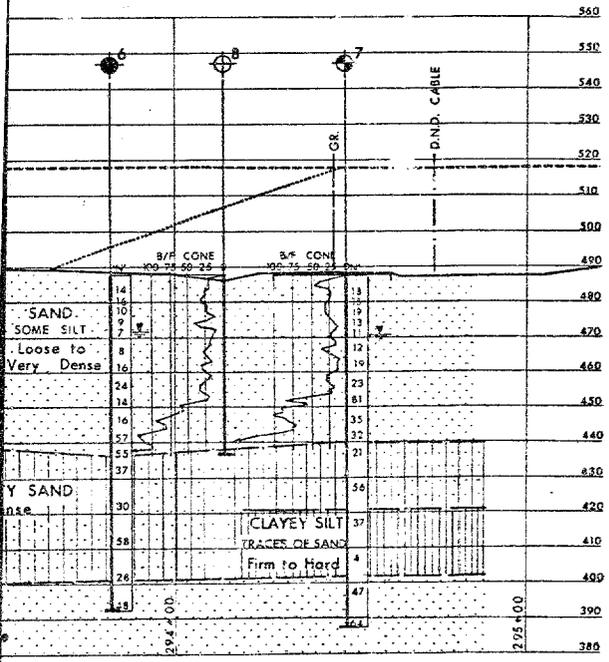
LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Level established at time of field investigation. JUNE 1973.

NO.	ELEVATION	STATION	OFFSET
1	485.6	292+27.5	17' RT.
2	485.6	292+64	17' LT.
3	499.9	292+91	17' RT.
4	489.6	293+27	17' LT.
5	498.1	293+48	17' RT.
6	468.0	293+82	17' LT.
7	487.6	294+48	17' LT.
8	487.7	294+14	17' RT.

— 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 OFFICE

CANADIAN PACIFIC RAILWAY

HIGHWAY NO. 17 NEW LINE 'A' DIST. NO. 9
 CO. RENFREW
 TWP. PETAWAWA LOT 27 CORNER RANGE 'A'

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. P.K.	CHECKED <input checked="" type="checkbox"/>	WP NO. 3-67-05	DRAWING NO.
DRAWN M.S.	CHECKED <input checked="" type="checkbox"/>	WG NO. 73-11029	73-11029 A
DATE <u>JULY 25, 1973</u>	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT. NO.		



File please

MINUTES OF MEETING

STRUCTURAL REVIEW COMMITTEE

TIME: July 7th, 1976, 9:30 A. M.

PLACE: Boardroom "B", West Building

Attending: A. E. McKim - Construction Branch
D. Laframboise - Construction Branch
R. Kan - Structural Office
M. Stoyanoff - Structural Office
P. Gormek - Structural Maintenance
M. Devata - Soil Mechanics Section
V. Boehnke - Hydrology Section.

Projects: (A) Petawawa River Bridge
W. P. 3-67-02

(B) C. P. R. Overhead
W. P. 3-67-05

Both projects were presented by Mr. R. Kan.

The Committee commented as follows:

Petawawa River Bridge (W.P. 3-67-02)

(a) Foundations

The foundation and unwatering requirements were reviewed and it was felt that no problems would be encountered during construction.

The unwatering was dealt with in some detail and it was concluded that the presence of boulders would probably preclude the method of unwatering at the piers as a fill, excavation, and pumping operation. It was pointed out that an unwatering item has been provided in the contract.

(b) Hydrology

Hydrology recommended that two of the deck drains be relocated in order to avoid erosion of the embankments of the streambed.

This requirement is to be effected by the Construction Branch at the time of construction.

(c) Structure

The load cell enclosures are shown as made of P.V.C. material. The Construction Branch commented that on the West Arm Lake Nipissing structure the bearing enclosures were also P.V.C. material but proved unsatisfactory in that they broke in handling.

The Construction Branch will take steps after award of the contract to modify the enclosure requirements to a more suitable arrangement as was done for the Lake Nipissing structure.



The drawing showing the pin installation for as built data is not current. The latest standard will be forwarded to the District prior to construction by the Construction Branch.

C.P.R. Overhead (W.P. 3-67-05)

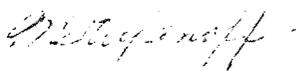
(a) Foundations

The Soil Mechanics Section recommended that since the proposed caisson supports for the structure are a special type, the installation of these should be monitored and records kept.

After award of the contract, the Construction Branch will provide ample notice in advance of this work to enable the Soil Mechanics Section to arrange for and carry out their project.

No further matters or points were noted and the meeting adjourned at 10 45 A.M.

MS/cf



M. Stoyanoff,
Structural Contract Engineer.

Copies to:

J. B. Wilkes
W. Wigle
E. Orr
R. Dorton
C. Grebski
W. Lin
J. Keen
K. Bassi
W. McFarlane
J. Childs
All in Attendance

Install Concrete Caisson Piles

Payment for this item shall be at the unit price bid for the total lineal feet of concrete piling remaining in the completed structure and shall include the supply and placing of all concrete in the piles as shown on the drawings and hereinafter described, and the supply of any other material and all equipment required to install the piles.

The Ministry will supply the cement.

The piles shall be driven type, cast in place concrete displacement caissons with an expanded base. They shall be placed using a cylindrical casing.

The casing shall be advanced to the required depth by hammering a zero slump concrete plug placed at the bottom of the casing. The casing shall then be restrained from further penetration. The expanded base shall then be formed by compressing and expelling batches of concrete from the bottom of the casing using an internal hammer having an energy of 140,000 ft. lbs per blow. Expelling of concrete shall continue until such time as a volume of 5 cu. ft. of concrete requires 22 blows for a 130 ton design load and 18 blows for a 70 ton design load to be completely expelled from the casing.

The shaft shall be formed by placing and compacting the concrete using the driving hammer. Simultaneously the casing shall be withdrawn. At no time during the casing withdrawal shall the surface of the concrete be less than 6" higher than the bottom of the casing until the ground surface is reached.

The shaft from top of base to cut-off elevation will be of reinforced concrete, cylindrical, of a minimum cross section equal to the outside diameter of the driving casing.

The class of all concrete used in the caisson shall be 4000 p.s.i., having a zero slump.

The cut-off elevation of the piles shall conform with the elevation shown on the plans, within 4" more or less. The piles shall not be out of plumb or indicated batter more than 2% of their length, not more than 3" laterally from location indicated on plans.

Measurement for payment of this item shall be based on the length of piling measured from the top of the base to the cut-off elevation.

W.P. 3-67-05,
CPR Overhead, Site 29-197,
Highway 17N, District 9.

MINUTES OF MEETING

A meeting was held on January 14, 1974, 2 P.M. in Mr. Grebski's office to discuss the Special Provisions relating to the cast in place concrete piles for the above bridge.

In attendance were the following:

- A. Mr. K.G. Bassi, Regional Str. Design Engr.
 - B. Mr. R. Kan, Structural Engineer
 - C. Mr. N. Zoltay, Structural Specifications Engr.
 - ✓ D. Mr. K. Selby, Sr. Foundations Engineer
 - E. Mr. W. Hashizume, Reg. Constr. Engr. Structures.
1. To attain the specified design loads, it was felt that some caissons may have to be taken down further. To provide for this contingency, longitudinal reinforcing bars P 7001 (abutments) and P 7002 (piers) will be lengthened by 3'-0".
 2. To convey to the Contractor the correct construction procedure, the Special Provisions will be rewritten as shown in the attached sheet.



W. Hashizume,
Regional Construction Engineer,
Structures.

Install Concrete Caisson Piles

Payment for this item shall be at the unit price bid for the total lineal feet of concrete piling remaining in the completed structure and shall include the supply and placing of all concrete and reinforcing steel in the piles as shown on the drawings and hereinafter described, and the supply of any other material and all equipment required to install the piles.

The Ministry will supply the cement.

The piles shall be driven type, cast in place concrete displacement caissons with an expanded base. They shall be placed using a cylindrical casing.

The casing shall be advanced to the required depth by hammering a concrete plug placed at the bottom of the casing. The casing shall then be restrained from further penetration. The expanded base shall then be formed by compressing and expelling batches of concrete from the bottom of the casing using an internal hammer having an energy of 140,000 ft. lbs per blow. Expelling of concrete shall continue until such time as a volume of 5 cu. ft. of concrete requires 22 blows for a 130 ton design load and 18 blows for a 70 ton design load to be completely expelled from the casing.

The shaft shall be formed by placing and compacting the concrete using the driving hammer. Simultaneously the casing shall be withdrawn. At no time during the casing withdrawal shall the surface of the concrete be less than 6" higher than the bottom of the casing until the ground surface is reached.

The shaft from top of base to cut-off elevation will be of reinforced concrete, cylindrical, of a minimum cross section equal to the outside diameter of the driving casing.

All reinforcing steel shall be supplied in accordance with the latest issue of C.S.A. Specification C 30.1, intermediate or structural grade.

The class of all concrete used in the caisson shall be 4000 p.s.i., having a zero slump.

The cut-off elevation of the piles shall conform with the elevation shown on the plans, within 4" more or less. The piles shall not be out of plumb or indicated batter more than 2% of their length, not more than 3" laterally from location indicated on plans.

Measurement for payment of this item shall be based on the length of piling measured from the top of the base to the cut-off elevation.

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

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

July 10, 1973.

*Foundation Investigation for Proposed
C.P.R. Overhead at Junction of Existing
Hwy. 17 & Hwy. 17 N, District 9 (Ottawa)
W.O. 73-11029 - W.P. 8-67-05*

Field work for the above-mentioned project was completed on June 27, 1973. The following paragraphs contain a summary of subsoil conditions and our recommendations relating to the design of the proposed structure foundations.

Subsoil Conditions

Subsoil at the site consists of a deep, loose to very dense deposit of sand ranging in thickness from 47 to 52 ft. overlying a compact to very dense deposit of sandy silt 17 to 35 ft. in thickness. The top layer is classified as fine to medium sand and has "N" values ranging between 5 and 81 blows per foot. The "N" values of the sandy silt range from 21 to 58 blows per foot. Below the sandy silt is a layer of silt to clayey silt averaging 18 ft. in thickness with "N" values varying from 4 to 100 blows per foot. Beneath the silt to clayey silt is a dense to very dense layer of sand with gravel. This deposit was encountered some 90 to 100 ft. below the surface.

Groundwater levels in the boreholes, after several days of observations were found to be at elevation 472+, some 16 feet below the surface.

Recommendations:

1) General

It is proposed to construct a new overhead structure at this site to carry the new Hwy. 17 over the C.P.R. tracks. The new bridge will be skewed at an angle of 44°-13'-40" and will have spans of 64 ft., 56 ft., and 60 ft. The grade of the new bridge will be at approximate elevation 518+ which is some 30 ft. above the average level of the ground surface at the site.

2) H Piles

The entire structure may be supported on steel H piles. Such piles, if driven to approximate elevation 380, should be capable of supporting safe loads of up to 95 tons per pile. It will be necessary to control pile driving in the field by means of the Hiley Formula according to the appropriate M.T.C. Standard.

3) Franki Piles

The entire structure may be supported on Franki type displacement caissons with expanded bases formed at approximate elevation 481, for the abutment and 472 for the piers. For pile diameters of 20", at the abutments 70 tons per pile is recommended and at the piers 130 tons per pile is recommended. For estimating purposes it may be assumed that for 9 piles each abutment, and 12 piles each pier the total cost will be in the order of \$12,000.

4) Spread Footings

The complete structure may also be supported on spread footings, pier footings being constructed in original ground, and the abutments being placed within the approach embankments on a specially constructed core of fully compacted Granular 'A' material. For the abutment the net safe soil pressure is recommended to be 2.5 t.s.f. and the method and details of construction should be as shown on the attached Fig. 1. At the proposed piers the bearing capacity of the subsoil is such that spread footings are not practical unless the supporting capacity of the subsoil is increased by compacting the soil using deep vibrators or vibroflots. Consideration should also be given to increasing the supporting capacity of the granular core within the approach fills. By the means of deep vibrators the safe bearing capacity of the soil can be increased to about 5.0 t.s.f. and possible differential settlements reduced to a maximum of 1/2 inch between adjacent footings. Compaction points should be spread about 5.5 ft. apart and the area compacted should be about 1-1/2 times the footing area. The depth of compaction should be about 20 ft. below footing base level or twice the footing width whichever is greater. For estimating purposes it may be assumed that the cost of compaction will be about \$6.00 per lin. ft. Track protection for the pier excavations will be required if the excavations are closer than 10 ft. from the C.P.R. tracks. This should be in the form of braced sheeting.

5) Spread Footings and Piles

As a fourth alternative the structure may be supported partly on spread footings and partly on piles. In this case piled foundations may be constructed as in (2) or (3) and spread footings as in (4). Regardless of which method of supporting the structure is selected it may be assumed that differential settlements between footings after the deck is poured will be less than 1 inch. In any event, settlements in this type of subsoil generally occur immediately the load is applied.

6) Dewatering

No dewatering problems are anticipated for any footing excavation since the groundwater level is well below the recommended footing bases.

All footings or pile caps will require a minimum of 6 feet of cover for frost protection.

No stability problems are anticipated for the proposed approach embankments constructed with standard 2:1 slopes.

The foregoing should be sufficient for your structural design requirements. If, however, further information is required please contact this office.

Our complete report will be forwarded to you in due course.

K. G. Selby

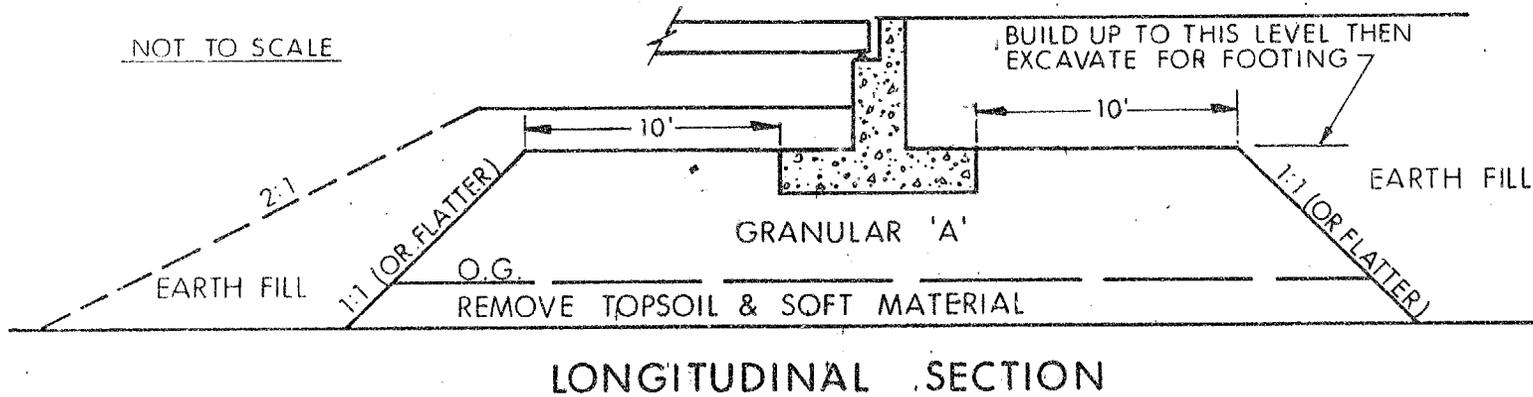
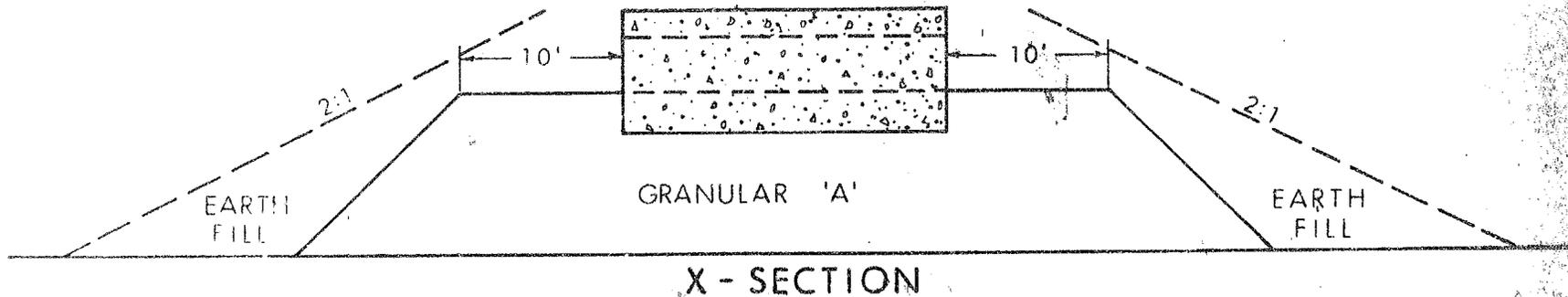
KGS/ao

K. G. Selby,
SUPERVISING FOUNDATIONS ENGINEER.

c.c. K. G. Bassi
J. Anderson

Foundations Files ✓
Documents

ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



NOTES

- 1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A'.
- 2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT D.T.C. STANDARDS.
- 3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING.

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

Structural Planning Office,
Kingston, Ontario.

Mr. K. Bassi

25 June 1973.

W.P. 3-67-05, Site 29-197,
C.P.R. Overhead,
Highway 17N, District 8-Ottawa

72-11021

With reference to the above-mentioned structure I enclose two sets of signed survey drawings (one set for your files and one set for the use of the designer) as listed below showing the revised alignment for the structure which has been relocated some 3000 ft. to the east of the original alignment.

Bridge Site Plan	E-5251-1
Plan	E-607-17 (New) Portion
Profile	C-607-17 (New) Portion
Railway Crossing Plan	G-3366

Design criteria, structure cross section, railway requirements, etc., are as described in the original Bridge Planning Report dated April 7, 1973. Services are the same as those mentioned in this Report and are located in similar positions relative to the railway track.

Results of the new foundation investigation being carried out under the supervision of Mr. K. G. Selby, Supervising Foundations Engineer, have not yet been received but the Foundation Report will be forwarded to you as soon as it is available.

It is not intended to issue a revised comprehensive Bridge Planning Report but please let me know if further information is required.

Preliminary bridge plans should be issued by August 29, 1973 and design completed by January 9, 1974.

TCK/hl
encl.

c. c. P. D. Billings
J. M. Childs
A. G. Stermac - Att. K. G. Selby
H. Chyc

T. C. Kingsland
Regional Structural Planning Engineer

A. J. Percy
R. Forrest



11. INSTALL CONCRETE CAISSON PILES

Payment for this item shall be at the unit price bid for the total lineal feet of concrete piling remaining in the completed structure and shall include the supply and placing of all concrete and reinforcing steel, in the piles as shown on the drawings and the supply of any other material and all equipment required to install the piles.

The Ministry will supply the cement.

The caisson-piles shall be of a cast in place concrete type with expanded base. They shall be placed using a cylindrical casing with an inside diameter of 20 inches.

The base will be compacted in place in the granular bearing soil and the last batch of concrete (5 cu. ft.) shall be expelled from the tube and compressed with not less than 22 blows for 120 ton design load and not less than 18 blows for 70 ton design load. Each blow shall not be less than 140,000 ft.lbs.

The shaft from top of base to cut-off elevation will be of reinforced concrete, cylindrical, of a minimum cross section equal to the outside diameter of the driving casing.

All reinforcing steel shall be supplied in accordance with C.S.A. Specification G 30.1 latest issue, intermediate or structural grade.

The class of concrete shall be 4,000 p.s.i., having a zero slump.

The cut-off elevation of the piles shall conform with the elevation shown on the plans, within 4" more or less. The piles shall not be out of plumb or indicated batter more than 2% of their length, nor more than 3" laterally from location indicated on plans.

Measurement for payment of this item shall be based on the length of piling measured from the top of the base to the cut-off elevation.

12. PLACE CONCRETE IN PIERS, ABUTMENTS AND WINGWALLS

Payment for this item at the lump sum bid will include supplying and placing the steel ring encasement for the column reinforcement as shown on drawing 29-197-3, the treatment of the bearing seats as specified on the drawings and the placing of the Date and Site Number figures as shown on the drawings. The Ministry will supply the figures.

FRANKI

CANADA LIMITED



105 NANTUCKET BLVD.

TELEX NO.
02-21159
CABLEGRAMS
"FRANKITOR"
TELEPHONE:
751-4200

SCARBOROUGH, ONT.

Our Reference:
X. 1972

May 26, 1972.

Mr. A. G. Stermac,
Principal Foundation Engineer,
Design Services Branch,
West Building,
Ministry of Transportation and Communications,
Downsview, Ontario.

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

Re: Canadian Pacific Railway Bridge
Highway No. 17 "New"
Petawawa
Job No. 72-11021
Franki Piles

Dear Sir:

As requested, we submit our suggested specifications for the above project.

As discussed in our letter of May 3, 1972, we recommend that the specifications stipulate that the pier piles be installed from existing grade.

Yours very truly,

FRANKI CANADA LIMITED,

A. W. Millard, P. Eng.,
Chief Engineer.

AWM:AL
Encl.

C.C.--Mr. K. G. Bassi, P. Eng.,
Regional Structural Design Engineer

TRANSPORT AND ASSEMBLE EQUIPMENT FOR INSTALLING FRANKI PILES

For the lump sum price bid under this item, the Contractor shall transport, unload and assemble all machinery and equipment required to install the specified type of piles to the specified design requirements; and shall, after all the piles are installed and accepted by the Engineer, dismantle, load and transport this machinery and equipment from the project site. All other costs relating directly and indirectly to the machinery and equipment required to install piles shall be included in the unit price bid for installing piles, and no extra payment will be made for any excavation, fill or backfill required to accommodate the equipment.

The equipment to be employed by the Contractor shall be adequate, in the opinion of the Engineer, to perform the work competently. Before commencing work, the Contractor shall submit full details of the equipment, and the methods of its operation to the Engineer for his approval.

When the satisfactory performance of the machinery and equipment has been demonstrated to the Engineer, such as the satisfactory installation of a battered pile, one-half of the lump sum price bid for this item will be paid. The remainder of the payment will be made at the completion of the work.

INSTALL FRANKI PILES

Payment for this item shall be at the unit price bid for the total lineal feet of concrete piling remaining in the completed structure and shall include the supply and placing of all concrete, reinforcing steel and steel shells in the piles as shown on the drawings.

The Department will supply the cement.

The caisson piles shall be of a cast-in-place concrete type, consisting of an expanded base and a shaft. They shall be placed using a cylindrical driving casing with an outside diameter of 20 inches. The class of concrete shall be 4000 p.s.i., and shall have a zero slump.

The base shall be compacted in place in the granular bearing soil and the last batch of concrete (5 CU. FT.) shall be expelled from the tube and compressed with not less than 22 blows for 120 Ton design load and not less than 18 blows for 70 Ton design load. Each blow shall not be less than 140,000 ft. lbs. The base shall be formed approximately at the elevations shown on the drawings.

The shafts from top of base to cut off elevation shall be of reinforced concrete, as indicated on the drawings.

Cont'd...

INSTALL FRANKI PILES (Continued)

The reinforced concrete shafts shall be cylindrical and of a minimum cross section equal to the outside diameter of the driving casing. The shafts shall be reinforced for their full length with longitudinal bars, bound together with a spiral, as shown on the drawings.

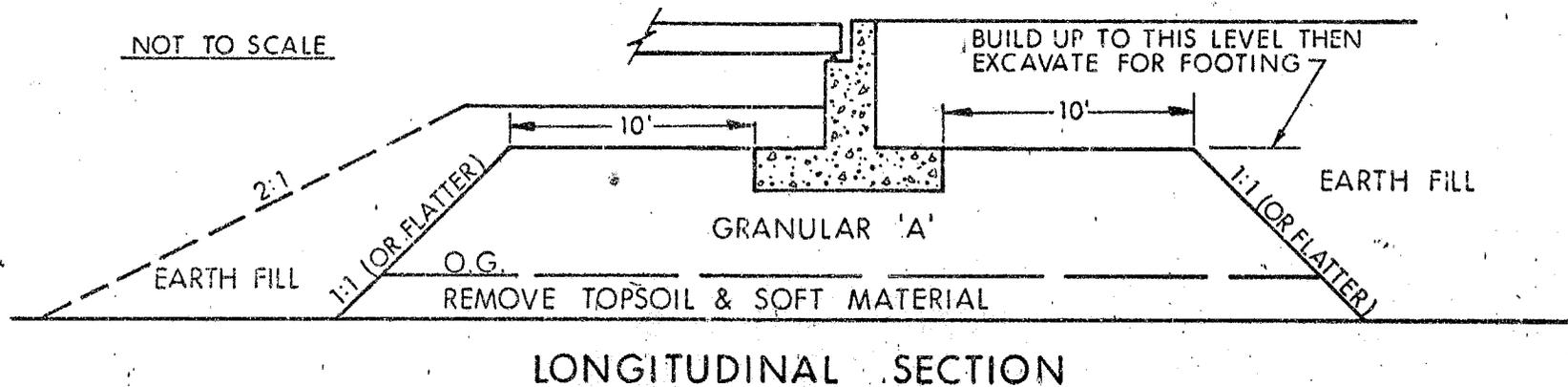
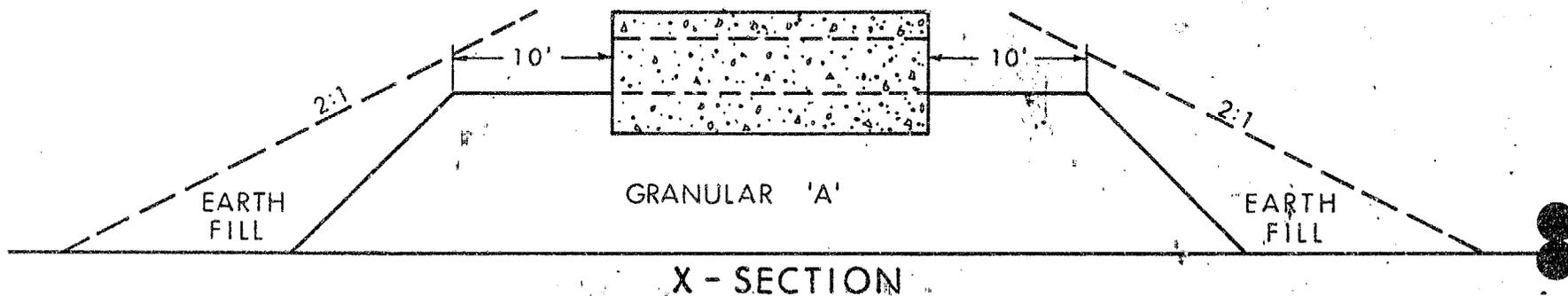
All reinforcing steel shall be supplied in accordance with C.S.A. Specification G30.1 latest issue, intermediate or structural grade.

Concrete for the reinforced shaft shall be deposited in batches of 3 cubic feet or less. Each batch shall be compacted with a minimum of 2 blows of 20,000 ft. lbs. each.

The cut off elevations of the piles shall conform with the elevation shown on the plans, within 4". The piles shall not be out of plumb or indicated batter more than 2% of their length, nor more than 3" laterally from the location indicated on the plans.

Measurement for payment of this item shall be based on the length of piling measured from the top of the base to cut off elevation.

ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



NOTES

- 1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A'.
- 2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT D.T.C. STANDARDS.
- 3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING.



JOHANN KELLER CANADA LTD.

Box 34, Toronto Dominion Centre, Suite 1400, Toronto 1, Ont.

VIBRO-COMPACTION
VIBRO-REPLACEMENT
GROUNDWATER LOWERING
GROUTINGS
TIEBACKS
DIAPHRAGM WALLS
SANDDRAINS

Tel.: (416) 863-1769
Telex: 02-21585

Montreal, April 27, 1972.

Mr. Kris G. Bassi, P. Eng.,
Regional Structural Design Eng.,
Ministry of Transportation &
Communications,
Downsview, ONT.

REFERENCE: Your Job W.P. No. 3-67-05
C.P.R. Crossing
Renfrew
Our Project No.: P/92/013

Gentlemen:

We looked at the details you gave us last Monday and we have pleasure to confirm that the encountered soil conditions are extremely suitable to apply the vibroflotation process.

Please find hereinafter our quotation for the execution of the foundation on the basis of these information which we would like to repeat shortly:

Soil Conditions: as mentioned on drawing 72-11021A

Structures: 2 abutments with sizes 6'6" x 35'
2 footings with sizes 15' x 15'

Soil Pressure: 10 kips /sq. ft.

Abutments are placed on fill according to your specifications called "Abutment on Compacted Fill Showing Granular 'A' Core".



Page 2 (Mr. Kris G. Bassi)
(April 27, 1972.)

We confirm that there will be no problem concerning the loosening of the granular 'A' when work is executed as shown attached.

If the spacing of compaction points is as shown, the depth will be in both cases 25' below bottom of footing which is some 6' below working platform respectively natural ground level for the two footings and some 2' below working platform at the two abutments.

The total settlements will be less than one inch. The differential settlements will be less than half an inch between two adjacent footings.

The execution of the work near the railway embankment is feasible.

In the area of the abutments the top silty layer of some 5 feet has to be excavated by general contractor before placing of the fill. The width of excavation has to correspond to width of compaction area.

Our price is based on the following considerations:

- a) Work can be executed till November 1972;
- b) Continuous work is possible;
- c) Access, dry working platform and bench marks are provided;
- d) All obstacles such as water-mains or cables are removed or protected.

The complete work includes mobilization and demobilization, execution of compaction, delivery of material to be added to compensate reduction of porosity, salaries, wages, equipment.

78 compaction points, 25' deep, for two footings and two abutments:

LUMP SUM : \$ 13,500.00

We hope this will be of satisfaction to you.

VB/cd
copy to Mr. Ken Selby

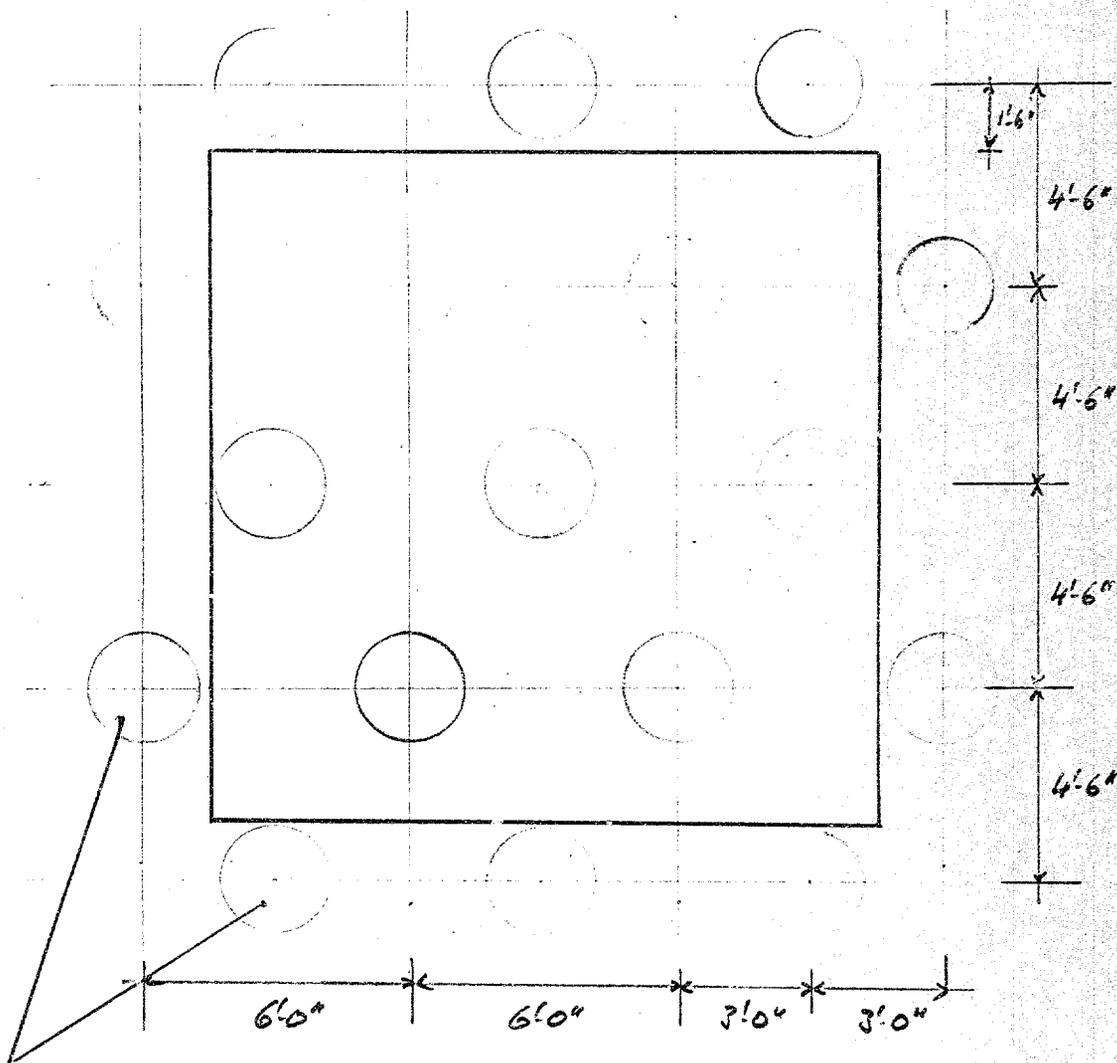
VOLKER BAUMANN



JOHANN KELLER
CANADA LTD.

DESIGN FOR VIBRO FLotation-PROCESS

PROJECT: W.P. NO 3-67-05



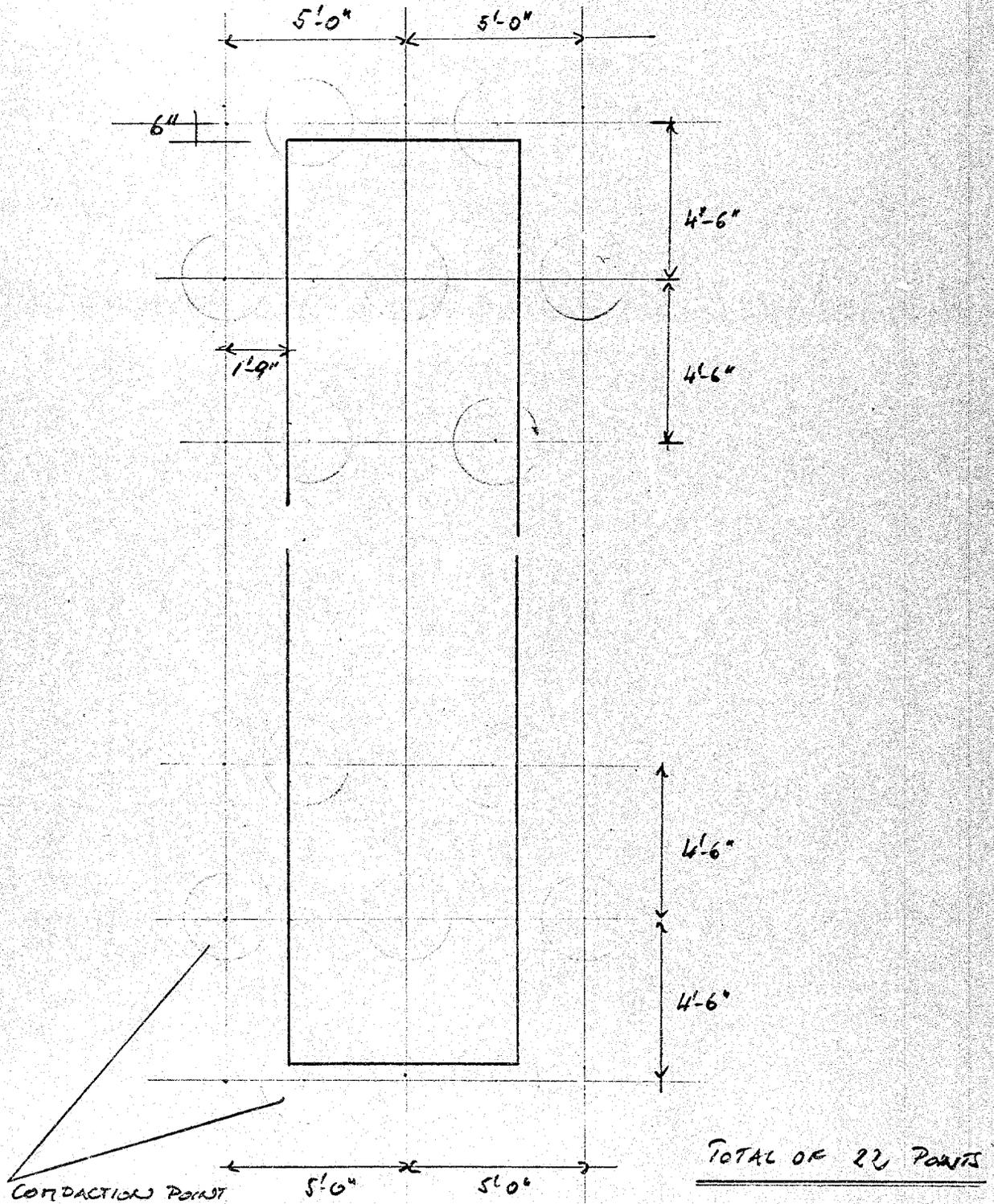
COMPACTION POINT

FOOTING WITH SIZE 15' x 15'

27.4.72 *J. K.*



JOHANN KELLER
CANADA LTD.



SIZE OF ABUTMENT: 6'-6" x 35'-0"

27.4.72 *[Signature]*

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

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

March 1, 1972.

Foundation Investigation For Proposed
C.P.R. Overhead at Junction of Existing
Hwy. 17 & Hwy. 17 N, District #9 (Ottawa)
W.O. 72-11021 -- W.P. 3-67-05

Field work for the above-mentioned project was completed on February 25, 1972. Under normal circumstances it takes another three to four weeks to complete our foundation investigation report. Due to the fact that we will be unable to meet our scheduled completion date of March 1, 1972, we have reviewed the information obtained in the field and have prepared a summary of this together with specific recommendations relating to the foundation design of the new structure in order that the scheduled structural design work may proceed without delay. Our summarized report is as follows:

Subsoil

Subsoil at the site consists of a deep deposit of sand ranging in thickness from 60" to 72" ft. overlying a dense to very dense deposit of silt with traces of clay. Apart from the upper 5 to 6 ft. where the relative density is classified as generally loose, the sand deposit as a whole is classified as compact to very dense with 'N' values ranging between 10 and 75 blows per foot. The grain size composition of the deposit varies somewhat, and some four different layers were identified from the surface downwards to be fine sand, fine to medium sand, medium sand, and fine sand. These layers range in thickness from 15 to 20 ft. The dense to very dense silt deposit extends for at least 37" ft. below the sand deposit. 'N' values in this material range from 40 to more than 100 blows per ft. Groundwater level in the boreholes was found to be at approximate elevation 470 some 25 feet below ground surface.

Recommendations

It is proposed to construct a new overhead structure at this site to carry the new Hwy. 17 over the C.P.R. tracks. The

BELOW THE SAND IS A COMPACT LAYER OF
OF SAND WHICH EXTENDS FOR APPROXIMATELY 16'
FOLLOWING THIS IS A VERY DENSE LAYER OF
GRAVEL

new bridge will be skewed at an angle of $27^{\circ} 07' 30''$ and will have spans of 96 ft., 89 ft., and 96 ft. The grade of the new bridge will be at approximate elevation 525± which is some 30 ft. above the average level of the ground surface at the site.

For the new structure various alternatives exist with regard to the type of foundation to be employed. Each of these alternatives should be considered and the most economic method selected. The various alternatives are:

- a) The entire structure may be supported on steel H piles. Such piles, if driven to approximate elevation 420, should be capable of supporting safe loads of up to 90 tons per pile. It will be necessary to control pile driving in the field by means of the Hiley Formula according to the appropriate D.T.C. Standard.
- b) The entire structure may be supported on Franki type displacement caissons with expanded bases formed at approximate elevation 472. For such piles design loads may be as follows:

16 inch dia. shaft	-	70 tons
20 inch dia. shaft	-	125 tons
24 inch dia. shaft	-	150 tons

The cost of installing these piles complete with reinforcement and all materials may be estimated assuming \$13.00, \$16.00, and \$19.00 per lin. ft. for the 16-inch, 20-inch and 24-inch types respectively.

- c) The complete structure may also be supported on spread footings, pier footings being constructed in original ground, and the abutments being placed within the approach embankments on a specially constructed core of fully compacted Granular 'A' material. For the abutment the net safe soil pressure is recommended to be 2 t.s.f. and the method and details of construction should be as shown on the attached Fig. 1. For the proposed piers spread footings may be constructed at or below elevation 489.0 assuming a net safe soil pressure of 3 t.s.f. Track protection for the pier excavations will be required if the excavations are closer than 10 ft. from the C.P.R. tracks. This should be in the form of braced sheeting.
- d) As a fourth alternative the structure may be supported partly on spread footings and partly on piles. In this case the abutment may be perched within the approach fills and supported on piles as in (a) or (b). The piers may be supported on spread footings as in (c).

March 1, 1972.

Regardless of which method of supporting the structure is selected it may be assumed that differential settlements between footings after the deck is poured will be less than 1 inch. In any event, settlements in this type of subsoil generally occur immediately the load is applied.

No dewatering problems are anticipated for any footing excavation since the groundwater level is well below the recommended footing bases.

All footings or pile caps will require a minimum of 6 feet of cover for frost protection.

No stability problems are anticipated for the proposed approach embankments constructed with standard 2:1 slopes.

The foregoing should be sufficient for your structural design requirements. If, however, further information is required please contact this Office.

Our complete report will be forwarded to you in due course.

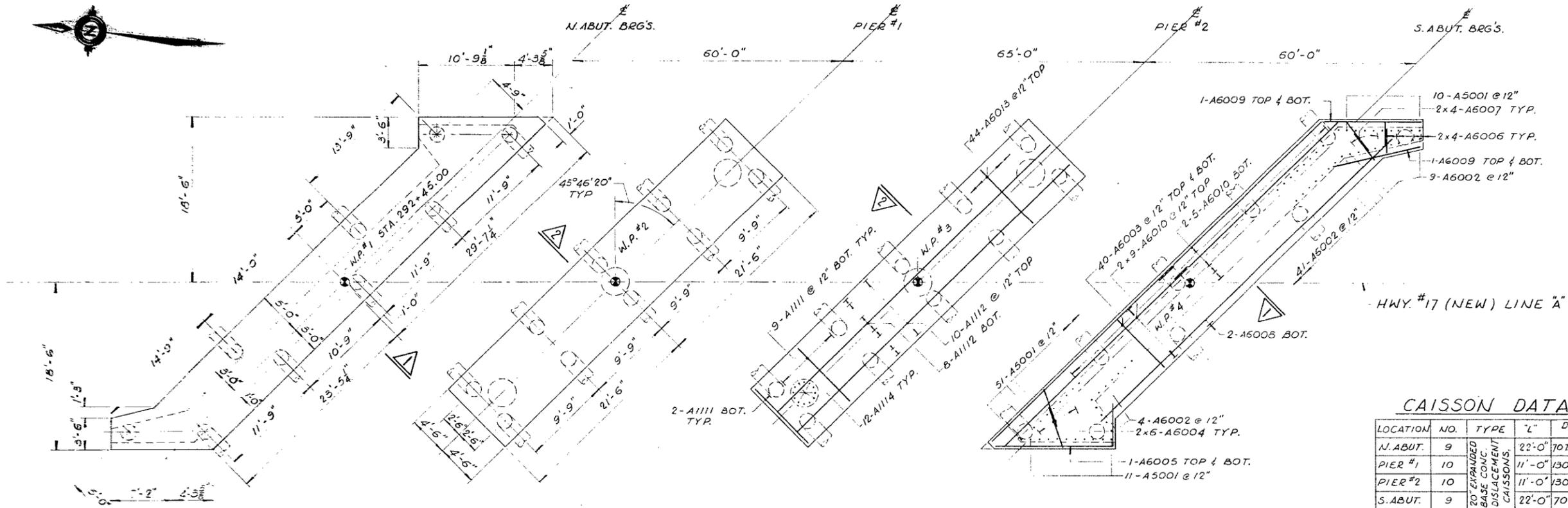
K. G. Selby

KGS/ao

K. G. Selby,
SUPERVISING FOUNDATION ENGINEER.

cc: K. G. Bassi
J. Anderson

Foundations Files
Documents ✓



PLAN

SCALE: $\frac{3}{16} = 1'-0"$

CAISSON DATA

LOCATION	NO.	TYPE	L"	DESIGN LOAD
N. ABUT.	9	20" EXPANDED BASE CONC. DISPLACEMENT CAISSONS	22'-0"	TOT/CAISSON
PIER #1	10	20" EXPANDED BASE CONC. DISPLACEMENT CAISSONS	11'-0"	130T/ "
PIER #2	10	20" EXPANDED BASE CONC. DISPLACEMENT CAISSONS	11'-0"	130T/ "
S. ABUT.	9	20" EXPANDED BASE CONC. DISPLACEMENT CAISSONS	22'-0"	TOT/ "

NOTES:

- SPACING OF CAISSONS TO BE MEASURED AT UNDERSIDE OF FOOTINGS.
- REINFORCING & CAISSON LAYOUT AT NORTH & SOUTH ABUT. FOOTINGS SIMILAR.
- REINFORCING & CAISSON LAYOUT AT PIERS SIMILAR.
- 28 DAY CONC. STRENGTH IN CAISSONS = 4000 P.S.I.
- CONC. SLUMP = 0"
- EXPANDED BASE DISPLACEMENT CONC. CAISSONS AT PIER LOCATIONS TO BE INSTALLED FROM EXISTING GROUND LINE PRIOR TO EXCAVATING PIER FOOTINGS.

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

C.P.R. OVERHEAD

AT JUNCTION OF EXISTING HWY. #17

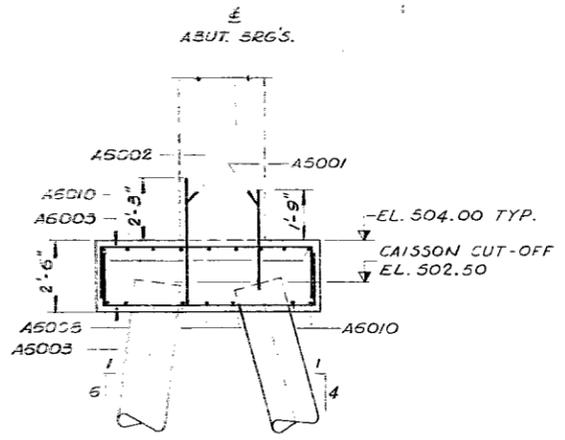
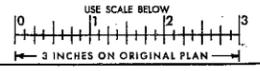
KING'S HIGHWAY No. 17 N DIST. No. 9
CO. RENFREW
TWP. PETAWANA LOT 27 RANGE A'

FOUNDATION LAYOUT & REINF.

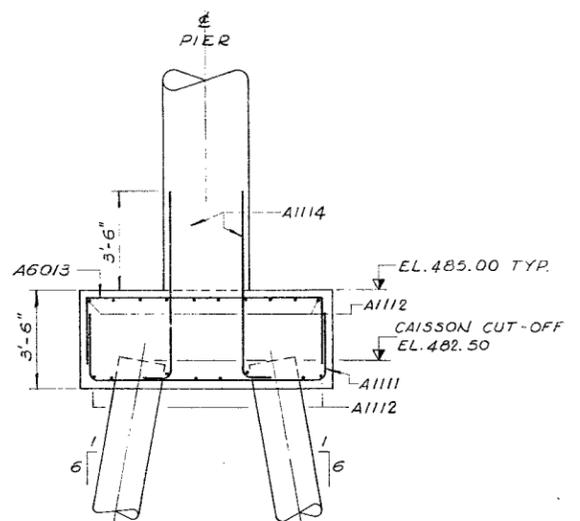
APPROVED	CONTRACT No.
DESIGN R.K. CHECK C.F.F.	W.R. No. 3-67-05
DRAWING B.S. CHECK R.K.	SITE No. 29-197 SHEET 3
DATE SEPT/73 LOADING 1/320-44	



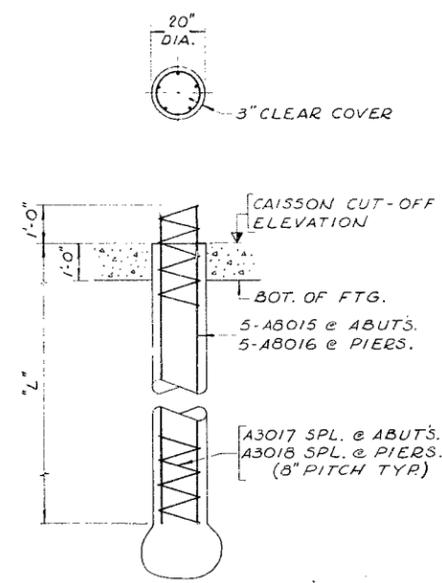
FOR REDUCED PLAN



SCALE: $\frac{3}{8} = 1'-0"$



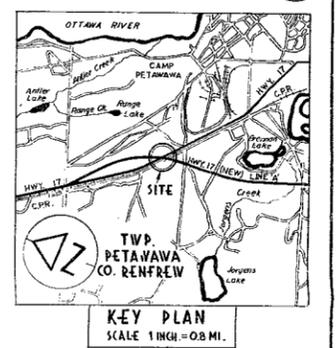
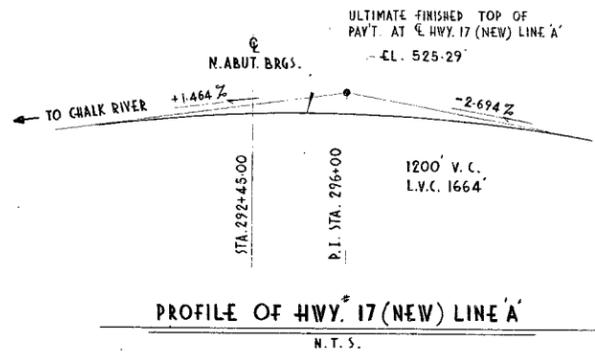
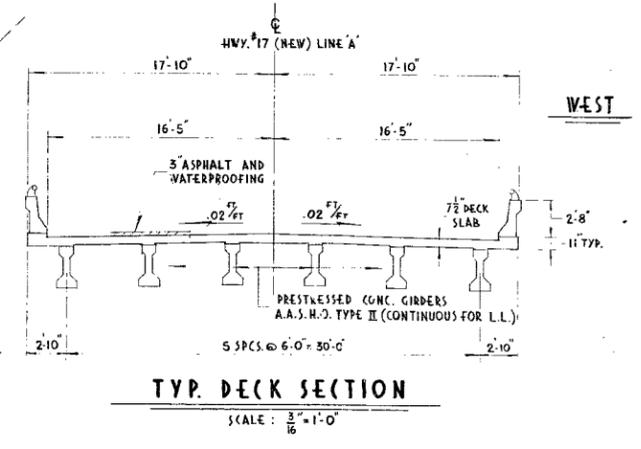
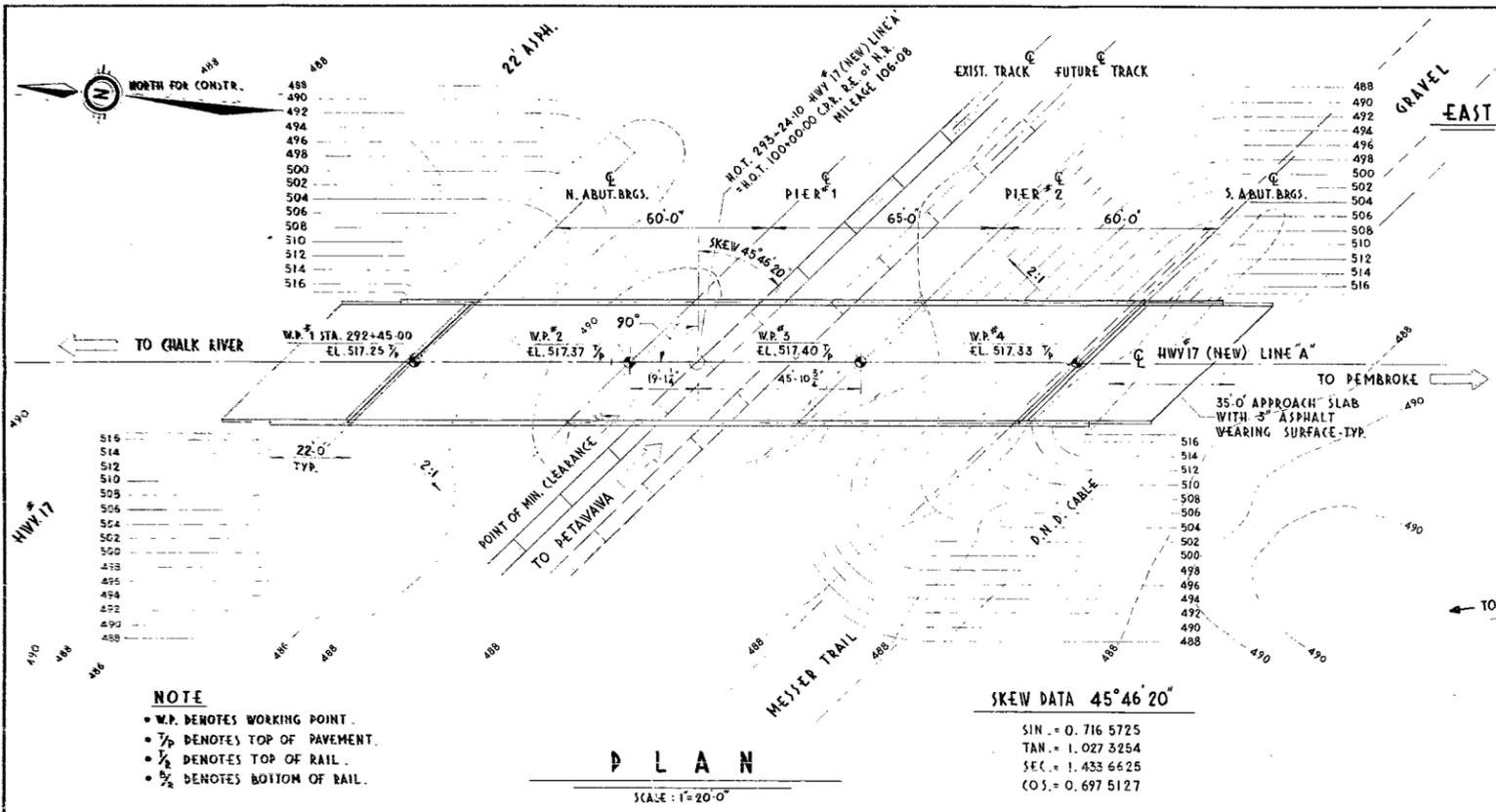
SCALE: $\frac{3}{8} = 1'-0"$



CAISSON DETAILS

N.T.S.

PRINT RECORD	No.	FOR	DATE



B.M. 491-97
GEODETIC DATUM
 N. & W IN ROOT OF O-B PINE 307 RT 292+97

- NOTES**
- CLASS OF CONCRETE :**
 DECK, BARRIER WALLS & PIERS 4000 P.S.I.
 ABUTMENTS & FOOTINGS 3000 P.S.I.
 PRESTRESSED GIRDERS 5000 P.S.I.
 APPROACH SLABS 3500 P.S.I.
- CLEAR COVER ON REINF. STEEL**
 FOOTINGS & ABUTMENTS 5"
 PIERS 5"
 DECK, TOP 2" BOT. 1"
 DIAPHRAGMS & BARRIER WALLS 1 1/2"
 APPROACH SLABS 2"
 AND/OR AS NOTED ON DRAWINGS

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± 1/8". NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

- LIST OF DRAWINGS**
- 29-197-1 GENERAL LAYOUT
 - 2 BORE HOLE LOCATION & SOIL STRATA
 - 3 FOUNDATION LAYOUT & REINF.
 - 4 ABUTMENTS
 - 5 PIERS
 - 6 PRESTRESSED GIRDERS & BEARINGS
 - 7 DECK
 - 8 CONC. BARRIER WALL (2'-8" HIGH)
 - 9 DETAILS OF 9" HIGH STEEL RAILING
 - 10 35 FT. APPROACH SLAB FOR BARRIER WALL
 - 11 TRACK PROTECTION & STANDARD DETAILS I
 - 29-197-12 STANDARD DETAILS II

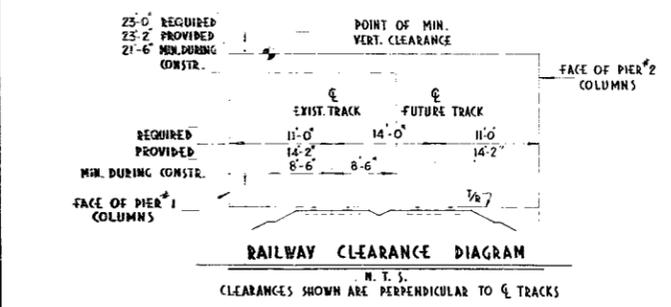
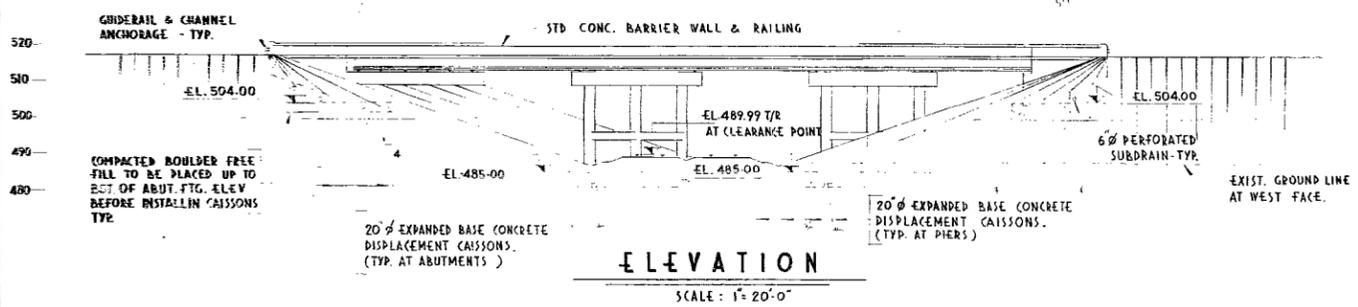
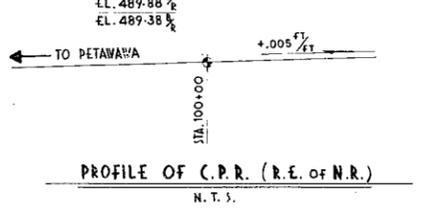
REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

C.P.R. OVERHEAD
 AT JUNCTION OF EXISTING HWY. 17
 KING'S HIGHWAY No. 17 N DIST. No. 9
 CO. RENFREW
 TWP. PETAWAWA LOT 27 RANGE A'

GENERAL LAYOUT

APPROVED: [Signature] CONTRACT No. []
 W.P. No. 3-67-05
 DESIGN: R. K. CHECK: C. P. F.
 DRAWING: G. C. CHECK: R. K.
 DATE: SEPT. 75 LOADING: H320-44 SITE No. 29-197 SHEET 1

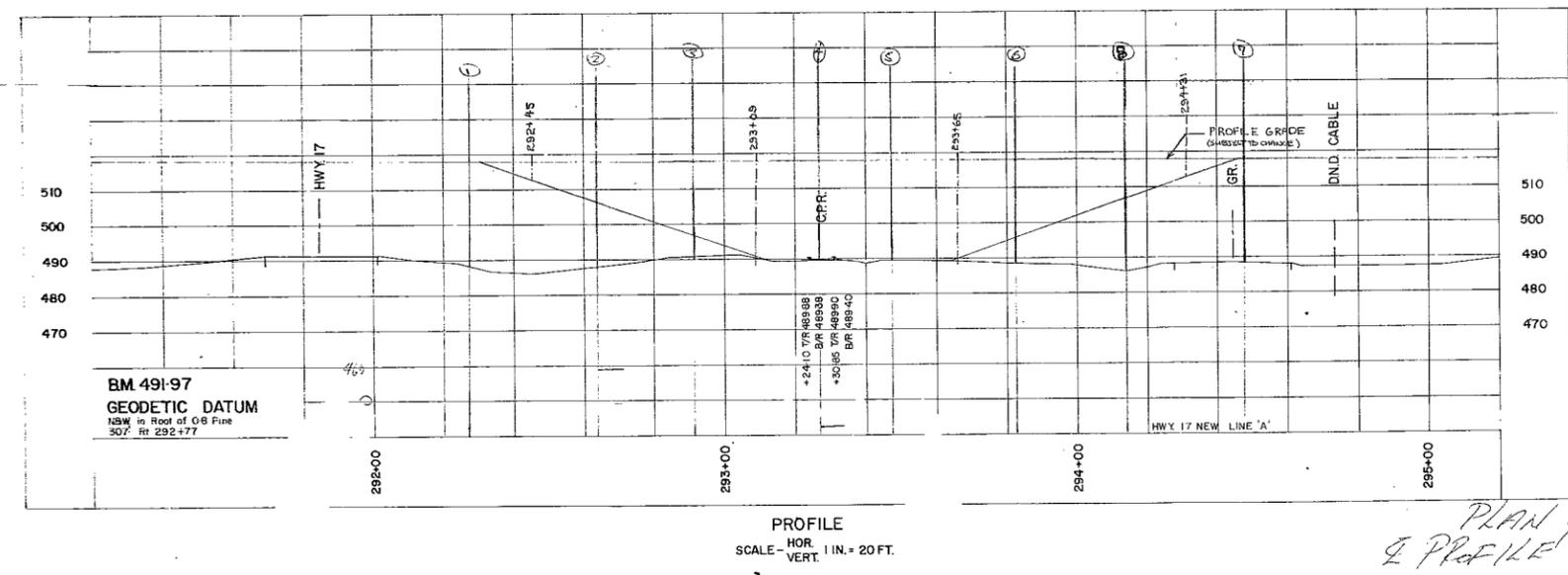
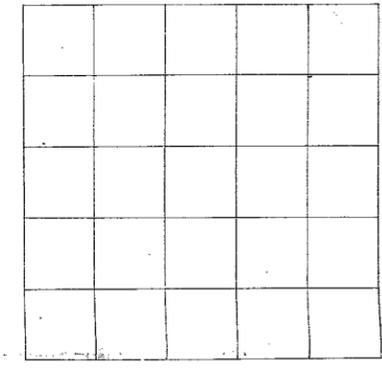
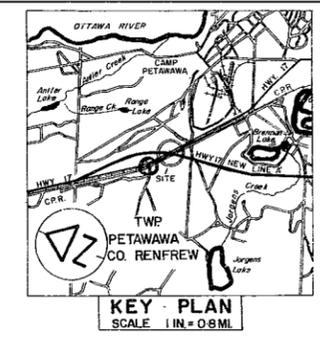
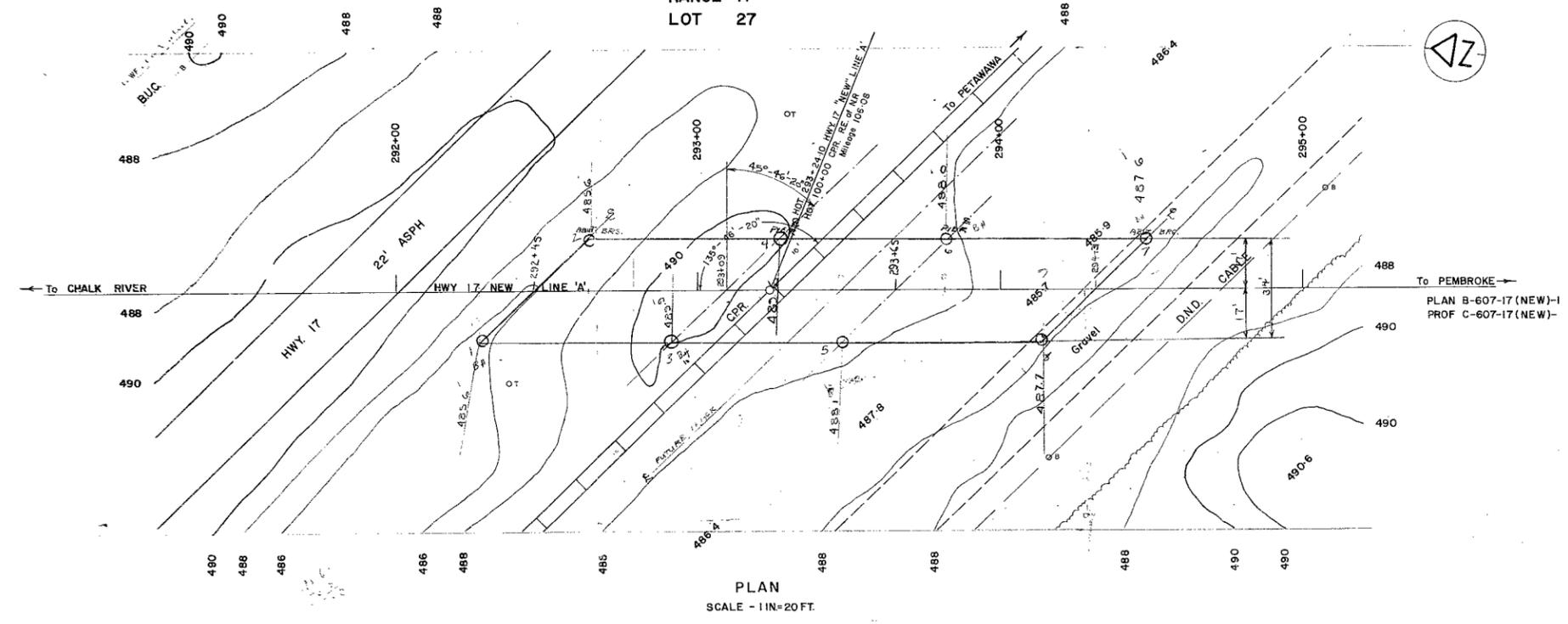


PRINT RECORD	No.	FOR	DATE

E-2521-1

E-2521-1

CO. RENFREW
TWP. PETAWAWA
RANGE 'A'
LOT 27



PLAN & PROFILE

WP 3-67-01
STR. W.P. 3 - 67 - 05

DATE	REVISIONS	BY	CH'KD
MAY 2/73	SKETCH SHOWING LOCATION OF PROPOSED STRUCTURE AS SUBMITTED FOR FOUNDATION INVESTIGATION.		
June 15/73	BA FOR FOUNDATIONS INVESTIGATION	P.K.	

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO
DESIGN SERVICES BRANCH — ENGINEERING SURVEYS

BRIDGE SITE

PROPOSED CROSSING
AT
CANADIAN PACIFIC RAILWAY
MILEAGE 106-08 CHALK RIVER SUBDIVISION
AND
PROP. HWY. 17 NEW LINE 'A'

LOT 27 RANGE 'A'
TWP. PETAWAWA CO. RENFREW

SCALE AS SHOWN	DISTRICT 9 - OTTAWA	REGION EASTERN
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Date of Survey - MAR / 73
Date of Plan - MAR / 73
SITE - 25-127

SURVEY BY Chief of Party - D. DOWDALL Supervisor - C. BAKER	BY Draftsman - M. HAYES Supervisor - G. MARTIN
CHECKED BY Draftsman - D. WATSON Supervisor - G. MARTIN	BY DRAWN BY Supervisor - G. MARTIN

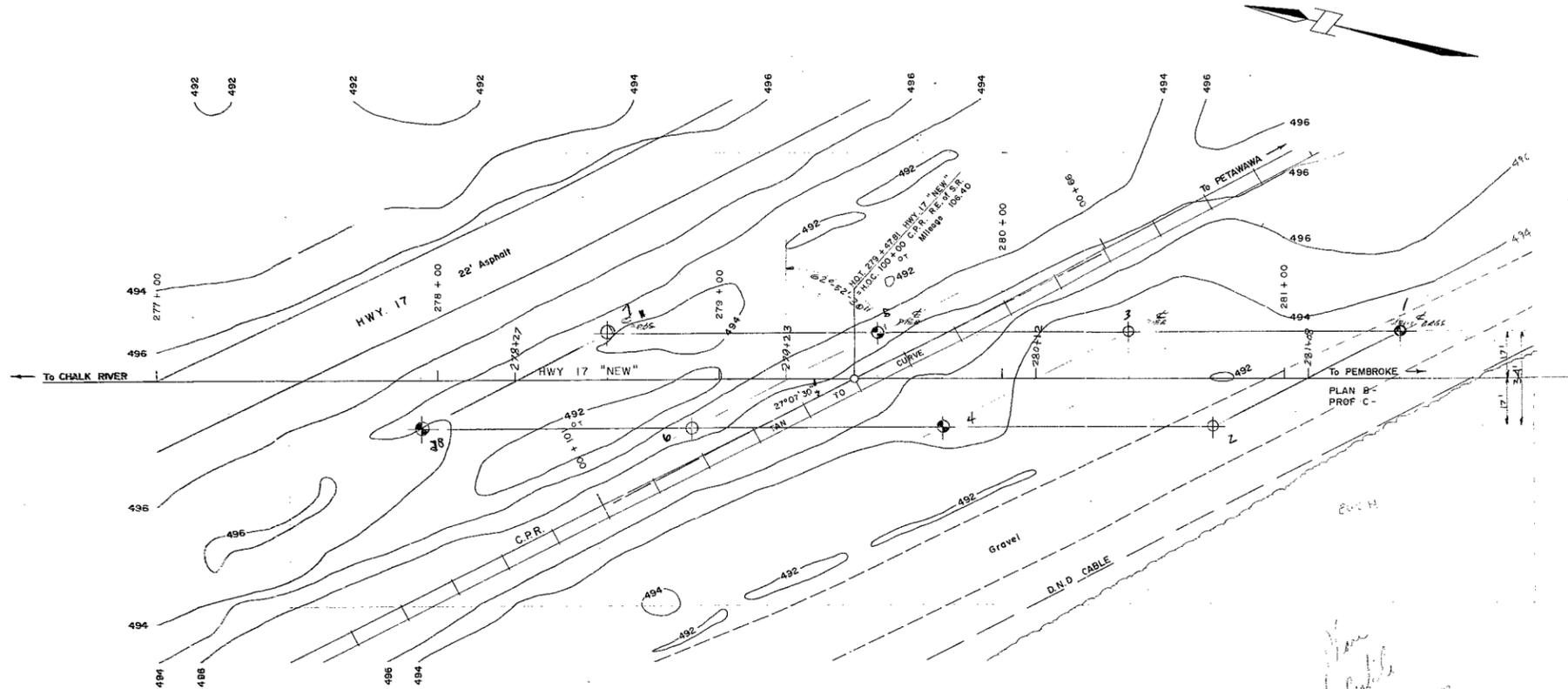
PLAN E-2521-1

31F-66

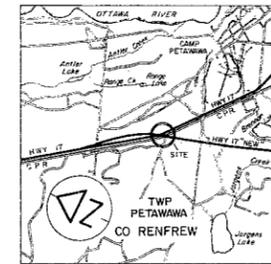
E-2521-1

E-2521-1

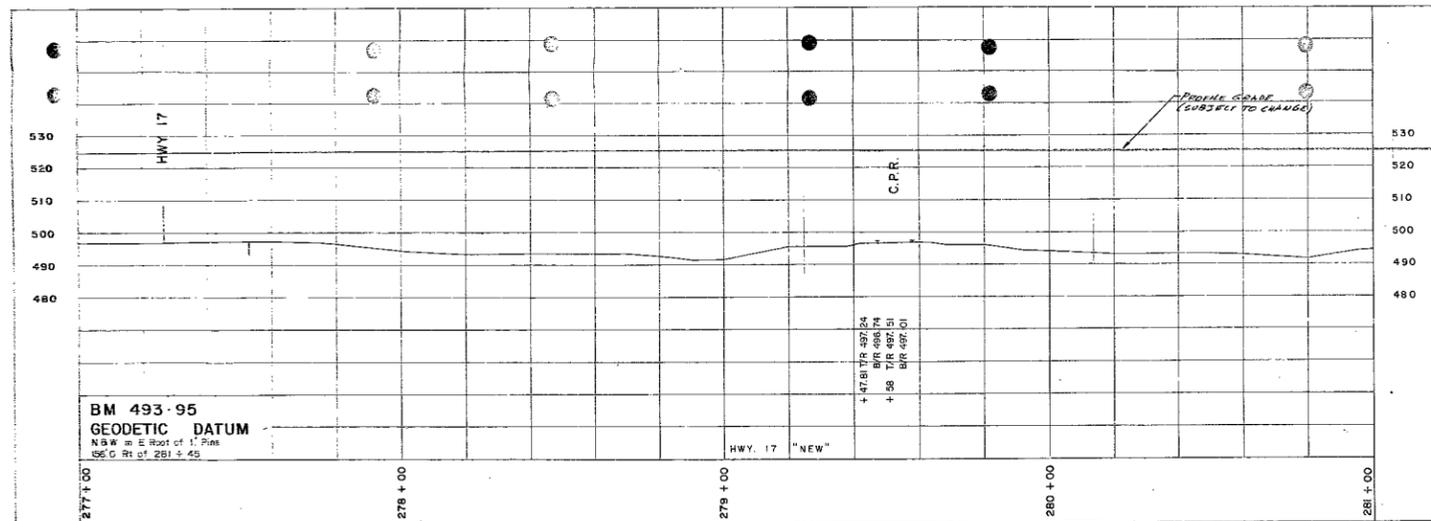
CO. RENFREW
TWP. PETAWAWA
CON 11
LOT 15



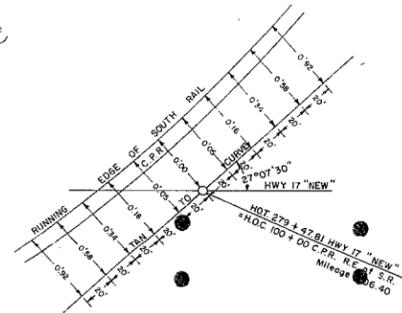
PLAN
SCALE - 1 IN = 20 FT.



KEY PLAN
SCALE - 1 IN = 0.8 MI.



PROFILE
SCALE - HOR. 1 IN = 20 FT.
VERT. 1 IN = 20 FT.



SKETCH SHOWING
C.P.R. & HWY 17 "NEW"
(Not to Scale)

W.P. 3-67-01
STR. W.P. 3-67-05

DATE	REVISIONS	BY	CH	KD
JAN 21/72	SHOWN JOINTS INDICATED, & PROPOSED STRUCTURE AS SUBMITTED FOR FOUNDATION INVESTIGATION.			
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS ONTARIO DESIGN SERVICES BRANCH - ENGINEERING SURVEYS				
BRIDGE SITE				
PROPOSED CROSSING AT CANADIAN PACIFIC RAILWAY MILEAGE 106.40 CHALK RIVER SUBDIVISION AND PROP. HWY 17 "NEW"				
LOT 15 TWP. PETAWAWA		CON. 11 CO. RENFREW		
SCALE AS SHOWN	DISTRICT OTTAWA	REGION EASTERN		
W.O. 3-67-01	Date of Survey - DEC. 1971	SITE - 29-197		
SURVEY BY Chief of Party - J. HOURIGAN Supervisor - C.M. BAKER		DRAWN BY Draftsman - E. DAGGITT Supervisor - G. MARTIN		
CHECKED BY Draftsman - D. WATSON Supervisor - G. MARTIN		PLAN E-5227-1		

31F-66 FOUNDATION & E.T.