

MEMORANDUM

To: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Office,  
Admin. Bldg.  
ATTENTION: Mr. S. McCombie

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

DATE: November 12, 1969

OUR FILE REF:

IN REPLY TO NOV 19 1969

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossing  
Regional Road 33 Relocation - Hwy. 417  
Twp. Cumberland Cty. Russell  
District No. 9 (Ottawa)  
W.J. 69-F-83 W.P. 35-66-07

1. Introduction:

In a memo dated September 16, 1969, the Foundation Section was requested by Mr. T. C. Kingsland, Regional Bridge Planning Engineer (Eastern Region) to determine the subsoil conditions at the above mentioned site. Subsequently, an investigation consisting of 3 sampled boreholes and 7 dynamic cone penetration tests was carried out by this Section using a standard diamond drill rig adapted for soil sampling purposes. In addition two test pits were put down at the site with a back hoe in order to supplement the information from the boreholes. This memo contains a brief resume of the subsoil and ground water conditions encountered at the site, together with our recommendations for the design of structure foundations and the stability of the approach fills.

The site is located about 1.5 miles south of Vars in a bog which is covered with tree stumps up to 36 inches in diameter and numerous

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1. Introduction: (cont'd.) .....

boulders, some of which range up to 5 feet in size. The ground surface rises away from the bog in all directions at a gentle gradient. The area surrounding the bog is used for agricultural purposes.

2. Subsoil Conditions

The low lying areas are covered with a thin (6 to 12 inches) mantle of peat or organic soil followed by 1 to 2 feet of clayey silt or silt. The higher ground has a thin surficial cover of topsoil. Underlying these surficial strata is a glacial till deposit, consisting of clayey silt with sand and gravel and occasional shale boulders. The thickness of this deposit ranges across the site between 4 and 6 feet. Results of laboratory tests on representative samples from this deposit are plotted on the individual Borelog sheets and on Figures 1 and 2 attached to this memo. The Standard Penetration Resistance 'N' Values in the glacial till ranged from 42 to 113 blows/ft. and indicate a hard consistency for the cohesive glacial till deposit.

The test pits put down through the glacial till revealed the presence of occasional boulders up to 18 inches in size. Some of these boulders consisted of shale slabs up to 6 inches in thickness. Shale bedrock with hard fossiliferous and crystalline limestone interbeds was encountered across the site at depths of 6 to 8 feet below the ground surface i.e. between elevations 234 and 238. The upper 1 to 2 feet of the bedrock

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2. Subsoil Conditions: (Cont'd.) .....

is severely weathered at isolated locations. The shale below the weathered zone is basically sound except for occasional fracturing and the presence of 1 to 2 inch thick mud seams within bedding plane joints.

Water level observations in the open boreholes indicate the ground water level to be situated across the site at about elevation 239.6 i.e. 1 to 6 feet below the ground surface. The test pit excavations indicated that in the low lying areas, seepage through the surficial deposits was occurring at a rapid rate. In the higher areas, slow seepage into the excavation was observed at a depth of about 7 feet below the ground surface. The ground water level across the site rose about 1 foot after 4 days of precipitation (estimated rainfall about 2 inches).

3. Recommendations:

It is proposed to construct a two span (127' - 137') structure to carry relocated Regional Road 33 over the East and West Bound Lanes of proposed Hwy. 417. The profile grade of the relocated Regional Road 33 at the proposed crossing will vary between elevations 266 and 268, resulting in approach fill heights of about 20 and 26 feet respectively at the north and south approaches. The investigation has revealed the presence of shale bedrock at depths of 6 to 8 feet below the ground surface underlying a hard cohesive glacial till deposit. In the low lying areas, the glacial till

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3. Recommendations: (Cont'd.) .....

deposit is overlain by 1 to 2 feet of organic materials.

In view of the relatively shallow depth to bedrock at this site, it is recommended that the proposed central pier be supported on a spread footing located on the sound shale bedrock at or below elevation 236 and designed for an allowable bearing pressure of 10 TSF.

As previously mentioned, excessive seepage can be anticipated from the surficial layers (organic material and silt) into footing excavations carried out in the low lying areas. Since a major portion of the excavation will be carried out through the relatively impermeable glacial till stratum, seepage can readily be controlled by ordinary pumping methods.

At the time of this writing, it is not known whether perched or closed-type abutments will be used. If perched abutments are contemplated, these may be supported on spread footings located within a zone of well-compacted granular fill and designed for an allowable bearing pressure of 2 TSF. The fill material below the tops of the footings should consist of well-compacted G.B.C. Class 'A' material and should extend for a horizontal distance of at least 10 feet from the footing edges in the plane of the footing tops. This portion of the fill should be built with side slopes of 2:1. The remainder of the fill should be completed to about profile grade for a distance of about 50 feet behind the abutments before re-excavating for the abutment footings. The differential settlement between such abutments and the central pier founded on bedrock will be in the order

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3. Recommendations: (Cont'd.)

of 1 inch. Alternatively, the perched abutments may be supported on short end bearing steel H piles driven to the bedrock surface at about elevation 234 to 236. The full design load for the particular section chosen may be used (e.g. 12BP73 steel 'H' piles may be designed for 90 Tons/pile).

If closed-type abutments are used, these may be supported on spread footings founded on the shale bedrock as discussed earlier for the pier footing.

All organic material should be subexcavated from within the plan limits of the approaches and backfilled with suitable granular material prior to construction of the approach embankments. The extent of the surficial organic materials beyond the structure limits should be investigated by the Regional Materials Section. Approach fills constructed with standard 2:1 slopes to the design grade will be stable.

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4. Miscellaneous:

The field work performed during the period October 21 - 29, together with the preparation of this memo, was undertaken by Mr. C. Mirza, Project Foundation Engineer.

Equipment used was owned and operated by F. E. Johnston Drilling Co. Ltd.

MD:rk  
Attach

c.c. Messrs: B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
S. J. Markiewicz  
C. R. Robertson  
J. E. Gruspier  
T. C. Kingsland (2)  
B. A. Singh

Foundations Files ✓  
General Files

*M. Devata*  
M. Devata,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

APPENDIX I

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

# RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 69-F-83

LOCATION Reg. Rd. 33 Reloc'n Sta 31+80 O/S 23' Rt.

ORIGINATED BY CM

W.P. 35-66-07

BORING DATE October 29, 1969

COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY *LL*

| SOIL PROFILE |                                      | SAMPLES |      |              | ELEV. SCALE | DYNAMIC PENETRATION RESISTANCE |            | LIQUID LIMIT — $w_L$  |                     | BULK DENSITY | REMARKS           |
|--------------|--------------------------------------|---------|------|--------------|-------------|--------------------------------|------------|-----------------------|---------------------|--------------|-------------------|
| ELEV. DEPTH  | DESCRIPTION                          | NUMBER  | TYPE | BLOWS / FOOT |             | BLOWS / FOOT                   | RESISTANCE | PLASTIC LIMIT — $w_p$ | WATER CONTENT — $w$ |              |                   |
| 245.8        | Ground Level                         |         |      |              |             |                                |            |                       |                     |              |                   |
| 0.0          | Probably Glacial Till                |         |      |              |             |                                |            |                       |                     |              |                   |
| 241.3        |                                      |         |      |              |             |                                |            |                       |                     |              |                   |
| 4.5          | End of Cone Test<br>Probably Boulder |         |      |              | 240         |                                | 100/6*     |                       |                     |              | Practical Refusal |
|              |                                      |         |      |              | 230         |                                |            |                       |                     |              |                   |





DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-F-83

LOCATION Reg. Rd. 33 Reloc'n Sta. 30+59 O/S 30' Lt.

ORIGINATED BY CM

W.P. 35-66-07

BORING DATE October 23, 24 and 27, 1969

COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE Washboring, NX-BX Casing, Cone Test

CHECKED BY *HL*

| SOIL PROFILE |  |             | SAMPLES |          |              | ELEV. SCALE | DYNAMIC PENETRATION RESISTANCE<br>BLOWS / FOOT |    |    |    |     | LIQUID LIMIT — $w_L$<br>PLASTIC LIMIT — $w_p$<br>WATER CONTENT — $w$ |     |       | BULK DENSITY<br>$\gamma$<br>P.C.F. | REMARKS |
|--------------|--|-------------|---------|----------|--------------|-------------|--|----|----|----|-----|--|-----|-------|------------------------------------|---------|
| ELEV. DEPTH  | DESCRIPTION                            | STRAT. PLOT | NUMBER  | TYPE     | BLOWS / FOOT |             | 20   | 40 | 60 | 80 | 100 | $w_p$  | $w$ | $w_L$ |                                    |         |
| 241.7        | Ground Level                           |             |         |          |              |             |  |    |    |    |     |  |     |       |                                    |         |
| 240.2        | Peat & Clayey Silt                     |             | 1       | SS       | 4            |             |  |    |    |    |     |  |     |       |                                    |         |
| 1.5          | Glacial Till                           |             | 2       | SS       | 42           |             |  |    |    |    |     |  |     |       |                                    |         |
| 235.2        | Clayey silt with sand & gravel - Hard  |             | 3       | SS       | 113          |             |  |    |    |    |     |  |     |       |                                    |         |
| 6.5          | Shale bedrock with Limestone interbeds |             | 4       | RG       | 100%         |             |  |    |    |    |     |  |     |       |                                    |         |
|              | Sound with occ. fractured zones        |             | 5       | RC       | 75%          |             |  |    |    |    |     |  |     |       |                                    |         |
|              | Few mud seams in upper 10'.            |             | 6       | RC       | 82%          |             |  |    |    |    |     |  |     |       |                                    |         |
| 221.6        |  |             | 7       | BX<br>RC | Rec<br>82%   |             |  |    |    |    |     |  |     |       |                                    |         |
| 20.1         | End of Borehole                        |             | 8       | BX<br>RC | Rec<br>100%  |             |  |    |    |    |     |  |     |       |                                    |         |

SHEAR STRENGTH P.S.F.  
 ○ UNCONFINED + FIELD VANE  
 ● QUICK TRIAXIAL x LAB. VANE

WATER CONTENT %  
 10 20 30

100/9"

W.L.  
 239.7  
 29-33-32-6

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 2A

FOUNDATION SECTION

JOB 69-F-83 LOCATION Reg. Rd. 33 Reloc'n. Sta 30+68 O/S 15' Rt. ORIGINATED BY GM  
 W.P. 35-66-07 BORING DATE October 23, 1969 COMPILED BY GP  
 DATUM Geodetic BOREHOLE TYPE Cone Test CHECKED BY SM

| SOIL PROFILE |                                      |            | SAMPLES |      |              | ELEV. SCALE | DYNAMIC PENETRATION RESISTANCE   | LIQUID LIMIT — $w_L$                   | BULK DENSITY | REMARKS           |
|--------------|--------------------------------------|------------|---------|------|--------------|-------------|--|--|--------------|-------------------|
| ELEV. DEPTH  | DESCRIPTION                          | STRAT. PLT | NUMBER  | TYPE | BLOWS / FOOT |             | BLOWS / FOOT   | PLASTIC LIMIT — $w_p$                  |              |                   |
| 242.4        | Ground Level                         |            |         |      |              |             | 20 40 60 80 100  |  |              |                   |
| 0.0          | Probably Glacial Till                |            |         |      |              | 240         | SHEAR STRENGTH P.S.F.<br>○ UNCONFINED + FIELD VANE<br>● QUICK TRIAXIAL x LAB. VANE | $w_p$ — $w$ — $w_L$<br>WATER CONTENT % |              |                   |
| 236.6        |                                      |            |         |      |              |             |  |  |              |                   |
| 5.8          | End of Cone Test<br>Probably Bedrock |            |         |      |              | 230         |  |  |              | Practical Refusal |

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

# RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 69-F-83 LOCATION Reg. Rd. 33 Reloc'n. Sta. 29+29 0/S 14' Rt. ORIGINATED BY CM  
W.P. 35-66-07 BORING DATE October 23, 1969 COMPILED BY GP  
DATUM Geodetic BOREHOLE TYPE Cone Test CHECKED BY SR

| SOIL PROFILE |                  |             | SAMPLES |      |              | ELEV. SCALE | DYNAMIC PENETRATION RESISTANCE<br>BLOWS / FOOT |    |    |    |     | LIQUID LIMIT — $w_L$<br>PLASTIC LIMIT — $w_p$<br>WATER CONTENT — $w$ |  | BULK DENSITY<br>$\gamma$<br>P.C.F. | REMARKS           |
|--------------|------------------|-------------|---------|------|--------------|-------------|--|----|----|----|-----|--|--|------------------------------------|-------------------|
| ELEV. DEPTH  | DESCRIPTION      | STRAT. PLOT | NUMBER  | TYPE | BLOWS / FOOT |             | 20   | 40 | 60 | 80 | 100 | WATER CONTENT %<br>$w_p$ — $w$ — $w_L$                               |  |                                    |                   |
| 241.5        | Ground Level     |             |         |      |              |             |  |    |    |    |     |  |  |                                    |                   |
| 0.0          | Probably         |             |         |      |              | 240         |  |    |    |    |     |  |  |                                    |                   |
| 235.5        | Glacial Till     |             |         |      |              |             |  |    |    |    |     |  |  |                                    |                   |
| 6.0          | End of Cone Test |             |         |      |              |             |  |    |    |    |     |  |  |                                    |                   |
|              | Probably Bedrock |             |         |      |              | 230         |  |    |    |    |     |  |  |                                    | Practical Refusal |

FOUNDATION SECTION

ORIGINATED BY CM

COMPILED BY GF

CHECKED BY *[Signature]*

| SOIL PROFILE |   |             | SAMPLES |          |              | ELEV. SCALE | DYNAMIC PENETRATION RESISTANCE<br>BLOWS / FOOT |                       | LIQUID LIMIT — $w_L$<br>PLASTIC LIMIT — $w_p$<br>WATER CONTENT — $w$ |                 | BULK DENSITY<br>$\gamma$<br>P.C.F. | REMARKS |
|--------------|---|-------------|---------|----------|--------------|-------------|--|-----------------------|--|-----------------|------------------------------------|---------|
| ELEV. DEPTH  | DESCRIPTION                               | STRAT. PLOT | NUMBER  | TYPE     | BLOWS / FOOT |             | 20 40 60 80 100                                | SHEAR STRENGTH P.S.F. | $w_p$ — $w$ — $w_L$  | WATER CONTENT % |                                    |         |
| 240.9        | Ground Level                              |             |         |          |              |             |  |                       |  |                 |                                    |         |
| 237.4        | Peat & organic silt<br>Changing to silt   | SS          | 1       | SS       | 4            | 240         |  |                       |  |                 |                                    |         |
| 235.5        |   | SS          | 2       | SS       | 11           |             |  |                       |  |                 |                                    |         |
| 233.9        | Glacial Till                              | SS          | 3       | SS       | 61           |             |  |                       |  |                 |                                    |         |
| 233.9        | Clayey silt with sand                     | SS          | 4       | SS       | 104          |             |  |                       |  |                 |                                    |         |
| 233.9        | & gravel - Hard                           | RC          | 5       | RC       | 92%          |             |  |                       |  |                 |                                    |         |
| 233.9        | Shale Bedrock with<br>Limestone interbeds | AXT R.C.    | 6       | AXT R.C. | 50%          | 230         |  |                       |  |                 |                                    |         |
| 233.9        | Sound with<br>Fractured zones             | AXT RC      | 7       | AXT RC   | 40%          |             |  |                       |  |                 |                                    |         |
| 233.9        |   | AXT RC      | 8       | AXT RC   | 55%          |             |  |                       |  |                 |                                    |         |
| 17.0         | End of Borehole                           |             |         |          |              | 220         |  |                       |  |                 |                                    |         |

FOUNDATION SECTION

CHECKED BY *[Signature]*

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 69-F-83

LOCATION Reg. Rd. 33 Reloc'n. Sta 29+97 0

ORIGINATED BY CM

W.P. 35-66-07

BORING DATE October 23, 1969

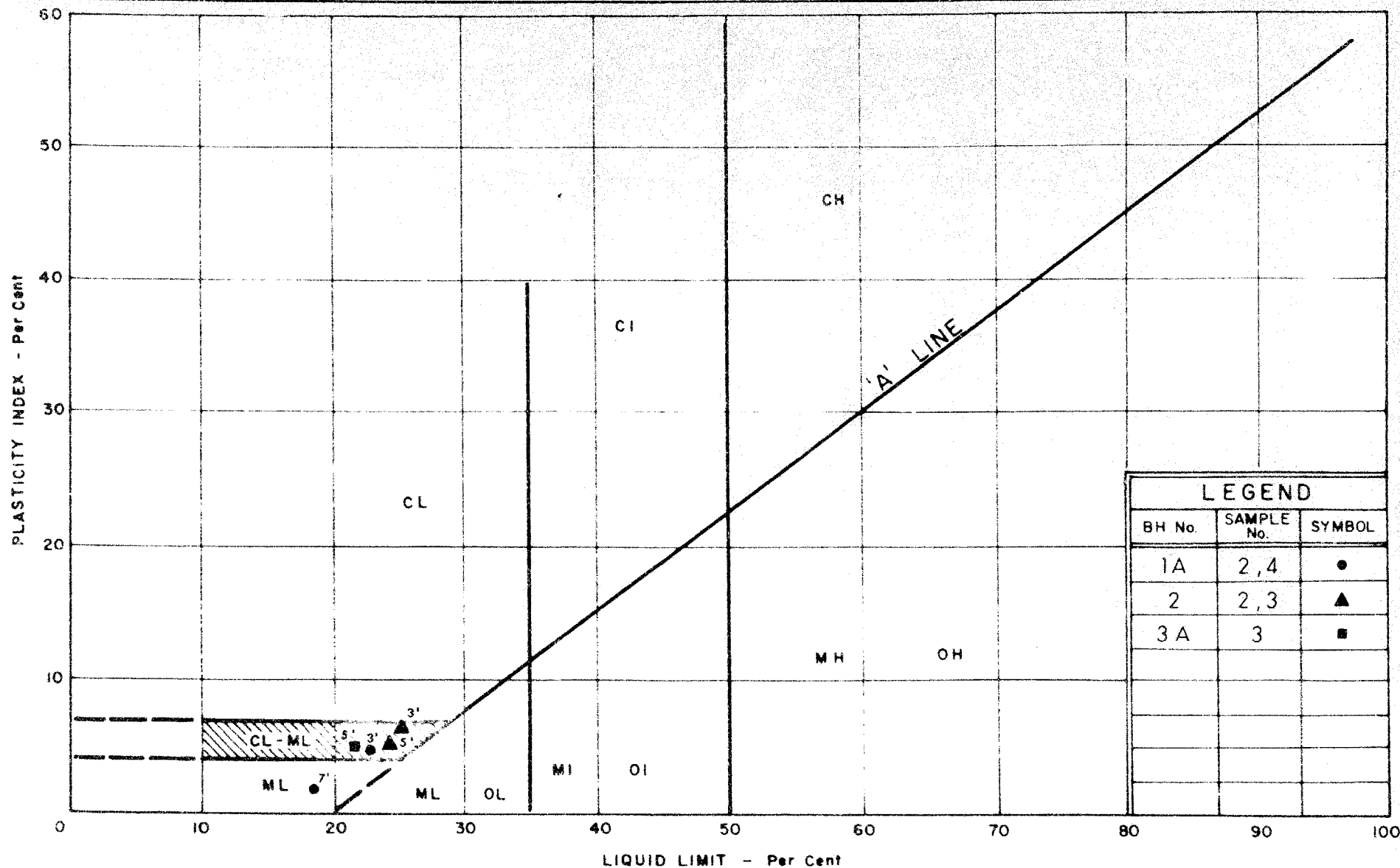
COMPILED BY GP

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY *JK*

| SOIL PROFILE   |                                      |             | SAMPLES |      |              | DYNAMIC PENETRATION RESISTANCE<br>BLOWS / FOOT |  | LIQUID LIMIT — $w_L$<br>PLASTIC LIMIT — $w_p$<br>WATER CONTENT — $w$ |  | BULK<br>DENSITY<br>$\gamma$<br>P.C.F. | REMARKS              |
|----------------|--------------------------------------|-------------|---------|------|--------------|--|--|--|--|---------------------------------------|----------------------|
| ELEV.<br>DEPTH | DESCRIPTION                          | STRAT. PLOT | NUMBER  | TYPE | BLOWS / FOOT | ELEV. SCALE                                    | SHEAR STRENGTH P.S.F.<br>○ UNCONFINED + FIELD VANE<br>● QUICK TRIAXIAL x LAB. VANE |  | WATER CONTENT %<br>$w_p$ — $w$ — $w_L$ |                                       |                      |
| 241.9          | Ground Level                         |             |         |      |              |  |  |  |  |                                       |                      |
| 0.0            | Probably<br>Glacial Till             |             |         |      |              | 240  |  |  |  |                                       |                      |
| 235.9          |                                      |             |         |      |              |  |  |  |  |                                       |                      |
| 6.0            | End of Cone Test<br>Probably Bedrock |             |         |      |              | 230  |  |  |  |                                       | Practical<br>Refusal |

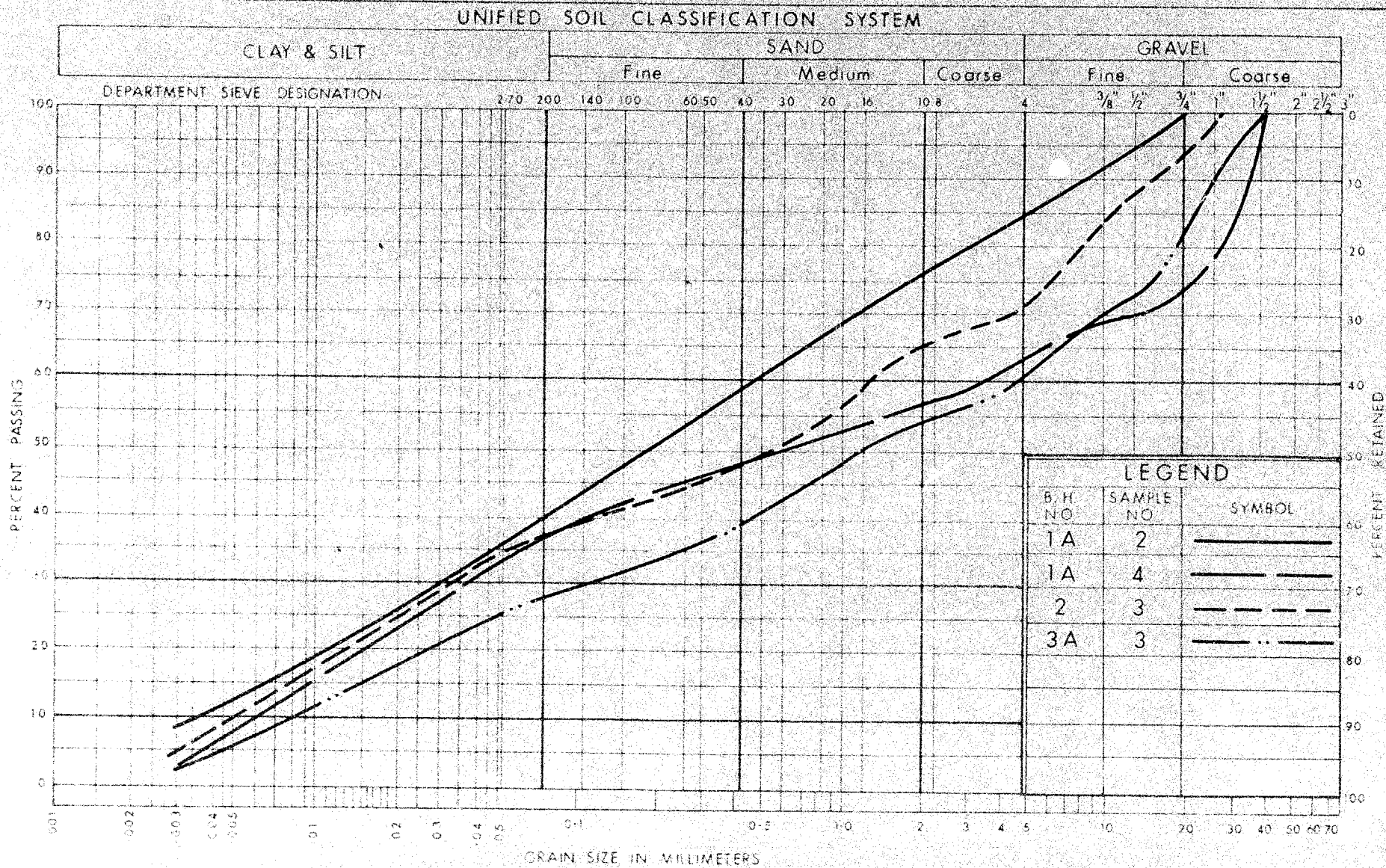


DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

# PLASTICITY CHART GLACIAL TILL

W.P. No. 35-66-07  
JOB No. 69-F-83  
FIG. NO. 1





DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

# GRAIN SIZE DISTRIBUTION GLACIAL TILL

W.P. No. 35-66-07

JOB No. 69 — F — 83

FIG. NO. 2

## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

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

DYNAMIC PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

### DESCRIPTION OF SOIL

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

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

### TYPE OF SAMPLE

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

### SOIL TESTS

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

# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

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

## GENERAL

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

## STRESS AND STRAIN

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

## EARTH PRESSURE

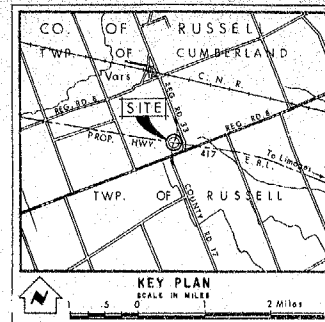
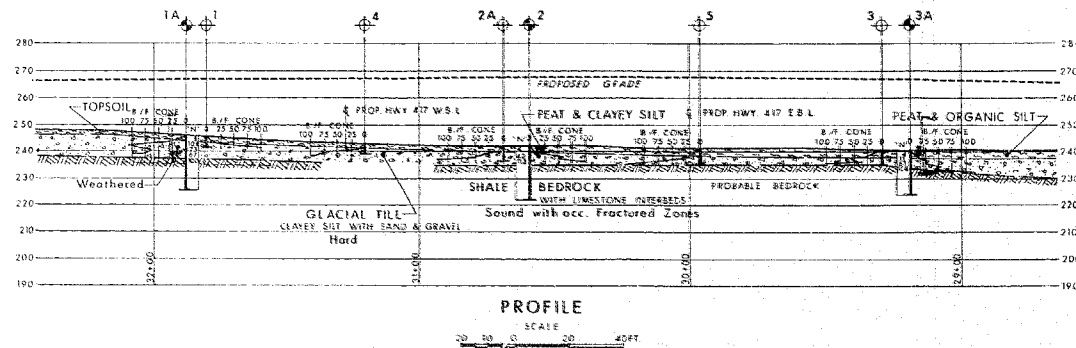
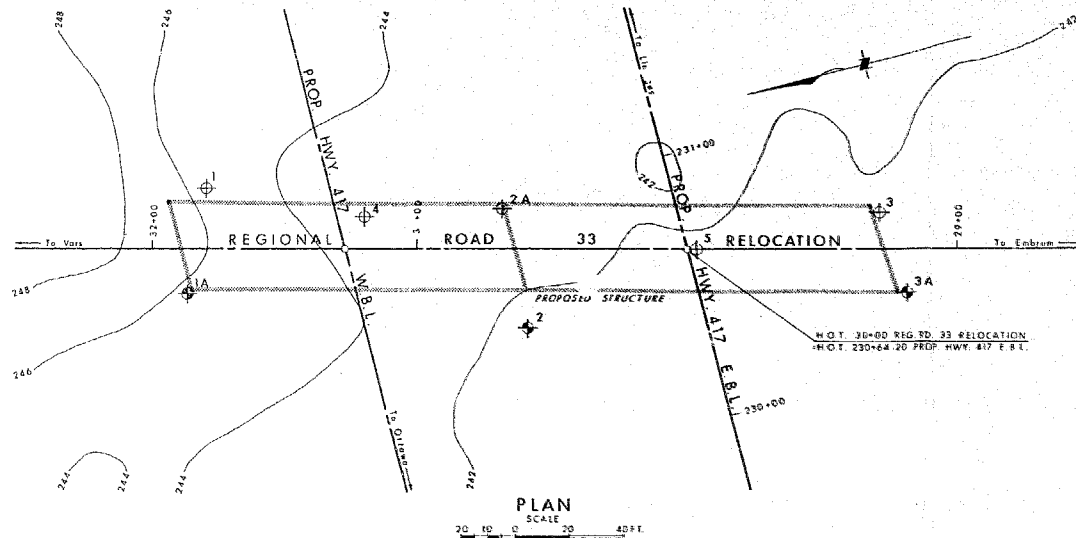
|          |   |
|----------|---|
| d        | DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE   |
| $\delta$ | ANGLE OF WALL FRICTION  |
| K        | DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS |
| $K_0$    | COEFFICIENT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

## FOUNDATIONS

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

## SLOPES

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



| LEGEND |   |  |  |
|--------|---|--|--|
|        | Bore Hole   |  |  |
|        | Cone Penetration Hole   |  |  |
|        | Bore & Cone Penetration Hole  |  |  |
|        | Water Levels established at time of field investigation. $\odot$ = 1969 |  |  |

| NO. | ELEVATION | STATION | OFFSET  |
|-----|-----------|---------|---------|
| 1   | 245.8     | 31+80   | 2' RT.  |
| 1A  | 245.8     | 31+87   | 12' LT. |
| 2   | 241.7     | 30+59   | 30' LT. |
| 2A  | 242.4     | 30+68   | 15' RT. |
| 3   | 241.5     | 29+29   | 14' RT. |
| 3A  | 240.9     | 29+19   | 16' LT. |
| 4   | 243.8     | 31+20   | 12' RT. |
| 5   | 241.9     | 29+97   | 4       |

NOTE

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

| DATE | BY | DESCRIPTION |
|------|----|-------------|
|      |    |             |

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE - FOUNDATION SECTION

REGIONAL ROAD 33 RELOCATION

KING'S HIGHWAY NO. 417 E.B.L. DIST. NO. 9  
CO. RUSSELL  
TWP. CUMBERLAND LOT 28 CON. VII

BORE HOLE LOCATIONS & SOIL STRATA

DRAWN BY C. M. CHECKED BY J. M. NO. 35-66-07 TEST DRIVING NO. 69-F-83A  
DATE NOV. 13, 1969 SITE NO. BRIDGE DRAWING NO.

APPROVED BY [Signature] ENGINEER

## ✓

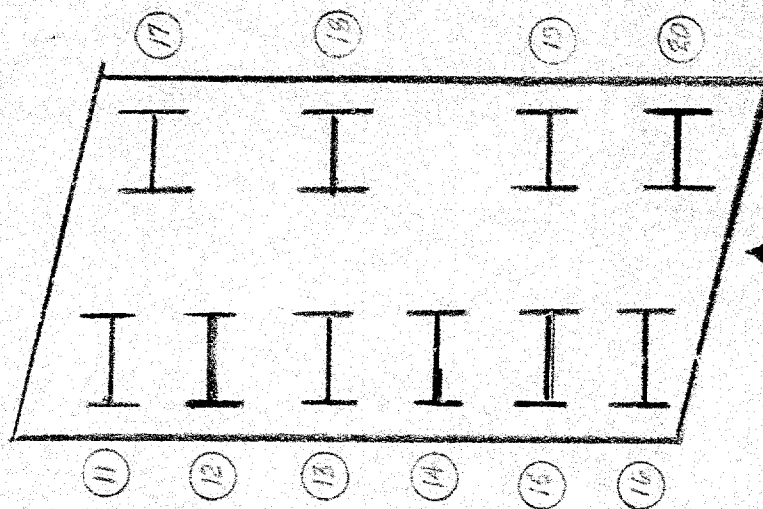
一人一

HAMMER TYPE GRAVITY DROP WEIGHT 2.5 TON ENERGY 40,000 FT.LBS

[illegible]

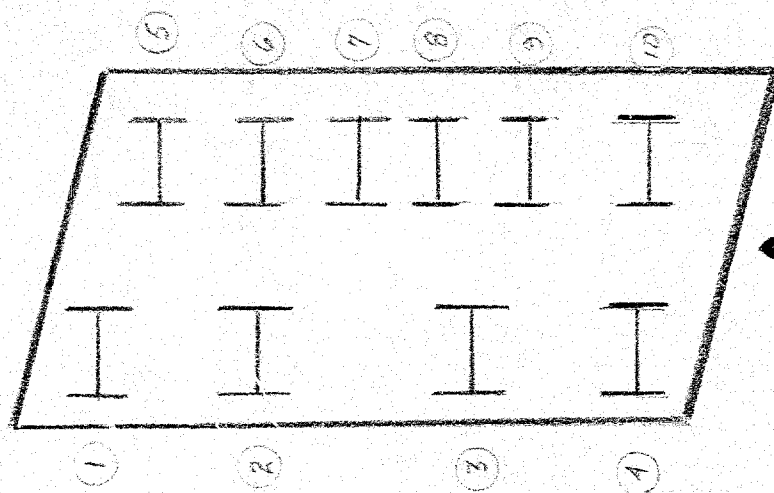
REGIONAL ROAD No 33

CONT - 72-62



SOUTH-ABUT

CENTRE PIER



NORTH-ABUT



**DEPARTMENT OF HIGHWAYS — ONTARIO**  
**MATERIALS AND TESTING OFFICE**  
**FOUNDATION SECTION**

**BRIDGE CONSTRUCTION — PILE DRIVING RECORD**

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE REDINOVICH ROAD BRIDGE # 33

CONTRACTOR PEEL CONST. DESIGN LOAD OF PILE 90 TONS.

HAMMER DETAILS: TYPE GRAVITY DROP WEIGHT 2 1/2 TONS HEIGHT OF FALL OR ENERGY 8'

TYPE OF ANVIL OR CAP \_\_\_\_\_ WEIGHT OF ANVIL OR CAP 500 LBS.

PILE DETAILS STEEL H PILES 12 B.P. X 74

PILE NO. 18 LOCATION SOUTH ABUTMENT ROAD DATE DRIVEN JULY 20/72

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

| DETAILS FOR FINAL SIX INCHES OF PENETRATION | 1                                     | 2 | 3 | 4 | 5 | 6 |
|---|---------------------------------------|---|---|---|---|---|
| BLOWS PER INCH                              | 16.                                   |   |   |   |   |   |
| MEASURED REBOUND IN INCHES                  |                                       |   |   |   |   |   |
| FINAL LENGTH OF PILE <u>20.3'</u>           | FINAL CUT OFF ELEVATION <u>253.00</u> |   |   |   |   |   |

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER  
 MATERIALS & TESTING DIVISION  
 DEPARTMENT OF HIGHWAYS  
 DOWNSVIEW, ONTARIO

SIGNED G. R. Van Dusen

NAME (PRINT) G. R. VAN DUSEN

DATE JULY 20/72

ATTACH SKETCH OF PILE NUMBERING SYSTEM

253.0  
 20.2  
 232.8



[illegible]

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



OVER

## DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND TESTING OFFICE

## FOUNDATION SECTION

## BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE Red Road Bridge #33CONTRACTOR PEEL CONSTRUCTION CO. DESIGN LOAD OF PILE 90 TONSHAMMER DETAILS: TYPE GRAVITY DROP WEIGHT 2 1/2 TONS HEIGHT OF FALL OR ENERGY 8'TYPE OF ANVIL OR CAP                      WEIGHT OF ANVIL OR CAP 500 LBSPILE DETAILS STEEL H PILES 12 B.P. X 74PILE NO. 4 LOCATION NORTH ABUTMENT ETC. Red Road #33 DATE DRIVEN JULY 12/72

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

| DETAILS FOR FINAL SIX INCHES OF PENETRATION | 1    | 2                       | 3 | 4 | 5 | 6 |
|---|------|-------------------------|---|---|---|---|
| BLOWS PER INCH                              | 16   |                         |   |   |   |   |
| MEASURED REBOUND IN INCHES                  | 50   |                         |   |   |   |   |
| FINAL LENGTH OF PILE                        | 16.0 | FINAL CUT OFF ELEVATION |   |   |   |   |
|   |      | 253.00                  |   |   |   |   |

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER  
MATERIALS & TESTING DIVISION  
DEPARTMENT OF HIGHWAYS  
DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT)

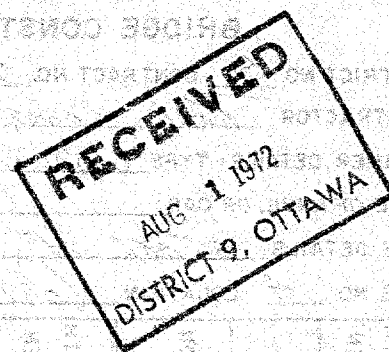
DATE

ATTACH SKETCH OF PILE NUMBERING SYSTEM

253.0

16.0

257.0



**Notes:-**

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

Piles driven vertically should be selected where possible.

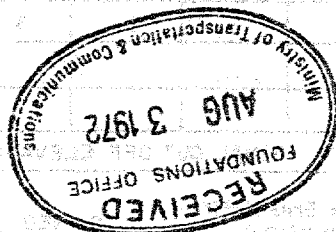
Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x  $\frac{1}{2}$ " steel plate shoe.

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

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

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

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



## MEMORANDUM

F-83 }  
 -84 }  
 -85 } *ago*

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

FROM: Bridge Section,  
 Kingston, Ontario.

ATTENTION: Mr. M. Devata,  
 Supervising Foundation Engr.  
 OUR FILE REF.

DATE: October 20, 1969.

IN REPLY TO

SUBJECT: W.P. 35-66-07, Site 27-207 - Co. Rd. 17 Interchange Underpass  
 W.P. 35-66-09, Site 27-206 - Co. Rd. 5 Interchange Underpass  
 W.P. 34-66-16, Site 27-198 - Sideroad to Vars Underpass  
 Highway 417, District 9

Further to my foundation requests dated September 19, 1969, I confirm that the following are the revised locations for the required boreholes at the above structures. I shall be glad if you will amend your copies of the plans accordingly. The chainages listed relate to the respective centre lines of the structures.

|  | Borehole Chainage | Borehole Chainage |                    |
|--|-------------------|-------------------|--------------------|
|  |                   | Str. with Berms   | Str. without Berms |
| F-83<br>W.P. 35-66-07<br>(Plan E-4677-1) | 29 + 27           |                   |                    |
|  | 30 + 64           |                   |                    |
|  | 31 + 91           |                   |                    |
| F-84<br>W.P. 35-66-09<br>(Plan E-4678-1) |                   | 29 + 01           | 28 + 43            |
|  |                   | 30 + 64           | 29 + 56            |
|  |                   | 32 + 22           | 30 + 64            |
|  |                   |                   | 31 + 72            |
|  |                   |                   | 33 + 00            |
| F-85<br>W.P. 34-66-16<br>(Plan E-4676-1) |                   | 28 + 44           | 26 + 40            |
|  |                   | 29 + 35           | 27 + 44            |
|  |                   | 30 + 80           | 28 + 44            |
|  |                   | 32 + 12           | 29 + 35            |
|  |                   | 32 + 97           | 30 + 80            |
|  |                   |                   | 32 + 12            |
|  |                   |                   | 32 + 97            |
|  |                   |                   | 33 + 87            |
|  |                   |                   | 34 + 85            |

*T. C. Kingsland*

T. C. Kingsland  
 Regional Bridge Planning Engineer

TCK/hl  
 c.c.

Bridge Office Files Section (Mr. S. McCombie)  
 Mr. K. Bassi

## MEMORANDUM

TO: Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Building

FROM: C.S. Grebski,  
Bridge Office

ATTENTION:

DATE: July 21, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT: Regional Rd. #33 (Reloc.)  
Interchange Underpass  
1.0 Miles South of Vars  
W.P. 35-66-07, Site No. 27-207  
Highway 417, District No. 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:rd

*C. S. Grebski*  
for C.S. Grebski,  
Bridge Design Engineer

Attach.

c.c. Foundation Office

*Comments*

- 1) D-67521 - 12 BP 74 steel H piles can be designed for 95 tons/pile rather than the 90 tons quoted. *(superficial)*
- 2) the sub-excavation of organic material is not noted on these drawings is it given on another contract drawing BTD.

RM. 110 102 Bldg

AG

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Office,  
Admin. Bldg.

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

ATTENTION:

DATE: August 5, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

Regional Rd. #33 (Reloc.)  
Interchange Underpass  
1.0 Miles South of Vars  
W.P. 35-66-07, Site No. 27-207  
Highway 417, District No. 9

69-F-83

We have reviewed the final bridge drawings for the above mentioned structure and submit the following comments:

In our foundation report it was recommended that all organic material should be sub-excavated from within the plan limits of the approaches prior to construction of the approach embankments. It is believed that these details will be incorporated by the Regional Road Design Section in their drawings.

MD/MseP

cc: Messrs. S. McCombie  
T. C. Kingsland  
S. J. Markiewicz  
Foundations Files  
Gen. Files

*M. Devata*

M. Devata,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

#69-F-83

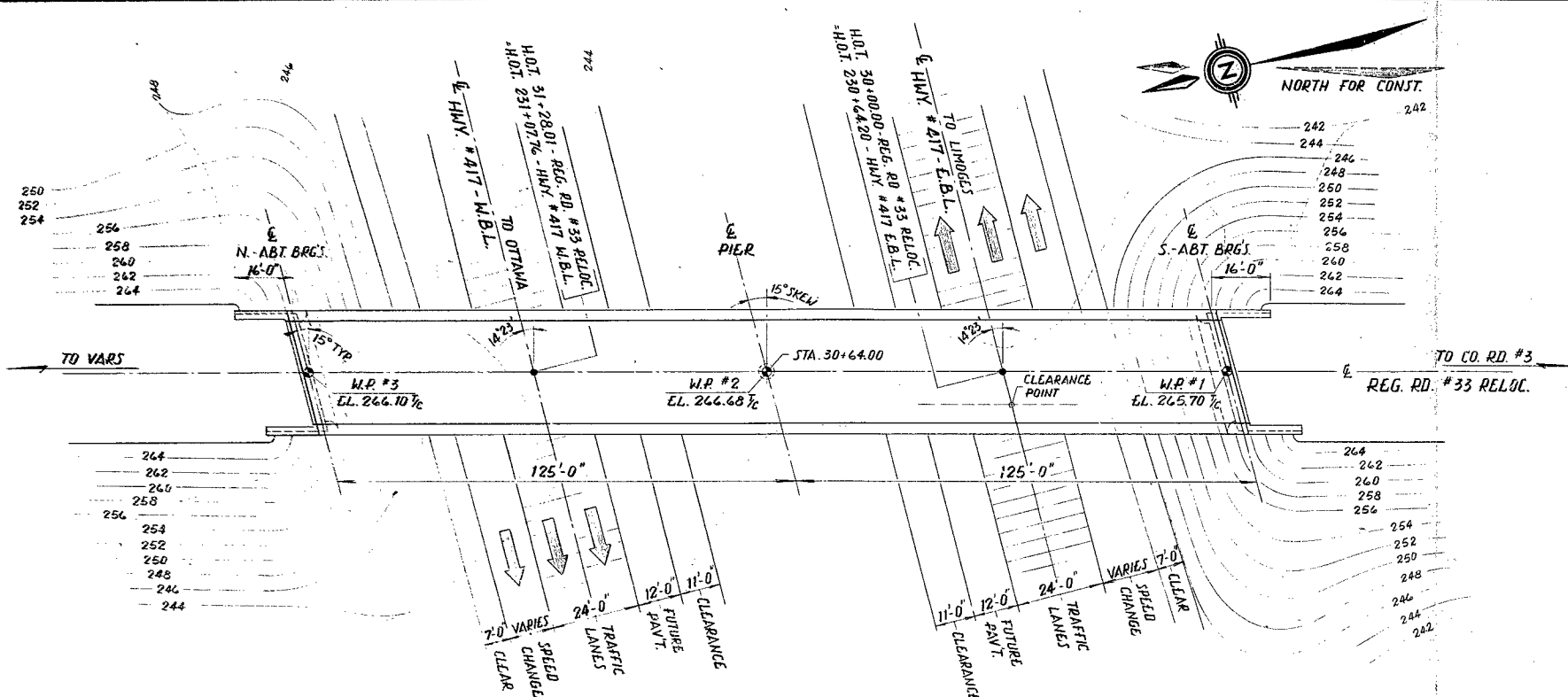
W.P. 35-66-07

H.W.Y. #417

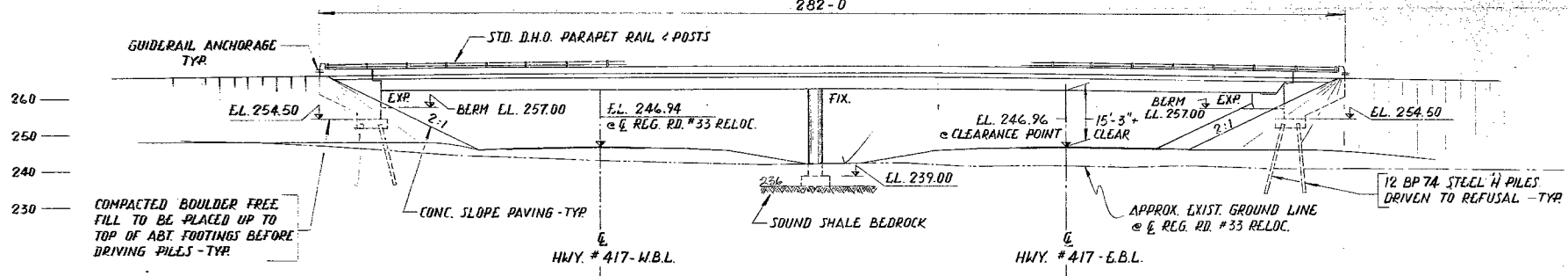
REGIONAL ROAD

33 RELOCATION

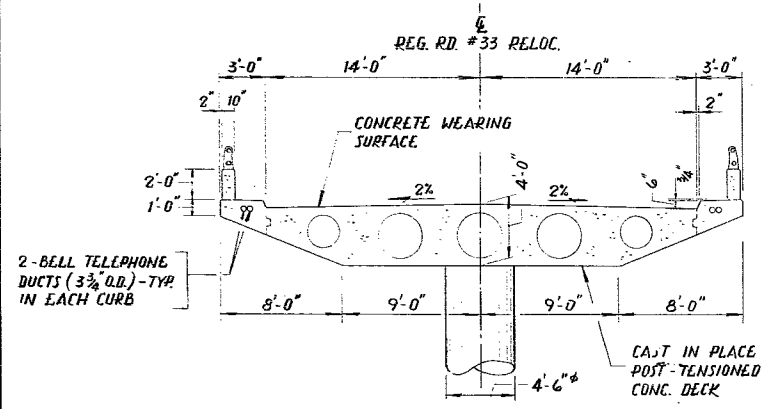




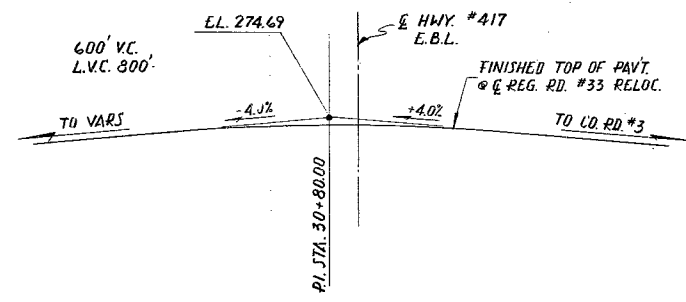
PLAN  
SCALE: 1" = 20'-0"



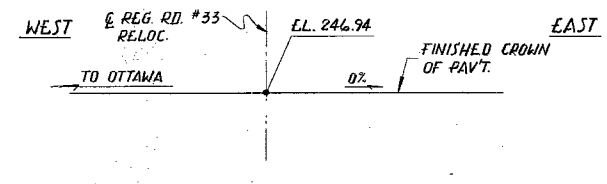
ELEVATION  
SCALE: 1" = 20'-0"



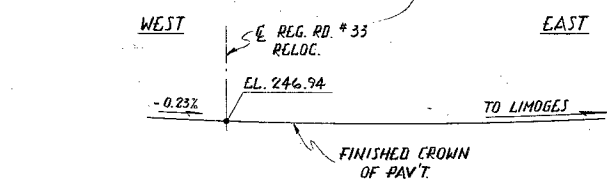
TYP DECK SECTION  
SCALE: 3/16" = 1'-0"



PROFILE OF REG. RD. #33 RELOC.  
N.T.S.



PROFILE OF HWY. #417 W.B.L.  
N.T.S.



PROFILE OF HWY. #417 E.B.L.  
N.T.S.

REFERENCE BENCH MARK  
B.M. EL. 243.59  
GEODETIC DATUM  
N. 1/4 IN W. ROOT OF 1.0' PINE  
356.0' RT. OF 233+39 E.B.L.

SKREW DATA - 15°  
SIN. - 0.258819  
COS. - 0.965926  
TAN. - 0.267949  
SEC. - 1.035276

NOTE:  
• W.P. DENOTES WORKING POINT  
• 7/8 DENOTES TOP OF CONCRETE WEARING SURFACE

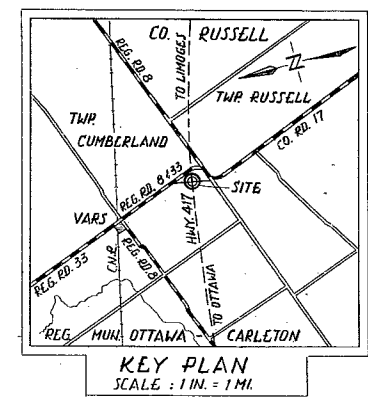
- LIST OF DRAWINGS
- D-6757-1 GENERAL LAYOUT
  - 2 BORE HOLE LOCATIONS & SOIL STRATA
  - 3 FOUNDATION LAYOUT
  - 4 ABUTMENTS & PIER
  - 5 DECK DETAILS & BEARINGS
  - 6 CABLE DETAILS
  - 7 DECK REINFORCEMENT I
  - 8 DECK REINFORCEMENT II
  - 9 PARAPET WALL DETAILS
  - 10 STANDARD STEEL PARAPET RAIL
  - 11 DETAILS OF CONC. SLOPE PAVING
  - 12 STANDARD DETAILS I
  - D-6757-13 STANDARD DETAILS II

NOTES

CLASS OF CONCRETE  
DECK, CURBS & PARAPET WALLS 5000 P.S.I.  
PIER COLUMN 3000 P.S.I.  
REMAINDER 3000 P.S.I.

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

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, STRESSED & GROUTED.



| REVISIONS |      |    |             |
|-----------|------|----|-------------|
| NO.       | DATE | BY | DESCRIPTION |
|           |      |    |             |
|           |      |    |             |
|           |      |    |             |

| DEPARTMENT OF HIGHWAYS ONTARIO<br>BRIDGE DIVISION |                  |                 |                   |
|---|------------------|-----------------|-------------------|
| REGIONAL RD. #33 (RELOC) INTERCH. U'PASS.         |                  |                 |                   |
| 1.0 MILES SOUTH OF VARS                           |                  |                 |                   |
| KING'S HIGHWAY No. 417                            | DIST. No. 9      |                 |                   |
| CO. REG. MUN. OF OTTAWA - CARLETON                |                  |                 |                   |
| TWP. CUMBERLAND                                   | LOT 28           | CON. VII        |                   |
| GENERAL LAYOUT                                    |                  |                 |                   |
| APPROVED  | BRIDGE ENGINEER  | SITE No. 27-207 | W.P. No. 35-66-07 |
| DESIGN G.N.B.B.                                   | CHECK A.S.       | CONTRACT No.    |                   |
| DRAWING A.A.                                      | CHECK A.S.       | DRAWING No.     | D-6757-1          |
| DATE JULY /70                                     | LOADING 11/20-44 |                 |                   |



