

CONT. 70-3

HWY. 10

ORANGEVILLE DIV.

EMBANKMENT

40P16-12

Ontario
Department of Transportation and Communications

~~CONFIDENTIAL~~

MEMORANDUM

TO: Mr. F. G. Allen,
Director,
Construction Branch,
Lab. Bldg.

FROM: Foundation Section,
Design Services Branch.

ATTENTION:

DATE: August 11, 1971

OUR FILE REF.

IN REPLY TO

AUG 17 1971

SUBJECT:



FOUNDATION INVESTIGATION REPORT
For

Embankment Distress
Between Sta's 622+00 & 635+00
Hwy. #10 - Orangeville Diversion
Town of Orangeville Co. of Dufferin
District No. 3 (Stratford)
Contract No. 70 - 03
W.O. 71-11062 --- W.P. 5-66-00

CONTRACT 70-003

Attached, please find the Foundation Investigation Report for the above mentioned section of Hwy. #10 - (Orangeville By Pass). We believe that the factual data, together with our assessment of the problem, are adequate for your immediate requirements.

Should additional information be required, please feel free to contact our Office.

AGS/MdeP
Attach.

cc: Messrs. W. D. Neillpovitz
J. W. MacDougall
D. M. Hopper
E. R. Davis
B. J. Giroux

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

Foundation Files ✓
Documents

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FOUNDATION INVESTIGATION REPORT
For
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W.O. 71-11062 --- W.P. 5-66-00

1. INTRODUCTION:

From the late fall of 1970 through the early months of 1971 the Hwy. #10 - Orangeville Diversion was constructed, namely from Station 597+87 northerly to Station 700+08.

After completion of the construction of the Diversion, signs of distress have been observed between Stations 624+00 and 635+00. This portion of the roadway has subsided and numerous longitudinal and transverse cracks are noticeable.

The Foundation Section was verbally requested, by Mr. F. G. Allen, Director, Construction Branch, to carry out an investigation of sufficient scope to determine the causes of the embankment distress in the above-mentioned area. Subsequently, this Section carried out an investigation to determine the subsoil and groundwater conditions in the affected area, together with other data which might aid in the assessment of the problem.

This report includes all the factual data obtained, as well as all the relevant visual observations made during the period of the field reconnaissance survey. In addition, an assessment of the causes of the embankment distress are presented.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The area investigated is located immediately west of the eastern limits of the Town of Orangeville and north of the intersection of Hwys. 9 and 10, in the County of Dufferin.

The southern and eastern portions of the site is relatively high table land which is at about elevation 1430. This high bank slopes gently down in a northerly and westerly directions to a broad flat valley, the base of which is located between elevation 1340 and 1345. The Town of Orangeville has been developed on the high table land - i.e., this land is being used for both residential and commercial purposes. The low-lying poorly drained valley, however, is quite swampy in places; this area is unoccupied and covered with light brush.

The south flowing Credit River meanders along the floor of the valley. The river channel is approximately 20 to 25 feet wide and 4 to 5 feet deep in the area investigated; there was about 2 feet of water in the river in November, 1970. The Orangeville Conservation Dam is located upstream on this river.

Physiographically, the site is situated in the section known as the "Hillsburgh Sand Hills". This area is characterized by rough hilly topography with the overburden being primarily composed of extensive granular deposits of glacial origin (ground moraine). A flat-bottomed poorly drained swampy valley runs through the moraine from Orangeville to Hillsburgh. The depth of the surficial organic material in this area generally varies between 4 and 8 feet. The overburden is underlain by dolomite bedrock of the Amabel formation, Silurian Period.

3. CONSTRUCTION DETAILS:

3.1) General:

Construction of the Hwy. #10 - Orangeville Diversion (from Station 597+87 northerly to Station 700+08) was started in the late fall of 1970. Details of the scheme are shown in plan on Drawing No. 71-11062A, appended to this report. This portion of the highway has two 12-foot wide paved lanes, as well as associated wide shoulders. From Station 597+87 northerly to Station 622+00, the highway was constructed on the sloping bank of the table land on which the Town of Orangeville is located. To reach the proposed subgrade level in this area, cuts up to 4 feet deep were required. From Station 622+00 northerly to Station 700+08, however, Hwy. #10 travels along the broad flat valley described in Section #2. To reach the proposed profile grade in this area, up to 9 feet of fill is required above the valley floor. The latter portion of Hwy. #10 is the section of interest, as far as this report is concerned.

3.2) Sub-Excavation of Organic Material (Sta's. 626+90, 644+00):

Between 6 and 8 feet of organic material was encountered between Stations 626+90 and 644+00. During the first part of November, 1970, this organic material was sub-excavated to its full depth; the lateral extent of the sub-excavation was carried out in accordance with current Department specifications. The excavated material was stockpiled on either side of the proposed roadway section. The sub-excavation so formed was backfilled with select, properly compacted granular subgrade material.

During this period, the Credit River, in the vicinity of the Hwy. #10 By-Pass, was diverted. A twin (12 foot by 6 feet) barrel arch culvert was constructed at the crossing of the creek diversion and the highways (approximately Station 635+70).

3. CONSTRUCTION DETAILS: (cont'd.) ...

3.3) Hwy. #10 Embankment Construction Between Stations
622+00 & 635+00:

The embankment, between the above-mentioned stations, which varied from 7 to 9 feet in height, was constructed between November 23, 1970 and January 5, 1971 - i.e., within the winter period.

The lower portion of the embankment core was formed of a fill composed of clayey silt with some sand and gravel; it is understood that the in-place thickness of this fill was to be of the order of 4 feet. This material was obtained from the cut treatment performed in the vicinity of Hwy. #9, which is located on the higher table land to the south of this particular section. It should be noted that major construction difficulties were encountered during the placement and compaction of this cohesive subsoil. The compaction and related construction equipment often bogged down within this soil during the field operations. These complications can at least partially, be explained by the severe weather conditions existing during the construction period. Information, obtained from the Department of Transport, indicated that, in this particular area, during the period in question, - 1) the mean average daily temperature was consistently below freezing (32°F), and 11) that the amount of precipitation (combination of snow and rain) was relatively large in comparison to the average conditions that normally occur. The recorded temperature and precipitation data are shown in graphical form on Drawing No. W.O. 71-11062C, appended to this report.

Following the placement and compaction of the cohesive fill, the embankment section was completed by placing a properly compacted layer of sand cushion overlain, in turn, by Granular 'A' material. It is understood, that the in-place composite thickness of these layers ranged between 3 and 4 feet.

The main embankment core, formed as described in the previous paragraphs, was built with 2:1 side slopes. These slopes

3. CONSTRUCTION DETAILS: (cont'd.) ...

3.3) Hwy. #10 Embankment Construction Between Stations
622+00 & 635+00: (cont'd.) ...

were later flattened to something of the order of 10:1 by placing the previously excavated organic material outside the main core.

During the early period of spring, 1971, well after completion of the embankment construction in this area, a few localized wet spongy areas were noticed. It was decided that such localized areas should be treated. The treatment consisted of sub-excavating all wet and unsuitable material and replacing it with compacted granular material.

3.4) Hwy. #10 Embankment Construction Between Stations
635+00 to 700+08:

The embankment between the above-mentioned stations was built from the latter part of April to mid May, 1971. The weather conditions prevailing at this time were ideal for construction operations. The embankment was constructed in a similar fashion to that discussed in the previous sub-section. Specifically, clayey silt was placed and compacted in lifts to an overall thickness of about 4 feet. This cohesive fill was, in turn, covered with well compacted layers of sand cushion and granular 'A' material.

The flexible pavement surface was placed, along the entire length of the Hwy. #10 - Orangeville Diversion, in the latter part of May, 1971.

4. POST-CONSTRUCTION OBSERVATIONS:

In the early part of June, 1971, the roadway was opened to traffic. Shortly after this, District personnel observed areas of major subsidence between Stations 624+00 and 635+00. The maximum amount of subsidence was of the order of 0.5 feet. There

4. POST-CONSTRUCTION OBSERVATIONS: (cont'd.) ...

were major longitudinal cracks along the pavement in the vicinity of Station 629+00, as well as longitudinal cracks on the shoulders. In addition, numerous transverse cracks were noticeable throughout this area. The side slopes, in places, appeared to be dish-shaped. A number of mushroom-shaped boils were also noticed on these slopes.

Photographs illustrating the aforementioned observations are appended to this report.

Outside of the affected area, the Hwy. #10 embankment sections have performed quite satisfactorily.

5. SUBSOIL CONDITIONS:

5.1) General:

The field work consisted of putting down 13 boreholes, three of which were accompanied by a dynamic cone penetration test, as well as three additional cone tests, using a continuous flight power auger (Penndrill), adapted for soil sampling purposes. All the borings were put down on the valley floor which is north of the higher table land on which the Village of Orangeville is located.

Two stratigraphical cross-sections, within the affected area, namely at Stations 629+00 and 632+67, have been inferred from the boring information obtained, and are plotted on Drawing No. 71-11062E, attached to this report.

A brief description of the soil types encountered on the valley floor are presented in the sub-sections to follow:

5.2) Originally Existing Natural (Parent) Deposits:

Between Stations 624+00 to 644+00, the valley floor is surficially covered by a soft to firm ('N' values ranging from 2 to 5 blows/ft.) black organic material (peat) with pockets of silty sand throughout. The thickness of this peat varies from 5 to 8 feet.

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.2) Originally Existing Natural (Parent) Deposits: (cont'd.) ...

The organic material, where it is encountered, and the topsoil, elsewhere, is underlain by a stratum composed of a compact to very dense ('N' values ranging from 11 to 58 blows/ft.) sand to silty sand with occasional thin layers of clayey silt. The thickness of this stratum varies from 15 to 17 feet.

The sand stratum is underlain by a 3 to 4 foot thick layer of very dense gravelly sand, which, in turn, is followed by a deposit of compact to dense sandy silt to silt. The latter deposit was not fully penetrated at any of the boring locations, it was, however, proven to extend to a depth of 25 feet at B.H. #5.

5.3) Granular Material Used to Backfill Sub-Excavation:

As discussed in Sub-section 3.2) the surficial organic material encountered, between Stations 626+90 and 644+00, was sub-excavated and backfilled. The borings put down indicated that the organic deposit, in this area, was completely removed and replaced with select subgrade material. The selected subgrade material is composed of sand with some gravel. The thickness of the backfill was found to vary from 5 to 8 feet.

Standard penetration testing carried out within the sand, gave 'N' values which range from 7 to 56 blows/ft. which would indicate that the fill has been subjected to a moderate degree of compaction.

5.4) Embankment Fill Materials:

5.4.1) Clayey Silt with some Sand & Gravel:

The embankment, from Station 622+00 northerly to Station 644+00, was placed directly on the granular backfill material, discussed in the previous sub-section, or the competent parent granular deposits elsewhere. The main core of the embankment was formed by placing and compacting a material

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.4) Embankment Fill Materials: (cont'd.) ...

5.4.1) Clayey Silt with some Sand & Gravel: (cont'd.) ...

composed of a clayey silt with some sand and gravel (refer to Sub-sections 3.3) and 3.4)). The borings indicate that the thickness of this compacted cohesive layer ranges from 3 to 4 feet, generally being thinnest beneath the central portion of the embankment core.

As discussed in Section #4, the area showing most distress occurred between Stations 624+00 and 635+00. It is of interest to compare the engineering properties of the cohesive material within the affected area to that outside this area.

- 1) The natural moisture content of the material within the affected area (Sta. 624+00 to Sta. 635+00) varies randomly from 12 to 23 percent, with an average of 17 percent. The values are consistently higher than the optimum compaction moisture content of this material which, from laboratory testing, was found to be about 13 percent. In the unaffected area (Sta. 635+00 to Sta. 644+00), however, the moisture content was approximately 1 to 2 percent below the optimum.
- ii) Standard Penetration Resistance testing, carried out within the affected area, gave 'N' values which ranged from 2 to 8 blows/ft. A limited number of tests carried out in the unaffected area gave values between 10 and 22 blows/ft. Based on these results, it is estimated that the major portion of the cohesive fill, in the affected area, is in a soft state, while in the unaffected area, it has a consistency which ranged from stiff to very stiff. This pattern was further confirmed by the dynamic cone penetration tests carried out in the affected and unaffected areas. The engineering properties discussed in the previous paragraphs, are plotted on Figure #1, located in the Appendix to this report.

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.4) Embankment Fill Materials: (cont'd.) ...

5.4.2) Granular Base Course Materials:

A layer, formed of well compacted lifts of granular material meeting the Department's specifications for sand cushion, was placed over the cohesive fill. This, in turn, was followed by a compacted layer of Granular 'A' material. The composite thickness of these layers ranges from 3 to 4 feet.

The standard penetration testing carried out within this zone gave 'N' values which range from 12 to 58 blows/ft. Based on these values, it is estimated that the granular fill was subjected to an acceptable degree of compaction.

6. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out, during the period of the investigation (June and July, 1971) by recording the water levels in the open boreholes. The results are plotted on Drawing #71-11062B. The groundwater level across the site was found to vary between elevations 1339 to 1341, which corresponds to depths of from 1 to 2 feet below original ground level.

7. DISCUSSION AND CONCLUSIONS:

The Hwy. #10 - Orangeville Diversion was constructed between late fall 1970 and spring, 1971. From Station 597+87 northerly to Station 622+00 the roadway section was placed on the north sloping bank on which the Town of Orangeville is located. The highway is in cut in this area. This portion has performed quite satisfactorily.

From Station 622+00 northerly to Station 700+08, however, the highway is located on a relatively low embankment (7 to 9 feet high) placed directly on the valley floor.

Between Stations 624+00 and 644+00, up to 8 feet of surficial organic material is present. This was completely

7. DISCUSSION AND CONCLUSIONS: (cont'd.) ...

sub-excavated and backfilled with granular material prior to constructing the embankment in this area (refer to Sub-section 3.5)). The lower portion of the embankment (3 to 4 feet) was formed of a compacted clayey silt material. This was covered by sand cushion, then Granular 'A' material, the composite thickness of which is between 3 and 4 feet.

As discussed in Section 4), that portion of the embankment, between Station 624+00 and 635+00, has shown major signs of distress, namely: i) areas have subsided up to 0.5 feet, and ii) both transverse as well as longitudinal cracks are prevalent both in the pavement as well as on the unpaved shoulders.

The field investigation has indicated that the subsoil, located beneath the embankment core (which includes both the granular backfill to the sub-excavation, as well as the parent granular deposits), is competent. The poor performance of the aforementioned portion of the embankment most probably originates within the embankment fill material.

As discussed previously, from Station 622+00 to 635+00, which encompasses the affected area, embankment construction was carried out in the winter months of 1970 and 1971. The mean temperature was consistently below freezing, and the precipitation (snow and rain) was relatively high during this period. It is difficult to place and compact fill under these conditions, particularly if the fill is cohesive in nature, as is the clayey silt material. In such soils the in-place moisture content must be reasonably close ($\frac{1}{2}$ to $2\frac{1}{2}$) to the optimum compaction water content in order to obtain a suitable degree of compaction. Most likely, at least a portion of the clayey silt fill was frozen during the placement and compaction operations. Under such conditions, it would be extremely difficult to achieve the required degree of compaction. It is concluded that the clayey silt fill, in the affected area, was in a soft, compressible state during

7. DISCUSSION AND CONCLUSIONS: (cont'd.) ...

the spring of 1971, and this led to the poor performance of the embankment section. This hypothesis will be elaborated upon in the paragraphs to follow:

In the spring the frozen cohesive fill would thaw and tend to become saturated in isolated areas. This was corroborated by the fact that the natural moisture content in the affected area was consistently higher than that in the unaffected area. The cohesive material, which was softened during this period of thaw, would tend to settle under its own weight as well as that of the overlying granular fill. This settlement would be largest beneath the centre of the embankment core, where the confining pressure is greatest, and less near the toe of the fill. This would lead to a differential settlement pattern across the embankment section. This was substantiated by the boring programme carried out. The borings indicated that, in the central portion of the embankment core (in the affected area), the thickness of the clayey silt fill was generally of the order of 3 to 3½ feet, increasing to about 4 feet toward the shoulder and toe of the section (refer to cross-sections on Drawing No. 71-11062B). It is our opinion that, in the central portion of the embankment, the cohesive fill has been compressed, and that the magnitude of this compression could be as much as 0.5 feet, which agrees with the level of subsidence observed, in the critical area, by District personnel.

The differential settlement pattern across the embankment section would no doubt explain the reason for both the longitudinal and transverse cracks noticed in the pavement section.

As mentioned in Section 4), some dishing was noticed on the side slopes of the embankment, particularly in those areas where the organic material was sub-excavated prior to placing fill. This sub-excavation was carried out in accordance with current Department specifications, namely Standard No. DD-406. Under this standard the organic material is removed beneath the

7. DISCUSSION AND CONCLUSIONS: (cont'd.) ...

main embankment core; the sub-excavation does not, however extend for the entire length of the outer slopes which have been flattened using the sub-excavated organic material. The organic material, located beneath the side slopes, would, therefore, be expected to settle more than the compacted granular subgrade backfill material beneath the main embankment core. Such differential settlement, no doubt, would cause dish-shaping of the side slopes, as well as transverse cracks outside the shoulder. The mushroom-shaped boils noticed on the side slopes proved to be areas where boulders were present. The soil surrounding the boulders settled, while the boulders remained in place, thus giving rise to this condition.

The embankment section north of Station 635+00, which was constructed in the spring of 1971, has performed satisfactorily. It is inferred that this is due to the fact that the clayey silt fill, in this area, was placed and compacted during a period of the year when the weather conditions were particularly conducive to carrying out construction operations.

8. MISCELLANEOUS:

The field work, performed during the period of June 28 to July 7, 1971, was carried out under the supervision of Mr. W. Hutton, Project Foundation Engineer.

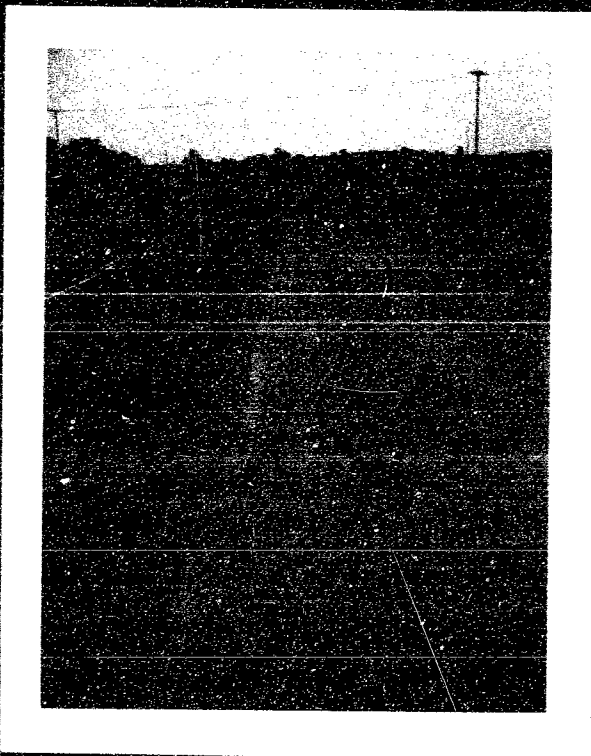
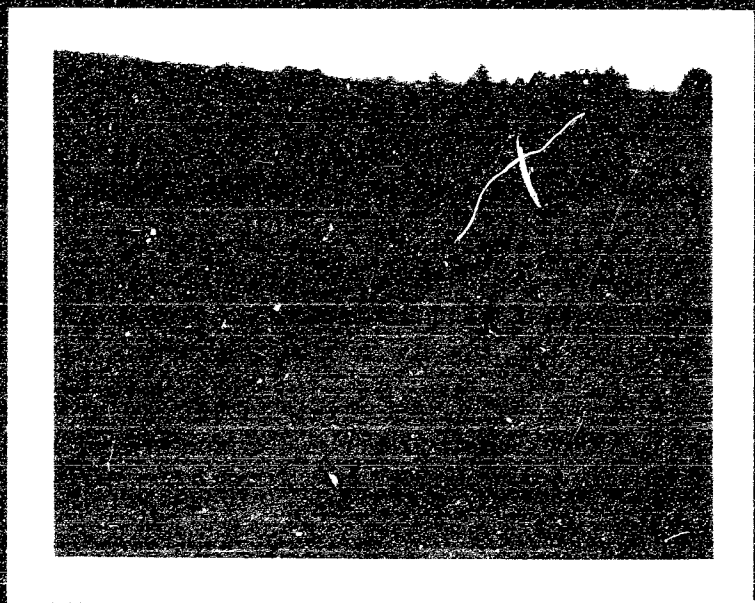
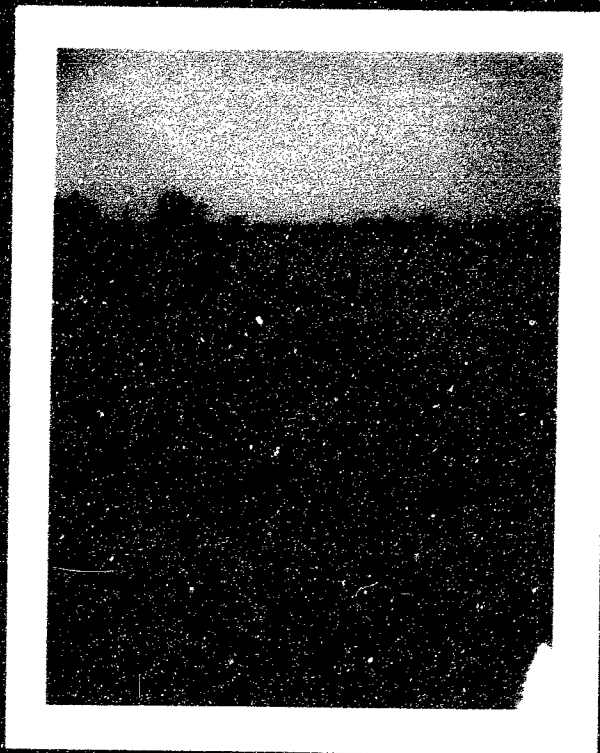
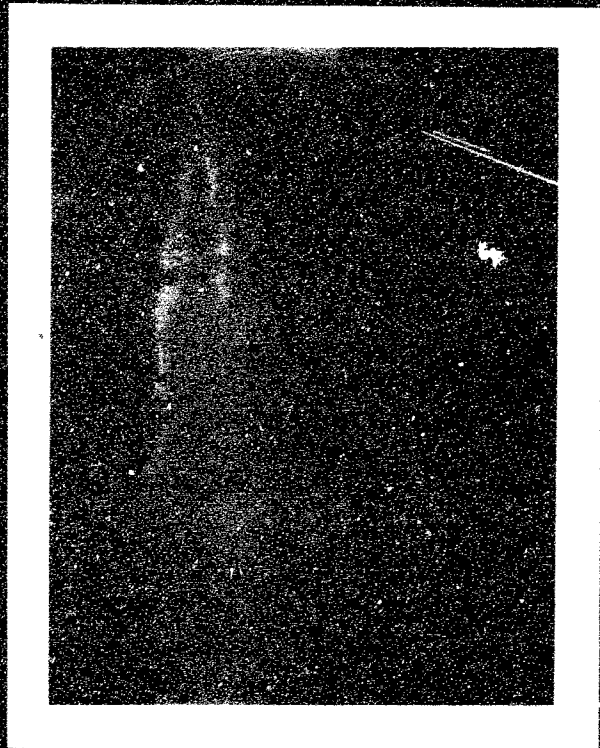
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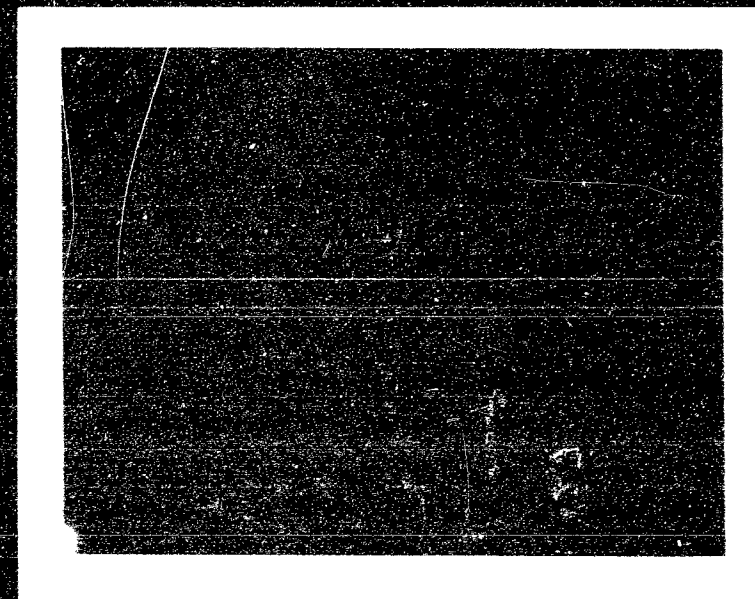
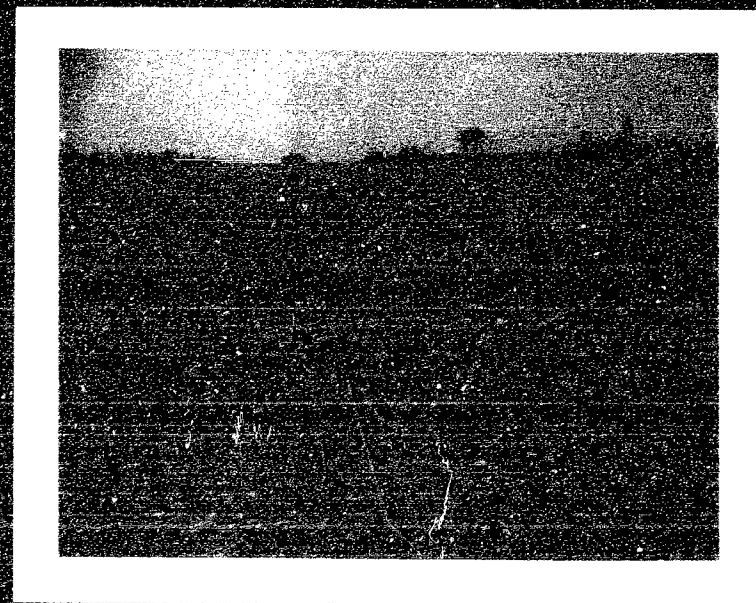
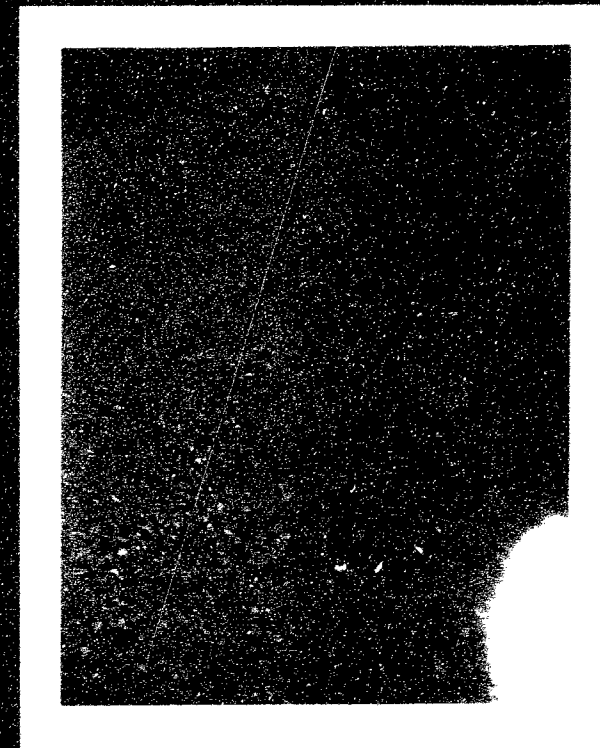
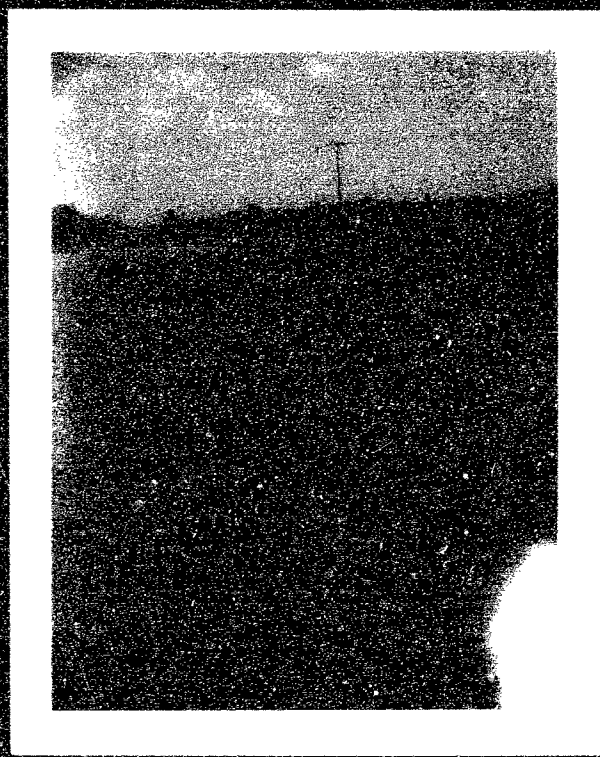
This report was written by Mr. B. T. Darch, Senior Foundation Engineer.

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

August, 1971

APPENDIX I





DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 71-11062

LOCATION Sta. 628 + 00 & Hwy. 10 O/S 17' 12"

ORIGINATED BY W.H.

W.P. 5-66

BORING DATE July 6, 1971

COMPILED BY W.H.

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L		BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT — w_p		
1348.7	Ground level.						SHEAR STRENGTH P.S.F.					WATER CONTENT %			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L			
0.0															
1330.9															
17.8	End of Cone Hole.														

FOUNDATION SECTION

ORIGINATED BY W.R.

COMPILED BY W.H.

CHECKED BY 

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LQUID LIMIT ———— w _L	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS / FOOT		20 40 60 80 100	PLASTIC LIMIT ———— w _p WATER CONTENT ———— w		
							SHEAR STRENGTH P.S.F.	w _p ———— w ———— w _L		
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	WATER CONTENT %		
								10 20 30	P.C.F.	G.R. S.A. SI. CL.
1347.4	Ground level.									
1344.4	Sand and gravel. Brown.	[Pattern]								
3.0	Clayey silt, some sa.	[Pattern]	1	SS	4					
1341.4	& gravel. Firm	[Pattern]	2	SS	5					
6.0	Sand with some	[Pattern]								
1338.4	gravel.	[Pattern]				1340				
9.0	End of borehole.					1330				

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 15

FOUNDATION SECTION

JOB 71-11062

LOCATION Sta. 639+06 @ Hwy. 10 O/S 12' rt.

ORIGINATED BY W.H.

W.P. 5-66

BORING DATE July 7/71

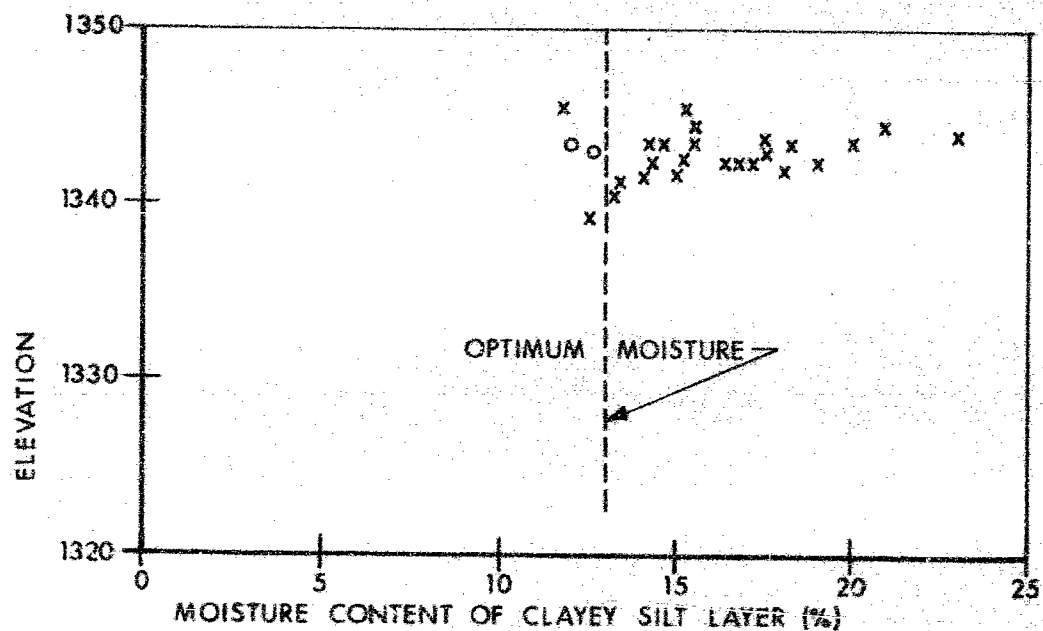
COMPILED BY W.H.

DATUM Geodetic

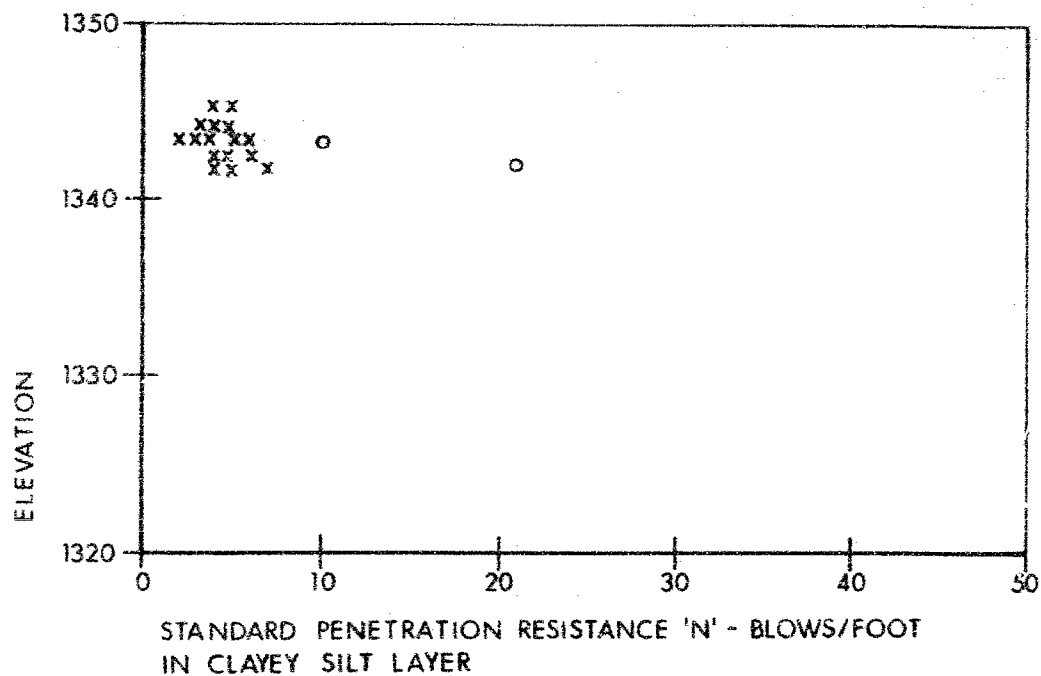
BOREHOLE TYPE Continuous Flight Auger

CHECKED BY *JK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	RESISTANCE	PLASTIC LIMIT — w_p	WATER CONTENT — w		
1349.2	Ground level.						20 40 60 80 100					
0.0	Sand and gravel.											
	Dense.		1	SS	48							
1343.7	Brown.		2	SS	45							
5.5	Clayey silt. Stiff.		3	SS	10							
7.5	Sand with gravel.		4	SS	77							
	End of borehole.					1340.0						



x -- AFFECTED AREA
o -- UNAFFECTED AREA



HWY. 10 BY-PASS ORANGEVILLE

FIG.1

JOB No. 71-11062

COUNTY OF DUFFERIN
TOWNSHIP OF MONO

CONTRACT No. 70-03
W.P. No. 5-66-00

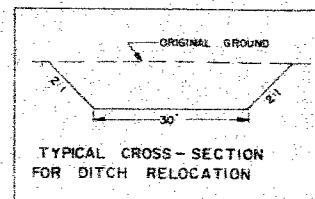
6

COUNTY OF PEEL
TOWNSHIP OF CALEDON

CON. I E.H.S.
LOT 31

CON. I W.H.S.
LOT 1

TOWN OF ORANGEVILLE



NOTE: SEE DWG. 71-11062 B FOR
BORE HOLE DETAILS
AT STA. 629+00 & STA. 632+67

FOR DETAIL OF STRUCTURE
SEE BRIDGE DRAWING D-6437-12
TWIN 12'10" x 8'4" S.P.P.A.

FOR TYPES AND LOCATIONS OF CURB
AND GUTTER, SEWER, AND INTERSECTION
DETAILS SEE DWG. 4112-2 SHEET 13

STA. 626+20 TO STA. 687+80 RT.
STA. 627+20 TO STA. 686+60 LT.
FENCE TO BE ERECTED AT 74'
OFFSET FROM CENTRE-LINE
(ONE FOOT INSIDE R.O.W.)

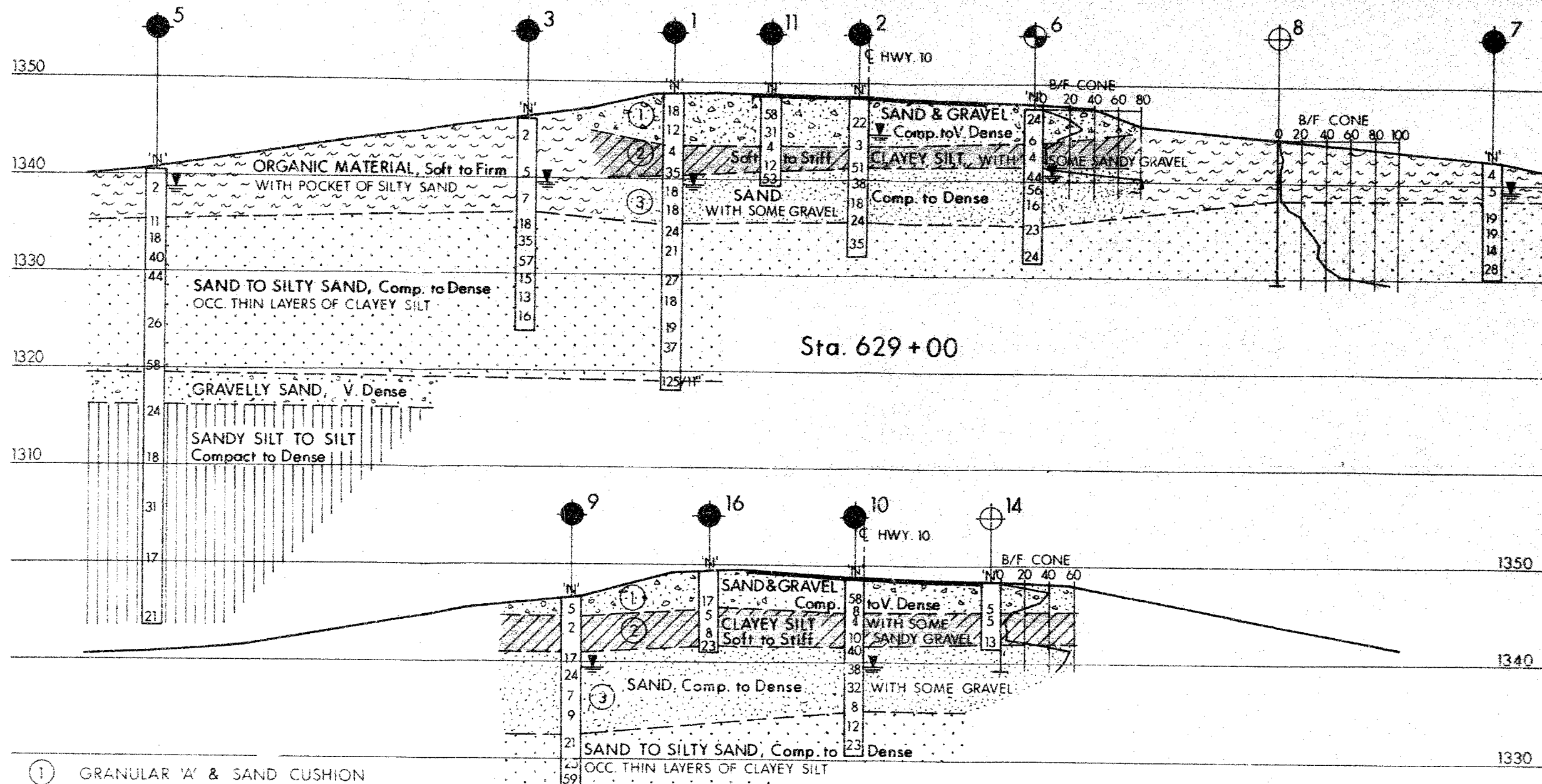
RANDOM RIP-RAP
REMOVAL OF CONCRETE PAVEMENT
REMOVAL OF BITUMINOUS PAVEMENT

TOWN OF ORANGEVILLE
COUNTY OF DUFFERIN

HIGHWAY 10 - ORANGEVILLE DIVERSION

DWG. No. 71-11062 A

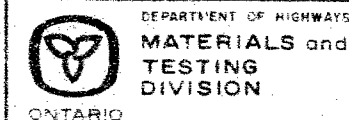
50' 0 100'
SCALE



- ① GRANULAR 'A' & SAND CUSHION
- ② EARTH FILL - CLAYEY SILT
- ③ SELECTED SUB GRADE MATERIAL (MUSKEG BACKFILL)

Sta. 632+67

1320



DEPARTMENT OF HIGHWAYS
 MATERIALS and
 TESTING
 DIVISION

EMBANKMENT SETTLEMENT
 HIGHWAY 10 - ORANGEVILLE DIVERSION
 TYPICAL CROSS - SECTIONS

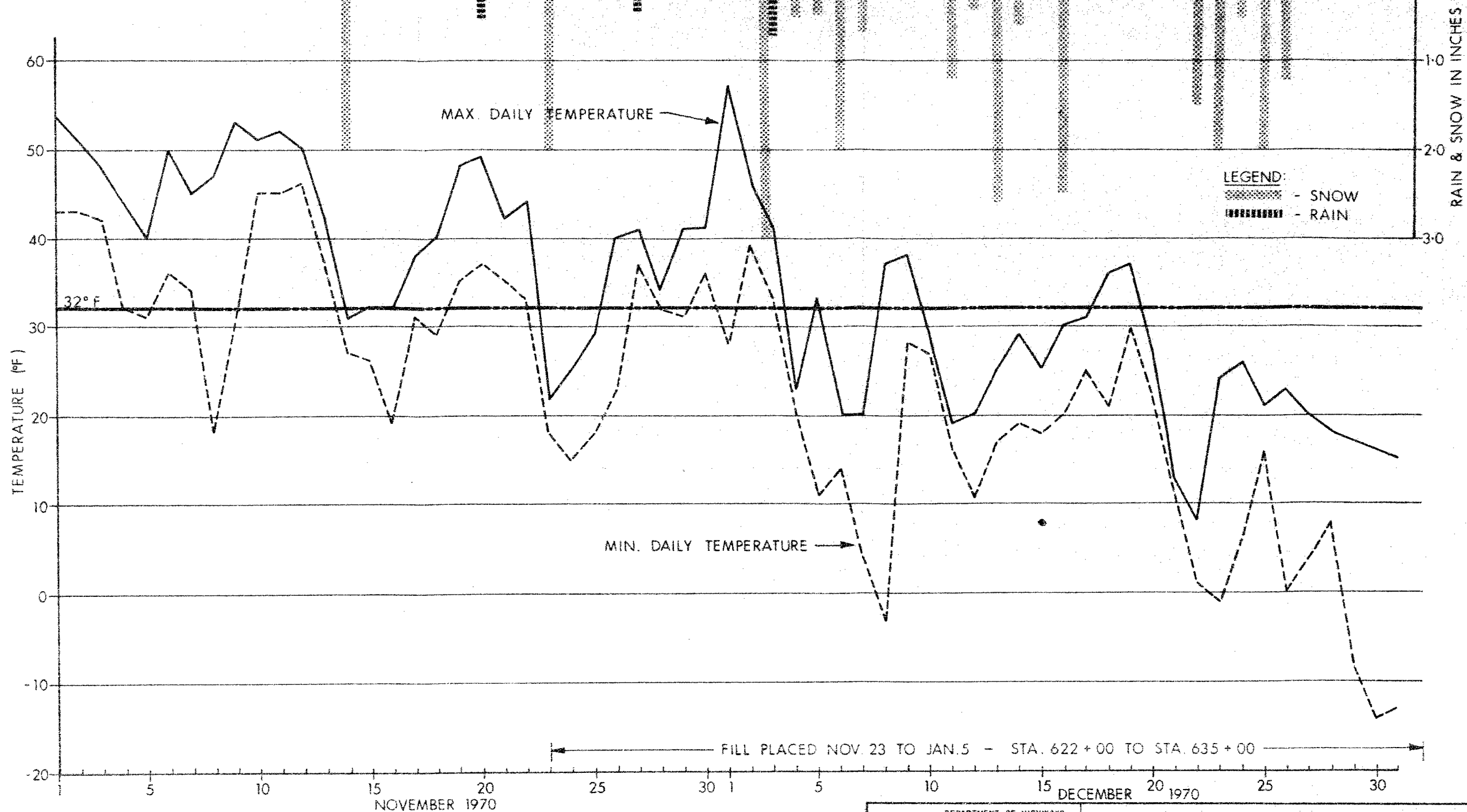
W.P. 5-66

JOB No. 71-11062

DATE JULY 12, 1971

APPROVED

DRAWING NO. 71-11062 B



DEPARTMENT OF HIGHWAYS
 MATERIALS and
 TESTING
 DIVISION

ONTARIO

HWY. 10 - ORANGEVILLE DIVERSION
 DAILY TEMPERATURE RECORD

W.P. 5 - 66

JOB No. 71-11062

DATE JULY 16, 1971

APPROVED

DRAWING NO. 71-11062 C

DEPARTMENT OF HIGHWAYS ONTARIO
MEMORANDUM

71-11062

To: Mr. A. G. Stermac,
Principal Foundations Engr.,
Downsview, Ontario.

FROM: District #3,
Stratford, Ontario.

ATTENTION:

DATE: September 10, 1971.

OUR FILE REF.

IN REPLY TO

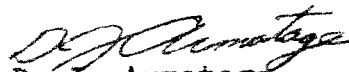
SUBJECT: Foundation Investigation Report for
Embankment Distress, Highway #10,
Orangville Diversion, Contract 70-03.

The District has reviewed the report for the above-noted investigation and would request additional information pertaining to this embankment problem.

We have recently had the failure section, from Station 625+75 - 634+00, padded with 1" - 6" of Hot Mix Pavement which has corrected this problem for the present. The District's concern is whether or not we can anticipate any further settlement in this area and if so over what period of time.

Your opinion on this matter would be beneficial for our future maintenance requirements in this area.

DJA/mt


D. J. Armatage,
Dist. Maintenance Engr.,
For:
W. D. Neilipovitz,
District Engineer.