

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCREs No. 30M 15-42

DIST. 6 REGION CENTRAL

W.P. No. 44-71-22

CONT. No. _____

W. O. No. _____

STR. SITE No. _____

HWY. No. 401

LOCATION NOISE BARRIERS ON HWY

401 BETWEEN PARK & HARMONY ROADS.

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____

30m 15-42
GEOCRE No.

ENGINEERING MATERIALS OFFICE
SOIL MECHANICS SECTION

WP 44-71-22

DIST 6

HWY 401

STR SITE

Noise Barriers - Oshawa
From Park Road Interchange to Harmony Road

DISTRIBUTION

R.D. Gunter
M.R. Ernesaks
D.E. Thrasher (2)

C. Grebski
G.A. Wrong
B.J. Giroux
R.S. Pillar

R. Hore

R. Fitzgibbon }
J. Anderson } cover only
G. Sloan }

Files ✓

SAMPLE DISPOSITION NOTICE		
TYPE	DISCARD AFTER	RECOMM. BY
JARS	77 05 31	JR
TUBES	-	-
ROCK CORES	-	-

GEOCREs

DATE MAY 31 1977



Memorandum

To: Mr. G.C.E. Burkhardt (3)
Head, Structural Section
Central Region
3501 Dufferin Street, Downsview

From: Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

Attention: Mr. W. Kulmatickas

Date: May 25, 1977

Our File Ref.

In Reply to

Subject: Re: Noise Barriers - Oshawa
From Park Road Interchange
to Harmony Road
W.P. 44-71-22, Hwy. 401
District 6, Toronto

INTRODUCTION

Further to your request of March 9, 1977, we have completed a foundation investigation for the above mentioned project. Fieldwork was necessary in order to establish the lateral resistance of the subsoil for the noise barrier system. In order to determine the surface condition a field investigation was carried out and the investigation consisted of a total of 17 sampled boreholes advanced by means of solid stem flight augers to depths up to 10 feet below existing ground surface.

This memorandum presents the results of our subsurface data, together with our comments on the design and construction of the noise barrier walls.

SITE DESCRIPTION AND GEOLOGY

The site is located within the highway 401 right of way from the Park Lawn Road interchange, 2.2 miles easterly to the Harmony Road interchange in the City of Oshawa, Regional Municipality of Durham.

Topographically, this section of highway passes through rolling terrain. Fills up to 20 feet high and cuts up to 30 feet were required to maintain freeway standard grades.

Physiographically, this area is located in the region referred to as the "Iroquois Plain". This is the lowland bordering Lake Ontario which was inundated in the Pleistocene time by Lake Iroquois. Subsoil in this area generally consists of lacustrine deposits overlying glacial till.

SUBSOIL CONDITIONS

The subsoil along this section of Hwy. 401 is quite variable. The summary of the foundation investigation data is attached for your information. It includes the 1) borehole number, 2) station and offset, 3) a description of the subsoil based on our field and laboratory classifications and 4) the Standard Penetration Testing 'N' values obtained in each borehole. Based on our borehole information the following general description may be inferred.

Park Road, Overpass to Simcoe Street Overpass

The parent surficial deposit is a glacial till which was explored to a maximum depth of 10 feet. The glacial till varies widely in composition from location to location. West of Sta. 180+00 the till is comprised of sand with silt and a trace of gravel with a relative density of compact to very dense. East of Sta. 180+00 the glacial till is a heterogeneous mixture of clayey silt, sand and gravel and the consistency may be described as hard.

Vicinity of Drew Street

The parent surficial deposit in this area is a lacustrine deposit of silty clay which was explored to a maximum depth of 10 feet. This deposit is silty clay with a trace of sand and gravel with organic inclusions. Laboratory testing indicates that the organic content in the organic layers ranges from 1.1 to 2.2 percent by weight.

The results of Atterberg Limit testing on four samples from the cohesive silty clay stratum are summarized below:

	<u>Range</u>	<u>Average</u>
Plastic Limit	18-20	20
Liquid Limit	38-41	39
Natural Moisture Content	19-28	23

The Atterberg Limits indicate that the silty clay is inorganic and of intermediate plasticity.

Based on Standard Penetration test 'N' values which range randomly from 6 to 30 blows per foot, the consistency of this stratum may be described as firm to very stiff and in general very stiff.

Wilson Avenue to Harmony Road

The parent surficial deposit of this section is a non-cohesive deposit of sandy silt to silty sand. Standard Penetration testing gave 'N' values which range from 12 to 20 blows per foot. Based on the Standard Penetration testing the relative density of this surficial granular deposit is in general compact.

Fill Material

This fill material varies in composition from location to location and no general pattern is evident from our limited exploration program. Both cohesive and cohesionless fill materials were encountered.

The cohesive fill material varies in composition from clayey silt to silty clay. The results of the Standard Penetration testing gave 'N' values which generally increase with depth ranging from 7 to 14 blows per foot and based on these values the cohesive fill material may be subjected to a moderate degree of compaction.

The cohesionless portion of the fill material ranges in composition from sandy gravel to silty sand. Standard Penetration testing carried out in the non-cohesive fill material gave 'N' values which range randomly from 6 to 21 blows per foot except for one location (approximately 400 feet west of Harmony Road and on the north shoulder of W.B. Hwy. 401. Refer B.H. 9) where the 'N' values are 0 and 2 blows per foot. Based on the 'N' values the non-cohesive fill material may be described as generally moderately compacted. The exception is in B.H. 9 where the borings were carried out to a depth of 26 feet and based on the nature of the augering operation, together with the results of the Standard Penetration Testing, the relative density of the fill material in this location from 3-25 feet, is very loose; below 25 feet the relative density is compact. This very loose silty sand fill material encountered in B.H. 9 is of localized extent and is associated with the old creek location just west of Harmony Road.

Groundwater Conditions

The subsoil investigation program was carried out using solid stem augers. Except for B.H. 9 where the very loose silty sand fill material was encountered, the boreholes remained open after removal of the augers. In B.H. 9 the borehole caved below a depth of 3 feet.

At the time of the field investigation all boreholes except B.H. 4 were found to be in a relatively dry condition; that is no groundwater was encountered. However, in B.H. 4 the groundwater elevation as observed by measuring in the open borehole was found to be 8 feet below existing ground surface.

DISCUSSION AND RECOMMENDATIONS

It is proposed to erect some 3 miles of noise barriers within the Highway 401 right of way between Park Road and Harmony Road in the City of Oshawa in connection with the reconstruction of the Hwy. 401 in that vicinity.

Borings carried out at various selected locations along the proposed noise barrier lines revealed that the parent surficial deposits vary largely in composition within the study area. References should be made to the attached Summary of Foundation Investigation for subsoil data. The borings were advanced by means of solid stem augers and the boreholes were found to be in a relatively dry condition above a depth of 8 feet.

In general, the major portion of the noise barriers will be located in a cut section at the top of the slope. Elsewhere, the noise barriers will be located in a fill section just off the shoulder of the roadway. An examination of the overall scheme of the proposed locations for the noise barriers reveal that some 5900 feet or about 1/3 of the total length of the noise barriers are to be erected in fill areas and the remaining 2/3 of the total length in cut section.

Three types of noise barriers are being considered.

- I 4 Metre Steel Noise Barrier With Post Spacing 9'7". Refer SD-9-145
- II 10 Foot Wood Noise Barrier With Post Spacing 10'. Refer SD-9-152
- III 4 Metre Concrete Noise Barrier With Post Spacing 6'10". Refer SD-9-150

The noise barriers are to be designed for a wind load of 20 lbs. per square foot. An analysis based on strength characteristics of the fill material and subsoil indicate that the footing dimensions should be as follows:

	Type I 4 Metre Steel Noise Barrier	Type II 10 Foot Wood Noise Barrier	Type III 4 Metre Concrete Noise Barrier	
Dia. of Footing (ft)	1.5	2.0	1.5	2.0
Depth of Footing (ft)	7.0	6.5	6.0	5.5

The choice between the type of noise barrier used and the breadth of footing should be based on other considerations.

If the posts for the footings are pre-cast the following construction requirements for backfill operations should be followed:

1. Backfill shall be of concrete with an ultimate strength of 2000 lb. per sq. in. at 28 days. The hole shall be not less than 4 in. larger than the diameter of the footing or
2. Backfill shall be of clean sand; the sand being thoroughly compacted by tamping in layers of not more than 8 in. thick. The hole shall be not less than 4 in. larger than the diameter of the post footing.

If you have any further questions please do not hesitate to call us.



M. MacLean
Project Engineer

For: M. Devata
Supervising Engineer

MM/gs

Attach.

cc: See Cover Sheet
Files
Record Services

APPENDIX

SUMMARY OF FOUNDATION INVESTIGATION FIELDWORK

Borehole Location and Subsoil Data (Stations and Offsets From Hwy. 401 Centreline Chainage)		Standard Penetration Test 'N' Values Blows/Ft.		
		1-2.5'	3.5-5'	6-7.5'
<u>B.H. 1</u>	Sta. 163+80 o/s 55' rt. 0-4' Fill (Matl) Silty Sand, Moderately Compacted 4-10' Fill (Matl) Clayey Silt, Trace Organics, Moderately Compacted	13	13	12
<u>B.H. 2</u>	Sta. 171+10 o/s 94' rt. 0-10' Glacial Till, Sand With Silt Trace of Gravel, Very Dense	95	83	99
<u>B.H. 3</u>	Sta. 180+65 o/s 65' rt. 0-4' Fill (Matl) Clayey Silt, Moderately Compacted 4-10' Glacial Till, Heterogeneous Mixture Clayey Silt, Sand and Gravel, Hard	8	31	79
<u>B.H. 4</u>	Sta. 211+18 o/s 110' rt. 0-10' Silty Clay, Trace Sand, Trace Gravel, Very Stiff (Groundwater Elevation at 8 Ft.)	7	18	24
<u>B.H. 5</u>	Sta. 217+91 o/s 79' rt. 0-10' Silty Clay, Trace Sand, Very Stiff		17	30
<u>B.H. 6</u>	Sta. 227+59 o/s 60' rt. 0-10' Fill (Matl) Clayey Silt, Trace Sand Moderately Compacted	7	10	12
<u>B.H. 7</u>	Sta. 246+42 o/s 60' rt. 0-4' Sand With Silt, Some Clay 4-10' Silty Clay, Firm	19	6	7
<u>B.H. 8</u>	Sta. 254+00 o/s 75' rt. 0-3' Fill (Matl) Clayey Silt, Moderately Compacted 3-10' Sandy Silt, Compact	14	18	12
<u>B.H. 9</u>	Sta. 265+93 o/s 65' lt. 0-3' Fill (Matl) Silty Sand, Compact 3-25' Fill (Matl) Silty Sand 25'-26' Sand and Gravel, Compact	17	2	0
<u>B.H. 10</u>	Sta. 258+68 o/s 60' lt. 0-4' Fill (Matl) Sandy Gravel, Moderately Compacted 4-10' Sandy Silt, Compact	16	17	20

Borehole Location and Subsoil Data
(Stations and Offsets From Hwy. 401
Centreline Chainage)

Standard Penetration
Test 'N' Values Blows/Ft.

Borehole	Station and Offset	Subsoil Description	SPN	SPN	SPN
<u>B.H. 11</u>	Sta. 247+95 o/s 60' lt.	0-6' Fill (Matl) Silty Sand, Moderately Compacted	6	21	
		6-10' Silty Clay, Stiff			11
<u>B.H. 12</u>	Sta. 233+30 o/s 60' lt.	0-10' Fill (Matl) Sand With Silt Moderately Compacted	10	14	14/6"
<u>B.H. 13</u>	Sta. 213+92 o/s 90' lt.	0-10' Silty Clay, Trace Sand, Trace Organics Stiff - Very Stiff	6	22	17
<u>B.H. 14</u>	Sta. 217+40 o/s 85' lt.	0-10' Silty Clay, Stiff - Very Stiff	8	22	12
<u>B.H. 15</u>	Sta. 185+60 o/s 70' lt.	0-4' Fill (Matl) Silty Clay, Moderately Compacted	14		
		4-10' Glacial Till, Heterogeneous Mixture Clayey Silt, Sand and Gravel, Hard		29	33
<u>B.H. 16</u>	Sta. 178+54 o/s 70' lt.	0-4' Fill (Matl) Sand With Silt, Moderately Compacted	16		
		4-10' Glacial Till, Sand With Silt, Trace Gravel Dense		34	48
<u>B.H. 17</u>	Sta. 168+82 o/s 150' lt.	0-10' Glacial Till, Sand With Silt Trace Gravel, Compact - Very Dense	4	46	100/9"

ENGINEERING MATERIALS OFFICE
SOIL MECHANICS SECTION

WP 44-71-22

DIST 6

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Noise Barriers - Oshawa
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Files

GEOCRE5

DATE MAY 31 1977



Memorandum

To: Mr. G.C.E. Burkhardt (3)
Head, Structural Section
Central Region
3501 Dufferin Street, Downsview

From: Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

Attention: Mr. W. Kulmattickas

Date: May 25, 1977

Our File Ref.

In Reply to

Subject: Re: Noise Barriers - Oshawa
From Park Road Interchange
to Harmony Road
W.P. 44-71-22, Hwy. 401
District 6, Toronto

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The noise barriers are to be designed for a wind load of 20 lbs. per square foot. An analysis based on strength characteristics of the fill material and subsoil indicate that the footing dimensions should be as follows:

	Type I		Type II		Type III	
	<u>4 Metre Steel Noise Barrier</u>		<u>10 Foot Wood Noise Barrier</u>		<u>4 Metre Concrete Noise Barrier</u>	
Dia. of Footing (ft)	1.5	2.0	1.5	2.0	1.5	2.0
Depth of Footing (ft)	7.0	6.5	6.0	5.5	6.0	5.5

The choice between the type of noise barrier used and the breadth of footing should be based on other considerations.

If the posts for the footings are pre-cast the following construction requirements for backfill operations should be followed:

1. Backfill shall be of concrete with an ultimate strength of 2000 lb. per sq. in. at 28 days. The hole shall be not less than 4 in. larger than the diameter of the footing or
2. Backfill shall be of clean sand; the sand being thoroughly compacted by tamping in layers of not more than 8 in. thick. The hole shall be not less than 4 in. larger than the diameter of the post footing.

If you have any further questions please do not hesitate to call us.



M. MacLean
Project Engineer

For: M. Devata
Supervising Engineer

MM/gs

Attach.

cc: See Cover Sheet
Files
Record Services

SUMMARY OF FOUNDATION INVESTIGATION FIELDWORK

Borehole Location and Subsoil Data (Stations and Offsets From Hwy. 401 Centreline Chainage)		Standard Penetration Test 'N' Values Blows/Ft.		
		1-2.5'	3.5-5'	6-7.5'
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<u>B.H. 2</u>	Sta. 171+10 o/s 94' rt. 0-10' Glacial Till, Sand With Silt Trace of Gravel, Very Dense	95	83	99
<u>B.H. 3</u>	Sta. 180+65 o/s 65' rt. 0-4' Fill (Mat1) Clayey Silt, Moderately Compacted 4-10' Glacial Till, Heterogeneous Mixture Clayey Silt, Sand and Gravel, Hard	8	31	79
<u>B.H. 4</u>	Sta. 211+18 o/s 110' rt. 0-10' Silty Clay, Trace Sand, Trace Gravel, Very Stiff (Groundwater Elevation at 8 Ft.)	7	18	24
<u>B.H. 5</u>	Sta. 217+91 o/s 79' rt. 0-10' Silty Clay, Trace Sand, Very Stiff		17	30
<u>B.H. 6</u>	Sta. 227+59 o/s 60' rt. 0-10' Fill (Mat1) Clayey Silt, Trace Sand Moderately Compacted	7	10	12
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<u>B.H. 9</u>	Sta. 265+93 o/s 65' lt. 0-3' Fill (Mat1) Silty Sand, Compact 3-25' Fill (Mat1) Silty Sand 25'-26' Sand and Gravel, Compact	17	2	0
<u>B.H. 10</u>	Sta. 258+68 o/s 60' lt. 0-4' Fill (Mat1) Sandy Gravel, Moderately Compacted 4-10' Sandy Silt, Compact	16	17	20

Borehole Location and Subsoil Data
(Stations and Offsets From Hwy. 401
Centreline Chainage)

Standard Penetration
Test 'N' Values Blows/Ft.

<u>B.H.</u>	<u>Sta.</u>	<u>o/s</u>	<u>ft.</u>			
<u>B.H. 11</u>	Sta. 247+95	o/s	60'	ft.		
	0-6'	Fill (Matl)	Silty Sand, Moderately Compacted	6	21	
	6-10'	Silty Clay,	Stiff			11
<u>B.H. 12</u>	Sta. 233+30	o/s	60'	ft.		
	0-10'	Fill (Matl)	Sand With Silt Moderately Compacted	10	14	14/6"
<u>B.H. 13</u>	Sta. 213+92	o/s	90'	ft.		
	0-10'	Silty Clay,	Trace Sand, Trace Organics Stiff - Very Stiff	6	22	17
<u>B.H. 14</u>	Sta. 217+40	o/s	85'	ft.		
	0-10'	Silty Clay,	Stiff - Very Stiff	8	22	12
<u>B.H. 15</u>	Sta. 185+60	o/s	70'	ft.		
	0-4'	Fill (Matl)	Silty Clay, Moderately Compacted	14		
	4-10'	Glacial Till,	Heterogeneous Mixture Clayey Silt, Sand and Gravel, Hard		29	33
<u>B.H. 16</u>	Sta. 178+54	o/s	70'	ft.		
	0-4'	Fill (Matl)	Sand With Silt, Moderately Compacted	16		
	4-10'	Glacial Till,	Sand With Silt, Trace Gravel Dense		34	48
<u>B.H. 17</u>	Sta. 168+82	o/s	150'	ft.		
	0-10'	Glacial Till,	Sand With Silt Trace Gravel, Compact - Very Dense	4	46	100/9"

Soil Mechanics Section
Engineering Materials Office
West Building
1201 Wilson Avenue
Downsview, Ontario
M3M 1J8

Tel: (416) 248-3282

April 20, 1977

Site Investigation Services Limited
677 Crown Drive
Peterborough, Ontario

Dear Sirs:

This letter confirms our request by telephone of April 14, 1977 for the supply of a Type I auger machine (5.1.1), together with all necessary equipment as per your Tender for Supply Contract S-76-1675 at Hwy. 401 and Park Road in Oshawa on April 20, 1977.

Mobilization will be from Oshawa.

Our Project Number is W.P. 44-71-22.

Yours truly,

M. Devata
Supervising Engineer

MD/gs

cc: W.W. Fry
Files ✓
Record Services



BORING CONTRACTORS - COMPARATIVE COSTS

SUPPLY CONTRACT No. 5-76-1675

PERIOD FROM Nov. 1/76 TO Apr. 30/77

DRILL ITEM NO. 5.1

START DATE Apr 20, 1977 Tuesday

ESTIMATED DRILLING FOOTAGE 24 holes @ 6/ho = 144 ft

UNIT REQUIRED 5.1 (I)

SITE Oshawa

ESTIMATED FEET PER HOUR 10' / hr

W. P. 44 71 2

RAFT REQUIRED YES NO

ESTIMATED TOTAL HOURS 15 hrs

W. O. _____

CONTRACTOR	EQUIPMENT DESCRIPTION AND RATES									MOBILIZATION RATES			MOBILIZATION POINTS	MILES ONE WAY	MOB. COST	DRILLING COST	OTHER COST	TOTAL COST
	S.1(A) S.A. TRAIL	S.1(B) S.A. TRUCK	S.1(C) S.A. M.V.	S.1(D) H.S. 2 1/4" TRAIL	S.1(E) H.S. 2 1/4" TRUCK	S.1(F) H.S. 2 1/4" M.V.	S.1(G) H.S. 3 1/4" TRAIL	S.1(H) H.S. 3 1/4" TRUCK	S.1(I) H.S. 3 1/4" M.V.	6.1(A) TRAIL	6.1(B) TRUCK	6.1(C) M.V.						
ICOST	36.00	36.00	38.00	38.00	38.00	40.00	38.00	38.00	40.00	1.40	1.40	1.50	CONCORD, BELLEVILLE, LONDON, NORTH BAY	33	99 ⁰⁰	600 ⁰⁰	②	1099
CANADIAN LONGYEAR	37.00	37.00	42.00	40.50	39.50	42.00	40.50	39.50	42.00	1.45	1.45	1.75	CONCORD, NORTH BAY (WITHIN 50 MILES)	38	133 ⁰⁰	630 ⁰⁰	②	763
	40.00	40.00	45.00	43.50	42.50	45.00	43.50	42.50	45.00	1.45	1.45	1.75	CONCORD, NORTH BAY, (OUTSIDE 50 MILES)					
GEOCON	-	32.00	37.00	-	34.50	39.00	-	34.50	39.00	-	1.25	1.65	REXDALE, SUDBURY, HAMILTON	38	133 ⁰⁰	585 ⁰⁰	③	712 ⁰⁰
MORTON DODDS	49.50	49.50	55.00	49.50	49.50	55.00	49.50	49.50	55.00	1.50	1.50	1.50	TORONTO, SUDBURY, THUNDER BAY	28	84	825 ⁰⁰	③	909 ⁰⁰
	Plus \$1.20/mi. Motel to job site or \$24.00/hr. travelling time in clients vehicle, if provided																	
DOMINION SOIL	45.00	45.00	45.00	-	-	-	45.00	45.00	45.00	1.50	1.50	1.50	TORONTO, KITCHENER, LONDON, THUNDER BAY, WINDSOR, OTTAWA, NORTH BAY	25	75 ⁰⁰	675 ⁰⁰	③	750 ⁰⁰
	Plus \$1.00/mi., Motel to job site & return daily, Thunder Bay, North Bay, Ottawa																	
JOHNSTON	35.00	35.00	40.00	37.50	37.50	42.50	37.50	37.50	42.50	1.35	1.35	1.60	OTTAWA, TORONTO (WITHIN 50 MILES)	40	28	637 ⁰⁰	⑦	765 ⁰⁰
	38.00	38.00	43.00	40.50	40.50	45.50	40.50	40.50	45.50	1.35	1.35	1.60	OTTAWA, TORONTO (OUTSIDE 50 MILES)					
MASTER	34.00	34.00	39.50	36.50	36.50	42.00	36.50	36.50	42.00	1.35	1.35	1.65	TORONTO, LONDON, NORTH BAY, OTTAWA	38	125 ⁰⁰	630 ⁰⁰	⑤	755 ⁰⁰
P. V. K.	30.00	30.00	37.50	-	-	-	-	-	-	1.50	1.50	2.00	TORONTO, BURFORD, LONDON					
SITE INVESTIGATION SERVICES	-	35.00	40.00	-	35.00	40.00	-	37.50	40.00	-	1.15	1.90	PETERBOROUGH, POINT HOPE, BELLEVILLE, OSHAWA, BRAMPTON, LINDSAY	0	0 ⁰⁰	600 ⁰⁰	①	600 ⁰⁰

ASSIGNED TO Site Investigation Ltd
 GIVE REASON IF OTHER THAN LOWEST COST CONTRACTOR ABLE TO SUPPLY EQUIPMENT ON REQUIRED DATE

REMARKS _____

DATE Apr 11/77 SIGNATURE OF SUPERVISING ENGINEER M. D. ...