REPORT ON
CONTRACT 501/84-53
CORE SAMPLINE & ANALYSIS
C.N. EAST YARDS
WINNIPEG, MANITOBA
NTL FILE G021

Prepared for
PARKS CANADA
PRAIRIE REGION
WINNIPEG, MANITOBA
FILE No. C4870-102-4-4

Prepared by
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WINNIPEG, MANITOBA

August 27, 1984

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ABSTRACT

This report is presented as a preliminary assessment of in situ historic resources and in general terms the gross subsoil conditions as they relate to the proposed Visitor Reception Centre and the feasibility of an extensive archaeological investigation of the history of the Red River west bank located east of the CN East Yards between the Assiniboine River and Water Street in Winnipeg.

Discussed in the report are the overburden and general soil characteristics which are determined on the basis of 24 boreholes and the search of existing soils data in the area.

Conclusions are drawn with regards to areas of potential historic values and excavation problems which might be encountered in the subsequent archaeological investigations.

Recommendations are offered for further studies in order to obtain specific soils data for the siting and conceptual design of the Visitor Reception Centre.

1.0 INTRODUCTION

As authorized by Miss Olga Bailey, Contracts Clerk, Prairie Region of Parks Canada, The National Testing Laboratories Ltd. (NTL) conducted a core sampling and analysis of the Red River West Bank near the CN East Yards in Winnipeg.

The primary objective of the work was, on the basis of 24 testholes, to define the gross stratigraphy of areas of potential interest to Parks Canada such that the archaeologists could assess the appropriate methods and locations for subsequent archaeological investigations. The work involved in this report represents the first phase of the physical investigation of the site history.

The detailed terms of reference for the work can be found on Alternative II of NTL proposal dated June 27, 1984 and copy of Acceptance of Tender, Contract 501/84-53 by Parks Canada.

2.0 SITE

The site is located immediately east of the easterly limit of the CN East Yards, along the west bank of the Red River from the mouth of the Assiniboine River northward to Water Street in the City of Winnipeg.

3.0 FIELD PROGRAM

The field drilling program was conducted in 2 stages over the period between July 25, 1984 and August 3, 1984.

Prior to undertaking the Stage I field exploration, 2 site meetings were held on July 12 and 23, 1984 between Parks Canada field personnel and the writer for locating the 3 deep boreholes and associated shallow borings. Utility clearances were obtained from all governing authorities including CNR.

The Stage I program was performed between July 25 & 27, 1984 and consisted of 15 boreholes (i.e. TH 1-15) put down at locations designated by Parks Canada personnel. On completion of the Stage I program, a meeting was held on July 31, 1984 between Mr. Peter Priess and other Archaeologists of Parks Canada and the writer, for the purpose of discussing the findings of the Stage I program and finalizing the drilling locations of the Stage II program. In this meeting, 9 additional boreholes were proposed and drilled on August 3, 1984. The borehole locations are shown on the site plan, plate 1 appended.

With the exception of TH 4, 5, 13 to 15 which were drilled below the top of the bank and on the flood plains using hand augering methods, all boreholes were drilled on and above the top of bank using either a 200mm or 400mm diameter truck-mounted power auger which is owned and operated by Subterranean (Winnipeg) ltd. Except TH 18 where auger refusal was caused by an unknown object in the fill at the 1.37m depth, all boreholes were drilled through the existing fill and terminated in the underlying non-cultural native soils, at depths of 2.5 to 7.2m from grade. The following field logging, sampling and testing procedures were adopted:

3.1 The soil profile encountered at each borehole was visually classified to its <u>full</u> depth.

3.2 Disturbed soil samples were obtained at close intervals or at depths of change in material types.

3.3 All samples were visually examined in the field and returned to our soil mechanics laboratory for further evaluation and reclassification.

3.4 Ground water conditions and stability of the borehole walls were observed during drilling and on completion of the drilling.

The foregoing sampling procedures were altered somewhat from those which were described in our proposal of June 27, 1984. The alterations were considered necessary due to the variability in composition and stony nature of the overburden encountered. The alterations did not jeopardize the purpose of the field investigation and were agreed to by Mr. Peter Priess of Parks Canada.

The entire test drilling and sampling operations were closely monitored by the writer and Parks Canada Archaeologists.

The findings of the Stage II program were verbally communicated to Mr. Peter Priess on the afternoon of August 3, 1984.

Layout of the 24 boreholes was done by our survey crew. Borehole surface elevations were determined from a site contour map supplied by Parks Canada.

4.0 LABORATORY WORK

The principle aim of the laboratory work was directed toward confirmation of the logs of the boreholes. This was carried out by detailed visual examination of the recovered samples. Particle size, shape, color, composition, consistency and/or relative density were used in this confirmation.

Laboratory classification tests on the soil samples were not conducted as such tests were of little value considering the purpose of this study.

The soil samples, each identified by a tag and wrapped with a plastic bag, are stored in 4 cardboard boxes in our laboratory. These samples are ready for immediate delivery to Parks Canada, if needed.

5.0 RESULTS

5.1 Search of Existing Soils Data

To verify the potential existence of relevant testhole logs and obtain a general appreciation of the gross subsoil stratigraphy of the area, inquiries were made with the City of Winnipeg, CNR, Univeristy of Manitoba and several local contractors and consulting engineering firms. In addition, search of pertinent literature in the form of soils maps and reports was undertaken in our library and others.

The results of this search showed that there were no specific testhole data in the immediate area of the site. However, regional soils information to the north, south and west of the site shows that the subsoil stratigraphy may consist of varying surface deposits (i.e. cinder, random fill etc.) underlain by glacial Lake Agassiz deposits of silts/sands and silty clays overlying either water bearing sand and gravel or glacial till, followed by Paleozoic carbonate limestone bedrock of the Red River formation (Lower Fort Garry member).

It should be noted that the areas along the Red River West bank and north of the mouth of the Assiniboine River were

previously used as a waste disposal site which historically was known as the "Red - Assiniboine River Junction dump site." The boundary, shape, size, depth and type of refuse involved are not known.

Testholes previously put down on the Red River west banks, along the CNR tracks and near the Norwood bridge to the south of the site showed that the soil profile generally consisted of random fill or cinders up to about 3m over approximately 7m of silty clay over 4.3m of fine sand and gravel over limestone bedrock. Glacial till was apparently absent in the area.

On the basis of personal communications with local foundation contractors, we understand that within the area previously owned by Genstar to the north, the subsoils generally consist of random fill over silt and silty clay over a thick bed of water bearing sand or a thin layer of glacial till over bedrock. Buildings and other structures in the area were mostly supported on driven piles. The depth to the sand and gravel or glacial till could range between 12.5 and 15.2m from grade. Limestone bedrock might be located within 15.5 to 18.3m of the ground surface.

5.2 Field Program

5.2a Site Observations

The slope faces of the Red River banks within the areas investigated were generally covered with trees, bush and localized random fill. There were signs of bank instability in the form of upper and lower slope movements, particularly near TH 11 where nearly vertical old scarps were noted. Toe erosion was evident at the river's edge. The river bank movements appeared to be of a rotational nature, extending retrogressively from the river's edge towards the top of bank.

At the time of the field investigation, no fresh slope slippage was apparent. However, the trunks of many trees in the area tended to bow downhill indicating the occurrence of "creep movements".

Random fill materials such as building debris, scrap metals, etc, had been end dumped on top or below the crest of the riverbanks. Such fill materials were seen on the river banks between the mouth of the Assiniboine River and TH 1, 4 & 6 to the north.

5.2b Test Drilling Results

The gross subsoil stratigraphy encountered at each of the 24 boreholes can be found on the attached borehole logs, Plates 2 to 25 inclusive. The soil sequence above the top of bank usually included varying fill materials over natural alluvial deposits of sand and clayey silts. Below the top of bank at TH 4, 5, 13, 14 & 15, native non-cultural stratified deposits of silts, topsoil, sand and clay were encountered and extended to the depths explored.

It should be noted that there was evidence of fill between the top of bank and TH 4, 5, 13 to 15. However, the number of boreholes authorized in this study was such that it was not possible to accurately determine the latural extent of the cultural fill deposits which extended below the top of the river banks.

The thickness of the fill materials ranged between 0.3m (TH 8) and 5.5m (TH 1). Generally, the fill consisted of relatively clean surficial sand and gravel fill over either random fill (i.e. a mixture of topsoil, brick, wood, metal, glass, broken bottle, tile, concrete, cobble, ash-like material, organics,

rag, plastic bag, sand, gravel, clay and silt) or railway-related fill (i.e. black or red cinder, coal etc.). The thickness and nature of the fill materials encountered in 19 of the 24 borings are summarized below:

	Fill	
Borehole	Thickness (m)	Nature
1	5.50	random
2	2.40	railway related
3	1.10	railway related
6	2.00	random
7	0.60	railway related
8	0.30	railway related
9	0.80	railway related
10	1.45	railway related
11	4.00	railway related
12	1.35	railway related
16	2.45	random (see note a)
17	1.85	random (see note b)
18	at least 1.37	random (see note c)
19	1.85	random (see note d)
20	2.00	railway related
21	2.75	sand, gravel, shale, silt
22	1.50	random (see note e)
23	1.00	random
24	1.25	random (see note f)

Notes

(a) At TH 16 (Plate 17), chinking-like deposits and some charcoal which could be related to previously burned log structures were encountered.

(b) At TH 17 (Plate 18), 3 attempts had to be made before the fill thickness could be verified by augering. A railway track was encountered at the 150mm depth in the 1st attempt. Auger refusal was experienced at 0.3m on an unknown object in the 2nd attempt.

(c) At TH 18 (Plate 19), drilling were attempted at 2 alternate locations. At both locations, the base of the fill could not be reached. Auger refused on an unknown object at 1.37m from grade. Artifact like deposits were recovered and picked up by a Parks Canada field representative.

(d) TH 19 was relocated approximately 3m east of original location, due to the possible existence of a waterline running in the north-south direction.

(e) At TH 22 (Plate 23), a 125mm thick layer of rotten log which could be related to an old log structure was encountered at about 2.25m from grade.

(f) At TH 24 (Plate 25), an abundance of fish bones, some shells, charcoal and chinking-like deposits were encountered between depths of 0.7 and 1.3m from grade.

The alluvial deposits (i.e. sand, silty clay, clayey silt) which were located below the fill were relatively weak, stratified and with varying relative densities and/or consistencies. The sand and the clayey silt/silty clay were usually loose and soft respectively. These deposits tended to increase their moisture contents from moist to wet near the depths of 3 to 4m from grade.

Caving was noted at the 2.9m depth at TH 21, at the 1.37m depth at TH 23 and at depths of 1.68 to 2.22m at TH 24.

Slight seepage was experienced at TH 21, at about 3.35m from grade.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 Background

In discussion with Parks Canada Archaeologists, we were advised that there were two old Forts (i.e. Gibralter I & II) located wihin the limits of our studied area. These Forts were log-type structures which were burned down at least 3000 years ago. There was also an immigration shed situated in the area. We understand that the main objective of the subsequent archaeological investigation is to determine the locations of these two Forts.

6.2 Areas of Potential Historic Values

On the basis of our field observation and exploration, it is postulated that the general areas of TH 16, 17, 18, 22, and 24 may represent areas of potential interest to Parks Canada. Among these boreholes, materials of potential historic values had been identified at TH 16, 22 and 24, at least on a limited basis.

In our view, the in-situ historic resources in the area would be best determined using trenching methods. These trenches should be initially dug through the noted boreholes, in the direction approximately perpendicular to the river banks and be supplemented with lateral trenches running parallel to the top of the river banks.

6.3 Potential Problems

Potential problems which we could foresee, would include stability of the trench walls and possible existence of unknown buried utilities and methane gas from the random fill. Although domestic garbage of any significance was not encountered in our boreholes, the occurrence of such and the associated methane gas should not be entirely ruled out. For safety reasons, the trenches should be provided with adequate excavation slopes (say 2H to 1V or flatter). Device for detecting methane or other toxic gases should be utilized freqently in the trenches.

Dewatering may be required if the trenches are extended significantly into the alluvial deposits or if the trenches are made in the wetter periods of the year.

Precautions should be exercised for trenching work near TH 16 and in the areas located east and south of the existing CNR Building and Structures shop where waterlines and other buried utilities may be encountered. Based on a copy of an old drawing received from CNR, there is a waterline running from the southeast corner of the said CNR shop towards a shed near the top of the river bank. Backfill of any waterline could be water-charged and when intercepted, a sudden inflow of water into the trenches may occur.

6.4 Further Work

6.4a Old Forts

In the event that the trenching operation fails to locate the old Forts, considerations may be given to drilling additional boreholes in the areas of potential interest to

Parks Canada. The drilling of boreholes would be superior to trenching, considering the expedition and minimum disturbance of existing surface features.

Due to the river bank instability and the existence of extensive end dumped fill discussed earlier, it is logical to assume that the top of the river bank at the site 3000 years ago would be different from what is seen today. For this reason, it is recommended that an airphoto study of the area be undertaken. This study would involve in the comparison of old air photos against the present ones such that the change in topography, surface features, shoreline and top of bank could be defined. If the original top of bank can be well defined, it would be of considerable assistance in search of the old Forts and in locating additional boreholes.

6.4b Visitor Reception Centre

We understand that preliminary design of the Vistor Reception Centre is currently underway by Parks Canada. We also understand that this Centre may be located in the areas previously owned by Genstar, where little borehole information is available.

Because of the history of the site, the bank instability and extensive random fill encountered in our present study, it would be advisable to put down some boreholes, on a preliminary basis, between our studied area and Water Street to the north.

This preliminary soils investigation would identify the general subsurface conditions, areas of potential difficulty and possible foundation alternatives and as such, it would provide valuable guidance to the design team in the site

selection and conceptual design of the Visitor Reception Centre. In this regard, we are prepared to undertake the work under similar terms and conditions of our current contract 501/84-53.

Respectfully submitted,

THE NATIONAL TESTING LABORATORIES LIMITED

per: Walter Kwan, M. Eng., P. Eng.
Manager, Geotechnical Division

WK:dm

FOR MAP SEE:
21K-87-101-62

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dsn: WK | CKD: WK | Date of Investigation: July 25, 1984 | JOB NO.: G021 | TH 1

WATER CONTENT %: Wp -□ W -○ Wl -△

DRILL TYPE: 400mm auger

OTHER TESTS:

DATUM

SURFACE ELEVATION: 230.2m

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
0		FILL - sand & gravel			
1		FILL -topsoil, sand, gravel - bricks, cobbles - wood, metal - broken bottles, glass - ceramic tile, concrete			
2					
3		FILL - clay & silt, soft			
4		FILL - soft, moist to wet - ash like deposits - light grey - some clay & silt - dark grey at 4.1m			
5		FILL - sand & gravel - dark grey to black			
6		CLAY - firm, brown, silty			
7		SAND & CLAY - wet, firm to soft			
8		End Hole at 7.2m			

PLATE 2

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 2

Wp - □ W - ○ Wl - △ WATER CONTENT %

DRILL TYPE: 400mm auger

OTHER TESTS

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 230.1m)	SOIL SAMPLE: CONDITION / TYPE / PENETRATION RESISTANCE
0		FILL - sand & gravel	
		FILL - cinder, black	
1		FILL - cinder - red	
2		- some black coal lumps	
3		SAND - fine, silty - brown to tan	
4		SILT - soft to firm - clayey, sandy - stratified - very sandy at 3.4m	
5			
		End Hole at 5.2m	
6			
7			

PLATE 3

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT

CN EAST YARDS

Logged/Own. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 3

Wp - □ W - ○ Wl - △
WATER CONTENT %

DEPTH (m)

SOIL SYMBOL

SOIL DESCRIPTION

DATUM

SURFACE ELEVATION 230.0m

SOIL SAMPLE: CONDITION | TYPE | PENETRATION RESISTANCE

DRILL TYPE: 200mm auger

OTHER TESTS

0 — FILL - sand & gravel, rootlets

FILL
- cinder
- black

1

SILT
- soft to firm
- clayey
- tan to brown
- some sand
- wet at 3.4m

2

3

End Hole at 3.4m

4

PLATE 4

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 4

Wp - □ W - ○ WI - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 226.7m)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 50mm hand auger / OTHER TESTS
0		SILT - brown, some clay				
		CLAY - firm, brown ~ silt inclusions at 0.6m 50mm thicklayer of clay glass & wood, black				
1		SILT - clayey ... 12mm thick ash like layer - sandy, stratified - oxidized stains - gypsum inclusions				
2		- 50mm thick ash like layer				
		SILT - brown to tan - soft to firm ~ clayey				
3		End Hole at 3.1m				

PLATE 5

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 5

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m) | SOIL SYMBOL

SOIL DESCRIPTION

DATUM

SURFACE ELEVATION 226.5m

SOIL SAMPLE: CONDITION | TYPE | PENETRATION RESISTANCE

DRILL TYPE: 50mm hand auger

OTHER TESTS

0

SILT
- tan, moist
- clayey

TOPSOIL
- black, organic

1

SILT
- clayey, sandy
- organic inclusions
- firm to soft
- more clay
- stratified

2

SAND - brown, silty
- some rootlets

SILT - clayey, soft

3

End Hole at 2.74m

PLATE 6

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 6

Wp- □ W- ○ WI- △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 230.8m)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 400mm auger / OTHER TESTS
0		FILL - sand, gravel - some topsoil				
1		FILL - ash like deposit - light grey to black, bricks - some hard mortar lumps - organics				
2		SILT - firm - clayey, rootlets - sandy, tan to brown				
		SAND - silty, brown - moist				
3		End Hole at 3m				

PLATE 7

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 7

Wp – □ W – ○ Wl – △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION 230.5m				DRILL TYPE: 200mm auger OTHER TESTS
0		FILL – sand, gravel				
		FILL – cinder, black				
		SAND – brown, moist – fine to medium				
1		SILT – firm to soft – some organic – oxidized stains				
2		– clayey, sandy – stratified – wet & soft at 4.12m				
3						
		--- grey, wet sandy silt				
4						
		End Hole at 4.12m				

PLATE 8

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 8

DRILL TYPE: 200mm auger

OTHER TESTS

DATUM

SURFACE ELEVATION 230.7m

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
0		FILL - sand, gravel			
		FILL - cinder, red			
1		SILT - firm, clayey - sandy, stratified			
		SAND - fine, brown - moist			
2		SILT - clayey, sandy - stratified - firm to soft			
3		End Hole at 3m			

PLATE 9

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 9

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 230.5m)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 200mm auger / OTHER TESTS
0		FILL - sand, gravel				
		FILL - cinder - black				
1		SILT - firm to soft - clayey, sandy - stratified - tan to brown - moist				
2						
3						
		End Hole at 3.2m				

PLATE 10

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 10

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 230.1m)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 200mm auger / OTHER TESTS
0		**FILL** - sand, gravel, clay - topsoil, bricks, - broken rock				
1		**FILL** - sand - brown to red - some cinder				
2		**SILT** - clayey, sandy - stratified - oxidized stains - sand layers at 2m - clay pockets at 2.6m - soft to firm				
3		End Hole at 3m				

PLATE 11

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Own. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 11

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION DATUM SURFACE ELEVATION 230.7m	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 200mm auger OTHER TESTS
0		FILL - sand, gravel - silt, bricks - trace of organics				
1						
2		FILL - cinder - red - some sand & gravel - wet at 3m - saturated at 3.7m				
3						
4		SAND - brown - fine to medium				
5		End Hole on soft clayey silt at 4.3m				

PLATE 12

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Own. WK | CKD WK | Date of Investigation July 25, 1984 | JOB NO. G021 | TH 12

Wp- □ W- ○ Wl- △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION 230.9m				200mm auger
0		FILL - sand, gravel - organics				
1		FILL - cinder - black, 50mm thick red layer at 1m, some coal				
2		SILT - firm to soft - clayey, sandy - stratified				
3						
4		End Hole at 3.6m				

PLATE 13

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Own. WK | CKD WK | Date of Investigation July 27, 1984 | JOB NO. G021 | TH 13

Wp – □ W – ○ WI – △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONSISTENCY	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION 226.7m				60mm hand auger OTHER TESTS
0		TOPSOIL - organic				
		SILT - clayey, sandy - stratified - tan to dark brown - moist, soft				
1		- - - rootlets at 1.52m				
		·· sandy at 1.83m				
2						
3		End Hole at 3m				

PLATE 14

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 27, 1984 | JOB NO. G021 | TH 14

DRILL TYPE: 50mm hand auger

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
		DATUM SURFACE ELEVATION 226.0m			
0		TOPSOIL - organic			
		SILT - soft to firm - clayey, stratified - soft black clay			
1		SAND - 75mm thick			
		SILT -soft - clayey, sandy - stratified - organic inclusions			
2					
3		End Hole at 3m			

OTHER TESTS

PLATE 15

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. WK | CKD WK | Date of Investigation July 27, 1984 | JOB NO. G021 | TH 15

Wp – □ W – ○ Wt – △ WATER CONTENT %

DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SOIL SAMPLE: CONDITION, TYPE, PENETRATION RESISTANCE | DRILL TYPE | OTHER TESTS

DATUM

SURFACE ELEVATION 226.0m

DRILL TYPE: 150mm hand auger

0

SILT – organic

SILT

- soft to firm
- clayey, sandy
- stratified

1

- - - organic inclusions at 1.3m

- - - sandy at 1.52m

- dark brown to black

2

End Hole at 2.5m

3

PLATE 16

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 16

Wp - □ W - ○ Wl - △ WATER CONTENT %

DRILL TYPE: 400mm Auger

OTHER TESTS

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION DATUM SURFACE ELEVATION 231.0m	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
0		FILL - sand & gravel			
		FILL wood layer 0.3m thick fine to medium brown sand wood layer - clay, silty - cinder, metal pieces - wire, glass - some chinking-like deposits - some charcoal - some ash like deposits			
1					
2					
3		SAND & SILT - brown - moist - compact - fine to medium			
4		End Hole at 3.75m			

PLATE 17

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 17

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
0		DATUM SURFACE ELEVATION 231.0m				400mm Auger
		FILL - sand, gravel - cinder, glass - brick, silt - concrete pieces - clay - 25mm thick ash-like layer at 1.52m - wood				
1						
2		SILT - soft to firm, clayey				
		End Hole at 2.13m				
3		NOTES 1) This test hole was drilled 0.3m west of original location where a railway track was encountered at 150mm from grade. 2) Prior to drilling at the final location, a 2nd attempt was made 0.6m east of original location. In this case, auger refusal on unknown object at 0.3m.				
4						

PLATE 18

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Own. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 18

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION 230.7m				DRILL TYPE: 400mm Auger OTHER TESTS
0	X	FILL - sand & gravel - wet lime at 1.2m				
	X	- plastic bag, - broken bottle				
1	X	- wood, metal pieces				
		Auger refusal at 1.37m on unknown object				
2		NOTES 1) Artifact like materials picked up by Parks Canada on site representative.				
		2) One additional hole drilled 0.6m east of TH 18; auger refusal again at 1.37m				
3						
4						

PLATE 19

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 19

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 231.2m)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 400mm Auger; OTHER TESTS
0		FILL - sand & gravel				
		FILL - cinder - coal - broken glass --- piece of oxidized copper - some silt - wood pieces				
1						
2		SILT - sandy - firm				
		SAND, brown				
		End Hole at 2.6m				
3						
4						

PLATE 20

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT

CN EAST YARDS

Logged/Own. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 20

Wp - □ W - ○ WI - △
WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION DATUM SURFACE ELEVATION 230.7m	SOIL SAMPLE CONDITION	TYPE	PENETRATION RESISTANCE	DRILL TYPE 400mm Auger OTHER TESTS
0		FILL - sand & gravel - some cobble to 100mmØ				
1		FILL - 50mm thick sand layer at 0.4m - black cinder at 1.5m - sand & silt				
2		SAND - brown, moist				
		SILT - firm to soft - clayey				
3		End Hole at 2.74m				
4						

PLATE 21

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Own. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 21

Wp – □ W – ○ Wl – △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION 229.7m				400mm Auger
0		FILL – sand & gravel				
1		FILL – broken shale				
2		FILL – silt – wet – soft, tan				
3		SAND – caving at 2.9m – brown – grey at 3m, seepage at 3.35m				
4		SILT – clayey – soft – dark grey				
		End Hole at 4.57m NOTE Test hole caved in to 3.35m from grade on completion.				

PLATE 22

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 22

DRILL TYPE: 400mm Auger

OTHER TESTS

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (M)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
		DATUM SURFACE ELEVATION 230.7m			
0	X	**FILL** - wood, concrete - sand, gravel			
1	X	- blue ceramic tile, rag - some silt			
	X	**FILL** - sandy silt, soft - trace of broken rock			
2		**SAND** - fine to medium - silty, compact --- 125mm thick layer of rotten log			
3		**SILT** - soft - clayey			
		End Hole at 3.05m			
4					

PLATE 23

The National Testing Laboratories Ltd.

BOREHOLE LOG

PROJECT: CN EAST YARDS

Logged/Dwn. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 29

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DATUM; SURFACE ELEVATION 230.7m)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: 400mm Auger / OTHER TESTS
0	X	FILL - sand & gravel - concrete pieces				
	X	FILL - silt - some clay				
1		SILT - - - caving at 1.37m - sandy - brown - soft to firm				
2						
3						
		End Hole at 3.2m				
4						

PLATE 24

BOREHOLE LOG

The National Testing Laboratories Ltd.

PROJECT: CN EAST YARDS

Logged/Dwn. GL/WK | CKD WK | Date of Investigation Aug 3/84 | JOB NO. G021 | TH 24

Wp - □ W - ○ Wl - △ WATER CONTENT %

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION 230.8m				DRILL TYPE: 400mm Auger OTHER TESTS
0		FILL - gravelly sand - some concrete & cobble				
1		FILL - sandy - wood, cinder, silt --- abundance of fish bones - shells, charcoal, chinking-like deposits				
		SAND --- caving between 1.68 & 2.22mm				
2		SILT - soft to firm - tan - sandy				
3						
4		End Hole at 4.27m NOTE Hole caved to 3.35m from grade on completion				

PLATE 25