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REPORT ON

GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL COATING FACILITY
SNAKE ISLAND ROAD
VILLAGE OF METCALFE (FORMER TOWNSHIP OF OSGOODE)
OTTAWA, ONTARIO

Submitted to:

Coatit Industries Ltd.
200 Elgin Street, Suite 202
Ottawa, Ontario
K2P 1L5

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March 2006 06-048

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March 15, 2006

Our Ref: 06-048

Coatit Industries Ltd.
200 Elgin Street, Suite 202
Ottawa, Ontario
K2P 1L5

ATT.: Mr. Robert Aldrich, COO

RE: GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL COATING FACILITY
SNAKE ISLAND ROAD
VILLAGE OF METCALFE (FORMER TOWNSHIP OF OSGOODE)
OTTAWA, ONTARIO

Dear Sir:

This report presents the results of a subsurface investigation carried out at the site of a proposed industrial building in Ottawa, Ontario. The purpose of the investigation was to identify the general subsurface conditions at the site by means of a limited number of test pits. Based on the factual information obtained, engineering guidelines were to be provided on the geotechnical aspects of the design of the project, including construction considerations that could influence design decisions. This work was carried out in accordance with our proposal dated February 27, 2006.

PROJECT DESCRIPTION AND SITE GEOLOGY

Plans are being prepared to develop the property located on the north side of Snake Island Road, just west of the intersection of Snake Island Road and Highway 31 (Bank Street) in the Village of Metcalfe, City of Ottawa, Ontario (refer to Key Plan, Figure 1). The proposed commercial development is to consist of a single storey building of slab on grade construction. At grade parking areas will be provided on the south and west sides of the proposed building.

The site of the proposed building is currently undeveloped and has a relatively flat to slightly rolling topography. The property is grass covered. The west side of the property is bordered by mature deciduous trees.

Surficial geology maps of the Ottawa area indicate that the site is underlain by deposits of glacial till. The thickness of the overburden is indicated to be between about 2 and 5 metres. Bedrock geology maps of the area indicate that the glacial till is underlain by dolostone bedrock of the Oxford formation.

SUBSURFACE INVESTIGATION

The field work for this investigation was carried out on February 17, 2006. During that time, five (5) test pits, numbered 1 to 5, inclusive were advanced to depths between 1.5 and 1.9 metres below existing ground surface using a rubber tire backhoe supplied and operated by a local contractor. The subsurface conditions encountered in the test pits were identified by visual and tactile examination of the materials exposed on the sides and bottom of the test pits and from the excavated materials. Standpipes were installed in three of the five test pits upon completion of excavation (test pits 2, 3, and 4) to measure the groundwater levels. The field work was supervised throughout by a member of our engineering staff who directed the excavating and logged the test pits.

Following completion of the test pits, selected soil samples were returned to our laboratory for further visual examination.

The results of the test pits are provided on the Record of Test Pit sheets following the text of this report. The locations of the test pits are shown on the Site Plan, Figure 2.

The test pit locations were determined by Morey Houle Chevrier Engineering Ltd. relative to the property lines. Test pit elevations were measured and recorded relative to a temporary benchmark that was established at the subject site by Stantec Geomatics Ltd. The benchmark consists of a nail in the utility pole at the southeast corner of the site and has an elevation of 89.038 metres (geodetic datum).

SUBSURFACE CONDITIONS

General

As previously indicated, the soil and groundwater conditions logged in the test pits are given in the Record of Test Pit sheets following the text of this report. The test pit logs indicate the subsurface conditions at the specific test locations only. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. Subsurface conditions at other than the test pit locations may vary from the conditions encountered in the test pits. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site.

The soil descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and Morey Houle Chevrier Engineering Ltd. does not guarantee descriptions as exact, but infers accuracy to the extent that is common in current geotechnical practice.

The following presents an overview of the subsurface conditions encountered in the test pits advanced in the area of the proposed building and the associated at grade parking areas.

Topsoil

All five (5) test pits encountered topsoil from ground surface. The topsoil generally consists of silty sand to silt with sand, and ranges in thickness from about 0.20 to 0.3 metres at the test pit locations.

Glacial Till

A deposit of glacial till was encountered below the topsoil in all the test pits. The glacial till is a heterogeneous mixture of all grain sizes, but may be generally described as a silty sand with variable amounts of clay and gravel, cobbles and boulders. All of the test pits were terminated at depths ranging from 1.5 to 2.0 metres within the glacial till deposit. Test pit 1 met with practical refusal to further excavating at a depth of about 1.5 metres on either nested boulders within the glacial till or on the surface of bedrock. Based on the effort required to excavate the glacial till, this deposit is considered to be compact to dense.

Groundwater Levels

Significant groundwater inflow was observed in test pits 1, 2, 3, and 4 during excavation at depths of 0.5 to 1.6 metres below ground surface. The static groundwater levels in test pits 2, 3, and 4 range from 0.6 to 1.5 metres below ground surface (approximate elevation 87.6 to 88.2 metres, geodetic datum) on February 21, 2006. It should be noted that the groundwater levels may be higher during wet periods of the year such as the early spring or following periods of heavy precipitation.

PROPOSED COMMERCIAL DEVELOPMENT

General

This section of the report provides engineering guidelines on the geotechnical design aspects of the project based on our interpretation of the test pit information and project requirements. It is stressed that the information in the following sections is provided for the guidance of the designers and is intended for this project only. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of the factual data as it affects their construction techniques, schedule, safety and equipment capabilities.

The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at this site. The presence or implications of possible surface and/or subsurface contamination resulting from previous uses or activities of this site or adjacent properties, and/or resulting from the introduction onto the site of materials from off site sources are outside the terms of reference for this report and have not been investigated or addressed.

Proposed Building Foundations

Based on the test pits that were advanced during the current investigation, the subgrade conditions at this site consist of topsoil from ground surface, followed by a native deposit of glacial till. The native deposit of glacial till is considered suitable for the support of the proposed building on spread footing foundations.

Based on the effort required during the excavation of the test pits, it appears that the glacial till material has a compact to dense relative density. Conventional spread footing foundations bearing on or within undisturbed, compact to dense glacial till could be sized using an allowable bearing pressure of 100 kilopascals. The total and differential settlement of the footings bearing on or within the glacial till should be less than about 25 and 15 millimetres, respectively, provided that all loose or disturbed soil is removed from the bearing surfaces. The topsoil is considered to be highly compressible and is not considered suitable for the support of the proposed structure (i.e. foundations or rigid concrete slabs on grade). All fill material (if encountered) and topsoil should be removed from the proposed building area.

The native soils at this site are sensitive to disturbance from construction traffic, frost and water. Groundwater/surface water inflow into the excavation should be handled as required by pumping from sumps within the excavation. Care should be taken during construction to prevent disturbance of the bearing surfaces due to construction traffic and water. The foundation subgrade surfaces should be cleaned of loose and disturbed soil prior to placing concrete for the footings.

Significant groundwater inflow was observed in test pits 1 to 4 during excavation. To reduce the potential for groundwater inflow into the excavation for the proposed building, we suggest that the proposed building be founded above the groundwater level (that is, above about elevation 88.2 metres) and that the required frost protection be achieved using a combination of earth cover and extruded polystyrene insulation. Details for insulating the footings are discussed below. Alternatively, the proposed structure could be designed with a thickened perimeter slab; the details for this alternative could be provided, if required.

Perimeter foundation drainage is not considered necessary for a slab on grade structure at this site, provided that the floor slab level is above the finished exterior ground surface level.

Frost Protection Requirements for Foundations

For frost protection purposes, all exterior footings should be provided with at least 1.5 metres of earth cover for frost protection purposes. Isolated (unheated) piers that are located in areas that are to be cleared of snow should be provided with at least 1.8 metres of earth cover for frost protection purposes. Alternatively, the required frost protection could be provided by means of a combination of earth cover and extruded polystyrene insulation. An insulation detail is provided on the attached Figure 3.

Seismic Design of Proposed Structure

The overburden deposits in the area of the proposed structure are comprised of a deposit of glacial till over bedrock. These deposits are non-cohesive and have an apparent compact to dense relative density.

A foundation factor, F, of 1.0 could be used for the seismic design of the proposed structure if it is founded within the overburden material at this site.

Foundation Wall and Pier Backfill

The native soils at this site are highly frost susceptible and should not be used as backfill against foundations, piers, etc. To avoid frost adhesion and possible heaving, the foundations should be backfilled with imported, free-draining, non-frost susceptible granular material such as that meeting OPSS Granular B Type I or II requirements. Where the backfill will ultimately support areas of hard surfacing (pavement, sidewalks or other similar surfaces), the backfill should be placed in maximum 200 millimetre thick lifts and should be compacted to at least 95 percent of the standard Proctor maximum dry density value using suitable vibratory compaction equipment. Where future landscaped areas will exist next to the proposed structure and if some settlement of the backfill is acceptable, the backfill could be compacted to at least 90 percent of the standard Proctor maximum dry density value.

Where areas of hard surfacing (concrete, sidewalk, pavement, etc.) abut the proposed building, a gradual transition should be provided between those areas of hard surfacing underlain by non-frost susceptible granular wall backfill and those areas underlain by existing frost susceptible native materials. It is suggested that granular frost tapers be constructed from founding level to the underside of the granular base/subbase material for the bard surfaced areas. The frost tapers should be sloped at 1 horizontal to 1 vertical, or flatter.

Slab on Grade Support (Heated Areas Only)

Based on the test pits advanced during this investigation, the area of the proposed building is underlain by as much as about 0.3 metres of topsoil. The topsoil is underlain by a deposit of glacial till. To prevent long term settlement of the main floor slab, all topsoil, organic material and any fill should be removed from below the proposed slab. The native glacial till subgrade should be proof rolled with a vibratory steel drum roller under suitable (dry) conditions. Any soft areas that are evident from the proof rolling should be subexcavated and replaced with compacted, imported sand or sand and gravel material, such as that meeting OPSS Granular B Type I or II requirements.

The grade within the proposed building could then be raised, where necessary, with granular material meeting OPSS requirements for Granular B Type I or II. The granular base for the proposed slab on grade should consist of at least 150 millimetres of OPSS Granular A.

OPSS documents allow recycled asphaltic concrete and concrete to be used in Granular A and Granular B Type II materials. Since the source of recycled material cannot be determined, it is suggested that any granular materials used beneath the floor slab be composed of virgin material (100 percent crushed rock) only.

All imported granular materials placed below the proposed floor slab should be compacted in maximum 200 millimetre thick lifts to at least 95 percent of the standard Proctor maximum dry density value.

Underfloor drainage is not considered necessary provided that the floor slab level is above the finished exterior ground surface level. If any areas of the building are to remain unheated during the winter period, thermal protection of the slab on grade may be required. Further details on the insulation requirements could be provided, if necessary.

Access Roadway and Parking Areas

In preparation for the construction of the access roadway and parking areas at this site, all surficial topsoil, and any loose/soft, wet, organic or deleterious materials should be removed from the proposed subgrade surface. Prior to placing granular fill for the parking and access roadway areas, the exposed subgrade should be heavily proof rolled with a vibratory steel drum roller under dry conditions and inspected and approved by geotechnical personnel. Any soft areas evident from the proof rolling should be subexcavated and replaced with suitable earth borrow.

It is suggested that parking areas for light vehicles (automobiles, etc.) be constructed using the following minimum pavement structure:

> 50 millimetres of OPSS HL3 asphaltic concrete, over
> 150 millimetres of OPSS Granular A base, over
> 300 millimetres of OPSS Granular B Type II subbase

For any access roadways and parking areas that will be used by truck traffic or fire routes, the asphaltic concrete surfacing thickness should be increased to 80 millimetres (40 millimetres of OPSS HL3 over 40 millimetres of OPSS HL8) and the thickness of the Granular B Type II subbase layer increased to 400 millimetres.

The above pavement structure assumes that the roadway/parking area subgrade surface is prepared as described in this report. If the subgrade surface is disturbed or wetted due to construction operations or precipitation, the granular thicknesses given above may not be adequate and it may be necessary to increase the thickness of the Granular B Type II subbase and/or to incorporate a woven geotextile separator between the roadway subgrade surface and the granular subbase material. The adequacy of the design pavement thickness should be assessed by geotechnical personnel at the time of construction.

The granular base and subbase materials should be compacted in maximum 200 millimetre thick lifts to at least 98 percent of the standard Proctor maximum dry density value. Any earth fill used for grade raise purposes below the proposed pavement should be compacted to at least 95 percent of the standard Proctor maximum dry density value.

Adequate drainage of the pavement granular materials and subgrade is important for the long term performance of the pavement at this site. Where surface drainage is used to control runoff, perimeter ditching around the paved areas is suggested and the granular base and subbase materials for the paved areas should extend horizontally to the ditch areas. Ditching is suggested on the northwest and south sides of the proposed parking area.

ADDITIONAL CONSIDERATIONS

The native soils at this site are sensitive to disturbance from construction traffic, rain water or snow melt, and frost. Adequate measures should be taken during construction to ensure that construction traffic operating directly on the subgrade is kept to a minimum, particularly when the surface of the subgrade is wet.

It is recommended that the final design drawings for this project be reviewed by the geotechnical engineer to ensure that the guidelines provided in this report have been interpreted as intended.

The engagement of the services of the geotechnical consultant during construction is recommended to confirm that the subsurface conditions throughout the proposed development do not materially differ from those given in the report and that construction activities do not adversely affect the intent of the design.

All foundations and subgrade areas for the proposed structure, site services, and access roadway/parking areas should be inspected by Morey Houle Chevrier Engineering Ltd. The placing and compaction of granular materials at this site should be inspected to ensure that the materials used conform to the grading and compaction specifications.

We trust that this report is sufficient for your requirements. If you have any questions concerning this information or if we can be of further assistance to you on this project, please call.

Yours truly,

MOREY HOULE CHEVRIER ENGINEERING LTD.

M.R. Rainville, C.E.T.

A.F. Chevrier, P.Eng.
Principal

LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

List of Abbreviations and Terminology
Record of Test Pit sheets
Figures 1, 2, and 3

LIST OF ABBREVIATIONS AND TERMINOLOGY

SAMPLE TYPES

AS auger sample
CS chunk sample
DO drive open
MS manual sample
RC rock core
ST slotted tube
TO thin-walled open Shelby tube
TP thin-walled piston Shelby tube
WS wash sample

PENETRATION RESISTANCE

Standard Penetration Resistance, N

The number of blows by a 63.5 kg hammer dropped 760 millimetre required to drive a 50 mm drive open sampler for a distance of 300 mm. For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

Dynamic Penetration Resistance

The number of blows by a 63.5 kg hammer dropped 760 mm to drive a 50 mm diameter, 60° cone attached to 'A' size drill rods for a distance of 300 mm.

WH

Sampler advanced by static weight of hammer and drill rods.

WR

Sampler advanced by static weight of drill rods.

PH

Sampler advanced by hydraulic pressure from drill rig.

PM

Sampler advanced by manual pressure.

SOIL TESTS

C consolidation test
H hydrometer analysis
M sieve analysis
MH sieve and hydrometer analysis
U unconfined compression test
Q undrained triaxial test
V field vane, undisturbed and remoulded shear strength

SOIL DESCRIPTIONS

Relative Density	'N' Value
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

Consistency	Undrained Shear Strength (kPa)
Very soft	0 to 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	over 100

LIST OF COMMON SYMBOLS

c_u undrained shear strength
e void ratio
C_c compression index
c_v coefficient of consolidation
k coefficient of permeability
I_p plasticity index
n porosity
u pore pressure
w moisture content
w_L liquid limit
w_P plastic limit
ϕ' effective angle of friction
γ unit weight of soil
γ' unit weight of submerged soil
σ normal stress

Morey Houle Chevrier Engineering Ltd.

PROJECT: 08-048

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: February 17, 2008

RECORD OF TEST PIT 1

SHEET 1 OF 1

DATUM: Geodetic

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural, V - + Remoulded, V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp ⊢—o w—⊣ Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		88.74					
	TOPSOIL		88.51 / 0.23					
	Brown silty sand, trace clay, some gravel, cobbles and boulders (GLACIAL TILL)							
1								▽
	Practical refusal on probable bedrock / End of borehole		87.22 / 1.52					Significant groundwater inflow at 1.10 metres below ground surface at time of excavating. Test pit filled 0.40 metres in 20 minutes.
2								
3								

TESTPIT RECORD 08-048 TESTPIT LOGS.GPJ MHECL.GDT 3/6/08

DEPTH SCALE
1 to 15

Morey Houle Chevrier Engineering Ltd.

LOGGED: PA

CHECKED: AC

PROJECT: 06-048

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: February 17, 2006

RECORD OF TEST PIT 2

SHEET 1 OF 1

DATUM: Geodetic

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural, V - + Remoulded, V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp —o W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		89.29					
	TOPSOIL		89.09 / 0.20					Native Backfill
1	Brown silty sand, trace clay, some gravel, cobbles and boulders (GLACIAL TILL)							▽ Hand slotted 32 mm PVC pipe with solid riser
2	End of borehole		87.30 / 1.99					Groundwater level in standpipe at 1.11 metres below ground surface on February 21, 2006. Significant groundwater inflow during excavating. Test pit filled 0.7 metres within 1 minute.
3								

TESTPIT RECORD 06-048 TESTPIT LOGS.GPJ MHECL.GDT 3/8/06

DEPTH SCALE

1 to 15

Morey Houle Chevrier Engineering Ltd.

LOGGED: PA

CHECKED: AC

PROJECT: 06-048

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: February 17, 2006

RECORD OF TEST PIT 3

DATUM: Geodetic

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp —o W— Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		89.69					
	TOPSOIL							
			89.46 / 0.23					
	Brown silty sand, trace clay, some gravel, cobbles and boulders (GLACIAL TILL)							Native Backfill
1								
								Hand slotted 32 mm PVC pipe with solid riser
			87.92 / 1.77					
	End of borehole							Groundwater level in standpipe at 1.54 metres below ground surface on February 21, 2006
2								Significant groundwater inflow at about 1.7 metres below ground surface during excavating.
3								

DEPTH SCALE

1 to 15

Morey Houle Chevrier Engineering Ltd.

LOGGED: PA

CHECKED: AC

TESTPIT_RECORD 06-048 TESTPIT LOGS.GPJ MHECL.GDT 3/8/06

RECORD OF TEST PIT 4

PROJECT: 06-048
LOCATION: See Site Plan, Figure 2
DATE OF EXCAVATION: February 17, 2006

SHEET 1 OF 1
DATUM: Geodetic
TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp —o W— Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface		88.75					
	TOPSOIL		88.57 / 0.18					Native Backfill
	Brown silty sand, trace clay, some gravel, cobbles and boulders (GLACIAL TILL)		87.23 / 1.52					Hand slotted 32 mm PVC pipe with solid riser
1								
	End of borehole							Groundwater level in standpipe at 0.62 metres below ground surface on February 21, 2006
2								Significant groundwater inflow at about 0.70 metres below ground surface during excavating. Test pit filled 0.50 metres in 20 minutes.
3								

DEPTH SCALE
1 to 15

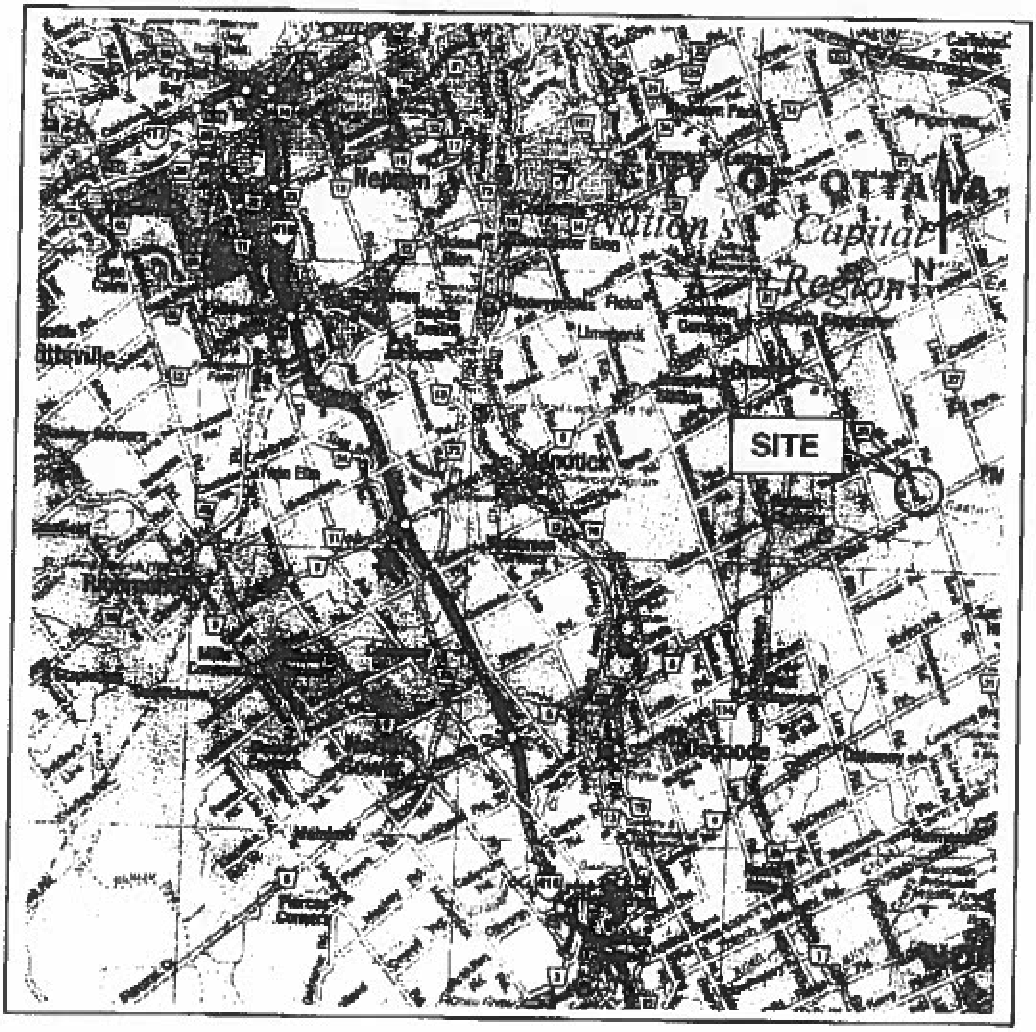
Morey Houle Chevrier Engineering Ltd.

LOGGED: PA
CHECKED: [signature]

TESTPIT RECORD 06-048 TESTPIT LOGS.GPJ MHECL.GDT 3/8/06

KEY PLAN

FIGURE 1

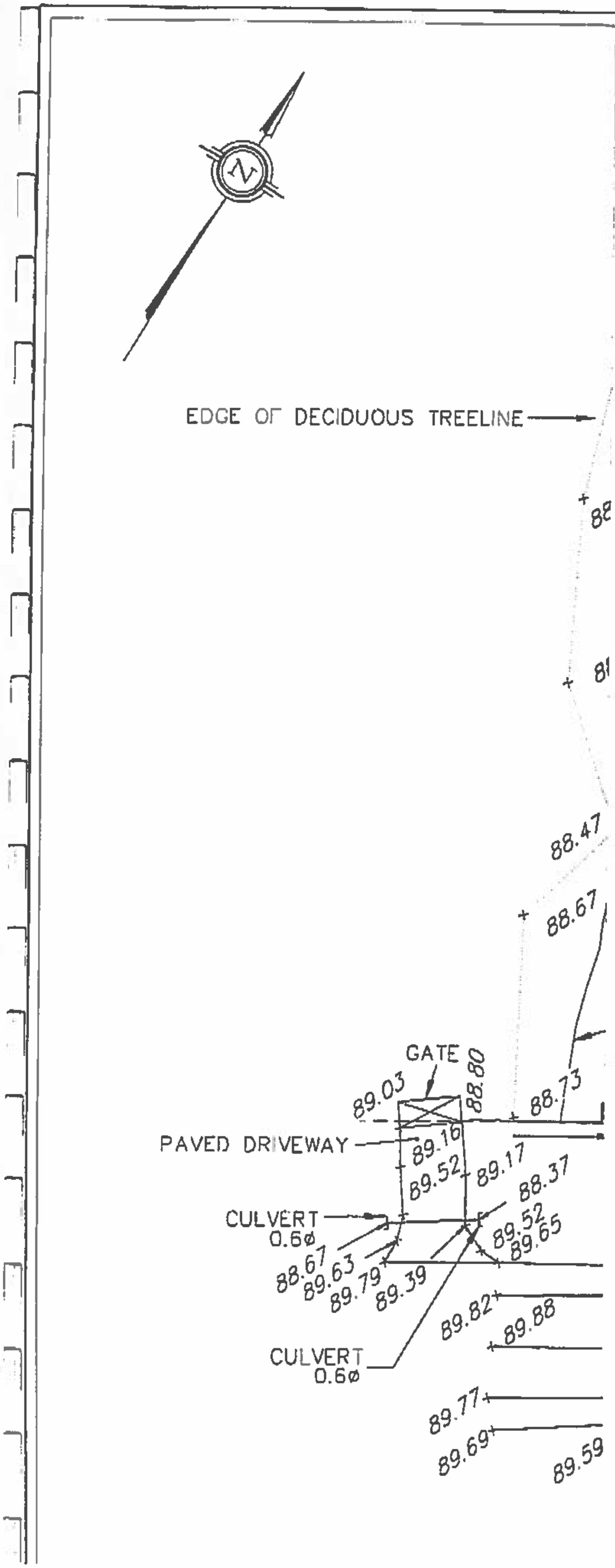


SCALE
1:250 000

MOREY
HOULE
CHEVRIER
ENGINEERING LTD.

Date: MARCH 2006

Project: 06-048



MOREY HOULE CHEVRIER
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MANOTICK, ON
(613) 692-8686 info@mhceng.com

FIRM BCIN # 30484

LEGEND

TP 1 XX.XX — TEST PIT LOCATION IN PLAN, CURRENT INVESTIGATION BY MOREY HOULE CHEVRIER ENGINEERING LTD

REFERENCE: PLAN PREPARED USING SITE PLAN PROVIDED BY STANTEC GEOMATICS LTD.

Location			Revision
SNAKE ISLAND RD., GREELY, ON			0
Client		Project No.	Scale
COATIT INDUSTRIES		06-048	1 : 400
Designed by M.R.	SITE PLAN		
Approved by A.C.H.	Date MAR 3, 2006	FIGURE 2	

MOREY HOULE CHEVRIER ENGINEERING LTD.

FOOTING INSULATION DETAIL
PROPOSED INDUSTRIAL FACILITY
SNAKE ISLAND RD., OTTAWA, ONT.

FIGURE 3

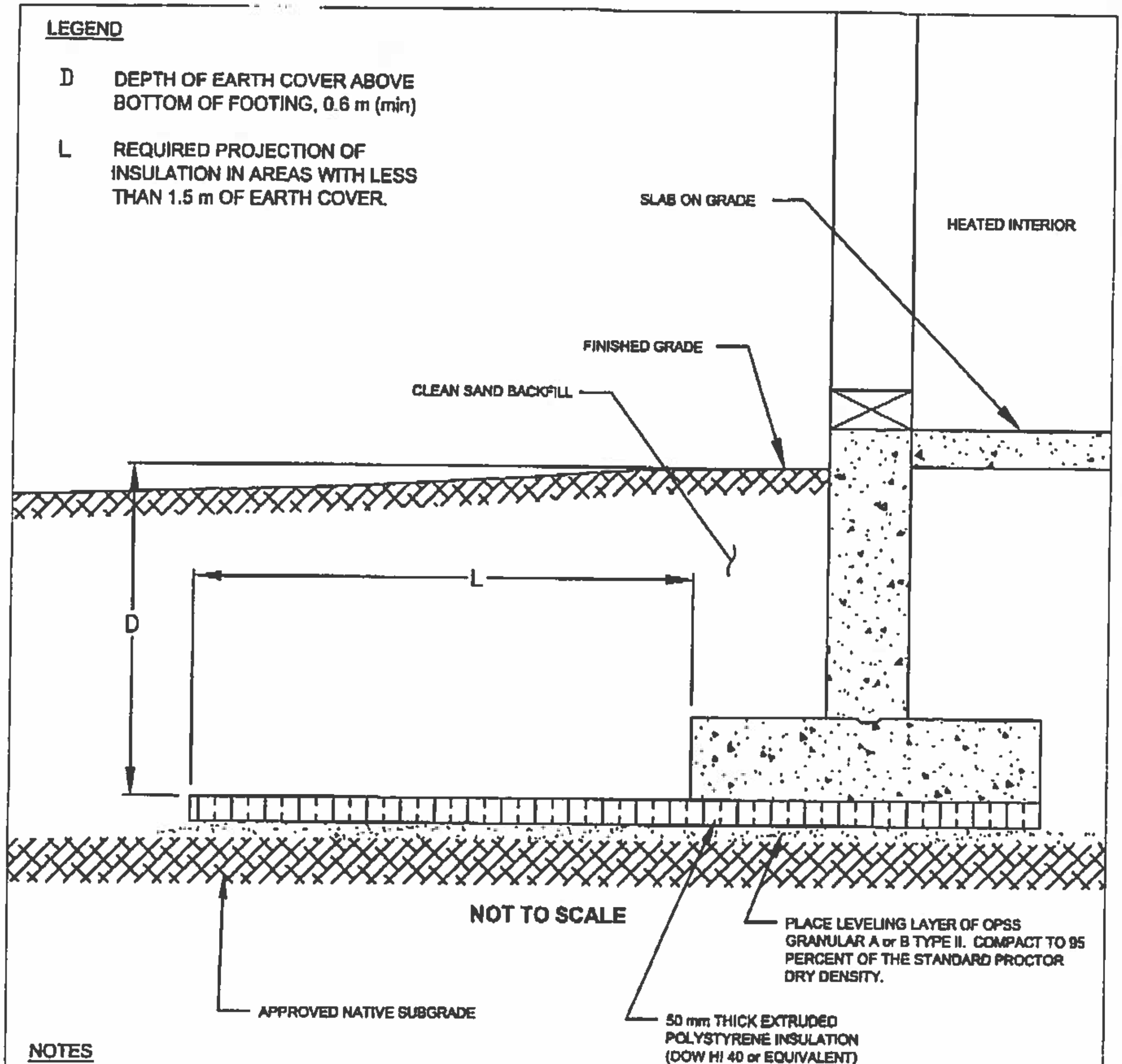
OUR REF: 06-048

DATE: March 9, 2006

LEGEND

D — DEPTH OF EARTH COVER ABOVE BOTTOM OF FOOTING, 0.6 m (min)

L — REQUIRED PROJECTION OF INSULATION IN AREAS WITH LESS THAN 1.5 m OF EARTH COVER.



NOTES

1) INSULATION JOINTS TO BE TIGHTLY BUTT JOINED OR SHIP LAPPED.

2) FOR ADEQUATE FROST PROTECTION, D + L $\geq$ 1.5 metres.

3) THE SURFACE BENEATH THE INSULATION SHOULD BE FLAT TO ENSURE THAT SPLITTING OR BREAKAGE OF THE SHEETS DOES NOT OCCUR.

4) ALL WORK SHOULD BE INSPECTED BY THE ENGINEER.