DRAFT PLAN OF SUBDIVISION
LOTS 45 TO 69,
AND
LOTS 74 TO 90,
AND
LOTS 98 TO 106,
AND
LOT 133,
AND
BLOCK G,
AND
PART OF CAMBRIDGE CRESCENT,
REGISTERED PLAN M-1003
CITY OF GREATER SUDBURY
DISTRICT OF SUDBURY

TULLOCH GEOMATICS INC.
2024
SCALE 1:500

5m 0 5 25m

THE INTENDED PLOT SIZE OF THIS PLAN IS 1219mm IN WIDTH BY 914mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:500.

METRIC:

DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

CONTOUR NOTE:

CONTOURS ARE SHOWN AT 0.25m AND 0.50m RESPECTIVELY.

ELEVATION NOTE:

ELEVATIONS SHOWN HEREON ARE GEODETIC, ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28) AND ARE DERIVED FROM THE CITY OF GREATER SUDBURY VERTICAL CONTROL MONUMENT No. 027829615C USING REAL TIME NETWORK (RTN) HAVING AN ELEVATION OF 272.609m.

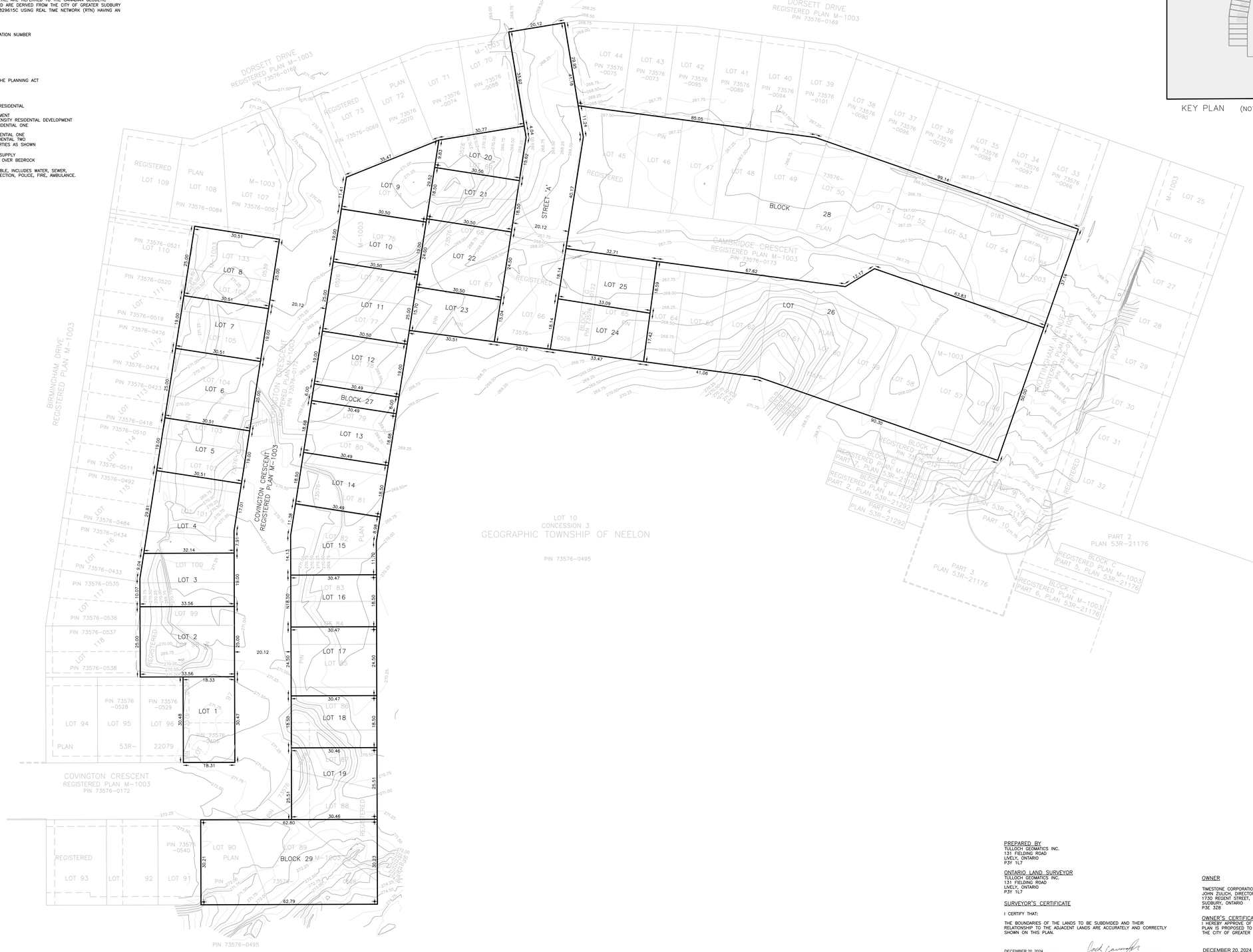
LEGEND:

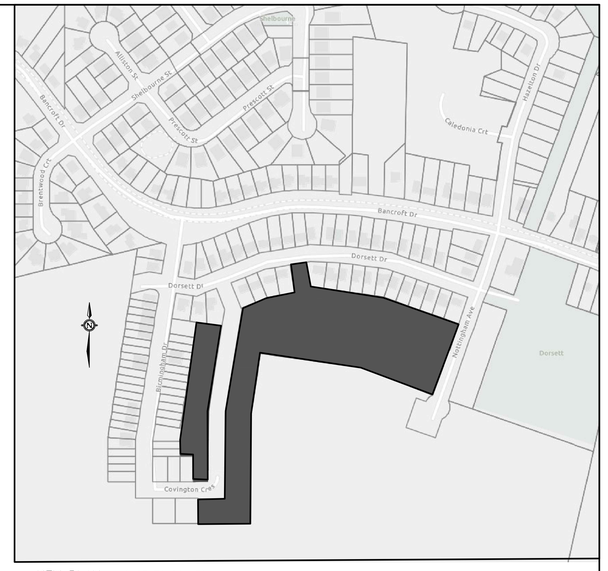
PIN DENOTES PROPERTY IDENTIFICATION NUMBER

ADDITIONAL INFORMATION

AS REQUIRED BY SECTION 51(17) OF THE PLANNING ACT

A) AS SHOWN
B) AS SHOWN
C) AS SHOWN
D) LOTS 1-26: R3 MEDIUM DENSITY RESIDENTIAL
BLOCK 27: CITY PARKLAND
BLOCK 28: STORM WATER MANAGEMENT
BLOCK 29: FUTURE R3 MEDIUM DENSITY RESIDENTIAL DEVELOPMENT
E) NORTH - R1-5 LOW DENSITY RESIDENTIAL ONE
SOUTH - FUTURE DEVELOPMENT
EAST - R1-5 LOW DENSITY RESIDENTIAL ONE
WEST - R2-2 LOW DENSITY RESIDENTIAL TWO
F) DIMENSIONS OF PROPOSED PROPERTIES AS SHOWN
G) ARTIFICIAL FEATURES AS SHOWN
H) WATER FROM EXISTING MUNICIPAL SUPPLY
I) GENERALLY SHALLOW OVERBURDEN OVER BEDROCK
J) CONTOURS AS SHOWN
K) MUNICIPAL SERVICES TO BE AVAILABLE, INCLUDES WATER, SEWER, HYDRO, BELL, GAS, GARBAGE COLLECTION, POLICE, FIRE, AMBULANCE.
L) AS SHOWN





KEY PLAN (NOT TO SCALE)

PREPARED BY
TULLOCH GEOMATICS INC.
131 FIELDING ROAD
LIVELY, ONTARIO
P3Y 1L7

ONTARIO LAND SURVEYOR
TULLOCH GEOMATICS INC.
131 FIELDING ROAD
LIVELY, ONTARIO
P3Y 1L7

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN ON THIS PLAN.

DECEMBER 20, 2024
DATE

JACK F. CAVANAGH
ONTARIO LAND SURVEYOR

OWNER

TIMESTONE CORPORATION
JOHN ZULICH, DIRECTOR
1730 REGENT STREET, UNIT 5
SUDBURY, ONTARIO
P3E 3Z8

OWNER'S CERTIFICATE
I HEREBY APPROVE OF THE MANNER IN WHICH THE LAND SHOWN ON THIS PLAN IS PROPOSED TO BE SUBDIVIDED AND REQUEST THE APPROVAL OF THE CITY OF GREATER SUDBURY.

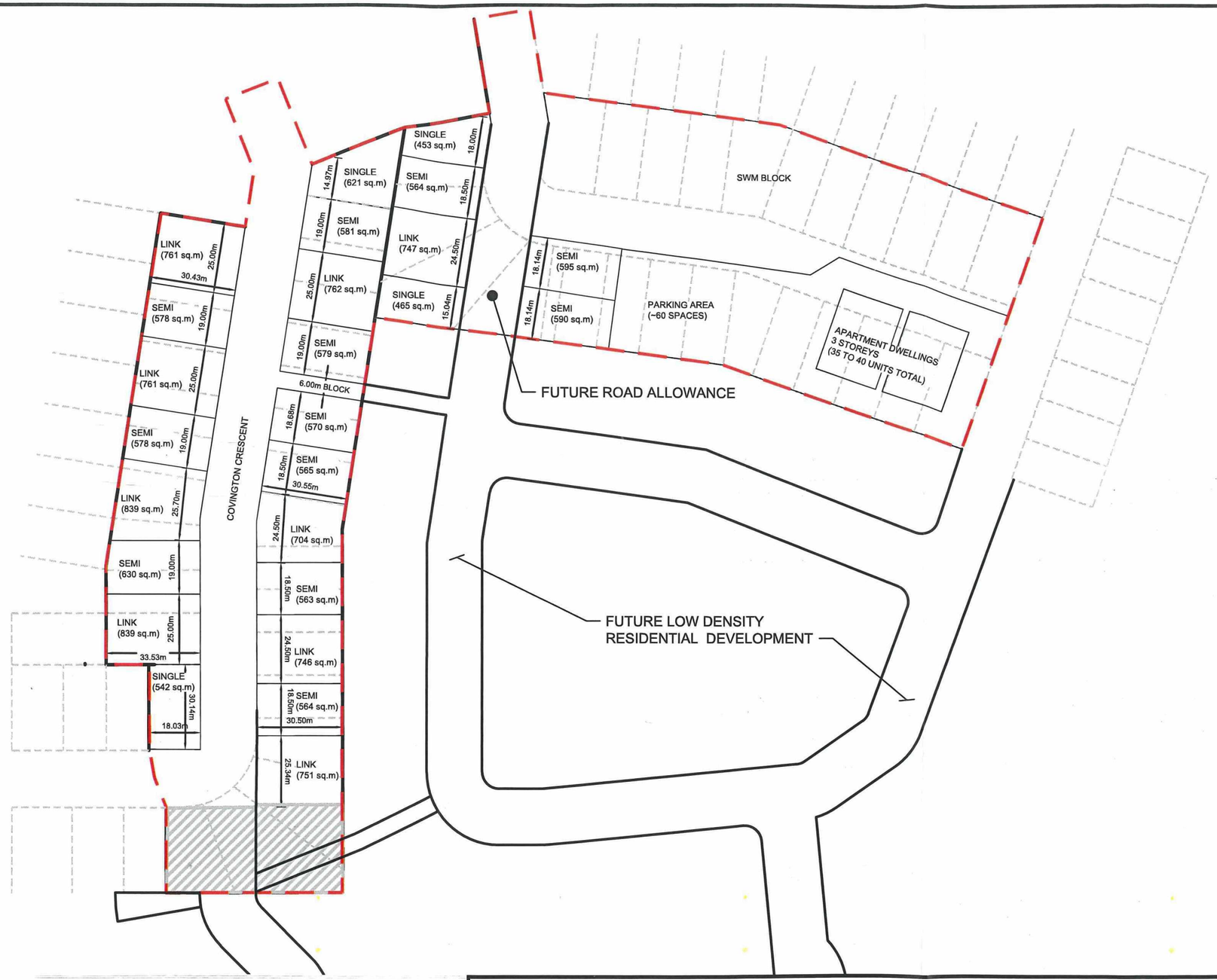
DECEMBER 20, 2024
DATE

JOHN ZULICH

TULLOCH GEOMATICS INC.
131 FIELDING RD.
LIVELY, ON
P3Y 1L7
T. 705 671.2295
F. 705 671.9477
TF. 800 810.1937
sudbury@tulloch.ca

DRAWN BY: SL FILE: 243118

P:\2024\243118 Topo Plan of Survey - Dorsett Drive\Geomatics\06 Production\03_Draft Plan\243118 Draft Plan - Dorsett Dr.DWG



LEGEND

- M-1003 LOT FABRIC
- PROPOSED LOT FABRIC
- PROPERTY & REZONING BOUNDARY
- FUTURE RESIDENTIAL DEVELOPMENT

PROJECT:

SCENIC VIEW SUBDIVISON

SUDBURY, ON

DRAWING:

PROPOSED DEVELOPMENT

www.jlrichards.ca

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.

DESIGN:	RL
DRAWN:	JQ
CHECKED:	JY
JLR #:	32395-000

CONCEPT PLAN

DRAWING #: DWG 01

PLOT DATE: December 20, 2024 3:23:34 PM

File Location: P:\32000\32395-000 - Zulich Scenic View Subdivision\05-Production\01-Civil\Attach Civil\Comparison Drawing.dwg

RECEIVED SP File No. _____

DEC 23 2024

PLANNING SERVICES

Greater Sudbury Source Protection Plan
Restricted Land Use Review
Application for Section 59 Notice

Greater | Grand Sudbury www.greatersudbury.ca

A Section 59 Notice Review is required for applicants choosing to proceed with a Building or Planning Service in a Vulnerable Area.

PART A: APPLICANT INFORMATION

Name of Applicant(s) (individuals, corporation or partnership): Timestone Corporation

Contact Name (where Applicant is corporation or partnership): John Zulich

Phone (home/business): _____ Phone (alternate): _____

Fax: _____ Email: jzulich@zulich.com

Mailing Address: 1730 Regent Street, Unit 5

City/Town: Sudbury Province: ON Postal Code: P3E 3Z8

PART B: PROPERTY INFORMATION

Are you the owner of the property where the proposed project is located? ☑ Y ☐ N

Property owner (if different from Applicant): TIMESTONE CORPORATION

Contact information (if different from Applicant): _____

Physical address of proposed project (if different from above): see attached

Township: Neelon Con: 3 Lot: 10

PCL/Part No. _____ Roll No. _____ Registered Plan No. _____

Are any new or existing structures heated with Fuel Oil? ☐ Yes ☑ No

Are any of the existing structures serviced by a Septic System or Holding Tank? ☐ Yes ☑ No

PART C: PROPOSAL INFORMATION

Proposal:

Application or Permit Number (if known): _____

- ☐ New Structure
- ☐ New Land Use/Change of Use
- ☐ New or Replacement Septic
- ☐ Expansion/Conversion of an Existing Approved Land Use or Structure
- ☐ Consent
- ☑ Re-Zoning
- ☐ Minor Variance
- ☐ Site-Plan/Alteration
- ☑ Plan of Subdivision/Condominium
- ☐ Official Plan Amendment
- ☐ Other _____

Zoning:

- ☑ Single Residential
- ☑ Multi-Residential (incl. subdivision)
- ☐ Rural (incl. agricultural)
- ☐ Industrial
- ☐ Commercial (incl. mixed use)
- ☐ Other (incl. institutional & future development): _____

Brief Description of Proposal and/or Activity: (Please attach any documents as 'Schedule A')

development of: +/- 46 units comprised of linked (+/-18 units), semis (+/- 24 units), single (+/- 4 units) dwellings; and an R3 block off of Nottingham to permit +/- 35 to 40 units; proposed SWM pond. Total of +/- 81-86 units proposed.

Proposed construction start date: 10/31/25 Proposed completion date: 10/31/25

☑ I have included a detailed description of the activity or land use, including but not limited to; quantities of any known chemicals/road salts/wastes to be stored on site and their composition (required).

☑ I have included legible, electronically produced copies of the site plans, specifications and/or drawings (if available/applicable).

☑ I have included a copy of any applicable survey certified by a registered Ontario Land Surveyor.

SP File No. _____

PART D: POTENTIAL THREAT ACTIVITIES

A drinking water threat as defined under the *Clean Water Act, 2006* is "an activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water".

The following activities are prescribed as drinking water threats for the purpose of the definition of "drinking water threat". **To the best of your knowledge, please check all prescribed activities that are currently present or may be associated with the proposed Building Permit or Planning Approval within the vulnerable area.**

MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE TABLES OF DRINKING WATER THREATS AS PRESCRIBED BY THE *Clean Water Act, 2006*		
☐	1.	**The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*** (wrecking yards, tailings or raw sewage disposal, hazardous/industrial/commercial/ municipal waste)
☑	2.	**The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage** (privies/septic systems/holding tanks/greywater systems, stormwater management, sewer systems and related pipes, sewage treatment plant/lagoon, industrial effluent)
☐	3.	**The application of agricultural source material to land** (materials produced on a farm including, but not limited to; manure, bedding, regulated compost etc.)
☐	4.	**The storage of agricultural source material** (materials produced on a farm including, but not limited to; manure, bedding, regulated compost etc.)
☐	5.	**The management of agricultural source material** (aquaculture only)
☐	6.	**The application of non-agricultural source material to land** (nutrients not produced on a farm including, but not limited to; sewage biosolids, ash, pulp/paper biosolids etc.)
☐	7.	**The handling and storage of non-agricultural material** (nutrients not produced on a farm including, but not limited to; sewage biosolids, ash, pulp/paper biosolids etc.)
☐	8.	**The application of commercial fertilizer** (any fertilizer containing phosphorus and/or nitrogen)
☐	9.	**The handling and storage of commercial fertilizer** (any fertilizer containing phosphorus and/or nitrogen)
☐	10.	**The application of pesticide to land**
☐	11.	**The handling and storage of pesticide**
☑	12.	**The application of road salt**
☑	13.	**The handling and storage of road salt**
☐	14.	**The storage of snow** (parking lots and melt/dump facilities)
☐	15.	**The handling and storage of fuel** (gasoline, diesel, home heating oil)
☐	16.	**The handling and storage of a dense non-aqueous phase liquid** (chemicals e.g. automotive businesses, dry cleaning, manufacturing/processing, cleaning agents etc.)
☐	17.	**The handling and storage of an organic solvent** (chemicals e.g. automotive businesses, dry cleaning, manufacturing/processing, cleaning agents etc.)
☐	18.	**The management of runoff that contains chemicals used in the de-icing of aircraft**
☐	19.	**An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body** (water taking)
☐	20.	**An activity that reduces the recharge of an aquifer** (development of impervious surfaces)
☐	21.	**The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard** (all farming – including production/business/hobby etc.)

SP File No. _____

PART E: APPLICABLE FEES

Pursuant to By-Law 2015-34, a By-Law of the City if Greater Sudbury Respecting Enforcement of the *Clean Water Act, 2006* (Source Protection By-Law), Schedule "A", a prescribed fee of $35 is to be collected for the review of the application to determine whether a notice shall be issued pursuant to section 59 of the Act.

Subsequently, additional fees may be incurred for proposals requiring Risk Management Plans, or additional inspections. Please review Schedule "A" for a complete list of prescribed user fees.

PART F: AGREEMENT

1. I/we have read, understood, and agree to the review of my proposal in accordance with section 59 of the *Clean Water Act, 2006*.
2. I/we have completed this application in full and I/we certify that the information contained in this application and any supporting documentation is true and complete to the best of my/our knowledge.
3. I/we understand that failure to provide all of the required information may delay processing of this application or render a failure to proceed with the application/proposed project.
4. I/we understand that I/we will be responsible for ensuring the technical and structural adequacy and legal requirements of this project.
5. I am/we are the owner(s) of the above mentioned property OR I am an agent acting on behalf of the property owner(s) with a letter of authorization (attached).
6. I/we have authority to bind the corporation or partnership, where applicable.
7. I/we understand that the property described in this application may be subject to random inspections to ensure compliance with information provided.

_____ _____ Dec 19/24

Signature of Applicant(s) **Date**

Note: If you have any questions or concerns while filling out the application form please contact the Risk Management Office at 705-674-4455 ext. 3600 or sourceprotection@greatersudbury.ca. A representative will contact you to discuss your application and advise of the review outcome.

PART G: FREEDOM OF INFORMATION & PROTECTION OF PRIVACY

Collection of Personal Information: The personal information collected on this form is collected by the City of Greater Sudbury under the authority of By-law 2015-34 for the purpose of processing your application under Part IV of the Clean Water Act, 2006. Questions regarding the collection of this information may be directed to the City's Risk Management Official, 200 Brady Street, Sudbury ON P3A 5P3 or (705) 674-4455 ext 3600.

Please mail the completed application along with $35 payment to:

ATTN: SOURCE PROTECTION - WATER/WASTEWATER SERVICES

CITY OF GREATER SUDBURY
PO BOX 5000 STN A
200 BRADY STREET
SUDBURY ON P3A 5P3

VILLE DU GRAND SUDBURY
CP 5000 SUCC A
200 RUE BRADY
SUDBURY ON P3A 5P3

Alternatively, you can drop off completed forms and $35 payment to Tom Davies Square or to any Citizen Service Center.

PART H: OFFICE USE ONLY - REVIEW OUTCOME

OFFICE USE ONLY

Date application received: _____ **By: (Department)** ☐ **Planning** ☐ **Building** ☐ **CSC:** _____

Applicable Building Permit No: _____ **Applicable Planning File No.:** _____

Fee Paid ☐ **Y** ☐ **N** **Received By (Print Name):** _____ **Signature:** _____

Copy of receipt of payment attached (Required): ☐ **Y** ☐ **N**

RISK MANAGEMENT OFFICE USE ONLY

Section 59 Application No. _____ **Date Application Received:** _____

Vulnerable Area: ☐ **WHPA** _____ ☐ **IPZ** _____ ☐ **ICA** _____

Proposed use/activity is:

1. ☐ **Permitted** and neither prohibited or restricted (**Notice issued** under section 59(2) of the *Clean Water Act, 2006*)
2. ☐ **Restricted and an approved Risk Management Plan has been agreed to or established** (**Notice issued** under section 59(2) of the *Clean Water Act, 2006*)
3. ☐ **Restricted and a Risk Management Plan is required** in order to obtain a Notice (**No Notice** to be issued under section 59(2) of the *Clean Water Act, 2006, as RMP Pending*)
4. ☐ **Prohibited (No Notice required** to be issued under section 59(2) of the *Clean Water Act, 2006*)

Notice attached: ☐ Y ☐ N ☐ Pending **Date of Review:** _____

☐ Issue Building Permit /Planning Approval ☐ Do Not Issue Building Permit /Planning Approval

☐ Application Pending RMP (Do Not Issue Permit/Approval at this time)

Reviewed by (print name): _____ **Signature:** _____

Approved by RMO (print name): _____ **Signature:** _____ **Date:** _____

CGS Stakeholders copied (date): _____ **Applicant Copied (date):** 10/31/25

Comments:

_____

_____

_____

_____

_____

APPROVALS PENDING

Proposed use/activity is:

Restricted and a Pending Risk Management Plan has now been agreed to or established
(Notice issued under section 59(2) of the Clean Water Act, 2006)

Date Plan Approved or Established:_____

Approved or Established By:_____ Signature:_____

Section 59 Application

Location

Lots 45-69, 74-90, 97-106, and 133, PLAN M-1003; PINs 735760183, 735760181, 735760526, 735760539. Part lots 86-90, Block G, Covington Crescent, and Cambridge Crescent on Plan M-1003, PINs 735760122, 735760172, 735760173, and 735760499

Detailed Description of the Activity

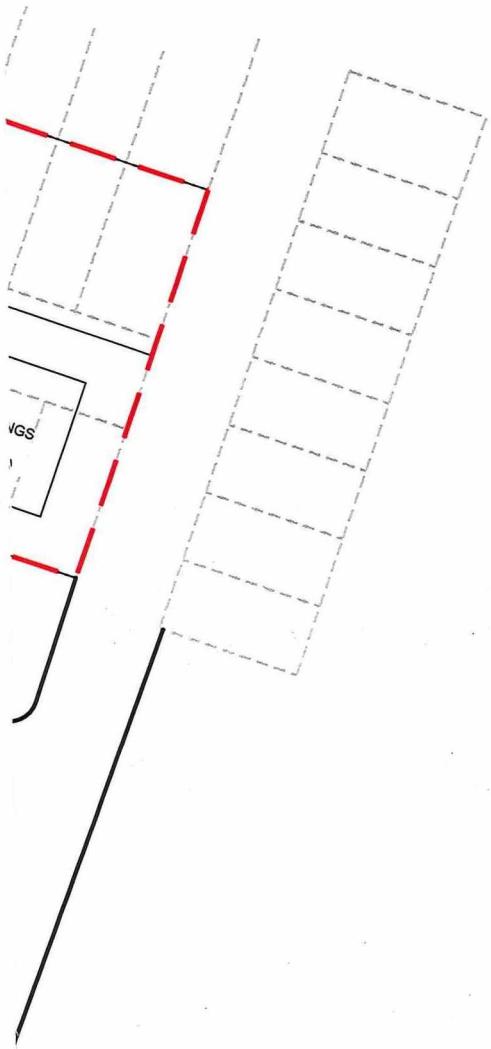
The proposed development consists of

- 25 lots and blocks for 46 residential units, with a mix of single detached, semi-detached, and linked dwellings;
- One block for a low-rise apartment dwelling;
- One block for a stormwater management pond;
- One block for a pathway; and
- Two roads

No significant quantities of chemicals/road salts/wastes are to be stored on site.

The identified threats include:

- Stormwater management systems (storm sewer pipes and pond);
- Municipal sanitary sewage pipes; and
- Application, handling and storage of road salt, as is typical with the development of a low density residential subdivision and medium density residential parking area.



LEGEND

- M-1003 LOT FABRIC
- PROPOSED LOT FABRIC
- PROPERTY & REZONING BOUNDARY
- FUTURE RESIDENTIAL DEVELOPMEI

N

SUBDIVISON
Y, ON

VELOPMENT

d may
poses
work
of
d.

DESIGN:	RL
DRAWN:	JQ
CHECKED:	JY
JLR #:	32395-000

CONCEPT PLAN

DRAWING #:
DWG 01

PLOT DATE: December 20, 2024 3:23:34 PM

File Location: P:\32000\32395-000 - Zulich Scenic View Subdivision\05-Production\01-Civil\Attach Civil\Comparison Drawing.dwg

Planning Justification Report
Zulich Scenic View Subdivision

December 2024

Prepared for:

JOHN ZULICH
Timestone Corporation
c/o Zulich Enterprises
1730 Regent Street, Unit 5
Sudbury, ON
P3E 3Z8

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
314 Countryside Drive, Sudbury, ON P3E 6G2

JLR No.: 32395-000

RECEIVED
DEC 23 2024
PLANNING SERVICES

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Table of Contents

List of Figures

1.0 Introduction

J.L. Richards & Associates Limited (JLR) was retained by Timestone Corporation (Timestone) to assist in the facilitation of planning approvals to rezone and subdivide the lands described as Part Lot 10, Con 3, Neelon Township; Lots 45-69, 74-90, 97-106, and 133, PLAN M-1003; PINs 735760183, 735760181, 735760526, 735760539. Part lots 86-90, Block G, Covington Crescent, and Cambridge Crescent on Plan M-1003, PINs 735760122, 735760172, 735760173, and 735760499 owned by the City of Greater Sudbury (CGS or City), also form part of the applications. The subject lands are located within the Scenic View Subdivision and will be rezoned from Low Density Residential One (R1-5) to Medium Density Residential Three (R3).

The proposed lots and blocks are as follows:

- 25 lots and blocks for 46 residential units, with a mix of single detached, semi-detached, and linked dwellings;
- One block for a low-rise apartment dwelling;
- One block for a stormwater management pond;
- One block for a pathway; and
- Two roads.

Scenic View Subdivision is a residential land development project in the Minnow Lake area of the City. Timestone is interested in developing the remainder of the undeveloped lands over time, commencing with Covington Crescent in 2025, east of the recently built Birmingham Drive.

The lands are located on Plan M-1003. Covington Crescent and Cambridge Crescent were previously registered, and then subsequently deemed by the City to be not in a plan of subdivision. The lot fabric, therefore, needs to be reinstated prior to completion for lot creation. While a rescinding by-law to reinstate the lot fabric and subsequent part-lot control was discussed with the City as a potential lot creation process; it was decided that a new plan of subdivision will be used instead.

The lands are designated as Living Area 1 in the Official Plan and proposed to be developed with full municipal services.

1.1 Planning Applications and Process

In order to facilitate the proposed development, the following Planning Act applications and processes are being used:

1) A zoning by-law amendment application to permit the proposed form of dwellings and densities. The zoning by-law amendment also requests an exception to s. 4.15.4 a) ii) to not require a 3.0m planting strip when the built form in the R3 Zone is low density residential (single, semi, linked dwelling);
2) Plan of Subdivision for lot creation.

Subsequent applications for part lot control to separate semi-detached units once foundations are built will need to be submitted at a later date and are not discussed in this report.

1.2 Proposed Development

The development proposes a mix of dwelling types including single detached, semi-detached, linked dwellings, and a block set aside for the construction of a low-rise apartment dwelling. This includes four lots for single detached dwellings, 12 lots for semi-detached and 9 for linked dwellings for a total of 46 units.

The Draft Plan of Subdivision also includes the construction of two new roads, a pathway block and a block for a stormwater management pond. The proposed roads will connect to the existing street network. Covington Crescent maintains the alignment as per the previously registered Plan M-1003. A new proposed road, Street 'A', will come south off of Dorsett Drive and extend to future development lands to the south. Street 'A' follows generally the beginning of what was 'Cambridge Crescent' in Plan M-1003 at the northwest end, connecting with Dorsett, but the eastern end is no longer proposed as those lands for part of the proposed stormwater management and R3 blocks.

The development of the single detached and semi/linked dwellings will require changes to the zoning as well as the lot fabric of the previously registered (and subsequently deemed) subdivision lands.

The proposed lot fabric complies with the minimum frontage, depth, and area for R3 lots for the proposed dwelling types. The lots have been designed to provide sufficient room to comply with required setbacks and lot coverage for the proposed dwelling types. The block proposed for the low-rise apartment dwelling also complies with the performance standards of the R3 zone, which will permit the development. Figure 1 demonstrates the proposed Draft Plan of Subdivision.

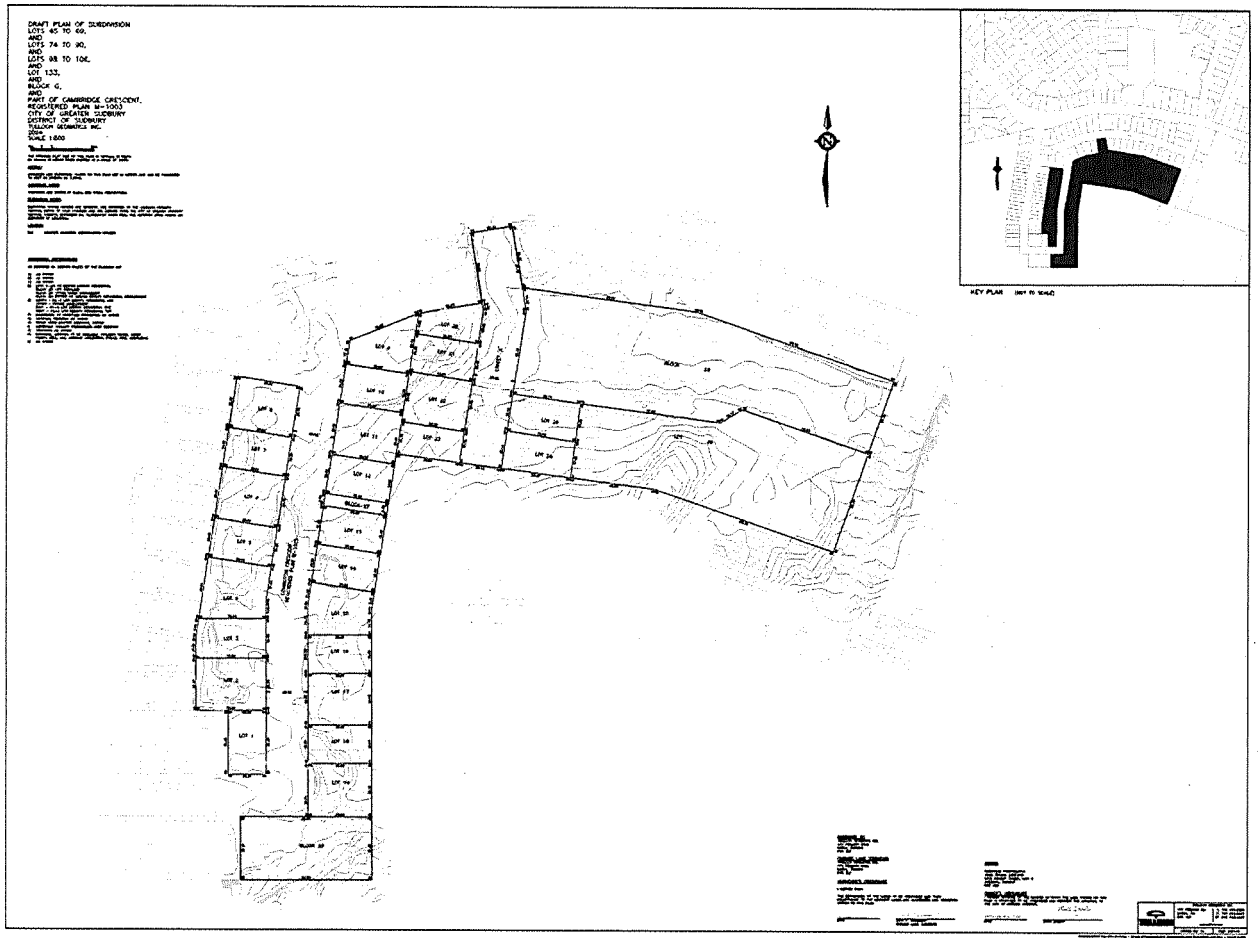


Figure 1: Proposed Draft Plan of Subdivision

1.3 Development History

The lands are located on registered Plan M-1003, parts of which were deemed by the City to not be within a Plan of Subdivision in 1991. The Figure below shows the initial Plan of Subdivision, Plan M-1003. This deeming by-law effectively removed the lot fabric and returns it to being one parcel only. Timestone received conditional approval from City Council to rescind Deeming By-law 91-81 to reinstate the lot fabric for certain lands in Plan M-1003 subject to a number of conditions to be met through motion number PL2012-221. Timestone has since been meeting conditions on specific parts of the subdivision as they get developed.

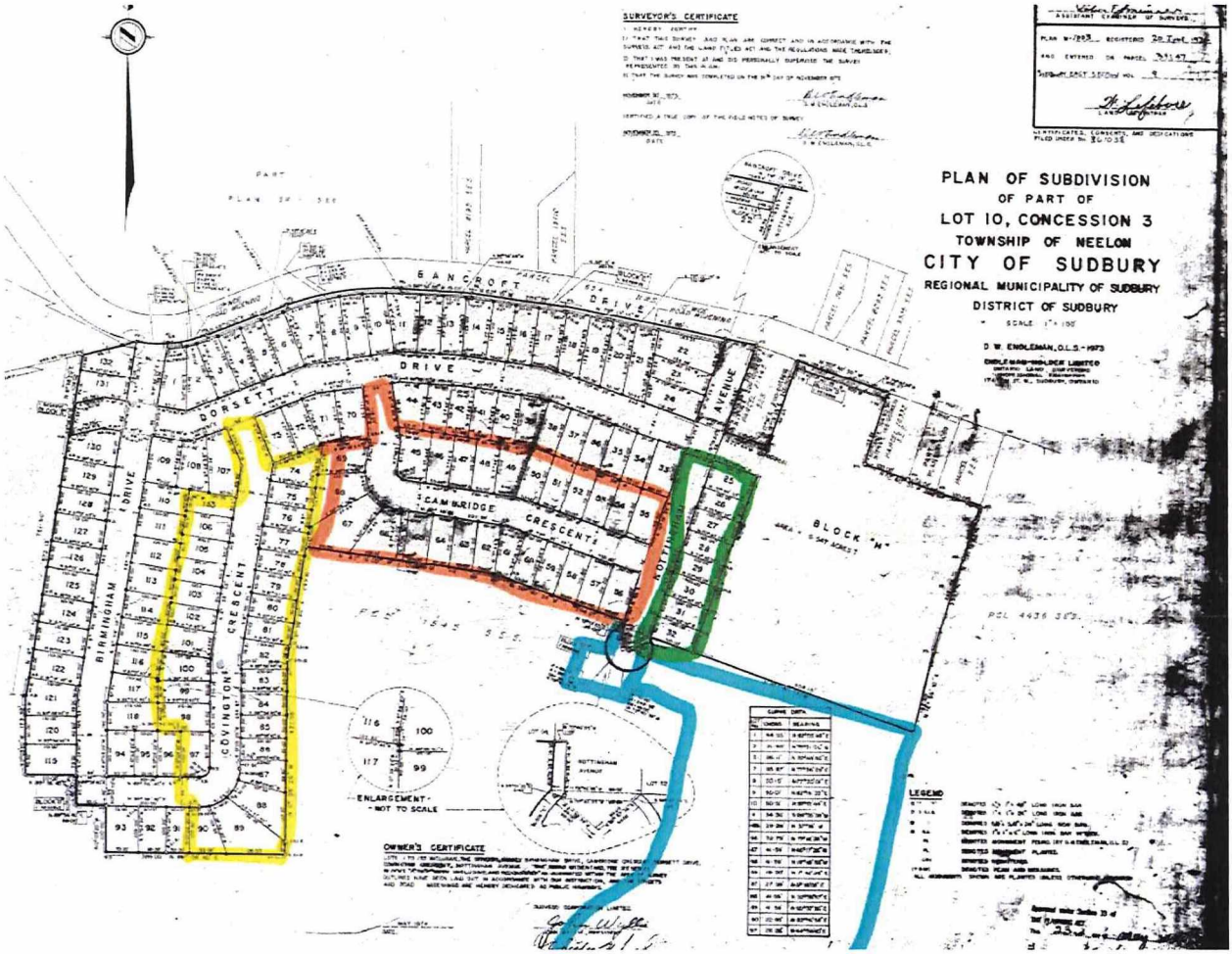


Figure 2: Previous M-1003 Plan

Given the proposed built form to permit a combination of single detached, semi-detached, and linked dwellings, as well as a low rise apartment block, a number of lot line adjustments would have been required that obfuscates the use of the M-1003 lot fabric as it was. The proposed application is therefore to create a new Draft Plan of Subdivision with the revised proposed lot fabric.

2.0 Subject Property and Surrounding Areas

The proposed development is located on the eastern side of the City of Sudbury in the Minnow Lake area of the City. The lands are in the centre of the Scenic View Subdivision and are east of the recently built Birmingham Drive and south of Dorsett Drive. Covington Crescent will connect to each of these local roads. A new proposed road, Street 'A', will come south off of Dorsett and extend to future development lands to the south. The Draft Plan of Subdivision covers a land area of +/- 3.23 ha.

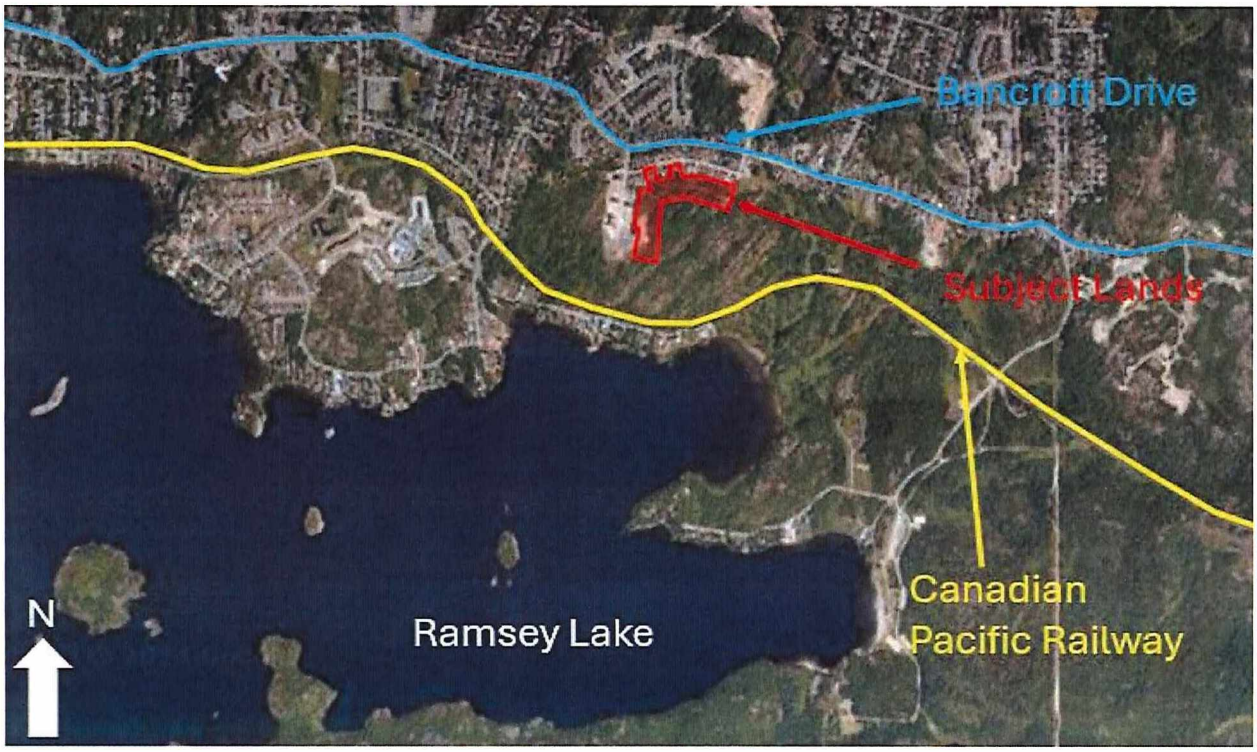


Figure 3: Location of Subject Lands

Generally, the terrain is relatively flat with vegetative cover in the northern portion of the area be rezoned. There are no wetlands on the subject lands. The City in its SPART comments noted that this application does not pose an elevated risk to species and habitats protected by the *Endangered Species Act*.

The subject lands are surrounded by low-density residential development to the north and west, consisting of single detached, semi-detached and linked dwellings, and vacant lands directly to the east and south. The subject lands are approximately 205 metres from the Canadian Pacific (CP) railway to the south and approximately 265 metres from Ramsey Lake further to the south.

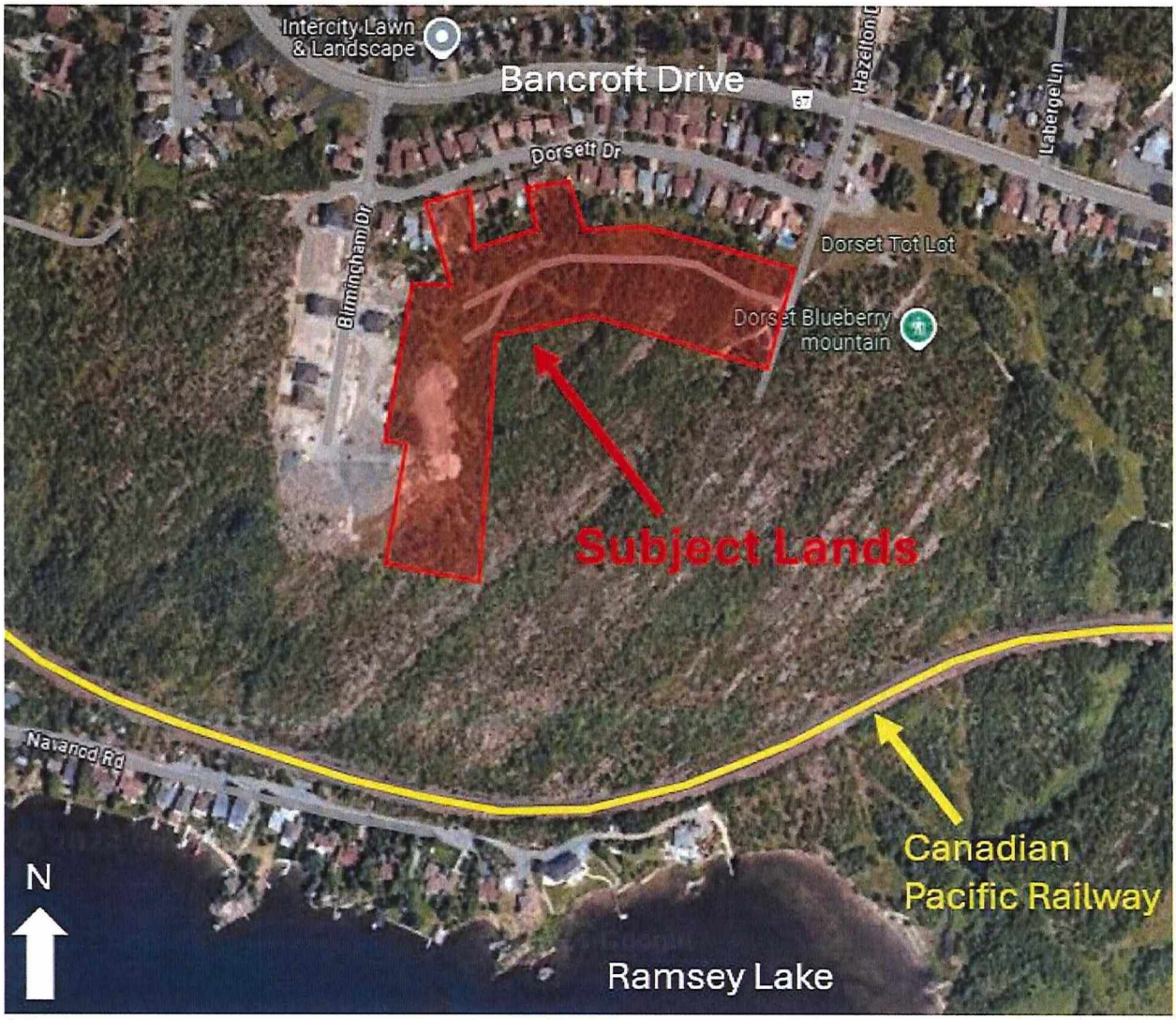


Figure 4: Surrounding Uses of Subject Lands

The subject lands are within the Ramsey Lake watershed and the northern portion of the lands are in the Intake Protection Zone IPZ3.

The vacant lands to the east and south represent the remaining lands in the Scenic View Subdivision. Low density residential development is proposed for this area through future applications for rezoning and Draft Plan of Subdivision.

3.0 Land Use Policy Framework

3.1 Planning Act R.S.O 1990 c P.13

The Planning Act provides a land use planning system led by provincial policy. The Act establishes planning processes, encourages co-operation and coordination among various interest, and recognizes the decision-making authority and accountability of municipal councils in planning.

Section 51 of the Planning Act outlines the regulations for Plans of Subdivision, specifically Section 51(24) outlines the criteria that an approval authority must have regard for. The following is a review of this criteria:

a) *the effect of development of the proposed subdivision on matters of provincial interest as referred to in section 2;*

The proposed Draft Plan of Subdivision is located within an existing settlement area and makes efficient use of the existing or planned infrastructure. The proposal continues to develop a previous Draft Plan of Subdivision. No significant natural heritage features are located on the subject lands that require protection.

b) *whether the proposed subdivision is premature or in the public interest;*

The proposed Draft Plan of Subdivision is not premature. It is proposed within the City's Settlement Area Boundary and provides a range of new residential dwelling options. It proposes to make use of existing and planned infrastructure to service the development while being in proximity to existing community amenities.

c) *whether the plan conforms to the official plan and adjacent plans of subdivision, if any;*

The proposed Draft Plan of Subdivision conforms to the City's OP by proposing new development located in the settlement area. The lands are designated to support new residential growth and accommodate a range and mix of housing types, as proposed. The subdivision will be serviced by municipal water and sewer, in a planned extension of existing municipal services.

d) *the suitability of the land for the purposes for which it is to be subdivided;*

The Subject Site is located within the City of Greater Sudbury Settlement Boundary and is therefore suitable for urban residential development. The City's SPART comments indicated that the development does not pose an elevated risk species and habitats protected by the Endangered Species Act.

d.1) if any affordable housing units are being proposed, the suitability of the proposed units for affordable housing;

No affordable housing units, as defined by the Province are being proposed in the subject application.

e) the number, width, location and proposed grades and elevations of highways, and the adequacy of them, and the highways linking the highways in the proposed subdivision with the established highway system in the vicinity and the adequacy of them;

All existing and proposed public streets have been shown on the draft plan of subdivision. The proposed lots and blocks will front onto open municipal roads. The proposed subdivision connects to the existing residential neighborhood located to the north and west of the subject lands.

f) the dimensions and shapes of the proposed lots;

The proposed lots and blocks have been designed in compliance to the City's Zoning By-law, respective of the proposed use of said lot or block.

g) the restrictions or proposed restrictions, if any, on the land proposed to be subdivided or the buildings and structures proposed to be erected on it and the restrictions, if any, on adjoining land;

No restrictions are proposed as part of the Draft Plan of Subdivision.

h) conservation of natural resources and flood control;

As confirmed by City Staff as part of the SPART process, no significant natural heritage features are found on the subject lands. As well, no water features are found where flooding is a concern.

i) the adequacy of utilities and municipal services;

A water/sewer capacity analysis request prepared by JLR has been submitted to the City in regards to the proposed development.

j) the adequacy of school sites;

The City of Greater Sudbury has a variety of elementary and secondary schools a short distance from the subject lands. No new school sites are anticipated for the proposed subdivision.

k) the area of land, if any, within the proposed subdivision that, exclusive of highways, is to be conveyed or dedicated for public purposes;

Two blocks will be conveyed City. This includes one block for a stormwater management pond and one block that will serve as a servicing easement as well as a pathway for connectivity and active transportation within the subdivision.

l) the extent to which the plan's design optimizes the available supply, means of supplying, efficient use and conservation of energy; and

The homes to be built within the subdivision will be constructed according to current Ontario Building Code standards which include requirements for energy conservation.

m) the interrelationship between the design of the proposed plan of subdivision and site plan control matters relating to any development on the land, if the land is also located within a site plan control area designated under subsection 41 (2) of this Act or subsection 114 (2) of the City of Toronto Act, 2006. 1994, c. 23, s. 30; 2001, c. 32, s. 31 (2); 2006, c. 23, s. 22 (3, 4); 2016, c. 25, Sched. 4, s. 8 (2).

The proposed lots and blocks for the single-detached, semi-detached and linked dwellings are exempted from Site Plan Control as per the Planning Act. The block for the apartment building will require Site Plan Control and will have to adhere to the City's Site Plan Control By-law. Any applications and agreements will be executed as required at a later date.

Based on our review of the criteria set out in Section 51(24) of the Planning Act, it is our professional planning opinion that the application for Draft Plan of Subdivision has regard for the Planning Act criteria and represents good land use planning that aligns with provincial and municipal planning goals.

3.2 Provincial Planning Statement 2024

The Provincial Planning Statement 2024 (PPS) is issued under the authority of Section 3 of the Planning Act provides policy directions on matters of provincial interest related to land use planning and development.

The Planning Act requires that decisions affecting planning matters "shall be consistent with" such policy statements issued under the Act. The following policies are relevant to the proposed development and applications.

Chapter 2 of the PPS 2204 provides policies on Building Homes, Sustaining Strong and Competitive Communities. Section 2.3 of the PPS provides policies on settlement areas.

Policy. 2.3.1.1. provides direction on the location of new growth:

> *Settlement areas shall be the focus of growth and development. Within settlement areas, growth should be focused in, where applicable, strategic growth areas, including major transit station areas.*

The proposed development is located within the settlement area of the City of Sudbury, as described in the Official Plan, where new growth is to occur. The new Plan of Subdivision will provide an additional range and mix of new housing stock in the community, close to existing services and amenities.

Policy 2.3.1.2 describes how new land use patterns should be developed:

> *2. Land use patterns within settlement areas should be based on densities and a mix of land uses which:*
>
> *a) efficiently use land and resources;*
> *b) optimize existing and planned infrastructure and public service facilities;*
> *c) support active transportation;*

The Draft Plan of Subdivision makes efficient use of land and resources by proposing new residential development at sufficient density where existing infrastructure and services can service the development. This will enable the proposed development to connect to existing and future municipal services, optimizing the existing and planned infrastructure.

The subdivision proposes two new roads with a sidewalk as appropriate to support active transportation. Two connections will be made to the existing subdivision to facilitate connections outside of the subject lands' boundaries and to the existing road network.

Chapter 3.0 of the PPS 2024 provides policies on infrastructure and facilities. Section 3.6 describes policies for sewage, water and stormwater.

3.6.1 states that planning for sewage and water services shall:

> a) *accommodate forecasted growth in a timely manner that promotes the efficient use and optimization of existing municipal sewage services and municipal water services…*

3.6.2. provides policies on the preferred method of servicing:

> *Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety.*

The proposed Plan of Subdivision will be serviced by new municipal sewage and water services with the development being in the settlement area This will support proper servicing of the new residential dwellings and minimize any potential risks.

The applications do not conflict with Chapters 4 and 5 of the PPS.

Based on our review of the Provincial Planning Statement 2024 (PPS) it is our professional planning opinion that the applications for rezoning and for Draft Plan of Subdivision are consistent with the policies of the PPS and overall represent good land use planning that aligns with provincial and municipal planning goals.

3.3 Growth Plan for Northern Ontario, 2011

The 2011 Growth Plan for Northern Ontario (GPNO) is a strategic framework that will guide decision-making and investment planning in Northern Ontario over the next 25 years.

The GPNO encourages a mix of residential development throughout Northern Ontario.

3.4.3 Municipalities are encouraged to support and promote healthy living by providing for communities with a diverse mix of land uses, a range and mix of employment and housing types, high-quality public open spaces, and easy access to local stores and services.

The proposed development will increase the housing supply and provide various housing types accessible to different households.

3.4 City of Greater Sudbury Official Plan

The City of Greater Sudbury adopted their Official Plan (OP) in 2006, and the Plan was subsequently approved by the Ontario Municipal Board in 2008.

In 2018, the City completed Phase 1 of 2 of their 5-year review, which was approved by the Minister in 2019. The Phase 2 review is currently underway. In reviewing the applicable policy, the online consolidated version of the OP was used, which included amendments up to October 16, 2024.

The City of Greater Official Plan acts as the principal land use planning policy document for the City and presents a vision of what Greater Sudbury will look like 20 years in the future. The OP contains policies to guide public and private development decisions consistent with the vision. The Official Plan establishes goals, objectives and policies to manage land use and infrastructure decisions over the next 20 years that have social, economic and environmental impacts.

The subject lands are designated as Living Area I on Schedule 1B and are located within the settlement area of the City as per Schedule 3.

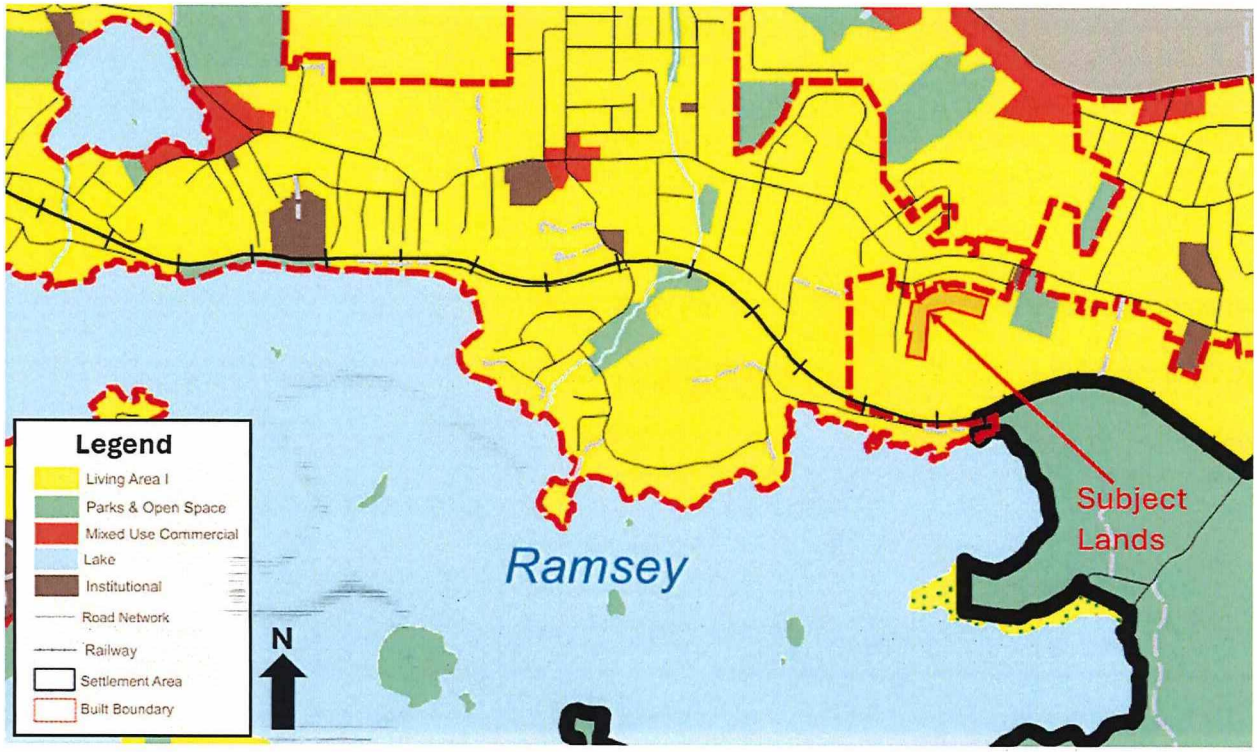


Figure 5: Official Plan Schedule 3 – Settlement Area and Built Boundary

Living Area I is the primary focus of residential development and encourages a mix of residential uses, in areas that are fully connected to municipal water and sewer servicing.

Section 3.2 provides general policies for Living Areas:

1. *Low density housing is permitted in all Living Area designations….*

3. *New residential development must be compatible with the existing physical character of established neighbourhoods, with consideration given to the size and configuration of lots, predominant built form, building setbacks, building heights and other provisions applied to nearby properties under the Zoning By-law.*

10. *Lot creation in Living Areas is permitted in accordance with minimum lot sizes set out in the Zoning By-law.*

The Draft Plan of Subdivision proposes new low-density housing of single-detached, semi-detached and linked dwellings, which are consistent with the prevailing built form in the surrounding area of the proposed development. The proposed medium density block is of an appropriate size to accommodate building(s), setbacks, parking, and landscaping/amenity areas. The previous phases of the subdivision on Birmingham Drive and Dorsett Drive contain a low-density built form.

The proposed lot size and configuration of the Draft Plan of Subdivision is of similar nature to the previous phases of the subdivision and comply with the proposed zoning of the R3 Zone. The layout of the lot fabric and road network reflects what has been previously built and will seamlessly connect to the existing neighbourhood. Building setbacks and heights of the proposed residential dwellings will be evaluated at the time of detailed design and will comply with the proposed zoning.

Section 3.2.1 provides on Living Area I – Communities:

1. *Low density development permits single detached dwellings, semi-detached dwellings, duplexes and townhouses to a maximum net density of 36 units per hectare. In order to maintain existing neighbourhood character, the Zoning Bylaw may establish lower densities in certain areas of the City.*

2. *In medium density developments, all low density housing forms are permitted, including small apartment buildings no more than five storeys in height to a maximum net density of 90 units per hectare.*

5. *In considering applications to rezone land in Living Area I, Council will ensure amongst other matters that:*
    a. *the site is suitable in terms of size and shape to accommodate the proposed density and building form;*
    b. *the proposed development is compatible with the surrounding neighbourhood in terms of scale, massing, height, siting, setbacks, and the location of parking and amenity areas;*
    c. *adequate on-site parking, lighting, landscaping and amenity areas are provided; and*
    d. *the impact of traffic on local streets is minimal.*

The Draft Plan of Subdivision proposes a lot configuration that will permit the development of single detached, semi-detached and linked dwellings, and an apartment block with a net density of 39.3 units per hectare.

The development proposes lot sizes that meet the minimum requirements set out in the zoning by-law to accommodate the density and built form. The development is of similar density and built form to the previous phases and is therefore compatible with the surrounding neighbourhood. The apartment block proposes 35-40 units, for a density of approximately 68 units per hectare, well below the maximum density of 90 units per hectare, and set back from the existing low density residential uses to the north by the storm water management block. Each of the proposed dwellings will have a driveway to accommodate parking and landscaping.

Section 3.2.2 provides policies on Living Area I Phasing Policies. This section provides on phasing new development to ensure the efficient use of land and achieve the desired land use pattern. The following policies apply to the subject lands:

1. *New development in Living Area I will occur adjacent to existing built-up urban areas. Emphasis will be placed on achieving a mix of uses and densities that allow for the efficient use of land, infrastructure and public service facilities.*

The Draft Plan of Subdivision is located in an area that is adjacent to the existing built-up area. A mix of different types of housing forms and densities is proposed to allow for an efficient use of land, infrastructure and public service facilities

Section 8 of the Official Plan covers policies related to water resources. The subject lands are within the Ramsey Lake Watershed and the northern portion is located in Intake Protection Zone 3. Section 8.5 provides policies on stormwater.

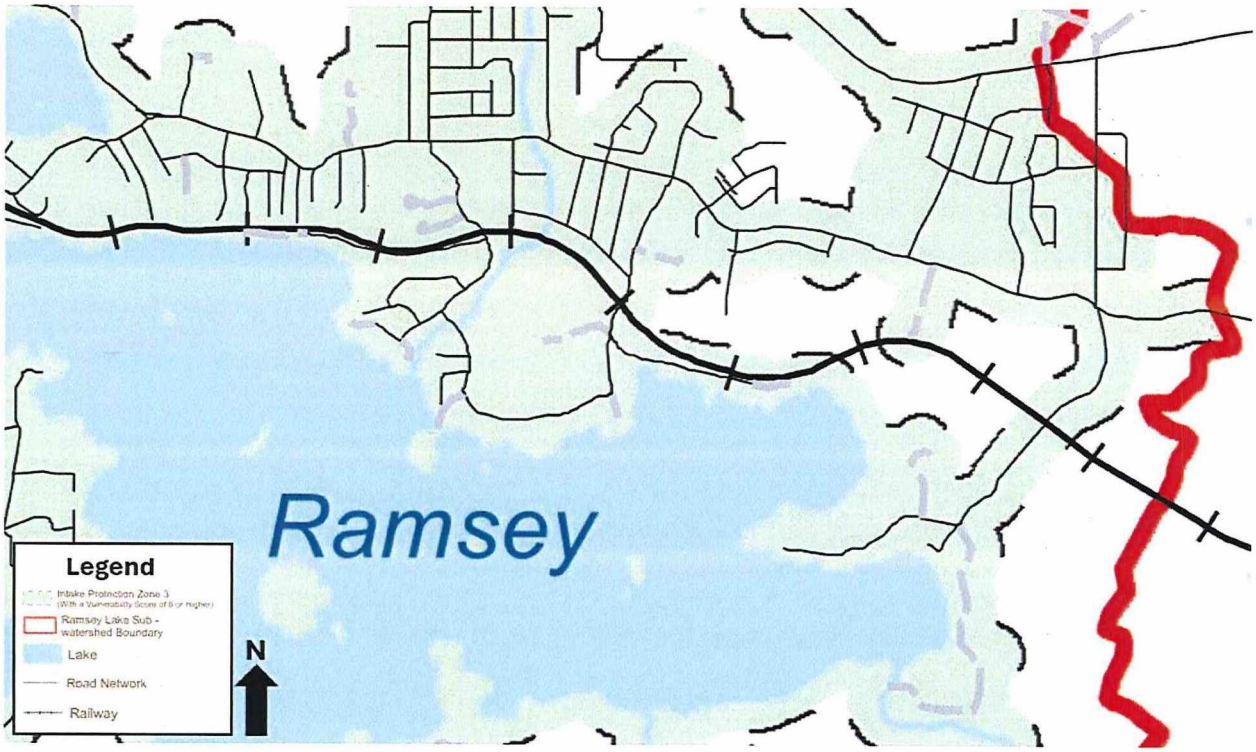


Figure 6: Official Plan Schedule 4a - Drinking Water Source Protection

The following policy applies to the proposed development related to stormwater, 8.5.3

> *"Applications for draft plan approval of subdivisions and site plan approvals in areas where a sub watershed plan has been completed will demonstrate, through a Stormwater Management Report, how the proposed development will provide stormwater management in accordance with the subwatershed plan. Applications for draft plan approval of subdivisions and site plan approvals in vulnerable areas are subject to the policies of section 8.3 of this plan".*

The proposed Draft Plan of Subdivision is located within the Ramsey Lake Watershed. As part of the application, a Stormwater Management Brief has been prepared to understand the feasibility,

size, and technical constraints of stormwater management for the proposed development and to address quantity and quality control for stormwater runoff. The proposed approach will meet the City's requirements for development within the Ramsey Lake Watershed and will ensure protection of the subwatershed.

As part of a complete application, the City has required a Section 59 application due to the location of the development within the Ramsey Lake Watershed. The identified threats include establishment of stormwater management systems (storm sewer and pond), and municipal sewage pipes, and application, handling and storage of road salt, as is typical with the development of a low density residential subdivision and medium density residential parking area.

Section 12 of the City's Official Plan provides policies on utilities, including municipal water and wastewater. These policies ensure the proper infrastructure and capacity is in place or will be in place to support new growth and development.

Section 12.2 describes policies related to sewer and water. The following policies under section 12.2.2 are applicable to the subject lands:

1. *Development in urban areas is permitted provided that existing and planned public sewage and water services have confirmed capacity to accommodate the demands of the proposed development. Alternatively, the proponent of the development will upgrade, at their own expense, the existing sewage and water.*

2. *It is policy of this Plan to ensure that water supply and sewer capacity are adequate to service development without major line or plant expansion.*

The proposed Draft Plan of Subdivision will be serviced by public sewage and water services. JLR has submitted a water/wastewater capacity analysis request which will confirm capacity to accommodate the demands of the proposed development. Any infrastructure upgrades and construction of new services as part of the development will be careful considered as part of the engineering submission.

Overall, it is our professional opinion the proposed Zoning By-law Amendment and Draft Plan of Subdivision conforms to the applicable policies in the City of Greater Sudbury Official Plan and the applications represent good land use planning.

3.5 City of Greater Sudbury Zoning By-law, 2010-2007

The subject lands are currently zoned "Low Density Residential One (R1-5)" in the City's Zoning By-law 2010-100Z which only permits single detached dwellings as the form of residential use. See Figure 7 below.

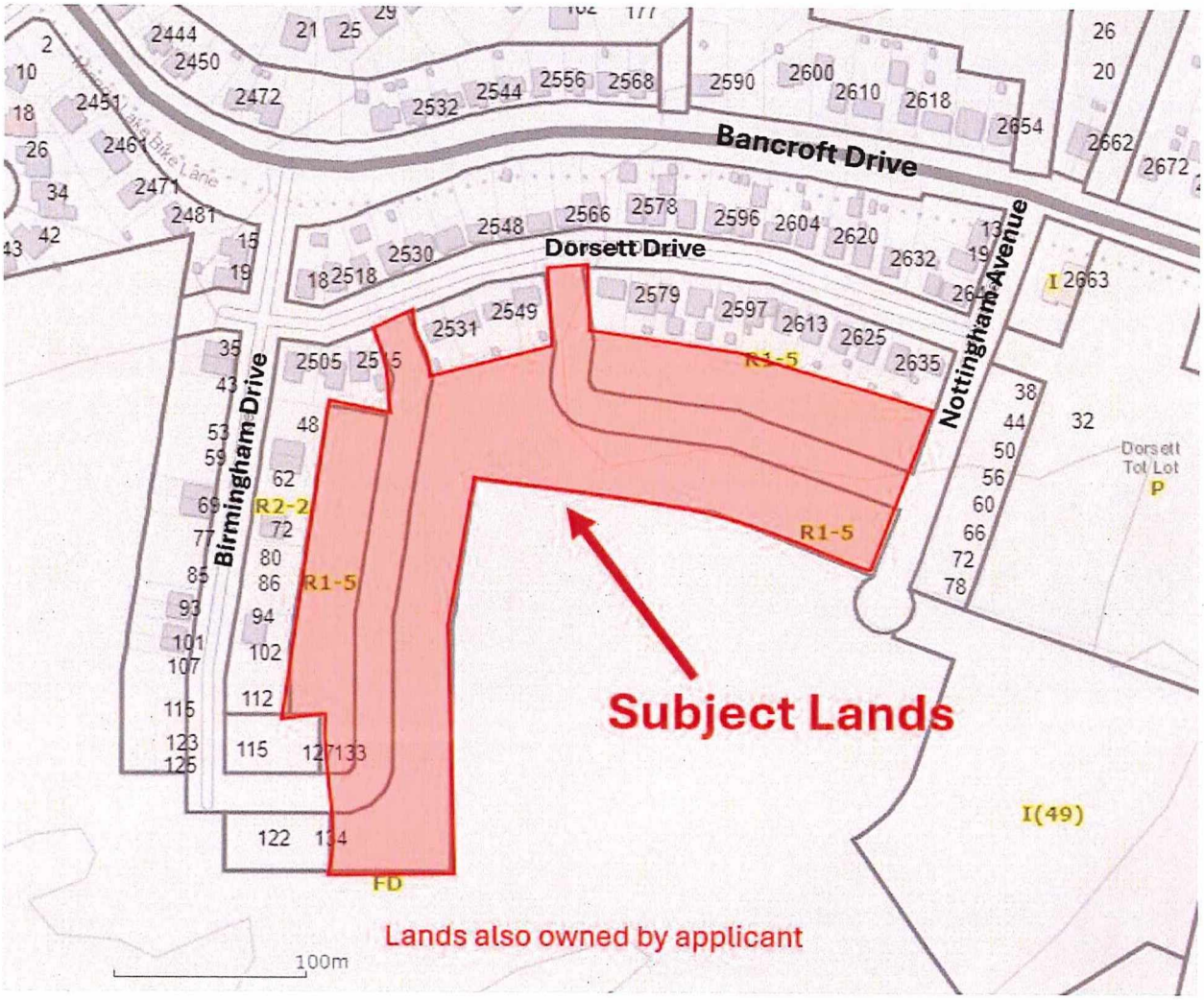


Figure 7: Excerpt from Schedule to Zoning By-law 2010-100Z

The lands are proposed to be rezoned to Medium Density Residential Three (R3) zone to allow for single, semi-detached, and linked dwellings, and the development of one block for a low-rise apartment dwelling.

The proposed lot fabric complies with the minimum frontage, depth, and area for R3 lots for the proposed dwelling types. Refer to Figure 8 below for the concept plan with proposed dwelling type, frontage, depth, and area. The lots have been designed to provide sufficient room to comply with required setbacks and lot coverage for the proposed dwelling types.

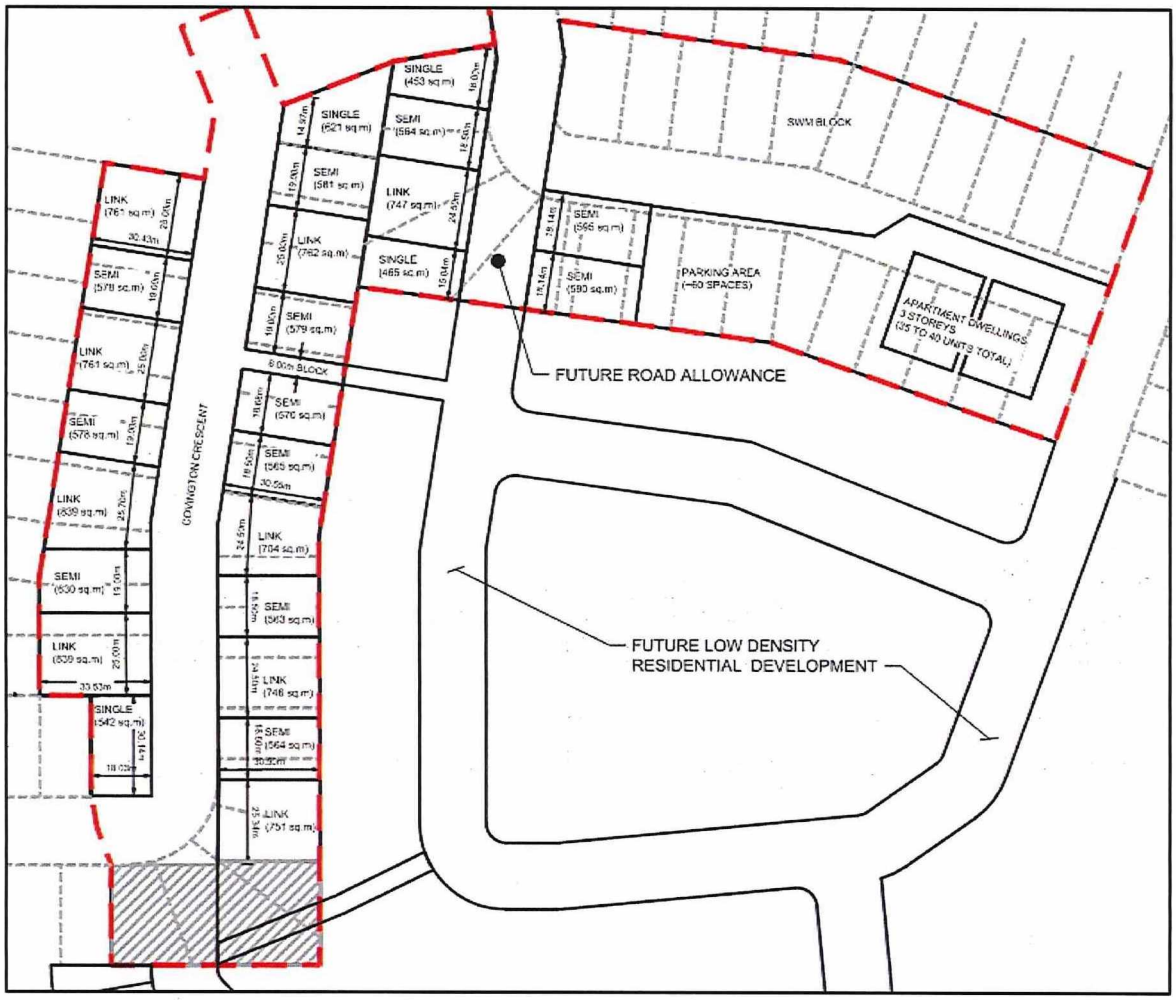


Figure 8: Concept Plan with Proposed Dwelling Types

In addition, an exception clause will be required for relief from Section 4.15.4 a) ii Planting Strip – location.

4.15.4 Planting Strip – Location

a) A 3.0 metre-wide planting strip adjacent to the full length of the lot line shall be required:

ii) Where a lot zoned Medium Density Residential (R3) (R3-1) or High Density Residential (R4) abuts a lot zoned Low Density Residential One (R1) or Low Density Residential Two (R2);

It is proposed that the exception read:

Notwithstanding Section 4.15.4 a)ii) to the contrary, the lands zoned R3(X) do not require a 3.0m planting strip abutting a R1 or R2 Zone when the built form in the R3 Zone is low density residential (single, semi, linked dwelling).

4.0 Lot Creation Process

As required by the Planning Act, the subject lands need to undergo a lot creation process to be divided into the proposed lots and blocks. A new plan of subdivision is being applied for to create the proposed lots and blocks as follows:

- 25 lots and blocks for 46 residential units, with a mix of single detached, semi-detached, and linked dwellings;
- One block for a low-rise apartment dwelling;
- One block for a stormwater management pond;
- One bock for a servicing easement/pathway; and
- Two roads.

Additional part-lot control applications will be used to separate semi-detached and linked dwellings once foundations are built.

5.0 Public Consultation Strategy

The following consultation steps will be undertaken with respect to the proposed applications:

- The applicant will contact the Ward Councillor to inform the Councillor of the applications and provide copies of the submissions and further information should they receive questions.
- Questions/comments will be recorded and responded to as they come in. The agent will liaise with the City Planner with respect to comments/questions that have been received on the application.
- The applicant/agent will request City's mailing list of property owners within 120 metres of the subject property.
- A notice regarding the proposed applications and providing contact information for the agent will be prepared and distributed to the above-noted mailing list.
- Attendance and participation at the required Public Meeting as per Section 34(12).

6.0 Conclusion

This Planning Justification Report has been prepared in support of the proposed residential Draft Plan of Subdivision and Zoning By-law Amendment applications in the City of Greater Sudbury, commonly referred to as the "Scenic View Subdivision". The development proposes a total of 28 lots and blocks for residential development including: single detached, semi-detached, linked dwellings and an apartment dwelling, for a total of 46 units not including the block for the apartment dwelling. Two roads are proposed that connect to the existing road network. Two blocks are also proposed: one for a stormwater pond and one for a servicing easement/pathway block. This rationale has demonstrated that:

1. The proposed plan of subdivision is consistent with the Provincial Planning Statement, 2024, as the development proposes a range of housing types on full municipal services within the settlement area and will not result in any negative impacts to natural features and is not subject to any potential hazards or constraints to development.

2. The application conforms to the City of Greater Sudbury Official Plan by providing new residential development within a settlement area where full municipal services are accessible and available, while providing a range and mix of housing types. Natural features have been considered and there are no known hazards or constraints to permit future residential development of these lands.

3. The application seeks to rezone to the R3 Zone to permit a variety of dwelling types. The dwelling forms will comply with the R3 zone provisions. A special exception is requested to eliminate an additional landscaping buffer requirement between similar low density dwelling types.

Therefore, it is our professional opinion the applications for a Draft Plan of Subdivision and Zoning By-law Amendment are appropriate for the subject lands and represent good land use planning.

J.L. RICHARDS & ASSOCIATES LIMITED

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Planner

Reviewed by:

Sarah Vereault, RPP, MCIP
Associate, Senior Planner, Practice Lead

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MEMO

Date:	December 23, 2024
To:	Bailey Chabot
From:	Johnny Yang
CC:	Robert Langlois
Subject:	Scenic View Subdivision – 2024 Rezoning and Subdivision Application Storm Water Management Brief
JLR No.:	32395-000.1

J.L. Richards & Associates Limited (JLR) was retained by Zulich Enterprises Ltd. (Zulich) to prepare a Storm Water Management (SWM) brief in support of the next phase of the Scenic View Subdivision located in the Minnow Lake area in Sudbury, Ontario. This document is part or the supporting material for the Subdivision and Re-zoning applications for this property.

Background

Zulich is interested in developing the remainder of the undeveloped lands at Scenic View over time, commencing with the area currently identified as Covington Crescent, east of the recently built Birmingham Drive. The area is presently zoned R1-5 (Low Density Residential One) by the CGS Zoning By-Law and designated Living Area 1 by the Official Plan. This next phase of the subdivision would extend the road to the north and connect to Dorsett Drive and would also include municipal services (water, sanitary sewers) for a number of new residences on the road, as well as the storm sewer collection system.

The proposed development is within a larger catchment area that currently drains to the northeast. In order to address the governing criteria for Storm Water Management, a new SWM facility is proposed for this area of the site as illustrated on Figure 1 (below). The new SWM facility will be located south of Dorsett in the new development lands. This area of the site is generally at a low elevation and is known to be underlain by deep soft soils – combined, these two factors make this location ideal for the locating of a SWM facility. Runoff will be conveyed through a combination of conventional storm sewers and rear lot swales, and overland flow will be directed along proposed municipal roadways, easements and blocks.

The proposed SWM facility has been designed conceptually only for the purpose of the Subdivision and Re-Zoning applications to understand its feasibility, size and other technical constraints. The facility will include a biofiltration pond for quality control and additional ponding area above for quantity control as discussed in the following sections.

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Quantity control

The Rational Method, as outlined in the Ministry of Transportation (MTO) Drainage Management Manual, was utilized to estimate the peak storm water flows, and the Modified Rational Method (MRM) was used to calculate the storage required on-site for the post to pre-development balance of the 5 and 100-year storm events. Further, a factor of 20% was used for the calculation of peak flow reduction given the site is located in the Ramsey Lake Watershed.

The catchment area (refer to Figure 1) is approximately 9.2 ha in size, and includes some of the existing developed areas, the proposed new subdivision lands as well as future development lands to the south. The existing surface condition is categorized as exposed rock with 70% tree cover. The runoff coefficient adopted for the pre-construction condition is based on the MTO Drainage Management Manual.

Figure 1 – STM Pond Location

The proposed development is a residential subdivision and will include low density residential areas such as single-family and double-family homes, as well as a limited number of small apartment-style buildings. The development will also include paved municipal roadways, sidewalks and typical landscaping for this type of development (i.e. driveways, sodded yards, etc.). The runoff coefficient adopted for the post-construction condition is based on the Table 4.1 of the Sudbury Engineering Design Manual.

Approximately 900 cubic meter storage volume is required to reduce the post-construction peak flow to 80% of the peak flow of the pre-construction condition under a 1in 100-year storm event.

Quality control

The biofiltration system was sized conceptually following the City's Draft Stormwater Management Design Guide and the Low Impact Development Stormwater Management Planning and Design Guide by Sustainable Technologies Evaluation Program (STEP, partnered with TRCA). According to this guide, the minimum pond area is identified to be 0.43 ha assuming a 400mm ponding depth. Due to the soil conditions identified in the geotechnical investigation at the proposed location, a 4H:1V side slope has been selected for soil stability. The entire pond area will also be mulched and vegetated.

As illustrated in Figure 1 the proposed pond is located in the northeastern area of the proposed subdivision. The pond has a 0.48 ha surface area at the bottom and extends to over 0.66 ha at the bank level. Maintenance access will be provided around the pond. The total storm block has been sized at approximately 0.8 ha.

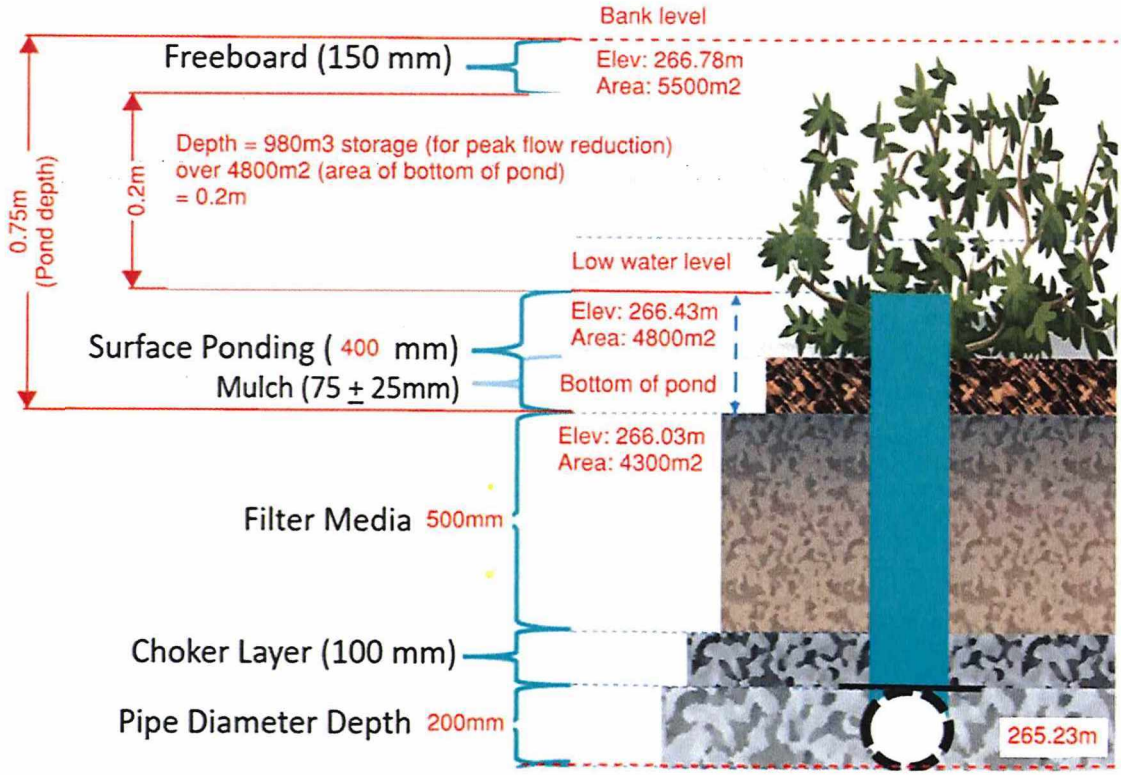

Figure 2 – STM Pond Section View

The pond bottom will include a number of parallel 200mm diameter perforated drainpipes, covered by a choker layer, a filter media layer, and 0.75m ponding depth. This structure will be designed to address the required depths for both quality and quantity control (Refer to Figure 2 for more detail). The drainpipes will report to one common storm sewer which will tie-in to the existing municipal storm system on Nottingham Ave, which then directs runoff to an existing drainage channel east of the site and ultimately to Ramsey Lake.

The design concept described above is meant to demonstrate the proposed facility is technically feasible to comply with applicable guidelines and fit within the intended block illustrated on the accompanying Re-Zoning and Subdivision Application drawings. This design concept will be developed in detail in the next phase based on detailed topographic survey and hydrologic modeling. The final design will include detailed grading, plan and section drawings, landscaping and a complete maintenance protocol as required by the City of Greater Sudbury.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Johnny Yang, P.Eng
Civil Engineer

Reviewed by:

Robert Langlois, P.Eng., FEC, PMP
Senior Associate, Manager, Sudbury Civil, Environmental and Planning

Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

GEOTECHNICAL INVESTIGATION
SCENIC VIEW SUBDIVISION DEVELOPMENT- PHASES 1, 2 and 3
BIRMINGHAM DRIVE, COVINGTON CRESCENT
CAMBRIDGE CRESCENT, NOTTINGHAM AVENUE
SUDBURY, ONTARIO

Prepared for: Timestone Corporation
1730 Regent Street
Sudbury, Ontario
P3E 3Z8

Attention: Mr. John Zulich, P. Eng.

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File No. 51-13-8005
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June 22, 2013

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1 Electronic copy - Timestone Corporation, Sudbury, Ontario
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1 Electronic copy - Terraprobe Inc., Sudbury, Ontario

TABLE OF CONTENTS

1.0 INTRODUCTION

Terraprobe Inc. (Terraprobe) was retained by Timestone Corporation to carry out a geotechnical investigation for the Phase 1, Phase 2 and Phase 3 developments of the Scenic View subdivision. The subject property is located south of Dorset Drive in the City of Greater Sudbury, Ontario (see Figure 1).

The exploratory borehole investigation program was devised to fulfill the requirements of the City of Greater Sudbury draft plan for this proposed subdivision development. The purpose of the investigation was to determine the subsurface conditions at the site by advancing a limited number of boreholes.

Based on the results of the exploratory borehole investigation, geotechnical engineering recommendations are presented for the following items:

- Frost depth;
- Appropriate types of foundations,
- Bearing capacity of the sub-strata;
- Pre-loading procedure;
- Suitability of on site soil to reuse as backfill;
- Foundation factors for earthquake forces;
- Excavation procedures;
- Trench stability;
- Bedding and compaction requirements;
- Recommended pavement design.
- Dewatering and drainage requirements;
- Geotechnical Construction Implications;
- Unit density of soil and coefficients for lateral load design;
- Considerations for constructibility;

2.0 SITE AND PROJECT DESCRIPTION

The Scenic Subdivision will consist of the development of two additional streets; Covington Crescent and Cambridge Crescent in addition to the extension of Birmingham Drive and Nottingham Avenue. Covington Crescent will be accessed from Birmingham Drive and Dorsett Drive. Cambridge Crescent will be accessed from Dorsett Drive and Nottingham Avenue.

To date, the development in this area consist of residential properties developed along Dorsett Drive, Birmingham Drive and Nottingham Avenue.

For the Phase I development (Birmingham Drive extension), the terrain at the site consist of an undulating bedrock subgrade which varies in elevation over short distances. Currently, the overall drainage is in a south west direction.

For the Phase II and Phase III of the development (Covington Crescent and Cambridge Crescent), the terrain consist of a relatively flat and low lying area. Bedrock outcrops were not visible in many areas. Currently, the overall drainage for the Phase II is in a south west direction while the Phase III is in a south east direction

The subject property is bound by the following:

North - Dorsett Drive and residential properties;
West - undeveloped land;
South - undeveloped land;
East - park land and undeveloped land.

It is anticipated that:

- Phase I of the subdivision development will consist of twenty one (21) residential building lots (see Figure 2, lots 110 to 130).
- Phase II of the subdivision development will consist of thirty four (34) residential building lots (see Figure 2, lots 74 to 133).
- Phase III of the subdivision development will consist of thirty three (33) residential building lots (see Figure 2, lots 25 to 32, 45 to 55, 56 to 69).

The residential buildings would consist of single and two storey houses with basements that would be serviced by municipal water and sewers.

3.0 GEOTECHNICAL INVESTIGATION

The geotechnical investigation was carried out at the site between March 26 to 27th, 2013. The field investigation consisted of advancing a total of seventeen (17) exploratory boreholes as follows:

1. Eight (8) exploratory boreholes (BH1 to BH8) along the centreline of the roadways;
2. Nine (9) exploratory boreholes (BH9 to BH17) along the rear lot section of selected residential properties;

Based on the visible prominent bedrock outcrops in the Phase I of the development, the initial proposed six (6) exploratory test pits were not excavated.

Prior to conducing the exploratory borehole investigation, the underground services locates were provided by R. G. Sutton Inspection Services Inc. in conjunction with Ontario One.

The location and elevations of the boreholes were determined by Tulloch Surveying based on the proposed site plan provided by RV Anderson Associates Limited. The elevations of the borings were determined relative to the City of Greater Sudbury vertical controls and UTM Zone 17 NAD 83 CSRS datum.

The drilling work was carried out by Landcore Drilling utilizing a track mounted drill rig, equipped with hollow stem augers and conventional soil sampling equipment. The operation was monitored by a Terraprobe Engineer in training (EIT) who logged the borings and examined the samples as they were obtained. All samples obtained from these boreholes were sealed into plastic jars, and transported to the Terraprobe Inc. laboratory for detailed inspection and testing. All of the borehole samples were examined (tactile) in detail by the project engineer, and classified according to visual and index properties. The boreholes were backfilled once the soil samples were retrieved.

The Standard Penetration Test (SPT) was used to obtain samples of the strata penetrated in the exploratory boreholes, using the Split-Barrel Method technique as outlined in ASTM D1586. The soil samples were taken with a conventional 50 mm diameter split barrel sampler at 0.75 m intervals within the upper 3.0 m and 1.5 m intervals thereafter. The conventional interval sampling procedure used for this investigation does not recover continuous samples of soil at any borehole locations. There is consequently some interpolation of the borehole layering between samples and indications of changes in stratigraphy as shown on the borehole logs are therefore approximate.

A field vane was utilised to measure the undrained shear strength of the underlying clay and silt deposits in BH1 and BH17.

Auger and spoon refusal as noted on the borehole logs were noted to terminate on probable boulders or bedrock.

Groundwater level observations are noted on the borehole logs in Appendix A.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the site are summarized below. The subsurface soil and groundwater conditions encountered in the boreholes are presented on the attached Log of Borehole sheets in Appendix A.

It should be noted that the subsurface conditions are confirmed at the borehole locations only. The stratigraphic boundaries indicated on the Log of Borehole sheets are inferred from non-continuous samples and observations of drilling resistance and typically represent a transition from one soil or rock type to another. These boundaries should not be interpreted to represent exact planes of geological change. The subsurface conditions have been confirmed in a series of widely spaced boreholes and will vary between and beyond the borehole locations. The following discussion has been simplified in terms of the major soil and rock strata for the purposes of geotechnical design. It may not be possible to drill a sufficient number of boreholes and sample and report them in a way that would provide all the subsurface information that could affect construction costs, techniques, equipment and scheduling.

All of the soil samples, that were retrieved from this geotechnical investigation, were tested in our soils laboratory to determine the water contents. In addition, grain size analysis were conducted on selected soil samples. The results of this soil testing is presented in Appendix B.

4.1 Soil Stratigraphy

In general, in most the the boreholes, a thin surficial organic layer was encountered which ranged between 25 mm to 150 mm thick. In boreholes (BH 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14, and 17), the organic layer was underlain by undisturbed native soils consisting mainly of upper layer of brown stiff clay and silt trace to some sand. This stratum was underlain by a compact to dense sand and gravel till in most of the boreholes.

In boreholes 6, 8, and 14, the brown stiff clay and silt trace to some sand was underlain by a brown stiff silty clay to clayey soil soils.

In boreholes 13 and 16, the surface soils consisted of a brown stiff clayey silt trace sand that was underlain by a brown stiff silty clay soil in BH 16. This brown stiff silty clay soil (BH16) and the clayey silt trace sand (BH13) were underlain by the dense sand and gravel till in most of the boreholes.

In boreholes 7, 11 and 15, the bedrock subgrade was exposed at the surface.

In all of the exploratory boreholes except for borehole 6, auger or spoon refusal was encountered on probable boulders or bedrock. A Dynamic Cone was advanced in BH17 to refusal on probable boulders or bedrock.

The following testing was conducted on representative soil samples:

1. Moisture contents.
2. Soil Gradations (hydrometers).
3. Atterberg Limits

Atterberg Limits tests were conducted on the following soil samples:

A. Sample 2 from Borehole 1 within the brown clay and silt trace sand trace gravel stratum at a depth of approximately 0.76 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

B. Sample 3 from Borehole 4 within the brown to grey clay and silt some sand trace gravel stratum at a depth of approximately 1.52 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

C. Sample 2 from Borehole 12 within the brown to grey silty clay trace sand stratum at a depth of approximately 0.76 metres. The results indicate slightly plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

D. Sample 1 from Borehole 13 within the brown clayey silt trace sand stratum at a depth of approximately 0.76 metres. The results indicate a slightly plastic soil with slight or low compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

E. Sample 3 from Borehole 14 within the brown clayey silt trace sand stratum at a depth of approximately 2.29 metres. The results indicate a

medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

F. Sample 2 from Borehole 16 within the brown clayey silt trace sand stratum at a depth of approximately 0.76 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

G. Sample 3 from Borehole 16 within the brown silty clay trace sand stratum at a depth of approximately 1.52 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

H. Sample 3 from Borehole 17 within the brown silt and clay trace sand stratum at a depth of approximately 2.29 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

I. Sample 4 from Borehole 17 within the brown silt and clay trace sand stratum at a depth of approximately 3.05 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

J. Sample 5 from Borehole 17 within the brown silt and clay trace sand stratum at a depth of approximately 4.57 metres. The results indicate a medium plastic soil with moderate or intermediate compressibility which plots above the A-line and is classified as a CL (Inorganic clays of low to medium plasticity).

The following table presents the soil stratigraphy encountered at each borehole location:

Borehole Soil Stratigraphy
Roadways

Borehole (Elev.)	Depth (m)	Subgrade Description	SPT Values 'N'	Water Cont.
BH1	0.00 - 0.15	1 - Organics		
(266.80)	0.15 - 2.29	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	2	24-30
	2.29 - 3.05	3 - Silt and Clay, some sand, brown, wet, stiff (C_u)		
	3.05 -3.81	4 - Till - Sand & Gravel, some silt, brown, wet, compact	4	24
	3.81	5 - Spoon refusal on probable boulders or bedrock	19	20
BH2	0.00 - 0.04	1 - Organics		
(267.60)	0.04 - 1.22	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	50	22-25
	1.22	3 - Spoon refusal on probable boulders or bedrocK		
BH3	0.00- 0.03	1 - Organics		
(268.80)	0.03 - 0.96	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)		33
	0.96 - 1.22	3 - Till - Sand & Gravel, trace silt, brown, wet, dense	50	27
	1.22	4 - Spoon refusal on probable boulders or bedrock		
BH4	0.00 - 0.05	1 - Organics		
(268.10)	0.05 - 2.69	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	5-13	34- 25
	2.69 - 3.36	3 - Till - Sand & Gravel, trace silt, brown, wet, dense	50	10-12
	3.36	4 - Spoon refusal on probable boulders or bedrock		
BH5	0.00 - 0.05	1 - Organics		
(270.30	0.05 - 1.02	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)		32
	1.02 - 1.07	3 - Till - Sand & Gravel, some silt, brown, wet, dense	50	21-37
	1.07	4 - Spoon refusal on probable boulders or bedrock		
BH6	0.00 - 0.05	1 - Organics		
(269.10)	0.05- 1.52	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	6	36-33
	1.52 - 3.20	3 - Silty Clay, trace sand, brown, wet, stiff (C_u)	6 - 50	31-30
	3.20	4 - Spoon refusal on probable boulders or bedrock		
BH7	0.00	Bedrock		
(271.00)				
BH8	0.00 - 0.05	1 - Organics		
(269.10)	0.05 - 1.52	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	8	33-31
	1.52 - 2.29	3 - Silty Clay, trace sand, brown, wet, stiff (C_u)	8	31
	2.29 - 3.05	4 - Silt and Clay, some sand, brown, wet, stiff (C_u)	7	27
	3.05 - 3.25	5 - Silty Clay, some sand, brown, wet, stiff (C_u)	50	28
	3.25	6- Spoon refusal on probable boulders or bedrock		

Borehole Soil Stratigraphy
Typical Building Lots

Borehole (Elev.)	Depth (m)	Subgrade Description	SPT Values 'N'	Water Cont.
BH 9	0.00 - 0.05	1 - Organics		
(270.00)	0.05 - 0.53	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)		49
	0.53	3 - Spoon refusal on probable boulders or bedrock		
BH10	0.00 - 0.05	1 - Organics		
(270.10)	0.05 - 0.76	2 - Clay and Silt, some sand, brown, wet, stiff (C_u)		34
	0.76 - 0.91	3 - Till - Sand & Gravel, some silt, brown, wet, dense	50	44
	0.91	4 - Spoon refusal on probable boulders or bedrock		
BH11	0.00	Bedrock		
(272.00)				
BH12	0.00 - 0.10	1 - Organics		
(269.10)	0.10 - 1.98	2 - Clay and Silt, trace sand, brown, wet, stiff (C_u)	7	19-34
	1.98 - 2.13	3 - Till - Sand & Gravel, some silt, brown, wet, dense	30	30
	2.13	4 - Spoon refusal on probable boulders or bedrock		
BH13	0.00 - 0.03	1 - Organics		
(269.30)	0.03 - 0.76	2 - Clayey Silt, trace sand, brown, wet, stiff (C_u)		29
	0.76 - 1.07	3 - Till - Sand & Gravel, some silt, brown, wet, dense	50	38
	1.07	4 - Spoon refusal on probable boulders or bedrock		
BH14	0.00 - 0.03	1 - Organics		
(268.20)	0.03 - 2.29	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	5	27-34
	2.29 - 3.81	3 - Clayey Silt, trace sand, brown, wet, stiff (C_u)	3	32
	3.81 - 4.27	Till - Sand & Gravel, some silt, brown, wet, compact	27	26
	4.27	4 - Spoon refusal on probable boulders or bedrocK		
BH15	0.00	Bedrock		
(270.40)				
BH16	0.00 - 0.08	1 - Organics		
(267.10)	0.08 - 1.52	2 - Clayey Silt, trace sand, brown, wet, stiff (C_u)	8	28-35
	1.52 - 3.13	3 - Silty Clay, trace sand, brown, wet, stiff (C_u)	6	27-33
	3.13 - 3.96	4 - Till - Sand & Gravel, some silt, brown, wet, compact	10	20
	3.96	5 - Auger refusal on probable boulders or bedrock		
BH17	0.0 - 0.05	1 - Organics		
(267.30)	0.05 - 2.29	2 - Clay and Silt, some sand, trace gravel, brown, wet, stiff (C_u)	2	27-32
	2.29 - 7.01	3 - Silt and Clay, some sand, brown, wet, stiff (C_u)	Wh - 4	43-53
	7.01 -14.48	4 - Start Dynamic Cone		
	14.48	5 - Dynamic Cone refusal on probable boulders or bedrock	Wh - 50	

4.2 Undrained Shear Strength

Field vane measurements were recorded from depths between 1.52 to 6.40 metres below the existing grade in Boreholes 1 and 17. The following table presents the corrected undrained shear strength of the underlying soils

BH	Depth (m)	Elevation (m)	Soil Description	Peak Cu* (kPa)	Remoulded Cu (kPa)	Sensitivity	
BH1	1.52	265.28	Clay and Silt	53.33	7.27	7.33	Medium sensitive
BH17	1.52	265.78	Clay and Silt	86.27	9.59	9.00	Highly sensitive
	4.57	262.73	Silt and Clay	69.97	9.33	7.50	Medium sensitive
	4.88	262.42	Silt and Clay	56.27	11.72	4.80	Medium sensitive
	6.10	261.20	Silt and Clay	37.52	4.69	8.00	Medium sensitive
	6.40	260.90	Silt and Clay	37.52	9.38	4.00	Medium sensitive

*The measured undrained shear strength values obtained in the field were corrected using the PI from the atterberg tests.

The results indicate that the undrained shear strength of the silt and clay varied from about 37 kPa to 86 kPa indicating a firm to stiff soil material. The remoulded shear strength indicated that the soils exhibit medium to sensitivity to disturbance except for the sample in BH17 at a depth of 1.52 which was found to exhibit a high sensitivity to disturbance.

4.3 Groundwater

The soil samples retrieved from the boreholes were noted to be in a wet condition. Based on the measured moisture contents of the soil samples and conditions encountered within the boreholes, the estimated groundwater table will generally be located close to the surface (0.3 to 0.4 metre) within the silt and clay stratum. It can be also be considered as a perched condition within the soils that are close to the bedrock surface.

It should be noted that the groundwater table is expected to fluctuate seasonally with higher levels expected during the spring and fall seasons.

5.0 GEOTECHNICAL DESIGN

The following discussions and recommendations are based on the factual data obtained from the investigation, and are presented for guidance of the design professionals only. The comments pertain to a specific project and location. This report is provided on the basis of these terms of reference and on the assumption that the preliminary design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of practice. If there are any changes to the site development features relevant to the interpretation made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Terraprobe should be retained to review the implications of these changes with respect to the contents of this report.

Comments about construction are presented only to bring attention to aspects which might impact the design. Contractors bidding on or conducting work associated with this project should review the factual data presented in the preceding sections of the report, to assess their effect on proposed construction methods and scheduling.

5.1 Frost Protection

For the Sudbury area, a minimum of 1.80 metres of soil cover is required for frost protection. All heated and unheated foundations and grade beams must be provided with a minimum of 1.80 metres of earth cover for frost protection or alternative equivalent insulation in the City of Greater Sudbury area.

5.2 Conventional Foundation Design

The development will be completed into three Phases as follows:

- Phase I Lots numbered 91 to 96 and 110 to 130
- Phase II Lots numbered 74 to 90 and 97 to 133
- Phase III Lots numbered 25 to 32 and 45 to 69

The following section discussed the anticipated soil conditions and presents the recommended net allowable bearing pressures for lightly loaded residential buildings.

5.2.1 Phase I Development - Conventional Strip Footing Foundation Design

For the Phase I development of the project, the following boreholes are referred to:

Lot borehole	9
Roadway borehole	8

Along the south section of the development, the site is underlain by a firm to stiff clay and silt soils which extends up to 3.25 metres (BH8) below the existing grades. Most of these stratums were underlain by till soils overlaying the bedrock subgrade (0.53 metre in BH9). Based on preliminary roadway grades, it is anticipated that fill in the order of 2.56 metres (BH8) will be required for this development. Portions of the site (both house lots and roadways) are underlain by relatively weak (firm to stiff consistency) and very moist to wet cohesive soils. These soils will experience long-term consolidation settlement in addition to the immediate settlement when loaded. The total settlement will be the result of the soil loading based on the site grade increase and from the residential house foundation loads.

For this part of the project development, we anticipate that all the building foundations will be designed to bear on an engineered fill placed over the dense till soils or bedrock subgrade or will be placed directly on the bedrock subgrade. This will require the sub-excavation of all subsurface soils (organics, compressible clay and silt soils) which can be stockpiled on the site for use as landscape materials or discarded from the site provided it is environmentally safe to do so.

In areas were engineered fill must be placed over a sloping bedrock subgrade (based on the building location and site condition), the footing base must be reviewed and evaluated by a Terraprobe engineer for the potential for long term movement of engineered fill.

Footings placed on bedrock should be established on a relatively level rock surface, i.e. generally sloping at an angle of less than approximately 10^0. In some instances, foundation bases can be placed on bedrock sloping at angles up to 25^0 to 30^0 from the horizontal, provided dowels are incorporated to resist shear. If the bedrock surface is irregular and jagged, dowels may not be required. Where rock slopes are at steeper angles, the rock surface is to be levelled to provide a stepped footing base.

As an alternative to levelling the bedrock, where the bedrock surface is irregular and jagged, it may be more practical to provide level benching over these areas by pouring lean concrete (minimum 10 MPa) prior to constructing the foundations. This decision is made on site, since each situation will depend on site specific bedrock conditions.

Some excavation for the building foundations may require drilling and blasting in bedrock. Allowances should be made for overbreak conditions. Due consideration should also be given to controlled blasting procedures in order to prevent potential damage to the surrounding environment. All blasts must be monitored and conducted as per the latest version of the Occupational Health and Safety Act and Regulations for Construction Projects (Part II- General Construction, Sections 196- 206). In addition, we would recommend that a pre-blast survey (as per OPSS 120.07.03) of all neighbouring properties should be undertaken prior to conducting some drilling and blasting activities. The preconstruction survey will serve to protect the client from claims unrelated to the construction activities in the development of this property.

It is also possible that in certain areas, the residential building footprints may intercept valleys of soils between some bedrock outcrops. We recommend excavating any soil materials and organics to expose the sound bedrock or dense till soils. Depending on the depth of the excavation, the footings may need to be placed on an engineered fill that would be placed as backfill in the excavation.

All excavated footing bases must be evaluated by a Terraprobe to ensure that the founding subgrade exposed at the excavation base is consistent with the design bearing pressure intended by the geotechnical engineer.

The following table presents the maximum net allowable bearing pressure recommenced for the design of conventional strip and spread footings placed on engineered fill or sound bedrock :

Maximum Net Allowable Bearing Capacity

	SLS (kPa)	ULS (kPa)
Footings on engineered fill placed over dense till soils or sound bedrock	250	375
Footings on sound bedrock		3000

Serviceability Limit States (SLS) does not apply for shallow foundations bearing directly on bedrock since the loads required for unacceptable settlements to occur would be much larger than the factored resistance at the Ultimate Limit States (ULS). Foundations installed on bedrock in accordance with the above recommendations would be expected to experience very little settlements limited to the elastic deformation of the concrete.

The minimum footing width for strip footings and for square footings should conform to the Ontario Building Code (OBC 2006), Section 9.15.3. Foundations installed on engineered fill would be expected to experience total settlements in the order of 25 mm (1 inch) and differential settlements in the order of 19 mm (3/4 inch).

Foundations installed directly on bedrock in accordance with the above recommendations would be expected to experience very little settlements limited to the elastic deformation of the concrete.

The bearing capacity is based on the proposed grading plans. If the grading plan are changed, then Terraprobe must review the changes to better assess the suitability and requirements for the engineered fill.

In all cases, foundations should be placed on bedrock or engineered fill which has been cleaned of all deleterious materials such as topsoil, loosened materials, and debris prior to pouring concrete. Rainwater or seepage entering the excavations should be pumped away (not allowed to pond), and any disturbed material should be removed from the base of the excavation.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

5.2.2 Phase II Development - Conventional Strip Footing Foundation Design

For the Phase II development of the project, the following boreholes are referred to:

Lot boreholes	10, 11 and 12 (both Phase II and III)
Roadway boreholes	5, 6, and 7

The site consist of firm to stiff clay and silt soils which extends up to 2.13 metres (BH12) below the existing grades. Most of the these stratums are underlain by till soils overlaying shallow bedrock. Based on preliminary roadway grades, it is anticipated that fill in the order of 0.60 metres (BH5) to 1.30 metres (BH6) will be required for this development. Portions of the site (both house lots and roadways) are underlain by relatively weak (firm to stiff consistency) and very moist to wet cohesive soils. These soils will experience long-term consolidation settlement in addition to the immediate settlement when loaded. The total settlement will be the result of the soil loading based on the site grade increase and from the residential house foundation loads.

For this part of the project development, we anticipate that all the building foundations will be designed to bear on an engineered fill placed over the dense till soils or bedrock subgrade or will be placed directly on the bedrock subgrade. This will require the sub-excavation of all subsurface soils (organics, compressible clay and silt soils) which can be stockpiled on the site for use as landscape materials or discarded from the site provided it is environmentally safe to do so.

In areas were engineered fill must be placed over a sloping bedrock subgrade (based on the building location and site condition), the footing base must be reviewed and evaluated by a Terraprobe engineer for the potential for long term movement of engineered fill.

Footings placed on bedrock should be established on a relatively level rock surface, i.e. generally sloping at an angle of less than approximately 10^0. In some instances, foundation bases can be placed on bedrock sloping at angles up to 25^0 to 30^0 from the horizontal, provided dowels are incorporated to resist shear. If the bedrock surface is irregular and jagged, dowels may not be required. Where rock slopes are at steeper angles, the rock surface is to be levelled to provide a stepped footing base.

As an alternative to levelling the bedrock, where the bedrock surface is irregular and jagged, it may be more practical to provide level benching over these areas by pouring lean concrete (minimum 10 MPa) prior to constructing the foundations. This decision is made on site, since each situation will depend on site specific bedrock conditions.

Some excavation for the building foundations may require drilling and blasting in bedrock. Allowances should be made for overbreak conditions. Due consideration should also be given to controlled blasting procedures in order to prevent potential damage to the surrounding environment. All blasts must be monitored and conducted as per the latest version of the Occupational Health and Safety Act and Regulations for Construction Projects (Part II- General Construction, Sections 196- 206). In addition, we would recommend that a pre-blast survey (as per OPSS 120.07.03) of all neighbouring properties should be undertaken prior to conducting some drilling and blasting activities. The preconstruction survey will serve to protect the client from claims unrelated to the construction activities in the development of this property.

It is also possible that in certain areas, the residential building footprints may intercept valleys of soils between some bedrock outcrops. We recommend excavating any soil materials and organics to expose the sound bedrock or dense till soils. Depending on the depth of the excavation, the footings may need to be placed on an engineered fill that would be placed as backfill in the excavation.

All excavated footing bases must be evaluated by a Terraprobe to ensure that the founding subgrade exposed at the excavation base is consistent with the design bearing pressure intended by the geotechnical engineer.

The following table presents the maximum net allowable bearing pressure recommenced for the design of conventional strip and spread footings placed on engineered fill or sound bedrock :

Maximum Net Allowable Bearing Capacity

	SLS (kPa)	ULS (kPa)
Footings on engineered fill placed over dense till soils or sound bedrock	250	375
Footings on sound bedrock		3000

Serviceability Limit States (SLS) does not apply for shallow foundations bearing directly on bedrock since the loads required for unacceptable settlements to occur would be much larger than the factored resistance at the Ultimate Limit States (ULS). Foundations installed on bedrock in accordance with the above recommendations would be expected to experience very little settlements limited to the elastic deformation of the concrete.

The minimum footing width for strip footings and for square footings should conform to the Ontario Building Code (OBC 2006), Section 9.15.3. Foundations installed on engineered fill would be expected to experience total settlements in the order of 25 mm (1 inch) and differential settlements in the order of 19 mm (3/4 inch). Foundations installed directly on bedrock in accordance with the above recommendations would be expected to experience very little settlements limited to the elastic deformation of the concrete.

The bearing capacity is based on the proposed grading plans. If the grading plan are changed, then Terraprobe must review the changes to better assess the suitability and requirements for the engineered fill.

In all cases, foundations should be placed on bedrock or engineered fill which has been cleaned of all deleterious materials such as topsoil, loosened materials, and debris prior to pouring concrete. Rainwater or seepage entering the excavations should be pumped away (not allowed to pond), and any disturbed material should be removed from the base of the excavation.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

5.2.3 Phase III Development - Conventional Strip Footing Foundation Design

For the Phase II development of the project, the following boreholes are referred to:

Lot boreholes 12 (both Phase II and III), 13, 14, 15, 16 and 17
Roadway boreholes 1, 2, 3 and 4

The site consist of firm to stiff clay and silt soils which extends up to 14.48 metres (BH17) below the existing grades. Most of the these stratums are underlain by till soils overlaying shallow bedrock. Based on preliminary roadway grades, it is anticipated that fill in the order of 0.50 metres (BH17) to 0.61 metres (BH2) will be required for this development. Portions of the site (both house lots and roadways) are underlain by relatively weak (firm to stiff consistency) and very moist to wet cohesive soils. These soils will experience long-term consolidation settlement in addition to the immediate settlement when loaded. The total settlement will be the result of the soil loading based on the site grade increase and from the residential house foundation loads.

For this part of the project development, we anticipate that all the building foundations will be designed to bear on an engineered fill placed over the dense till soils or bedrock subgrade or will be placed directly on the bedrock subgrade. This will require the sub-excavation of all subsurface soils (organics, compressible clay and silt soils) which can be stockpiled on the site for use as landscape materials or discarded from the site provided it is environmentally safe to do so.

5.2.3.1 Phase III Development - Lots 45 to 50

For the residential lots numbered 45 to 50, it is anticipated that the firm to stiff clay and silt soils deposits will be too deep to be sub-excavated. In this are of the Phase III development, it is anticipated that the lot fabric will need to be surcharged in order to proceed with conventional construction consisting of strip and spread footings.

Some additional geotechnical work would be required to retrieve an undisturbed native soil sample to conduct a consolidation test. Based on this data, the estimated long-term consolidation settlement due to site grading and house construction loading at this site would be calculated and a schedule for surcharging would be presented. The surcharging could extend into the roadway portions of this Phase. There fore, the surcharging would need to be staged based on the anticipated time for the development.

- For a staged construction, it is recommended that the site grading activity (engineered fill placement to raise site grade) should be completed first and left in place for sufficient time until majority of the settlement (about 90 percent of total settlement as established by on-site settlement monitoring) prior to installing the building foundations. This time separation will allow majority of the settlement related to the surcharge loading (fill placement to raise site grades) to occur before the building construction.

- Preferably, the subject area should be raised by engineered fill to design grades and pre-loaded to apply surcharge to expedite and minimize the settlement. The pre-loading should consist of earth/rockfill berm (up to 3.0 metres height) extending at least 3 metres beyond the footprint of the subject area in every direction and sloped down at 1 H to 1 V inclination to the existing ground. In order to minimize the possibility of a localised bearing failure, the total pre-load height should be restricted to 4.0 metres or less. The settlement monitoring will indicate if adjustments are required to the pre-load to achieve the expected settlement.

5.2.3.2 Phase III Development - Remaining Lots

For the remaining residential lots for the Phase III development, we anticipate that all the building foundations will be designed to bear on an engineered fill placed over the dense till soils or bedrock subgrade or will be placed directly on the bedrock subgrade. This will require the sub-excavation of all subsurface soils (organics, compressible clay and silt soils) which can be stockpiled on the site for use as landscape materials or discarded from the site provided it is environmentally safe to do so.

Our recommendations from section 5.2.2 would be applicable for these residential lots.

5.3 Engineered Fill

The boreholes indicate that the undisturbed native soils predominantly consist of wet clayey silt to silt and clay soils. The subgrade soils are sensitive to change in moisture content and can become soft if the soils are subject to additional water or precipitation. As well, they could be easily disturbed if travelled on during construction. As such, it is recommended that a thin engineered fill pad be placed over the undisturbed native soils immediately after verification of the soil capability by Terraprobe.

The engineered fill that is required for this project should consist of a Granular B Type II (OPSS 1010). All engineered fill is to be placed directly on the underlying undisturbed native soil or bedrock subgrade cleaned free of organics and deleterious materials. For footings placed on an engineered fill over a bedrock subgrade, the engineered fill must be a minimum of 300 mm thick.

The Granular B Type II material is to be placed in maximum 200 mm thick lifts and compacted to 100 percent SPMDD. The engineered fill is to extend horizontally a minimum of 1.0 metre beyond the footing edge and slope down at 1 horizontal to 1 vertical. The engineered fill would be placed over the exposed undisturbed native soils or sound bedrock subgrade. Full time supervision of the placement and compaction of the engineered fill is required to for each lift of engineered fill. For a Granular BType II, witnessing the

proof rolling on a full time basis and probing with a probe rod would be utilized to verify and approve the compactive effort.

It is also noted, that in areas were engineered fill must be placed over a sloping bedrock subgrade (based on the building location and site condition), the footing base must be reviewed by a Terraprobe engineer to assess the potential for long term movement of engineered fill.

Where fill areas are in excess of approximately 1.0 metre, a well graded blast rock fill material with no rock particle exceeding 300 mm in diameter may be used. The well graded 300 mm diameter rock fill is to be placed in lifts equal to the maximum particle size diameter and chinked with heavy tracked machines (a bulldozer, minimum D6 Caterpillar or equivalent). All blast rock fill material with a diameter less than 150 mm (including Granular B Type II) is to be vibratory compacted with a large drum roller to a minimum 100 percent SPMDD. To ensure proper filter grading, the blast rock fill material should gradually decrease in diameter as the material is brought to the underside of the Granular B Type II. Depending on the gradation of the blast rock fill material at the Granular B Type II interface, a non-woven geotextile (Terrafix 360R or equivalent) may be required. This would be reviewed on site by a by a Terraprobe geotechnical engineer. Full time supervision of the placement and compaction of the engineered fill is required to for each lift of engineered fill. For a well graded blast rock fill, witnessing the chinking on a full time basis would be utilized to verify and approve the compactive effort.

The well graded blast rock fill should be capped with a minimum of 300 mm of Granular B Type II (placed directly under the footings). The Granular B Type II must be placed in maximum 150 mm lifts and compacted to 100% SPMDD. Full time supervision of the placement and compaction (chinking) of the engineered blast rock fill is required to observe and approve the compactive effort.

Prior to pouring concrete for the footings, the footing areas (bedrock or engineered fill pad) should be cleaned of all deleterious materials such as topsoil, fill, softened, disturbed or caved materials, as well as any standing water. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

5.4 Bedrock Transition Zones

Where foundations must span from bearing on bedrock to engineered fill, differential settlement can occur. The following transition precautions are suggested to accommodate the resulting potential differential settlement:

- the transition zone of the foundation at the bedrock to engineered fill contact should be adequately reinforced on either side using thickened footings or concrete grade beams.

- reinforced concrete foundation walls are usually incorporated to provide additional rigidity.

- individual spread footings must be located entirely on bedrock or entirely on engineered fill.

- control joints should be incorporated through the superstructure at the transition between the bedrock and native soil/engineered fill areas.

5.5 Basement Concrete Slab-On-Grade

Concrete floor slabs should be placed on a minimum of 150 mm of Granular A (OPSS 1010) or 19 mm minus clear stone (OPSS 1004) placed in maximum 150 mm thick lifts and compacted to a minimum 100 percent SPMDD. Prior to the placement of the granular base, the soil subgrade should be assessed by a Terraprobe engineer. Soft and wet subgrade areas which deflect excessively or include topsoil/deleterious materials must be subexcavated and backfilled with suitable compacted clean earth fill material.

If required, the granular subbase should consist of a Granular B Type II (OPSS 1010) placed in maximum 150 mm thick lifts and compacted to a minimum of 100 percent SPMDD.

5.6 Basement Drainage

Consideration should be given during site grading design to ensure that basements are constructed above the groundwater elevation. If possible, consideration should be given to design lot grading to allow basement levels to be at least 0.5 metre above the groundwater elevation. Where basement floor level is located within 0.5 metre of the groundwater elevation, a provision of subfloor drainage is required. In case basements are designed below the groundwater table, basements must be waterproofed and structures should be designed to resist uplift force.

To assist in maintaining the building dry from surface water seepage, it is recommended that exterior grades around the building be sloped away at a 2 percent gradient or more, for a distance of at least 2 metres. Roof drains should discharge a minimum of 1.5 metres away from the structure to a drainage swale or appropriate drainage outlet.

Since the buildings will have a basement, exterior perimeter foundation drains are required. The foundation drains should consist of a minimum 100 mm diameter fabric wrapped perforated pipe surrounded by a 19 mm diameter clearstone gravel (OPSS 1004) with a minimum cover of 150 mm (OBC section 9.14.3, Division B, pg B9-60). The perimeter weeping tile would drain into a sump pit located in the basement area. The perimeter foundation drains should discharge towards the rear section of the house to a swale or suitable drainage outlet. The perimeter and sub-floor drain installation and outlet considerations must conform to the Ontario Building Code and plumbing code requirements.

The exterior foundation backfill should extend a minimum lateral distance of 600 mm out from the foundation wall and should consist of free-draining granular material, such as a Granular B Type I (OPSS 1010) or suitable alternative drainage cellular media.

5.7 Re-use of Excavated Material & General Backfill

Any topsoil and organic soil materials encountered at the site should not be reused as backfill in settlement sensitive areas, such as beneath the floor slabs, pavements and trench backfill areas. Theses material may be stockpiled and reused for landscaping purposes.

All backfill materials should consist of free draining material such as Granular B Type II (OPSS 1010) which can be readily compacted. In settlement sensitive areas, such as beneath pavements and trenches, the backfill should be placed in lifts of 150 mm or less and compacted to a minimum of 100 percent SPMDD. It is recommended that inspection and testing be carried out during construction to confirm trench backfill quality, thickness and to ensure adequate compaction.

Should construction be conducted during the winter season, it is imperative to ensure that frozen material is not utilized as trench backfill.

5.8 Pipe Bedding

The buried services should be placed on conventional Class 'B' granular bedding as per the latest version of the City of Greater Sudbury GSSD-1227.010 specifications for sewer pipes & water mains for good ground conditions. The granular bedding would be placed over an engineered fill, undisturbed native soils or blast rock shatter. In the case of a soil trench, where disturbance of the trench base has occurred, such as due to groundwater seepage, or construction traffic, the disturbed soils should be sub-excavated and replaced with suitably compacted granular fill

Bedding details should conform to the latest version of the City of Greater Sudbury GSSD-1227.010 specifications.

A- Earth Trench

The bedding materials, which include OPSS 1004 bedding sand or OPSS 1010 Granular A, should be compacted to a minimum of 95 percent Standard Proctor Maximum Dry Density (SPMDD). A clear stone type bedding on cohesionless soil (silt, sand, etc.) subgrade may be considered, but only in conjunction with a suitable geotextile filter (Terrafix 360R or equivalent), otherwise without proper filtering, there may be entry of fines from the cohesionless soils into the bedding. This loss of ground could result in loss of support to the pipes and possible future settlements.

B- Rock Trench

The bedding materials should consist of a 19 mm clear stone (OPSS 1004, Table 2) placed and compacted to a dense state in a rock trench.

5.9 Trench Backfill

Trench backfill above the springline of the pipe should conform to the latest version of the City of Greater Sudbury GSSD-1227.010 specifications. Backfilling of narrow trenches can be accomplished by reusing the excavated soils (provided they are not too wet) above the springline of the pipe to the underside of the roadway subbase materials provided the moisture content is maintained within 2 percent of optimum moisture content. If the native soils prove difficulty to compact with vibratory compaction equipment, it is recommended that a free draining material such as Granular B OPSS 1010 be used.

Backfilling above the springline trench backfill of narrow trenches in a blast rock can be accomplished by using a Modified Granular B (GSSS) or Granular B Type II (OPSS 1010) to the underside of the roadway subbase materials. All fill should be placed in 150 mm lifts and compacted to a minimum of 95 percent Standard Proctor Maximum Dry Density (SPMDD).

All fill should be placed in 150 mm lifts and compacted to a minimum of 95 percent Standard Proctor Maximum Dry Density (SPMDD). It needs to be noted that post-compaction settlement of fine grained fills on the order of 0.5 to 1.0 percent of the total height are common, even when adequately placed to specified compaction. It is best to schedule deep fill placement as far in advance of finish surfacing as possible for best grade integrity.

5.10 Earthquake Design Parameters

The 2006 Ontario Building Code stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification. The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the OBC (2006). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity measurements have been taken or alternatively estimated on the basis of rational analysis of undrained shear strength or penetration resistance.

$$\upsilon_{s\text{-}avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{\upsilon_{si}}} \qquad s_{u\text{-}avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{s_{ui}}} \qquad N_{avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{N_i}}$$

Shear wave velocity | Undrained shear strength | SPT N-values

At this site, it is known the upper soil stratigraphy consists up to 14.48 metres or greater of soil with a firm to stiff relative density with undrained shear values in the range of 37 to 86 kPa. It is known that the deeper stratigraphy in this area is at least as competent as the existing stratum and that the competent bedrock consisting of igneous and metamorphic rocks could lie at depths that may range between the surface to over 14.48 metres below the existing grades. For seismic design purposes, the site designation for seismic analysis is Class C.

According to Tables 4.1.8.4.B and 4.1.8.4.C. of the same code, the applicable acceleration and velocity based site coefficients are tabulated below.

Site Class	Values of F_a				
	$S_a(0.2) \leq 0.25$	$S_a(0.2) = 0.50$	$S_a(0.2) = 0.75$	$S_a(0.2) = 1.00$	$S_a(0.2) = 1.25$
C	1.0	1.0	1.0	1.0	1.0

Site Class	Values of F_v				
	$S_a(1.0) \leq 0.1$	$S_a(1.0) = 0.2$	$S_a(1.0) = 0.3$	$S_a(1.0) = 0.4$	$S_a(1.0) \geq 0.5$
C	1.0	1.0	1.0	1.0	1.0

Values of F_a and F_v can be linearly interpolated for intermediate values of S_a between 0.2 and 1.0.

5.11 Pavement Design

5.11.1 Subgrade Preparation

The pavement subgrade for the proposed roadways is expected to consist of surcharged undisturbed native soils (Phase III) or engineered fill placed over till soils or bedrock (phases I and II). The proper base and subbase fill materials become very important in addressing the proper load distribution to provide a durable pavement structure. In particular, the silt content of the sub-grade material also plays a key role in the design of the pavement structure.

The laboratory gradations conducted on native soil samples indicate that site soils in general are susceptible to frost action and will manifest itself by frost heaves and frost boils, inducing cracks in the asphalt surface. It is imperative that proper surface and subsurface drainage of the pavement structure is achieved with proper grades, catch basins and subdrains.

Prior to placing the granular subbase and base courses, the exposed subgrade must be inspected by Terraprobe to confirm the soil conditions encountered. Should unstable areas be found, Terraprobe can provide appropriate advice for addressing local weak areas at that time, such as re-compaction and/or sub-excavation. If unstable subgrade conditions are encountered, they should be sub-excavated, and backfilled with clean earth fill material (granulars) placed in 150 mm lifts and compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD). If wet site conditions exist during filling, stabilization with granular materials may be required.

5.11.2 Pavement Structure

The following are the minimum design requirements for flexible pavement in local residential roadways based on a twenty (20) year life expectancy, which can be used for this site, provided the subgrade is properly prepared:

Pavement Structure Design Requirement
Local Residential, Undisturbed Native soils or Engineered fill Subgrade

Pavement Layer	Compaction Requirements	Minimum Pavement Thickness Design
Surface Course Asphaltic Concrete HL-3 (OPSS 1150)	as per OPSS 310 92.0 to 96.5 % MRD	40 mm
Base Course Asphaltic Concrete HL-8 (OPSS 1150)	as per OPSS 310 92.0 to 96.5 % MRD	50 mm
Base Course: Granular A (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM-D698)	150 mm
Subbase Course: Granular B Type II (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM D698)	600 mm
150 mm diameter fabric wrapped sub-drains		

The granular materials should be placed in lifts 150 mm thick or less and be compacted to a minimum of 100 percent SPMDD for granular base and granular sub-base. Asphalt materials should be rolled and compacted to OPSS 310 specifications. The granular and asphalt pavement materials and their placement should conform to OPSS Forms 310, 501, 1010, 1150 and the City of Greater Sudbury specifications. In-situ density testing to monitor the effectiveness of the compaction equipment in achieving the required densities is required for certification.

Pavement Structure Design Requirement
Local Residential, Blast Rock Fill Subgrade

Pavement Layer	Compaction Requirements	Minimum Pavement Thickness Design
Surface Course Asphaltic Concrete HL-3 (OPSS 1150)	as per OPSS 310 92.0 to 96.5 % MRD	40 mm
Base Course Asphaltic Concrete HL-8 (OPSS 1150)	as per OPSS 310 92.0 to 96.5 % MRD	50 mm
Base Course: Granular A (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM-D698)	150 mm
Subbase Course: Granular B Type II (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM D698)	300 mm
Subbase Fill Course: Blast Rock Fill (300 mm dia or less)	chinked in place	to underside of subbase

All granular base and sub-base materials should be placed in lifts 150 mm thick or less and be compacted to a minimum of 100 percent SPMDD. The granular and asphalt pavement materials and their placement should conform to OPSS Forms 310, 501, 1010, 1150 and the City of Greater Sudbury specifications. Asphalt materials should be rolled and compacted to OPSS 310 specifications. In-situ density testing to monitor the effectiveness of the compaction equipment in achieving the required densities is required for certification

Blast rock fill is to be chinked in place and verified by a representative of this office. Where the in-situ blast rock fill material is not well graded, it may be necessary to place a non-woven geotextile (Terrafix 360R or equivalent) prior to placing any fill material to prevent the migration of fines.

5.11.3 Pavement Drainage

The above pavement thickness design is based on a drained pavement subgrade by 150 mm subdrains in the undisturbed native soils. The subdrains should consist of 150 mm diameter fabric wrapped perforated plastic pipe. Alternatively, for high water table areas, the pipe could be installed within a stone filter comprised of HL8 OPSS 1150 Coarse Aggregate covered by a filter cloth (Terrafix 360R or equivalent). The aggregate filter should be at least 50 mm thick below the pipe and at least 150 mm thick beside and above the pipe and wrapped with filter cloth.

In blast rock fill, subdrains are not required.

Control of surface water is also a factor in achieving good pavement life. Grading adjacent pavement areas should be designed so that water is not allowed to pond adjacent to the outside edges of the pavement. The surface of the pavement should be free of depressions and sloped at a minimum grade of two percent to drain at the catch basin locations.

5.12 Horizontal Transition Treatment

Depending on the engineered fill material used within the proposed roadways (i.e. Granular B Type II or blast rock fill material), the subgrade materials within below the proposed pavement structure may transition from the following materials:

1. Earth cut to earth fill;
2. Rock cut to rock fill;
3. Rock cut to earth fill;
4. Earth fill to rock fill;

5. Earth fill to granular fill;
6. Rock cut to earth cut.
7. Transition treatments to mitigate differential settlement should follow Ontario Provincial Standard Drawings 205.010 to 205.050.

6.0 DESIGN CONSIDERATIONS FOR CONSTRUCTIBILITY

6.1 Site Work

It is recommended that the geotechnical aspects of the proposed works outlined within, be completed under appropriate geotechnical supervision to routinely check such items as subgrade preparation, fill compaction and material physical characteristics for compliance with the various recommendations and specifications presented within.

As noted, the undisturbed native soils generally contain a significant amount of fine grained soils (silt and clay particles) and will become weakened when subject to traffic when wet. If site works are carried out during periods of wet weather, then it can be expected that the subgrade will be disturbed unless an adequate granular working surface is provided to protect the integrity of the subgrade soils. The disturbance caused by the traffic can result in the removal of disturbed soil and use of fill materials for site restoration or underfloor fill that is not intrinsic to the project requirements.

Some excavation for the services and building foundations will require drilling and blasting in bedrock. Allowances should be made for overbreak conditions. Due consideration should also be given to controlled blasting procedures in order to prevent potential damage to the surrounding environment. All blasts must be monitored and conducted as per the latest Occupational Health and Safety Act and Regulations for Construction Projects (currently Nov. 1993, Part II- General Construction, Sections 196- 206).

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the exposed soil in the foundation excavations and concrete must be provided.

6.2 Excavations

From the measured water levels and water contents of the soil samples and the estimated water table level, it is anticipated that groundwater seepage will enter the excavations.

Generally, ground water inflow into shallow excavations (i.e., less than 600 mm below the water table) can be controlled by pumping from sumps. Deeper excavations will require more positive control, such as through well points. In order to minimize the excavation limits (slopes), we would recommend that the excavations be carried out within a trench box to place the pipes or within the confines of interlocking steel sheet piles.

We would anticipate that some form of a well point system may be required to install the underground services once the pre-load has been completed.

Where workmen must enter excavations carried deeper than 1.20 metres, the trench excavations should be suitably sloped and/or braced in accordance with the latest version of the Occupational Health and Safety Act and Regulations for Construction Projects (Part III - Excavations, Section 226). Alternatively, the excavation walls may be supported by bracing or close shoring or a trench box. The Occupational Health and Safety Act recognizes four (4) broad classifications of soils, which are summarized as follows:

TYPE 1 SOIL

a. is hard, very dense, and only able to be penetrated with difficulty by a small sharp object;
b. has a low natural moisture content and a high degree of internal strength;
c. has no signs of water seepage; and
d. can be excavated only by mechanical equipment.

TYPE 2 SOIL

a. is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
b. has a low to medium natural moisture content and a medium degree of internal strength; and
c. has a damp appearance after it is excavated.

TYPE 3 SOIL

a. is stiff to firm and compact to loose in consistency or is previously excavated soil;
b. exhibits signs of surface cracking;
c. exhibits signs of water seepage;
d. if it is dry, may run easily into a well-defined conical pile; and
e. has a low degree of internal strength.

TYPE 4 SOIL

a. is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
b. runs easily or flows, unless completely supported before excavating procedures;
c. has almost no internal strength
d. is wet or muddy; and
e. exerts substantial fluid pressure on its supporting system.

The native soils encountered at this site would be classified as Type 3 soils above the groundwater table and Type 4 soils below under these guidelines.

Based on Type 3 soils; the excavations will need to be sloped at a minimum gradient of 1 horizontal to 1 vertical from the bottom of the excavation.

Based on Type 4 soils; the excavations will need to be sloped at a minimum gradient of 3 horizontal to 1 vertical from the bottom of the excavation.

Alternatively, the excavations may be shored by a support system complying with sections 235, 236, 237, 238, 239 and 241 under O. Reg. 231/91, s 234(1).

6.3 Anticipated Ground Water Management

Generally, groundwater inflow can be controlled to a depth of up to approximately 600 mm below the water table by installing strategically placed sumps and pumping the collected water out of the excavations. Deeper excavations in this type of material will require more positive control, such as through well points and/or interlocking steel sheet piles. It is noted that excavations carried below the water table in cohesionless soil (silt, sand, sand and gravel) will experience loosening and sloughing of the base and sides, unless the ground water level is lowered first.

It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater elevation at the time of construction. The method used should not undermine any adjacent structures. The contractor should submit their proposal to the prime consultant for review and approval prior to construction. A permit to take water may be required from the Ministry of the Environment. It is the responsibility of the contractor to make this application as required and any other applications from other Ministries or authorities as required (DFO, Conservation authorities, etc.).

All collected water is to discharge a sufficient distance away from the excavation to prevent re-entry. Sediment control measures, such as a silt fence should be installed at the discharge point of the dewatering system. The utmost care should be taken to avoid any potential adverse impacts on the environment.

It should be noted that the water table is expected to fluctuate seasonally with higher levels expected during the spring and fall seasons.

6.4 Horizontal Earth Pressure

If required, walls or bracings subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K [\gamma (h-h_w) + \gamma' h_w + q] + \gamma_w h_w$$

where:

P	=	the horizontal pressure at depth, h (m)
K	=	the earth pressure coefficient,
h_w	=	the depth below the ground water level (m)
γ	=	the bulk unit weight of soil, (kN/m^3)
γ'	=	the submerged unit weight of the exterior soil, (γ - 9.8 kN/m^3)
q	=	the complete surcharge loading (kPa)

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall, this equation can be simplified to:

$$P = K[\gamma h + q]$$

This equation assumes that free-draining granular backfill is used and positive drainage is provided to ensure that there is no hydrostatic pressure acting in conjunction with the earth pressure.

Resistance to sliding of earth retaining structures is developed by friction between the base of the footing and (N) and the frictional resistance of the soil (tan φ) expressed as R = N tan φ. This is an ultimate resistance value and does not contain a factor of safety.

Passive earth pressure resistance is generally not considered as a resisting force against sliding for conventional retaining structure design because a structure must deflect significantly to develop the full passive resistance.

The average values for use in the design of structure subjected to unbalanced earth pressures at this site are tabulated as follows:

Parameter	Definition	Units
ϕ	internal angle of friction	degrees
γ	bulk unit weight of soil	kN/ m^3
K_a	active earth pressure coefficient (Rankin)	dimensionless
K_o	at-rest earth pressure coefficient (Rankin)	dimensionless
K_p	passive earth pressure coefficient (Rankin)	dimensionless

The following soil material properties can be used for design purposes for this project:

	Silt and Clay	Gran B (pit run)	Gran A	Blast Rock (150mm-) or Gran B Type II
Effective Angle of Internal Friction(Phi),degrees, unfactored	28	34	38	40
Cohesion (kPa)	5	0	0	0
Unit Weight (Gamma), kN/m^3	18	21	22	23
Active Earth Pressure, Coefficient, K_a	0.36	0.28	0.23	0.22
Passive Earth Pressure, Coefficient, K_p	2.77	3.54	4.20	4.60
At rest Earth Pressure, Coefficient, K_o	0.53	0.44	0.38	0.35

The values of the earth pressure coefficients noted above are for a horizontal grade behind the wall. The earth pressure coefficients for an inclined grade (retained soil) will vary based on its inclination.

Where permanent drainage for earth retaining walls is not install, hydrostatic pressure acting on the walls must be included in the above calculation; the unit weight of water, $\gamma_w = 9.81$ kN/m^3. For sloping backfill, the Canadian Highway Bridge Design Code, section C 6.9 should be consulted for the design recommendations.

The surcharge effect from compaction equipment during construction must be taken into account. Where lighter compaction equipment and smaller lifts are used the surcharge effect will be minimized. This should be reviewed in detail by a structural engineer. Permanent earth retaining wall designs are to be carried out in accordance with the latest edition of the Canadian Foundation Engineering Manual and/or the Canadian Bridge Design Code.

6.5 Quality Control

The proposed residential buildings will be founded on shallow strip and spread footing foundations may be placed on an engineered fill placed over till soils or bedrock or may be placed directly on bedrock in Phases I and II. In one section of the Phase III development, the proposed residential buildings will be founded on shallow strip and spread footing foundations placed on an engineered fill once the surcharging of the subject property has been completed or on native soils. In the other areas, the shallow strip and spread footing foundations may be placed on an engineered fill placed over till soils or bedrock or may be placed directly on bedrock

The installation and placement of the surcharge and pre-load materials must be monitored and evaluated by Terraprobe to ensure that the calculated settlements are achieved. When the foundation excavation and installation proceed, they must be monitored and evaluated by Terraprobe or an engineer experienced in these matters to ensure that the founding bearing area achieved is consistent with the design bearing capacity intended by the geotechnical engineer.

The on-site review of the condition of the foundation soil as the foundations are constructed is an integral part of the geotechnical design function and is required by Section 4.2.2.2, Division B, of the 2006 Ontario Building Code. If Terraprobe is not retained to carry out foundation evaluations during construction, then Terraprobe accepts no responsibility for the performance or non-performance of the foundations, even if they are ostensibly constructed in accordance with the design recommendations contained in this report.

The requirements for fill placement on this project have been stipulated relative to Standard Proctor Maximum Dry Density as determined by ASTM D698. Terraprobe operates a CCIL (Canadian Council of Independent Laboratories) certified aggregates laboratory. In situ determinations of density during fill placement on site are recommended to demonstrate that the specified densities are achieved. Terraprobe is a CNSC licensed operator of appropriate nuclear density gauges for this work and can provide sampling and testing services for the project as necessary, with our qualified technical staff. For a Granular B Type II, witnessing the proof rolling on a full time basis would be utilised to verify and approve the compactive effort.

It has been assumed that concrete for the this structure will be specified in accordance with the requirements of CAN3 - CSA A23.1. Terraprobe maintains a CSA certified concrete laboratory and can provide concrete sampling and testing services for the project as necessary.

7.0 STATEMENT OF LIMITATIONS AND RISK

7.1 Procedures

This investigation has been carried out using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by Terraprobe and other engineering practitioners, working under similar conditions and subject to the time, financial and physical constraints applicable to this project. The geotechnical engineering discussions and recommendations that have been presented are based on the factual data obtained from this investigation.

The exploratory borehole investigation was carried out by Landcore Drilling. The investigation work was monitored by a Terraprobe technician whom logged the boreholes and examined the soil samples from the different soil stratums. Soil samples were sealed into plastic jars and transported to the Terraprobe soil laboratory for further testing and classification. There is consequently some interpolation of the borehole soil strata layering and indications of changes in stratigraphy as described are therefore approximate.

It must be recognized that there are special risks whenever engineering or related disciplines are applied to identify subsurface conditions. Even a comprehensive sampling and testing program implemented in accordance with the most stringent level of care may fail to detect certain conditions. Terraprobe has assumed for the purposes of providing design parameters and advice, that the conditions that exist between sampling points are similar to those found at the sample locations. The conditions that Terraprobe has interpreted to existing between sampling points may differ from those that actually exist.

It may not be possible to excavate a sufficient number of boreholes or sample and report them in a way that would provide all the subsurface information that could affect construction costs, techniques, equipment and scheduling. Contractors bidding on or undertaking work on the project should be directed to draw their own conclusions as to how the subsurface conditions may affect them, based on their own investigations and their own interpretations of the factual investigation results, cognizant of the risks implicit in the subsurface investigation activities.

7.2 Changes In Site And Scope

It must also be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions. Groundwater conditions are particularly susceptible to change as a result of season variation and alterations in drainage conditions.

The engineering discussion design parameters and recommendations that have been provided are based on the factual data obtained from this investigation made at the site by Terraprobe and are intended for use by the owner and their retained designers in the design phase of the project. Since the project is still in the design stage, all aspects of the project relative to the subsurface conditions cannot be anticipated. If there are changes to the project scope and development features the interpretations made of the subsurface information, the geotechnical design parameters and comments relating to constructibility issues and quality control may not be relevant to the revised project or complete. Terraprobe must be retained to review the implications of changes with respect to the contents of this report and must be retained to review the design drawings and specifications prior to construction.

8.0 CLOSURE

This report was prepared for the express use of our client Timestone Corporation and their retained design consultants. This report is copyright of Terraprobe and no part of this report may be reproduced by any means, in any form, without the prior written permission of Terraprobe.

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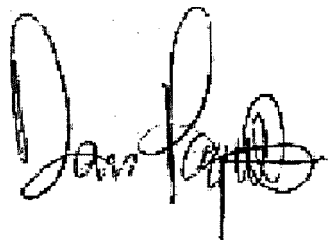
We trust that the foregoing is sufficient for your present requirements. If you have any questions or if we can be of further assistance, please do not hesitate to contact us.

Yours truly,

Terraprobe Inc.



Denis Paquette, P.Eng.
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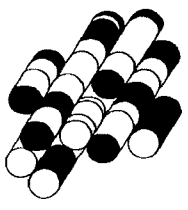
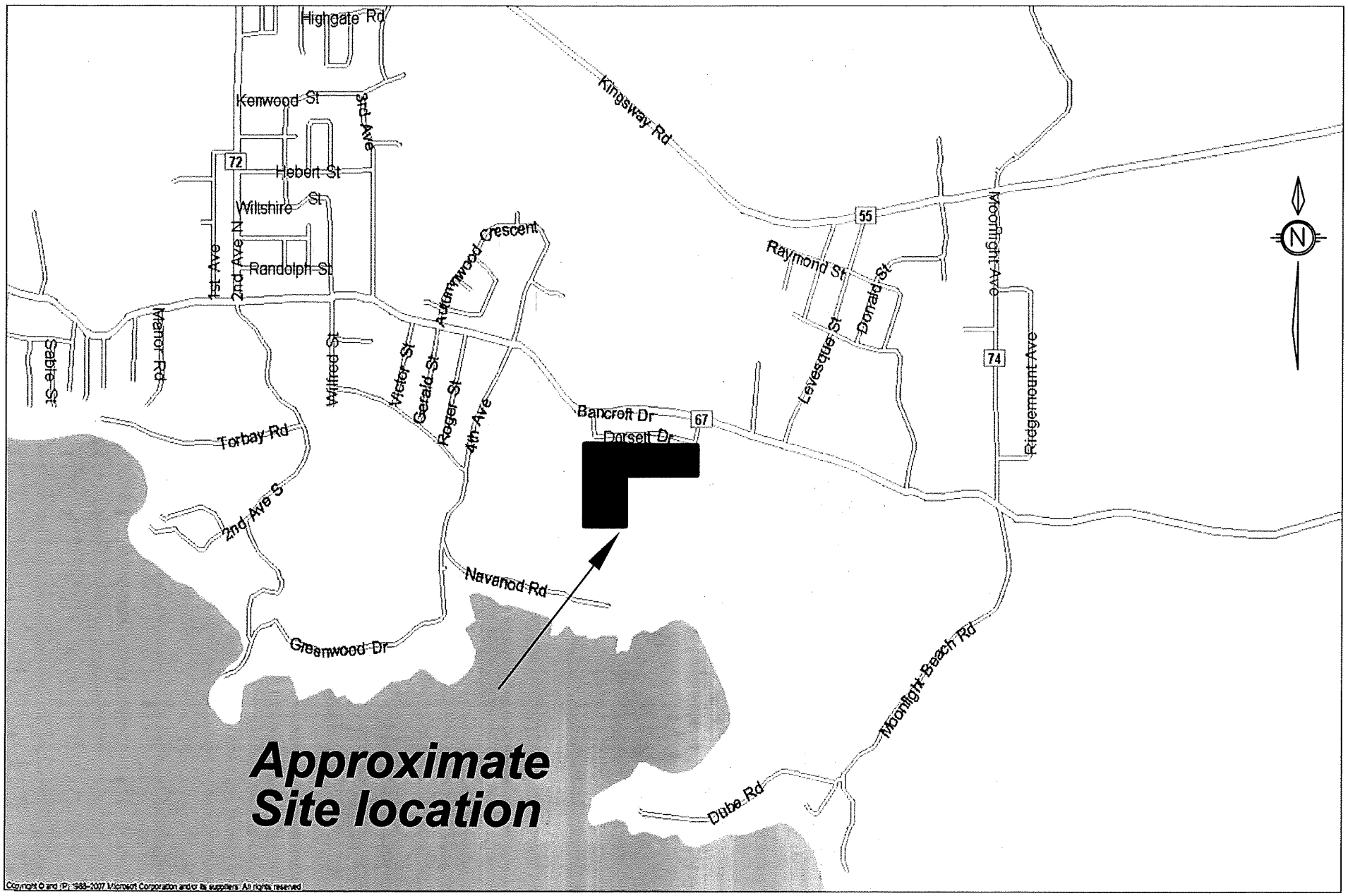
Denis Paquette

FIGURES

TERRAPROBE LIMITED

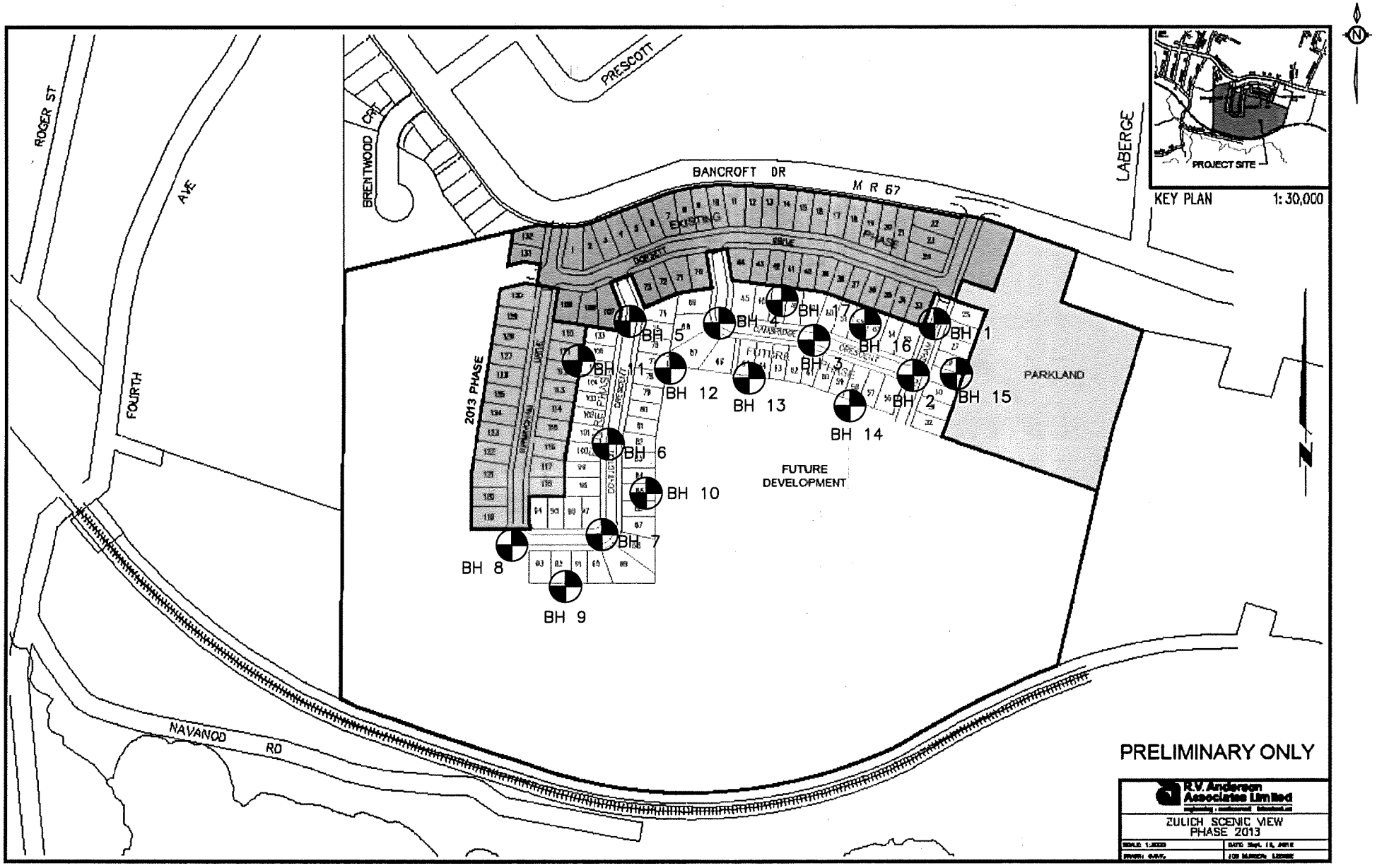




Map provided By Microsoft Street & Trips

Drawing NTS

Terraprobe	Title/Name Location: Site Location Plan– Scenic View Subdivision Off Dorset Drive Sudbury, Ontario	Date: March, 2013	Project #: 51–13–8005	Figure: 1



Drawing provided by RV Anderson Associates Limited

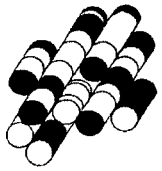
Drawing not to scale

Terraprobe	Title/Name Location: Borehole Location Plan – Scenic View Subdivision Off Dorset Drive, Sudbury, Ontario	Date: March, 2013	Project No.: 51-13-8005	Figure: 2

APPENDIX A

Borehole Logs

Terraprobe Inc.



Terraprobe

ABBREVIATIONS, TERMINOLOGY, GENERAL INFORMATION

BOREHOLE AND TEST PIT LOGS

SAMPLING METHOD

SS	split spoon
ST	Shelby tube
AS	auger sample
WS	wash sample
RC	rock core
WH	weight of hammer
PH	pressure, hydraulic

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.).

SOIL DESCRIPTION - COHESIONLESS SOILS

Relative Density	'N' value
very loose	< 4
loose	4 - 10
compact	10 - 30
dense	30 - 50
very dense	> 50

SOIL DESCRIPTION - COHESIVE SOILS

Consistency	Undrained Shear Strength, kPa	'N' value
very soft	< 12	< 2
soft	12 - 25	2 - 4
firm	25 - 50	4 - 8
stiff	50 - 100	8 - 16
very stiff	100 - 200	16 - 32
hard	> 200	> 32

SOIL COMPOSITION

	% by weight
'trace' (e.g. trace silt)	< 10
'some' (e.g. some gravel)	10 - 20
adjective (e.g. sandy)	20 - 35
'and' (e.g. sand and gravel)	35 - 50

TESTS, SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
φ'	angle of internal friction
c'	cohesion shear strength
C_c	compression index

GENERAL INFORMATION, LIMITATIONS

The conclusions and recommendations provided in this report are based on the factual information obtained from the boreholes and/or test pits. Subsurface conditions between the test holes may vary.

The engineering interpretation and report recommendations are given only for the specific project detailed within, and only for the original client. Any third party decision, reliance, or use of this report is the sole and exclusive responsibility of such third party. The number and siting of boreholes and/or test pits may not be sufficient to determine all factors required for different purposes.

It is recommended Terraprobe be retained to review the project final design and to provide construction inspection and testing.

Terraprobe

LOG OF BOREHOLE BH–1

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 26, 2013
CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount
LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51–13–8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" VALUE
266.80	GROUND SURFACE: 150 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
	Clay and Silt, some sand, trace gravel		2	SS	2
				SV	
264.51					
2.29	Stiff Brown Wet		3	SS	4
	Silt and Clay, some sand				
263.75					
3.05	Compact Brown Wet		4	SS	19
	Till – Sand and Gravel, some silt				
262.99					
3.81	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – • U – o
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP
w
LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

53
7.53

wP
wL
41%

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS

Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH–2

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 26, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51–13–8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" VALUE
267.60	GROUND SURFACE: 40 mm Topsoil				
0.00	Stiff Brown Wet Clay and Silt, some sand, trace gravel		1	AG	
			2	SS	50
266.48					
1.22	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH–3

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 26, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51–13–8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE
268.80	GROUND SURFACE: 25 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
	Clay and Silt, some sand, trace gravel				
267.84			2	SS	50
0.96	Till – Sand and Gravel, trace silt				
267.58					
1.22	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT WP
LIQUID LIMIT WL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH–4

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51–13–8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" VALUE
268.10	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
	Clay and Silt, some sand, trace gravel		2	SS	10
			3	SS	5
265.41			4	SS	13
2.69	Dense Brown Wet				
	Till – Sand and Gravel, trace silt		5	SS	50
264.74					
3.36	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

PLASTIC LIMIT wP | NATURAL MOISTURE CONTENT w | LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH-5

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51-13-8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE
270.30	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet Clay and Silt, some sand, trace gravel		1	AG	
269.28			2	SS	50
1.02	Dense Sand and Gravel, some silt Wet				
1.07	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT w_P | w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH-6

PROJECT: Scenic View Sub., Phase 1, 2 ,3 — DATE: March 27, 2013

CLIENT: Timestone Corporation — EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario — ELEVATION DATUM: Local — FILE: 51-13-8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" VALUE
269.10	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet Clay and Silt, some sand, trace gravel		1	AG	
			2	SS	6
267.58					
1.52	Stiff Brown Wet Silty Clay, trace sand		3	SS	6
				SV	
265.90			4	SS	50
3.20	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

PENETRATION RESISTANCE PLOT — SHEAR STRENGTH kPa (20, 40, 60, 80)

FIELD VANE – + Q – ●

POCKET PEN – * U – ○

NATURAL MOISTURE CONTENT — PLASTIC LIMIT wP — LIQUID LIMIT wL

WATER CONTENT (%) (10, 20, 30)

wP

wL 47%

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS

Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH-7

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51-13-8005

DEPTH (m)	DESCRIPTION	SOIL PROFILE: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE	DEPTH SCALE IN METRES	PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (FIELD VANE – + Q – ●, POCKET PEN – * U – ○)	NATURAL MOISTURE CONTENT / PLASTIC LIMIT / LIQUID LIMIT / WATER CONTENT (%)	O.V.M. Reading (ppm)	STANDPIPE INSTALLATION OR REMARKS
271.00	GROUND SURFACE:					0	20 40 60 80	10 20 30		
0.00	Bedrock subgrade					1				
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				

NOTES:

Terraprobe

LOG OF BOREHOLE BH-8

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51-13-8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" VALUE
269.10	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
	Clay and Silt, some sand, trace gravel		2	SS	8
267.58					
1.52	Stiff Brown Wet		3	SS	8
	Silty Clay, trace sand				
266.81					
2.29	Stiff Brown Wet		4	SS	7
	Silt and Clay, some sand				
266.05					
3.05	Stiff Silty Clay, some sand Wet		5	SS	50
3.25	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP | w | LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH-9

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local FILE: 51-13-8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE
270.00	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
269.47	Clay and Silt, some sand, trace gravel				
0.53	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP | w | LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)
◇49%

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH–10

PROJECT: Scenic View Sub., Phase 1, 2 ,3 — DATE: March 27, 2013

CLIENT: Timestone Corporation — EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario — ELEVATION DATUM: Local — FILE: 51–13–8005

DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE
270.10	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet				
	Clay and Silt, trace sand, trace gravel		1	AG	
270.01					
0.89	Dense – Sand and Gravel, some silt		2	SS	50
0.91	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – O
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP — LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

49%

STANDPIPE INSTALLATION OR REMARKS

Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH-11

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME - 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51-13-8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	SAMPLES: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE	DEPTH SCALE IN METRES	PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (20 40 60 80) / FIELD VANE - + Q - ● / POCKET PEN - * U - O	PLASTIC LIMIT wP / NATURAL MOISTURE CONTENT w / LIQUID LIMIT wL / WATER CONTENT (%)	O.V.M. Reading (ppm)	STANDPIPE INSTALLATION OR REMARKS
272.00	GROUND SURFACE:					0	20 40 60 80	10 20 30		
0.00	Bedrock subgrade					1				
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				

NOTES:

Terraprobe

LOG OF BOREHOLE BH–12

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51–13–8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE
269.10	GROUND SURFACE: 100 mm Topsoil				
0.00	Stiff Brown Wet Clay and Silt, trace sand		1	AG	
			2	SS	7
			3	SS	30
267.12					
1.98	DenseTill – Sand and Gravel, some silt				
2.13	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP
w
LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH–13

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 26, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51–13–8005

DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUE
269.30	GROUND SURFACE: 25 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
	Clayey Silt, trace sand				
268.54					
0.76	Dense Brown Wet		2	SS	50
268.23	Till – Sand and Gravel, some silt				
1.07	Spoon refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – ○
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP
w
LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

NOTES:

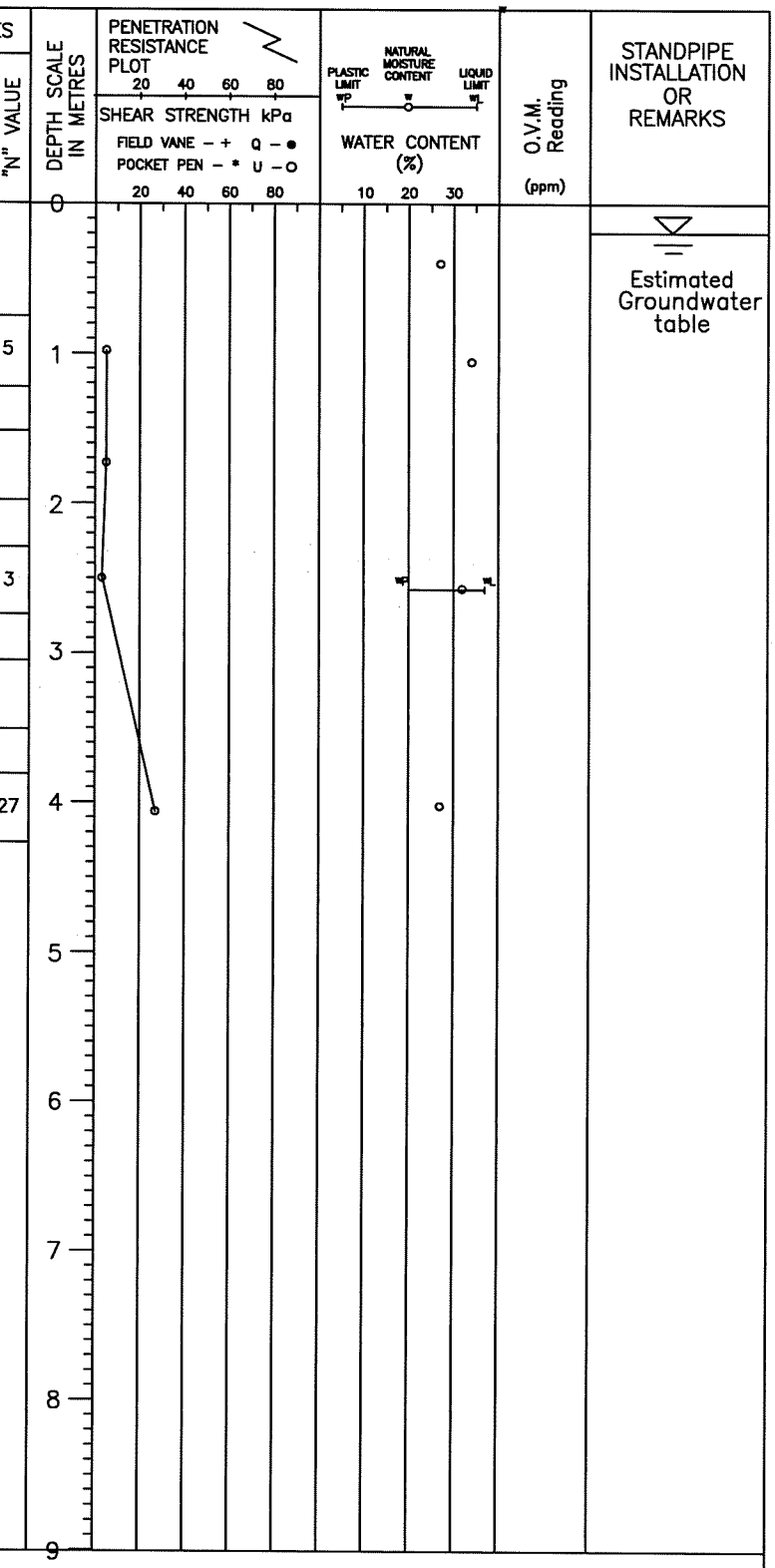
Terraprobe

LOG OF BOREHOLE BH–14

PROJECT: Scenic View Sub., Phase 1, 2 ,3
CLIENT: Timestone Corporation
LOCATION: Sudbury, Ontario

DATE: March 26, 2013
EQUIPMENT: CME – 55 Truck Mount
ELEVATION DATUM: Local FILE: 51–13–8005

DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE
268.20	GROUND SURFACE: 25 mm Topsoil				
0.00	Stiff Brown Wet Clay and Silt, some sand, trace gravel		1	AG	
			2	SS	5
				SV	
265.91					
2.29	Stiff Brown Wet Clayey Silt, trace sand		3	SS	3
				SV	
264.39					
3.81	Compact Brown Wet Till – Sand and gravel, some silt		4	SS	27
263.93					
4.27	Spoon refusal on probable boulders or bedrock				



O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS

Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH-15

PROJECT: Scenic View Sub., Phase 1, 2 ,3
DATE: March 27, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51-13-8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	SAMPLES: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE	DEPTH SCALE IN METRES	PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (FIELD VANE – + Q – ●, POCKET PEN – * U – O)	NATURAL MOISTURE CONTENT / PLASTIC LIMIT wP / LIQUID LIMIT wL / WATER CONTENT (%)	O.V.M. Reading (ppm)	STANDPIPE INSTALLATION OR REMARKS
270.40	GROUND SURFACE:					0	20 40 60 80	10 20 30		
0.00	Bedrock subgrade					1				
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				

NOTES:

Terraprobe

LOG OF BOREHOLE BH–16

PROJECT: Scenic View Sub., Phase 1, 2 ,3 — DATE: March 26, 2013

CLIENT: Timestone Corporation — EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario — ELEVATION DATUM: Local — FILE: 51–13–8005

DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE
267.10	GROUND SURFACE: 75 mm Topsoil				
0.00	Stiff Brown Wet Clayey Silt, trace sand		1	AG	
			2	SS	8
265.58					
1.52	Stiff Brown Wet Silty Clay, trace sand		3	SS	6
				SV	
263.97					
3.13	Compact Brown Wet Till – Sand and Gravel, some silt		4	SS	10
263.14					
3.96	Auger refusal on probable boulders or bedrock				

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
FIELD VANE – + Q – ●
POCKET PEN – * U – O
20 40 60 80

NATURAL MOISTURE CONTENT
PLASTIC LIMIT wP — w — LIQUID LIMIT wL
WATER CONTENT (%)
10 20 30

O.V.M. Reading (ppm)

STANDPIPE INSTALLATION OR REMARKS
Estimated Groundwater table

wP wL 40%

NOTES:

Terraprobe

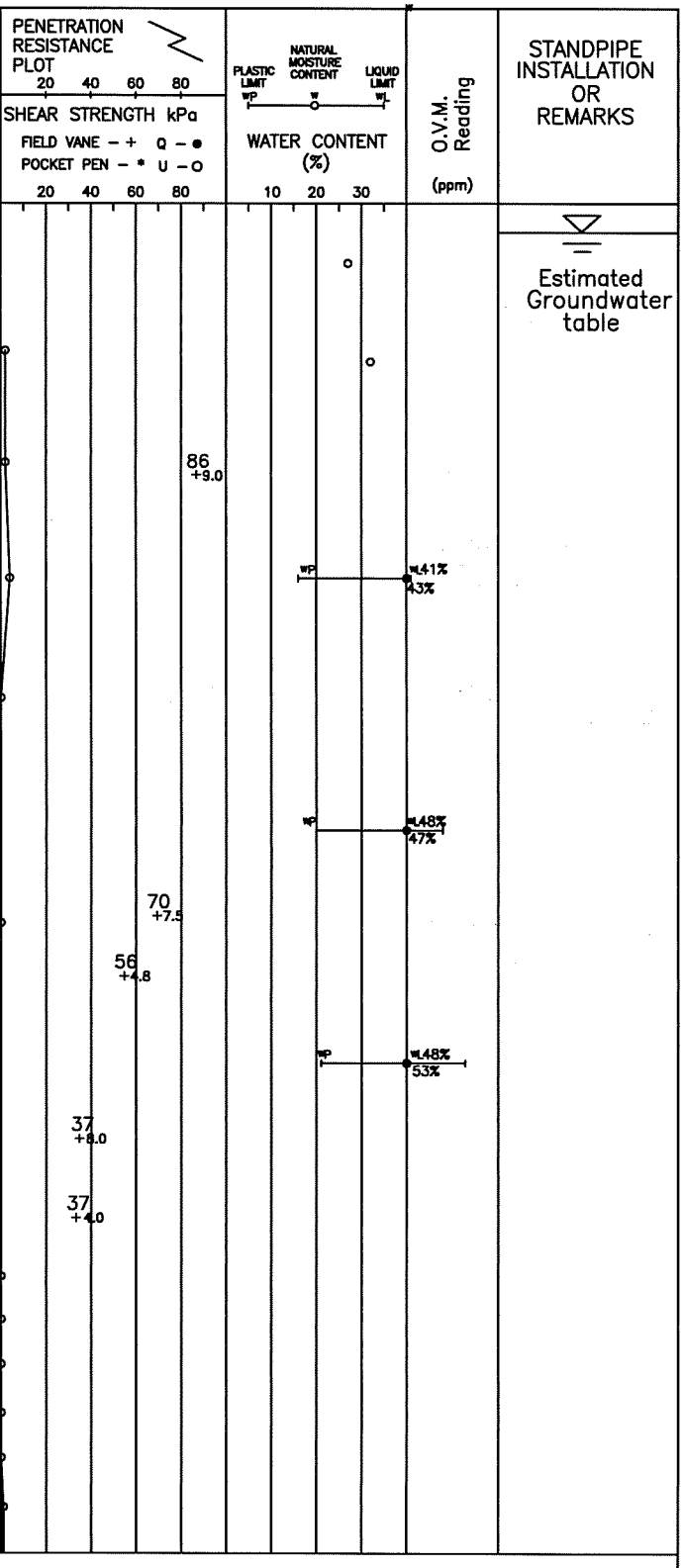
LOG OF BOREHOLE BH-17

PROJECT: Scenic View Sub., Phase 1, 2, 3 — DATE: March 26, 2013

CLIENT: Timestone Corporation — EQUIPMENT: CME – 55 Truck Mount

LOCATION: Sudbury, Ontario — ELEVATION DATUM: Local — FILE: 51-13-8005

DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE
267.30	GROUND SURFACE: 50 mm Topsoil				
0.00	Stiff Brown Wet		1	AG	
	Clay and Silt, some sand, trace gravel		2	SS	2
				SV	
265.01					
2.29	Stiff Brown to Grey Wet		3	SS	4
	Silt and Clay, trace sand				
				SV	
			4	SS	WH
				SV	
				SV	
			5	SS	WH
	Firm			SV	
260.29				SV	
7.01	Start of Dynamic Cone				WH
					WH
					WH
					WH
					WH
	End of Borehole				1



STANDPIPE INSTALLATION OR REMARKS

Estimated Groundwater table

NOTES:

Terraprobe

LOG OF BOREHOLE BH17

PROJECT: Scenic View Sub., Phase 1, 2, 3
DATE: March 26, 2013

CLIENT: Timestone Corporation
EQUIPMENT: CME – 55 Track Mount

LOCATION: Sudbury, Ontario
ELEVATION DATUM: Local
FILE: 51-13-8005

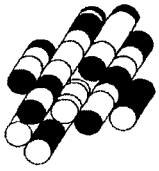
DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" VALUE	DEPTH SCALE IN METRES	PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (FIELD VANE – + Q – ●, POCKET PEN – * U – O)	NATURAL MOISTURE CONTENT / WATER CONTENT (%)	O.V.M. Reading (ppm)	STANDPIPE INSTALLATION OR REMARKS
					2	9				
254.43					4					
14.48	Dynamic Cone Refusal on probable boulders or bedrock				100	10 11 12 13 14 15 16 17 18				

NOTES:

APPENDIX B

Soil Laboratory Results

Terraprobe Inc.



Terraprobe

WATER CONTENT TEST FORM

PROJECT: Scenic View Subdivision, Phases 1, 2, 3
LOCATION: Sudbury, Ontario
CLIENT: Timestone Corporation

FILE NO.: 51-13-8005
LAB NO.: 5163
SAMPLE DATE: March 26-27, 2013
SAMPLE BY: N.T.
TEST DATE: March 28, 2013
TESTED BY: R.D.

BOREHOLE NUMBER		1	1	1	1
SAMPLE NUMBER		1	2	3	4
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	2.29-3.05	3.05-4.57
WT. OF WET SOIL + TARE (g)	A	60.93	58.39	62.42	80.27
WT. OF DRY SOIL + TARE (g)	B	51.76	48.46	53.14	69.65
WEIGHT OF TARE (g)	C	13.72	15.81	14.98	15.23
WATER CONTENT (%)	A-B/B-C*100	**24%**	**30%**	**24%**	**20%**

BOREHOLE NUMBER		2	2
SAMPLE NUMBER		1	2
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52
WT. OF WET SOIL + TARE (g)	A	78.52	64.20
WT. OF DRY SOIL + TARE (g)	B	66.02	55.31
WEIGHT OF TARE (g)	C	15.46	15.17
WATER CONTENT (%)	A-B/B-C*100	**25%**	**22%**

BOREHOLE NUMBER		3	3
SAMPLE NUMBER		1	2
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52
WT. OF WET SOIL + TARE (g)	A	69.41	73.87
WT. OF DRY SOIL + TARE (g)	B	55.76	61.29
WEIGHT OF TARE (g)	C	14.24	15.39
WATER CONTENT (%)	A-B/B-C*100	**33%**	**27%**

BOREHOLE NUMBER		4	4	4	4	4	4
SAMPLE NUMBER		1	2	3	4A	4B	5
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	1.52-2.29	2.29-2.69	2.69-3.05	3.05-4.57
WT. OF WET SOIL + TARE (g)	A	85.72	89.49	95.48	102.42	114.07	126.22
WT. OF DRY SOIL + TARE (g)	B	72.38	74.46	79.37	88.16	106.53	116.05
WEIGHT OF TARE (g)	C	30.56	30.02	30.40	30.39	30.63	30.62
WATER CONTENT (%)	A-B/B-C*100	**32%**	**34%**	**33%**	**25%**	**10%**	**12%**

BOREHOLE NUMBER		5	5	5
SAMPLE NUMBER		1	2A	2B
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.02	1.02-1.07
WT. OF WET SOIL + TARE (g)	A	86.04	84.46	102.16
WT. OF DRY SOIL + TARE (g)	B	72.64	75.10	82.84
WEIGHT OF TARE (g)	C	30.68	30.00	30.35
WATER CONTENT (%)	A-B/B-C*100	**32%**	**21%**	**37%**

BOREHOLE NUMBER		6	6	6	6
SAMPLE NUMBER		1	2	3	4
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	1.52-2.29	3.05-4.57
WT. OF WET SOIL + TARE (g)	A	96.40	85.72	90.44	91.66
WT. OF DRY SOIL + TARE (g)	B	78.78	71.84	76.34	77.53
WEIGHT OF TARE (g)	C	30.26	30.31	30.52	30.58
WATER CONTENT (%)	A-B/B-C*100	**36%**	**33%**	**31%**	**30%**

Terraprobe

WATER CONTENT TEST FORM

PROJECT: Scenic View Subdivision, Phases 1, 2, 3
LOCATION: Sudbury, Ontario
CLIENT: Timestone Corporation

FILE NO.: 51-13-8005
LAB NO.: 5163
SAMPLE DATE: March 26-27, 2013
SAMPLE BY: N.T.
TEST DATE: March 28, 2013
TESTED BY: R.D.

BOREHOLE NUMBER		8	8	8	8	8
SAMPLE NUMBER		1	2	3	4	5
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	1.52-2.29	2.29-3.05	3.05-3.25
WT. OF WET SOIL + TARE (g)	A	77.07	77.08	86.50	96.39	125.45
WT. OF DRY SOIL + TARE (g)	B	65.40	66.08	73.14	82.41	104.70
WEIGHT OF TARE (g)	C	30.39	30.37	29.95	30.69	30.47
WATER CONTENT (%)	A-B/B-C*100	**33%**	**31%**	**31%**	**27%**	**28%**

BOREHOLE NUMBER		9
SAMPLE NUMBER		1
DEPTH OF SAMPLE (m)		0.00-0.53
WT. OF WET SOIL + TARE (g)	A	115.83
WT. OF DRY SOIL + TARE (g)	B	87.63
WEIGHT OF TARE (g)	C	30.51
WATER CONTENT (%)	A-B/B-C*100	**49%**

BOREHOLE NUMBER		10	10
SAMPLE NUMBER		1	2
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-0.91
WT. OF WET SOIL + TARE (g)	A	94.49	115.25
WT. OF DRY SOIL + TARE (g)	B	78.38	89.36
WEIGHT OF TARE (g)	C	30.38	30.51
WATER CONTENT (%)	A-B/B-C*100	**34%**	**44%**

BOREHOLE NUMBER		12	12	12	12
SAMPLE NUMBER		1	2	3A	3B
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	1.52-1.98	1.98 -2.13
WT. OF WET SOIL + TARE (g)	A	107.87	95.36	105.74	90.28
WT. OF DRY SOIL + TARE (g)	B	95.36	78.89	92.64	76.47
WEIGHT OF TARE (g)	C	30.65	30.56	30.41	30.48
WATER CONTENT (%)	A-B/B-C*100	**19%**	**34%**	**21%**	**30%**

BOREHOLE NUMBER		13	13
SAMPLE NUMBER		1	2
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52
WT. OF WET SOIL + TARE (g)	A	64.72	66.02
WT. OF DRY SOIL + TARE (g)	B	53.54	52.27
WEIGHT OF TARE (g)	C	15.07	15.77
WATER CONTENT (%)	A-B/B-C*100	**29%**	**38%**

BOREHOLE NUMBER		14	14	14	14
SAMPLE NUMBER		1	2	3	4
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	2.29-3.05	3.81-4.27
WT. OF WET SOIL + TARE (g)	A	57.85	69.31	84.35	89.35
WT. OF DRY SOIL + TARE (g)	B	48.63	55.47	67.22	74.25
WEIGHT OF TARE (g)	C	14.34	14.67	14.32	15.70
WATER CONTENT (%)	A-B/B-C*100	**27%**	**34%**	**32%**	**26%**

Terraprobe

WATER CONTENT TEST FORM

PROJECT: Scenic View Subdivision, Phases 1, 2, 3
LOCATION: Sudbury, Ontario
CLIENT: Timestone Corporation

FILE NO.: 51-13-8005
LAB NO.: 5163
SAMPLE DATE: March 26-27, 2013
SAMPLE BY: N.T.
TEST DATE: March 28, 2013
TESTED BY: R.D.

BOREHOLE NUMBER		16	16	16	16	16
SAMPLE NUMBER		1	2	3	4A	4B
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	1.52-2.29	3.05-3.13	3.13-3.96
WT. OF WET SOIL + TARE (g)	A	53.29	68.70	77.21	69.78	49.08
WT. OF DRY SOIL + TARE (g)	B	44.77	54.75	61.61	58.25	43.14
WEIGHT OF TARE (g)	C	14.49	14.48	15.00	15.55	13.88
WATER CONTENT (%)	A-B/B-C*100	**28%**	**35%**	**33%**	**27%**	**20%**

BOREHOLE NUMBER		17	17	17	17	17
SAMPLE NUMBER		1	2	3	4	5
DEPTH OF SAMPLE (m)		0.00-0.76	0.76-1.52	2.29-3.05	3.80-4.26	5.30-5.76
WT. OF WET SOIL + TARE (g)	A	72.20	89.17	84.15	79.21	83.45
WT. OF DRY SOIL + TARE (g)	B	60.04	74.70	68.00	63.59	65.18
WEIGHT OF TARE (g)	C	14.77	29.97	30.28	30.40	30.57
WATER CONTENT (%)	A-B/B-C*100	**27%**	**32%**	**43%**	**47%**	**53%**

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	1	TEST DATE:	April 12, 2013
SAMPLE NUMBER:	2	TESTED BY:	R.D.
SAMPLE DEPTH (m):	0.76-1.52	LAB NO.:	5163
MATERIAL DESCRIPTION:	Clay and Silt, trace sand, trace gravel		

LIQUID LIMIT DETERMINATION

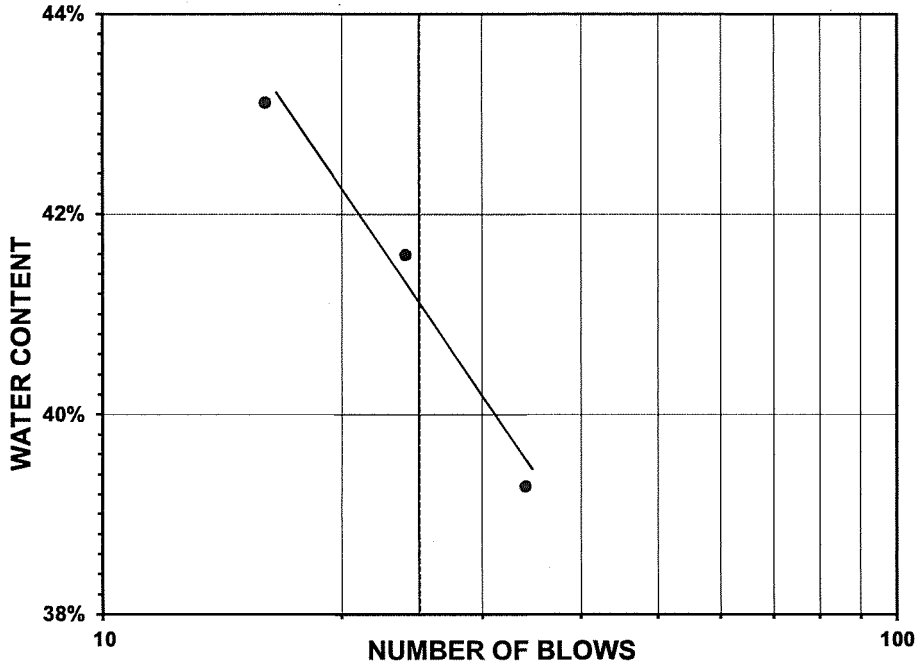
	1	2	3	4
Tare number	XW	CH	SV	
Number of blows	34	24	16	
Weight of wet soil and tare (g)	22.86	21.58	23.19	
Weight of dry soil and tare (g)	20.46	19.70	20.78	
Weight of water (g)	2.40	1.88	2.41	
Weight of tare (g)	14.35	15.18	15.19	
Weight of dry soil (g)	6.1	4.5	5.6	
Water content (%)	39.28%	41.59%	43.11%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	JH	211
Weight of wet soil and tare (g)	19.88	20.80
Weight of dry soil and tare (g)	19.11	19.70
Weight of water (g)	0.77	1.10
Weight of tare (g)	15.19	14.05
Weight of dry soil (g)	3.92	5.65
Water content (%)	19.64%	19.47%
Average (%)	19.56%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
A = I_P / (% Clay)



Liquid Limit (W_L)	41
Plastic Limit (W_P)	**20**
Natural Water Content (W_N)	30
Liquidity Index (I_L)	**0.48**
Plasticity Index (I_P)	**21**
Activity (A)	**0.45**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	4	TEST DATE:	April 12, 2013
SAMPLE NUMBER:	3	TESTED BY:	R.D.
SAMPLE DEPTH (m):	1.52-.2.29	LAB NO.:	5163
MATERIAL DESCRIPTION:	Clayey Silt, trace sand, trace gravel		

LIQUID LIMIT DETERMINATION

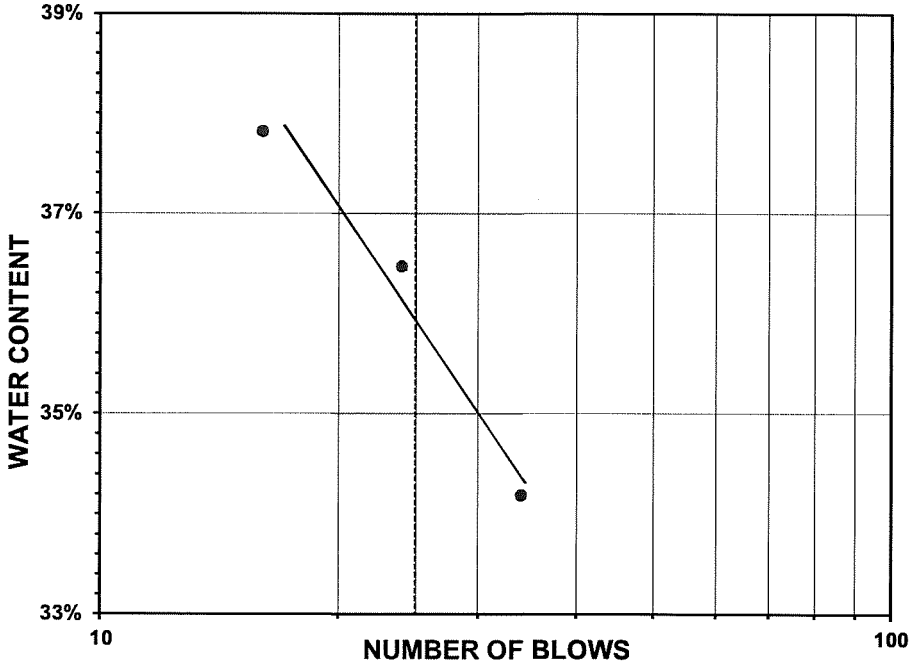
	1	2	3	4
Tare number	207	686	DP	
Number of blows	34	24	16	
Weight of wet soil and tare (g)	22.67	24.42	25.35	
Weight of dry soil and tare (g)	20.54	21.79	22.57	
Weight of water (g)	2.13	2.63	2.78	
Weight of tare (g)	14.31	14.58	15.22	
Weight of dry soil (g)	6.2	7.2	7.4	
Water content (%)	34.19%	36.48%	37.82%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	BX	200
Weight of wet soil and tare (g)	26.63	26.65
Weight of dry soil and tare (g)	24.82	24.88
Weight of water (g)	1.81	1.77
Weight of tare (g)	15.20	15.40
Weight of dry soil (g)	9.62	9.48
Water content (%)	18.81%	18.67%
Average (%)	18.74%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
A = I_P / (% Clay)



Liquid Limit (W_L)	36
Plastic Limit (W_P)	**19**
Natural Water Content (W_N)	33
Liquidity Index (I_L)	**0.82**
Plasticity Index (I_P)	**17**
Activity (A)	**0.57**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 27, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	12	TEST DATE:	April 15, 2013
SAMPLE NUMBER:	2	TESTED BY:	M.H.
SAMPLE DEPTH (m):	0.76-1.52	LAB NO.:	5163
MATERIAL DESCRIPTION:	Clayey Silt, trace Sand		

LIQUID LIMIT DETERMINATION

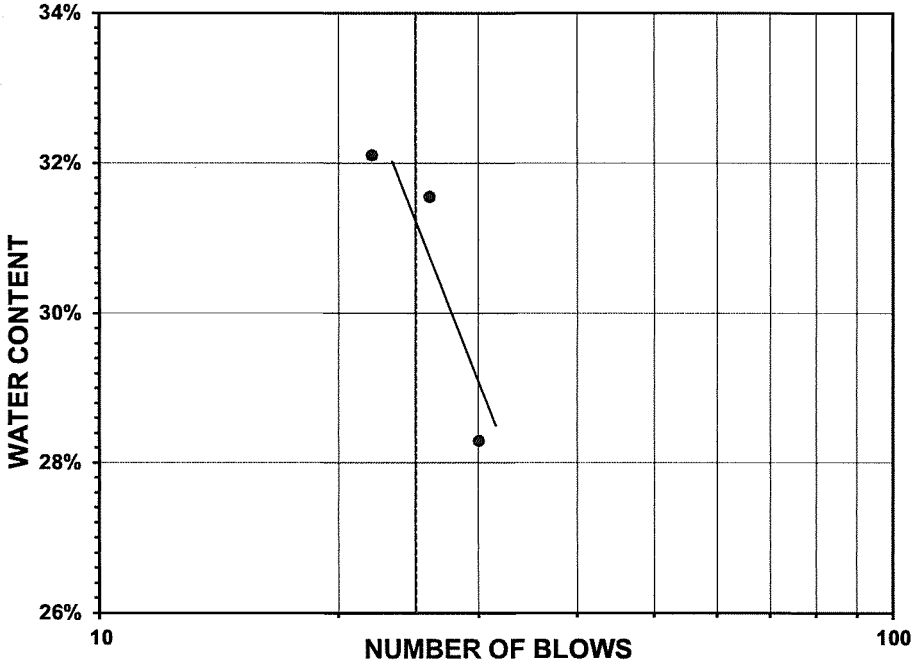
	1	2	3	4
Tare number	K	D	303	
Number of blows	30	26	22	
Weight of wet soil and tare (g)	34.92	37.07	36.65	
Weight of dry soil and tare (g)	33.89	35.35	35.16	
Weight of water (g)	1.03	1.72	1.49	
Weight of tare (g)	30.25	29.90	30.52	
Weight of dry soil (g)	3.6	5.5	4.6	
Water content (%)	28.30%	31.56%	32.11%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	304	310
Weight of wet soil and tare (g)	40.54	40.64
Weight of dry soil and tare (g)	38.84	38.90
Weight of water (g)	1.70	1.74
Weight of tare (g)	30.37	30.39
Weight of dry soil (g)	8.47	8.51
Water content (%)	20.07%	20.45%
Average (%)	20.26%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
$A = I_P$ / (% Clay)



Liquid Limit (W_L)	32
Plastic Limit (W_P)	20
Natural Water Content (W_N)	34
Liquidity Index (I_L)	1.17
Plasticity Index (I_P)	12
Activity (A)	0.46

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	13	TEST DATE:	April 12, 2013
SAMPLE NUMBER:	1	TESTED BY:	R.D.
SAMPLE DEPTH (m):	0.00-0.76	LAB NO.:	5163
MATERIAL DESCRIPTION:	Clayey Silt, trace sand		

LIQUID LIMIT DETERMINATION

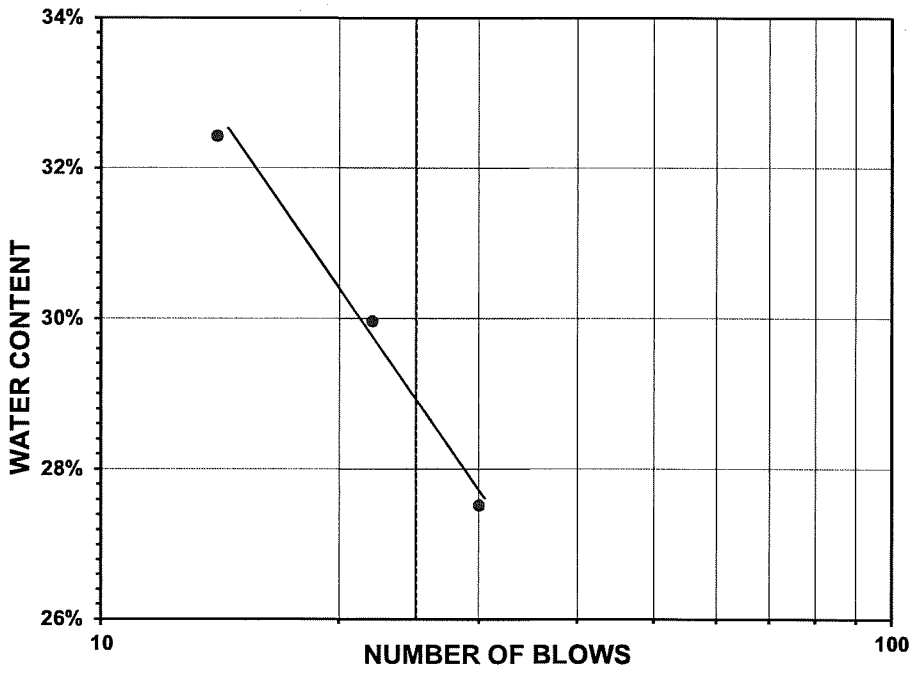
	1	2	3	4
Tare number	BOB	AC	303	
Number of blows	30	22	14	
Weight of wet soil and tare (g)	23.46	24.86	27.33	
Weight of dry soil and tare (g)	21.61	22.69	24.82	
Weight of water (g)	1.85	2.17	2.51	
Weight of tare (g)	14.89	15.45	17.08	
Weight of dry soil (g)	6.7	7.2	7.7	
Water content (%)	27.53%	29.97%	32.43%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	210	JHM
Weight of wet soil and tare (g)	26.45	26.43
Weight of dry soil and tare (g)	24.42	24.79
Weight of water (g)	2.03	1.64
Weight of tare (g)	13.86	16.12
Weight of dry soil (g)	10.56	8.67
Water content (%)	19.22%	18.92%
Average (%)	19.07%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
A = I_P / (% Clay)



Liquid Limit (W_L)	29
Plastic Limit (W_P)	**19**
Natural Water Content (W_N)	29
Liquidity Index (I_L)	**1.00**
Plasticity Index (I_P)	**10**
Activity (A)	**0.45**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	14	TEST DATE:	April 12, 2013
SAMPLE NUMBER:	3	TESTED BY:	R.D.
SAMPLE DEPTH (m):	2.29-3.05	LAB NO.:	5163
MATERIAL DESCRIPTION:	Clayey Silt, trace sand		

LIQUID LIMIT DETERMINATION

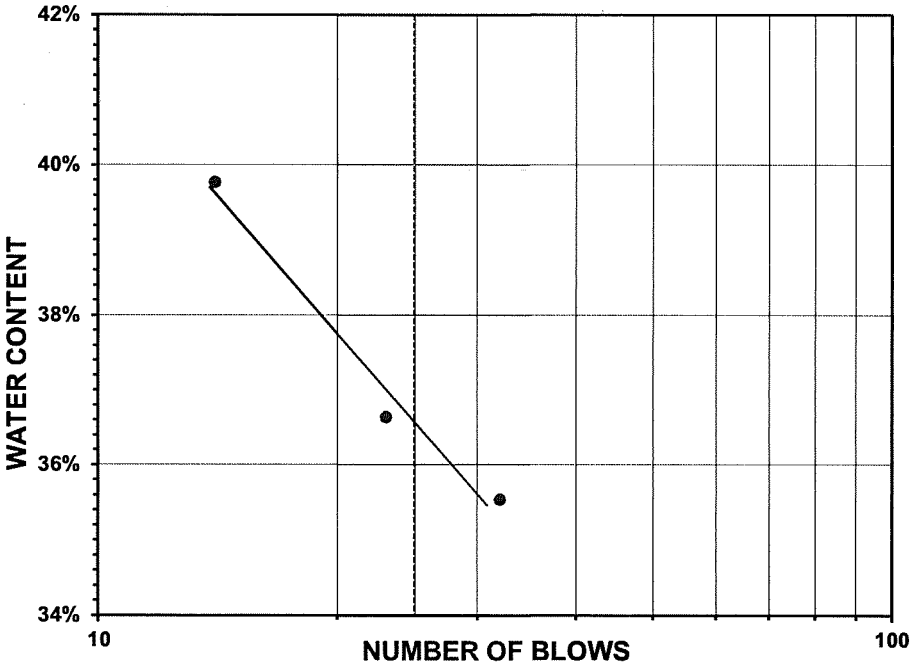
	1	2	3	4
Tare number	G	310	R	
Number of blows	32	23	14	
Weight of wet soil and tare (g)	41.34	40.57	41.69	
Weight of dry soil and tare (g)	38.45	37.84	38.56	
Weight of water (g)	2.89	2.73	3.13	
Weight of tare (g)	30.32	30.39	30.69	
Weight of dry soil (g)	8.1	7.5	7.9	
Water content (%)	35.55%	36.64%	39.77%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	300	A
Weight of wet soil and tare (g)	43.00	37.41
Weight of dry soil and tare (g)	40.94	36.19
Weight of water (g)	2.06	1.22
Weight of tare (g)	30.53	29.96
Weight of dry soil (g)	10.41	6.23
Water content (%)	19.79%	19.58%
Average (%)	19.69%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
A = I_P / (% Clay)



Liquid Limit (W_L)	37
Plastic Limit (W_P)	**20**
Natural Water Content (W_N)	32
Liquidity Index (I_L)	**0.71**
Plasticity Index (I_P)	**17**
Activity (A)	**0.52**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	Marc 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	16	TEST DATE:	April 15, 2013
SAMPLE NUMBER:	2	TESTED BY:	M.H.
SAMPLE DEPTH (m):	0.76-1.52	LAB NO.:	5163
MATERIAL DESCRIPTION:	Silt and Clay, trace sand		

LIQUID LIMIT DETERMINATION

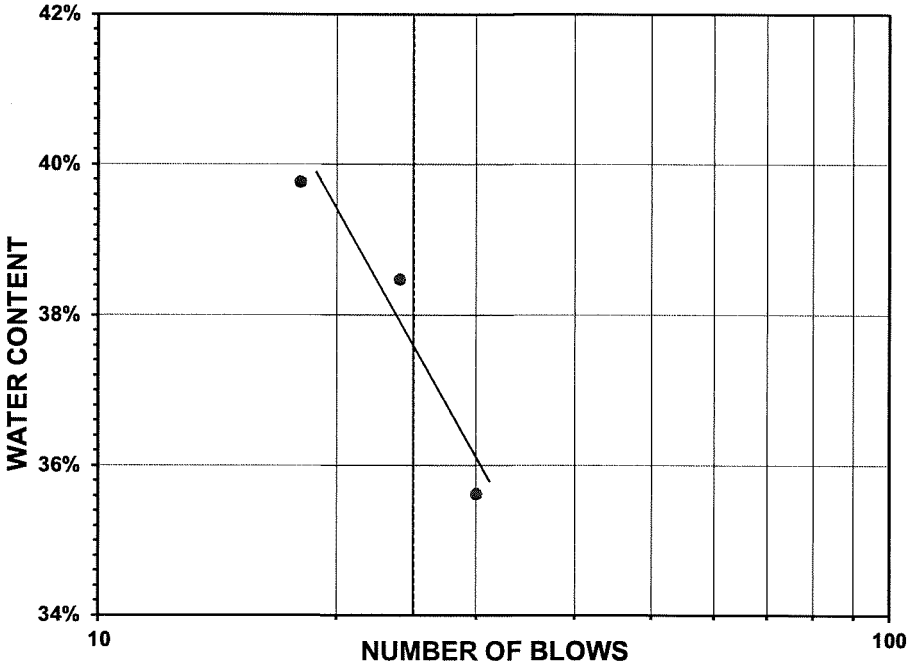
	1	2	3	4
Tare number	310	304	309	
Number of blows	30	24	18	
Weight of wet soil and tare (g)	34.72	36.54	36.52	
Weight of dry soil and tare (g)	33.58	34.82	34.75	
Weight of water (g)	1.14	1.72	1.77	
Weight of tare (g)	30.38	30.35	30.30	
Weight of dry soil (g)	3.2	4.5	4.5	
Water content (%)	35.63%	38.48%	39.78%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	313	P
Weight of wet soil and tare (g)	39.64	40.79
Weight of dry soil and tare (g)	38.12	39.07
Weight of water (g)	1.52	1.72
Weight of tare (g)	30.53	30.41
Weight of dry soil (g)	7.59	8.66
Water content (%)	20.03%	19.86%
Average (%)	19.94%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
$A = I_P$ / (% Clay)



Liquid Limit (W_L)	38
Plastic Limit (W_P)	**20**
Natural Water Content (W_N)	35
Liquidity Index (I_L)	**0.83**
Plasticity Index (I_P)	**18**
Activity (A)	**0.45**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	16	TEST DATE:	April 15, 2013
SAMPLE NUMBER:	3	TESTED BY:	M.H.
SAMPLE DEPTH (m):	1.52-2.29	LAB NO.:	5163
MATERIAL DESCRIPTION:	Silt and Clay, trace sand		

LIQUID LIMIT DETERMINATION

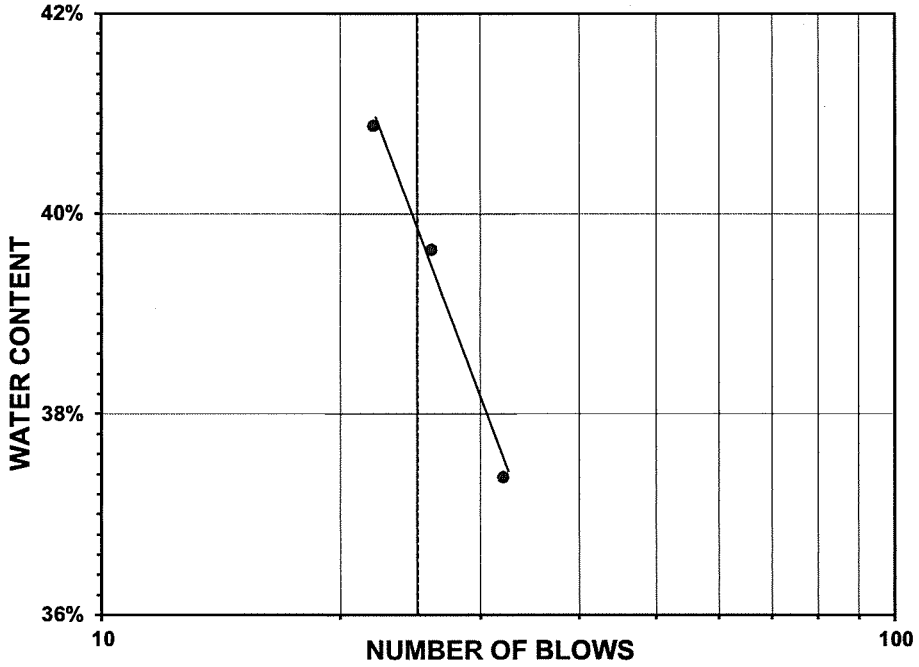
	1	2	3	4
Tare number	305	306	316	
Number of blows	32	26	22	
Weight of wet soil and tare (g)	34.68	35.40	36.16	
Weight of dry soil and tare (g)	33.57	34.06	34.50	
Weight of water (g)	1.11	1.34	1.66	
Weight of tare (g)	30.60	30.68	30.44	
Weight of dry soil (g)	3.0	3.4	4.1	
Water content (%)	37.37%	39.64%	40.89%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	316	309
Weight of wet soil and tare (g)	37.30	38.70
Weight of dry soil and tare (g)	36.14	37.26
Weight of water (g)	1.16	1.44
Weight of tare (g)	30.45	30.32
Weight of dry soil (g)	5.69	6.94
Water content (%)	20.39%	20.75%
Average (%)	20.57%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
A = I_P / (% Clay)



Liquid Limit (W_L)	40
Plastic Limit (W_P)	21
Natural Water Content (W_N)	33
Liquidity Index (I_L)	0.64
Plasticity Index (I_P)	19
Activity (A)	0.46

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	Marchg 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	17	TEST DATE:	April 15, 2013
SAMPLE NUMBER:	3	TESTED BY:	M.H.
SAMPLE DEPTH (m):	2.29-3.05	LAB NO.:	5163
MATERIAL DESCRIPTION:	Silt and Clay, trace sand		

LIQUID LIMIT DETERMINATION

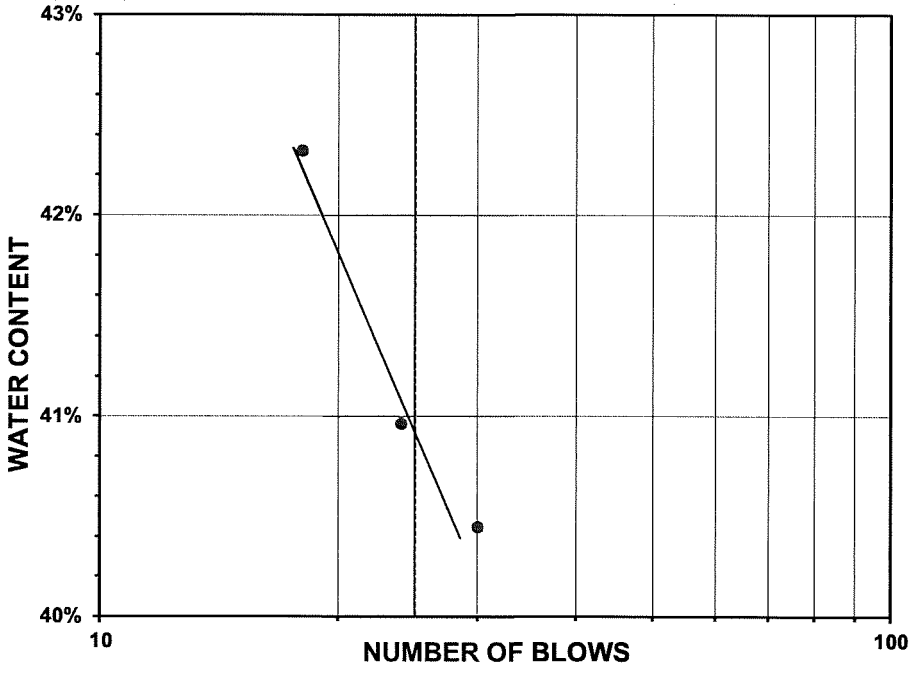
	1	2	3	4
Tare number	BT	A	307	
Number of blows	30	24	18	
Weight of wet soil and tare (g)	22.38	23.58	23.70	
Weight of dry soil and tare (g)	20.39	20.86	20.89	
Weight of water (g)	1.99	2.72	2.81	
Weight of tare (g)	15.47	14.22	14.25	
Weight of dry soil (g)	4.9	6.6	6.6	
Water content (%)	40.45%	40.96%	42.32%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	S	POW
Weight of wet soil and tare (g)	25.60	27.08
Weight of dry soil and tare (g)	23.99	25.34
Weight of water (g)	1.61	1.74
Weight of tare (g)	14.97	15.70
Weight of dry soil (g)	9.02	9.64
Water content (%)	17.85%	18.05%
Average (%)	17.95%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
$A = I_P$ / (% Clay)



Liquid Limit (W_L)	41
Plastic Limit (W_P)	**18**
Natural Water Content (W_N)	43
Liquidity Index (I_L)	**1.09**
Plasticity Index (I_P)	**23**
Activity (A)	**0.49**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	17	TEST DATE:	April 15, 2013
SAMPLE NUMBER:	4	TESTED BY:	M.H.
SAMPLE DEPTH (m):	3.05-4.57	LAB NO.:	5163
MATERIAL DESCRIPTION:	Silty Clay, trace sand		

LIQUID LIMIT DETERMINATION

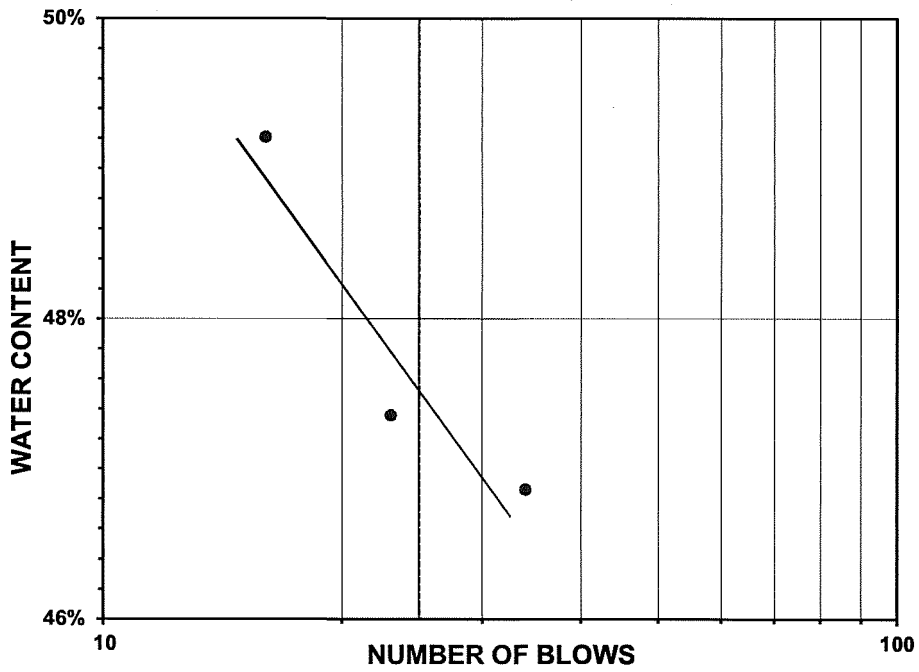
	1	2	3	4
Tare number	301	311	312	
Number of blows	34	23	16	
Weight of wet soil and tare (g)	37.97	39.50	39.90	
Weight of dry soil and tare (g)	35.58	36.63	36.79	
Weight of water (g)	2.39	2.87	3.11	
Weight of tare (g)	30.48	30.57	30.47	
Weight of dry soil (g)	5.1	6.1	6.3	
Water content (%)	46.86%	47.36%	49.21%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	ME	AA1
Weight of wet soil and tare (g)	21.91	21.97
Weight of dry soil and tare (g)	20.58	20.71
Weight of water (g)	1.33	1.26
Weight of tare (g)	14.02	14.38
Weight of dry soil (g)	6.56	6.33
Water content (%)	20.27%	19.91%
Average (%)	20.09%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
$A = I_P$ / (% Clay)



Liquid Limit (W_L)	48
Plastic Limit (W_P)	**20**
Natural Water Content (W_N)	47
Liquidity Index (I_L)	**0.96**
Plasticity Index (I_P)	**28**
Activity (A)	**0.43**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

Terraprobe

ATTERBERG LIMITS REPORT FORM

PROJECT:	Scenic View Subdivision, Phases 1, 2, 3	FILE NO.:	51-13-8005
LOCATION:	Sudbury, Ontario	SAMPLE DATE:	March 26, 2013
CLIENT:	Timestone Corporation	SAMPLE BY:	N.T.
BOREHOLE NUMBER:	17	TEST DATE:	April 15, 2013
SAMPLE NUMBER:	5	TESTED BY:	M.H.
SAMPLE DEPTH (m):	4.57-6.10	LAB NO.:	5163
MATERIAL DESCRIPTION:	Silty Clay, trace sand		

LIQUID LIMIT DETERMINATION

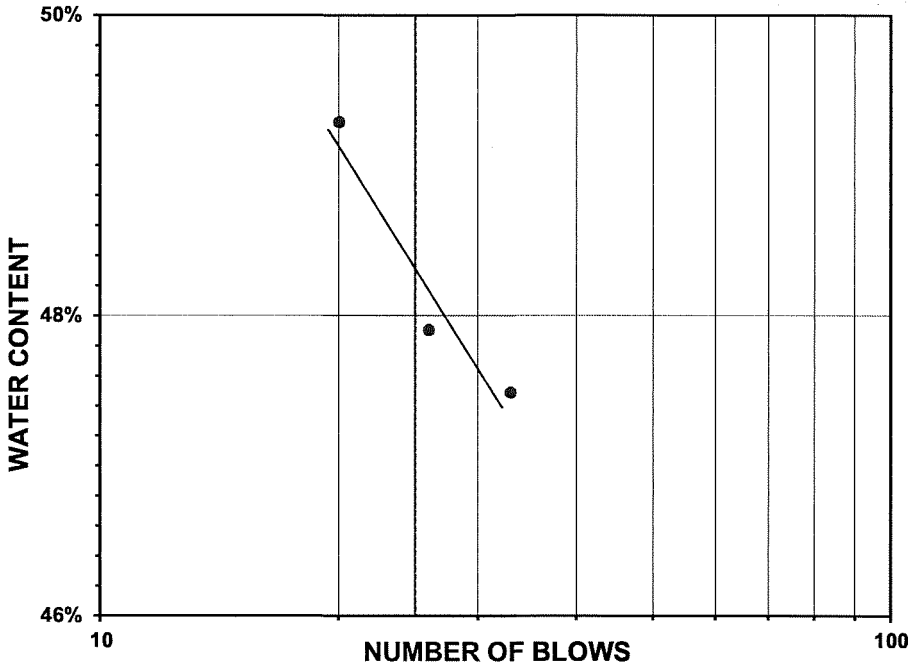
	1	2	3	4
Tare number	313	317	307	
Number of blows	33	26	20	
Weight of wet soil and tare (g)	35.55	36.07	36.87	
Weight of dry soil and tare (g)	33.94	34.24	34.79	
Weight of water (g)	1.61	1.83	2.08	
Weight of tare (g)	30.55	30.42	30.57	
Weight of dry soil (g)	3.4	3.8	4.2	
Water content (%)	47.49%	47.91%	49.29%	

PLASTIC LIMIT DETERMINATION

	1	2
Tare number	314	K
Weight of wet soil and tare (g)	39.41	38.72
Weight of dry soil and tare (g)	37.82	37.23
Weight of water (g)	1.59	1.49
Weight of tare (g)	30.35	30.25
Weight of dry soil (g)	7.47	6.98
Water content (%)	21.29%	21.35%
Average (%)	21.32%	

RESULT CALCULATIONS

W_L = WC% at 25 blows
W_P = WC% when rolled to 1/8" diameter
$I_L = W_N - W_P/I_P$
$I_P = W_L - W_P$
$A = I_P$ / (% Clay)



Liquid Limit (W_L)	48
Plastic Limit (W_P)	**21**
Natural Water Content (W_N)	53
Liquidity Index (I_L)	**1.19**
Plasticity Index (I_P)	**27**
Activity (A)	**0.40**

CLASSIFICATION

I_P	PLASTICITY
0-3	Non Plastic
4-15	Slightly Plastic
16-30	Medium Plastic
> 30	Highly Plastic
W_L	**COMPRESSIBILITY**
0-30	Slight or Low
31-50	Moderate or Intermediate
> 50	High

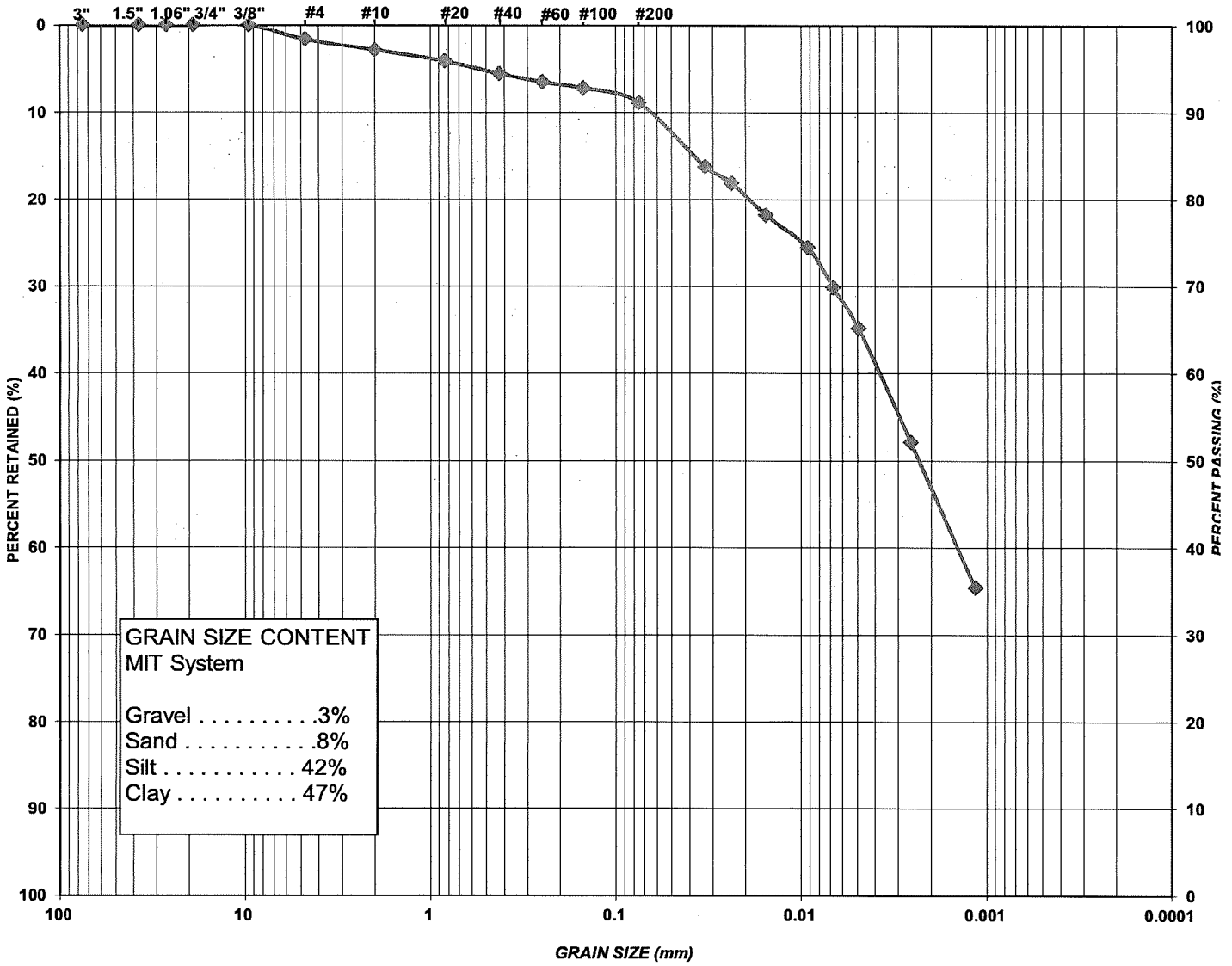
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**1**	TEST DATE:	**April 9, 2013**
SAMPLE NUMBER:	**2**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**0.76-1.52**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Clay and Silt, trace sand, trace gravel**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



GRAIN SIZE (mm)

MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

UNIFIED SYSTEM	CBBLS	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
		GRAVEL		SAND			

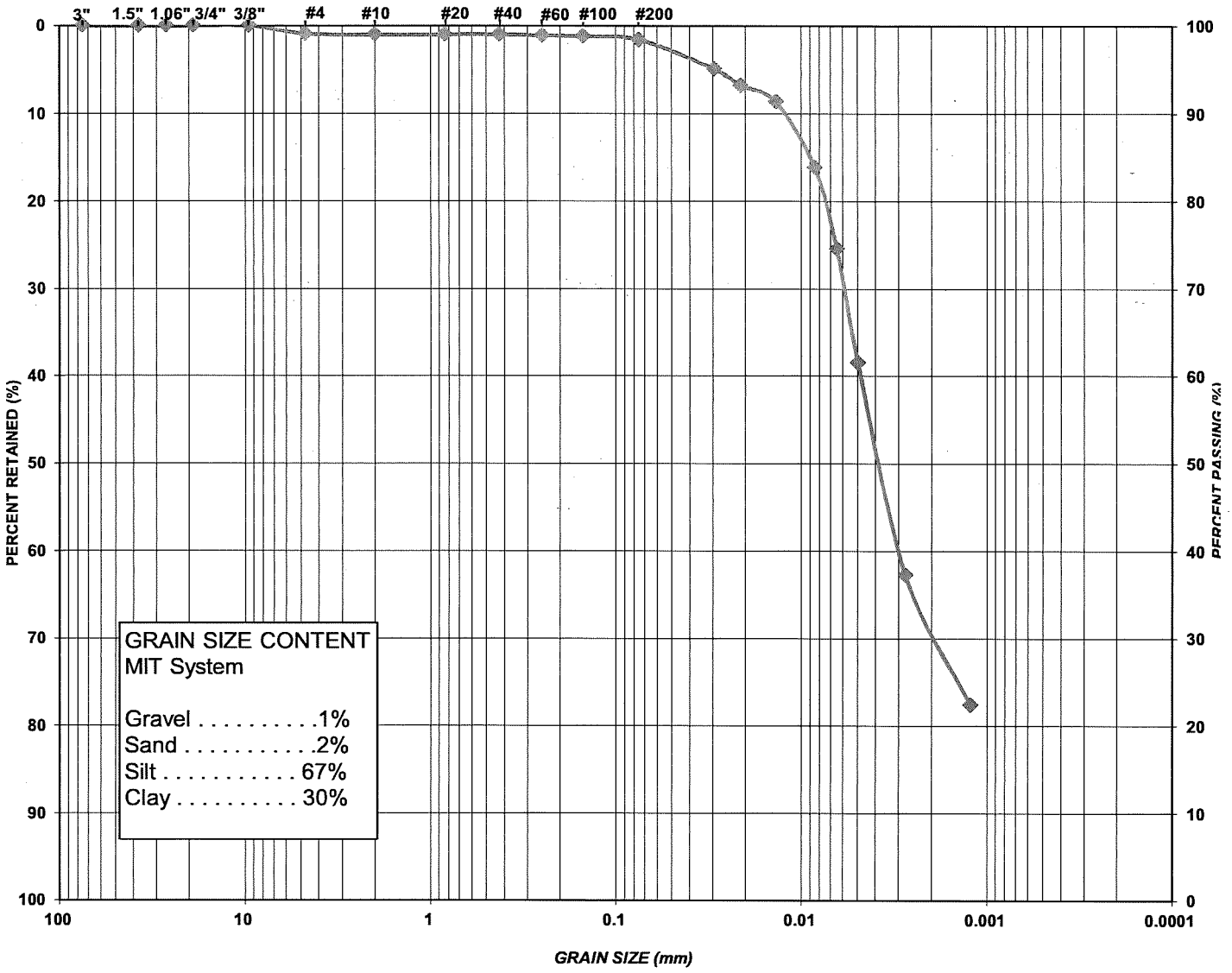
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 27, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**4**	TEST DATE:	**April 4, 2013**
SAMPLE NUMBER:	**3**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**1.52-2.29**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Clayey Silt, trace sand, trace gravel**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

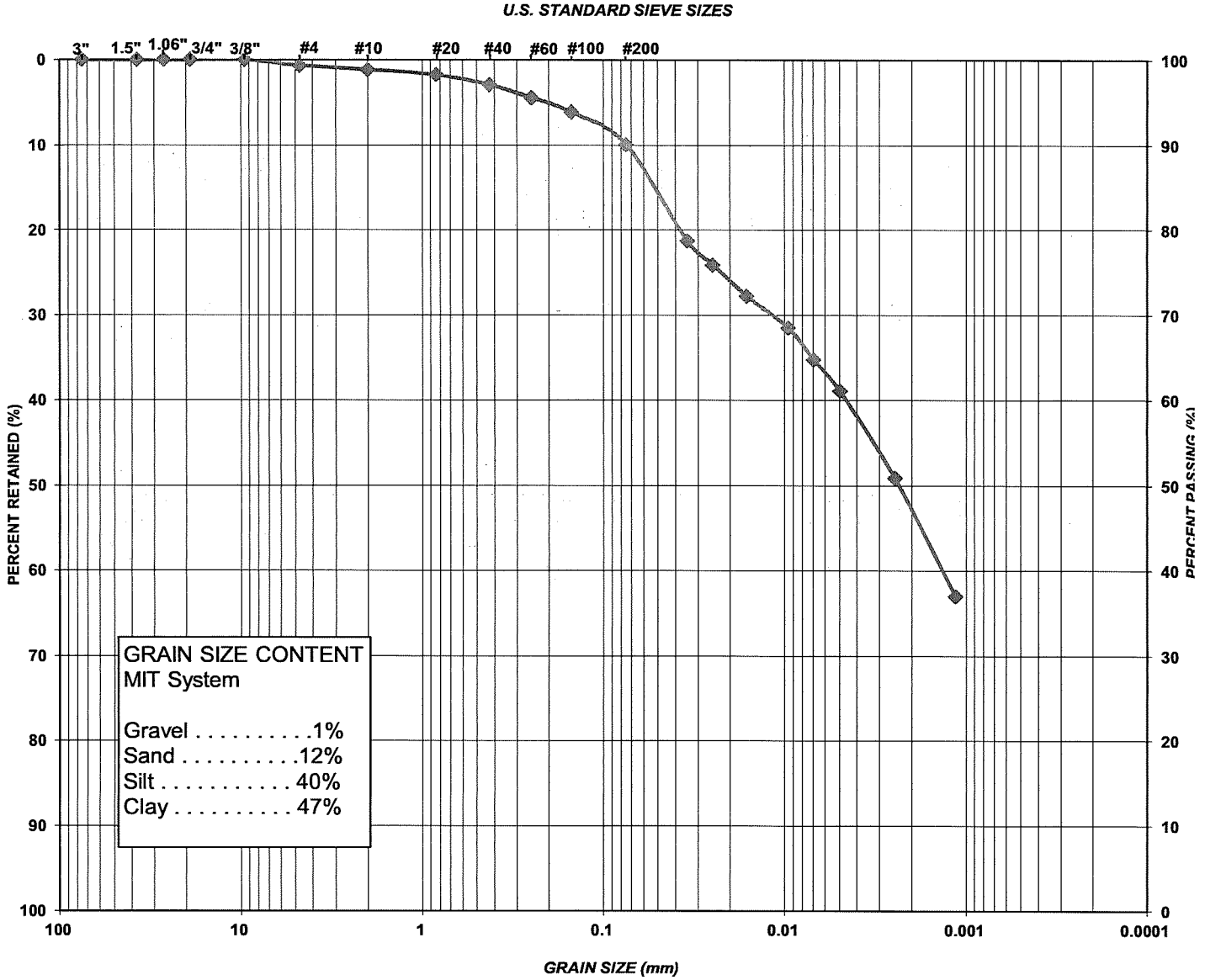
UNIFIED SYSTEM		COARSE	FINE	COARSE	MEDIUM	FINE	
		GRAVEL		SAND			SILT AND CLAY

Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 27, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**6**	TEST DATE:	**April 4, 2013**
SAMPLE NUMBER:	**1**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**0.00-0.76**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Clay and Silt, some sand, trace gravel**		

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY	
		GRAVEL			SAND					
UNIFIED SYSTEM	CBBLS	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY			
		GRAVEL		SAND						

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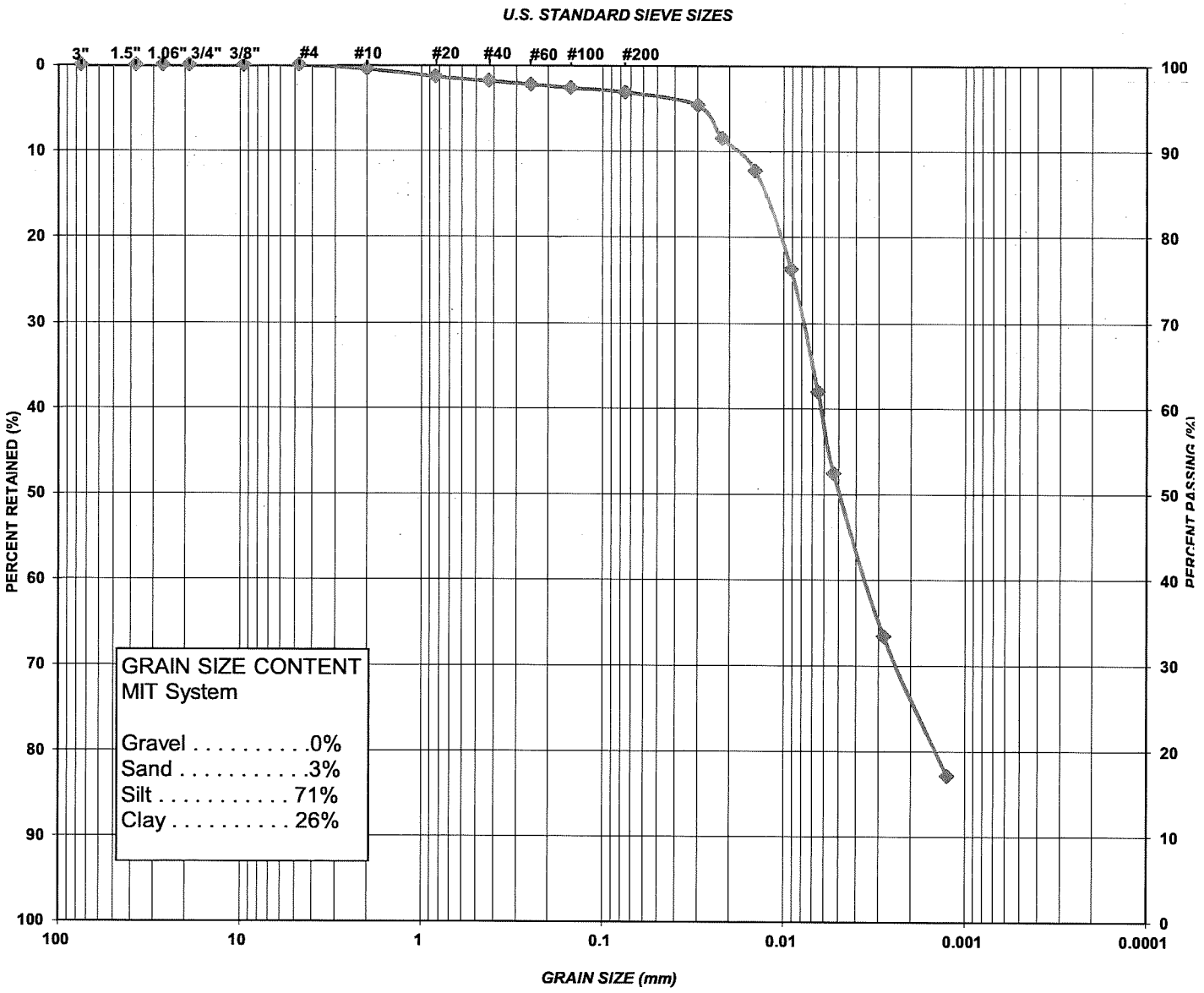
HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 27, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**12**	TEST DATE:	**April 4, 2013**
SAMPLE NUMBER:	**2**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**0.76-1.52**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Clayey Silt, trace sand**		

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

UNIFIED SYSTEM	CBBLS	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
		GRAVEL		SAND			

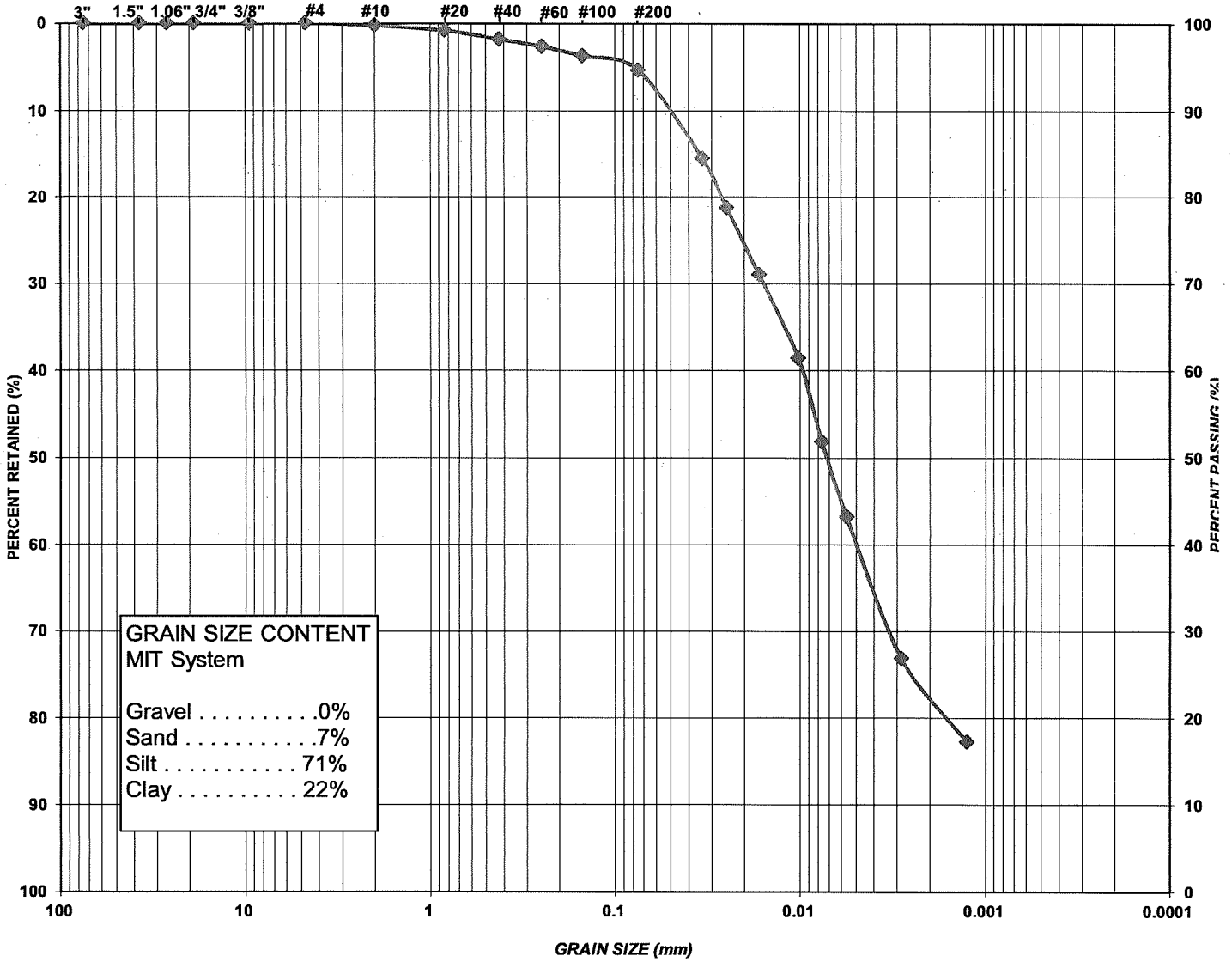
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**13**	TEST DATE:	**April 3, 2013**
SAMPLE NUMBER:	**1**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**0.00-0.76**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Clayey Silt, trace sand**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



GRAIN SIZE (mm)

MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

UNIFIED SYSTEM		COARSE	FINE	COARSE	MEDIUM	FINE	
		GRAVEL		SAND			SILT AND CLAY

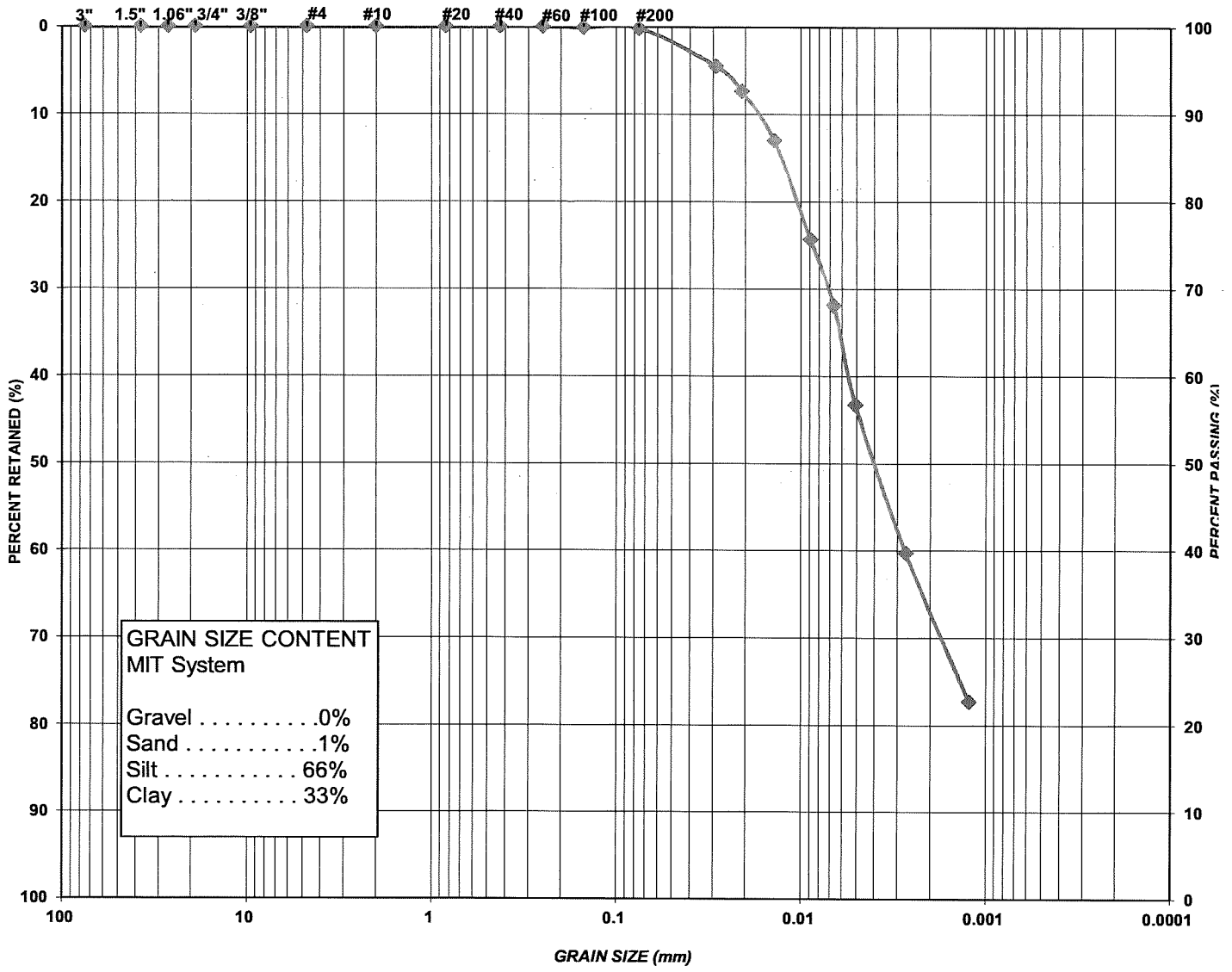
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**14**	TEST DATE:	**April 9, 2013**
SAMPLE NUMBER:	**3**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**2.29-3.05**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Clayey Silt, trace sand**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY		
		GRAVEL			SAND						
UNIFIED SYSTEM	CBBLS	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY				
		GRAVEL		SAND							

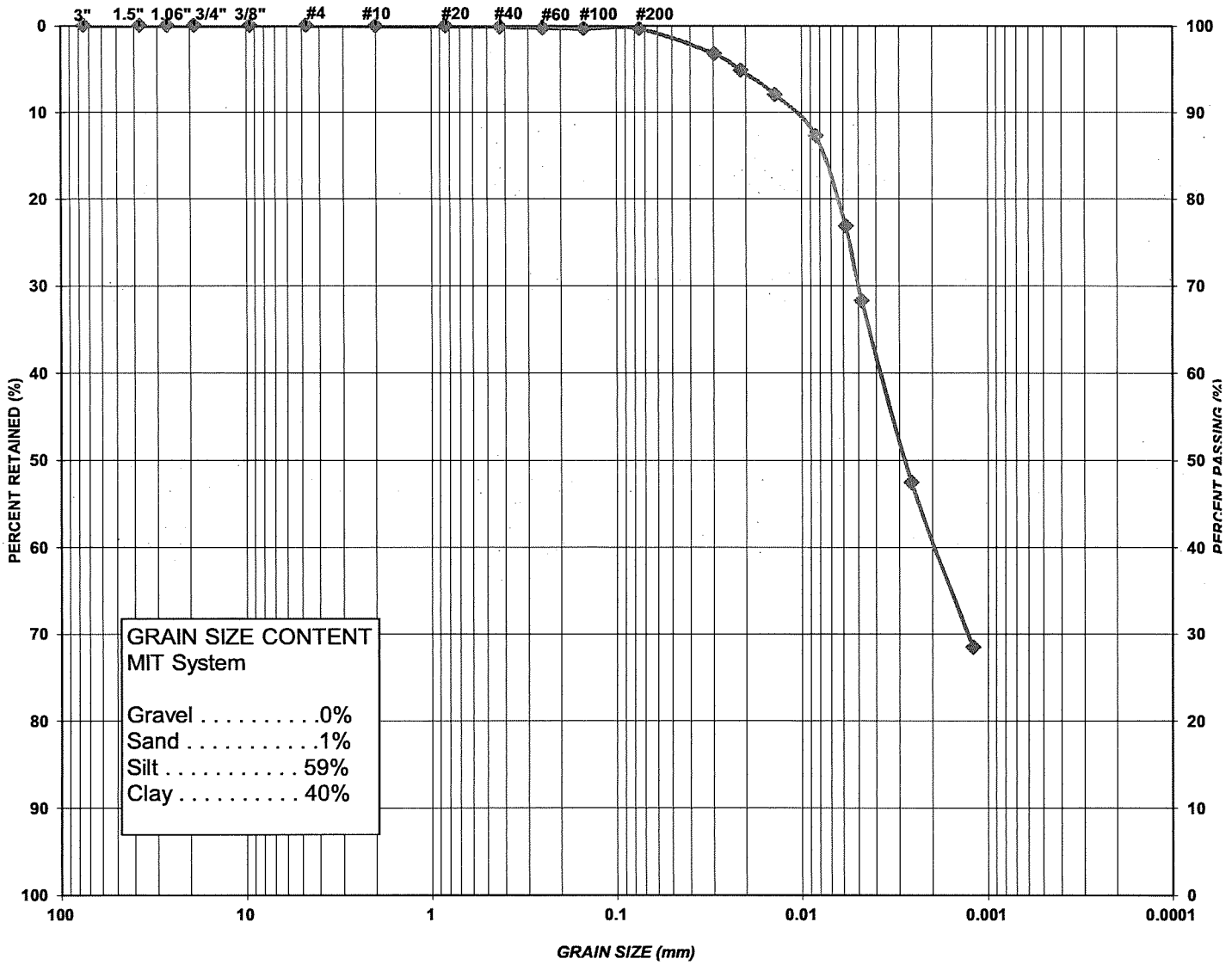
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**16**	TEST DATE:	**April 3, 2013**
SAMPLE NUMBER:	**2**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**0.76-1.52**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Silt and Clay, trace sand**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



GRAIN SIZE (mm)

MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

UNIFIED SYSTEM	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
		GRAVEL		SAND			

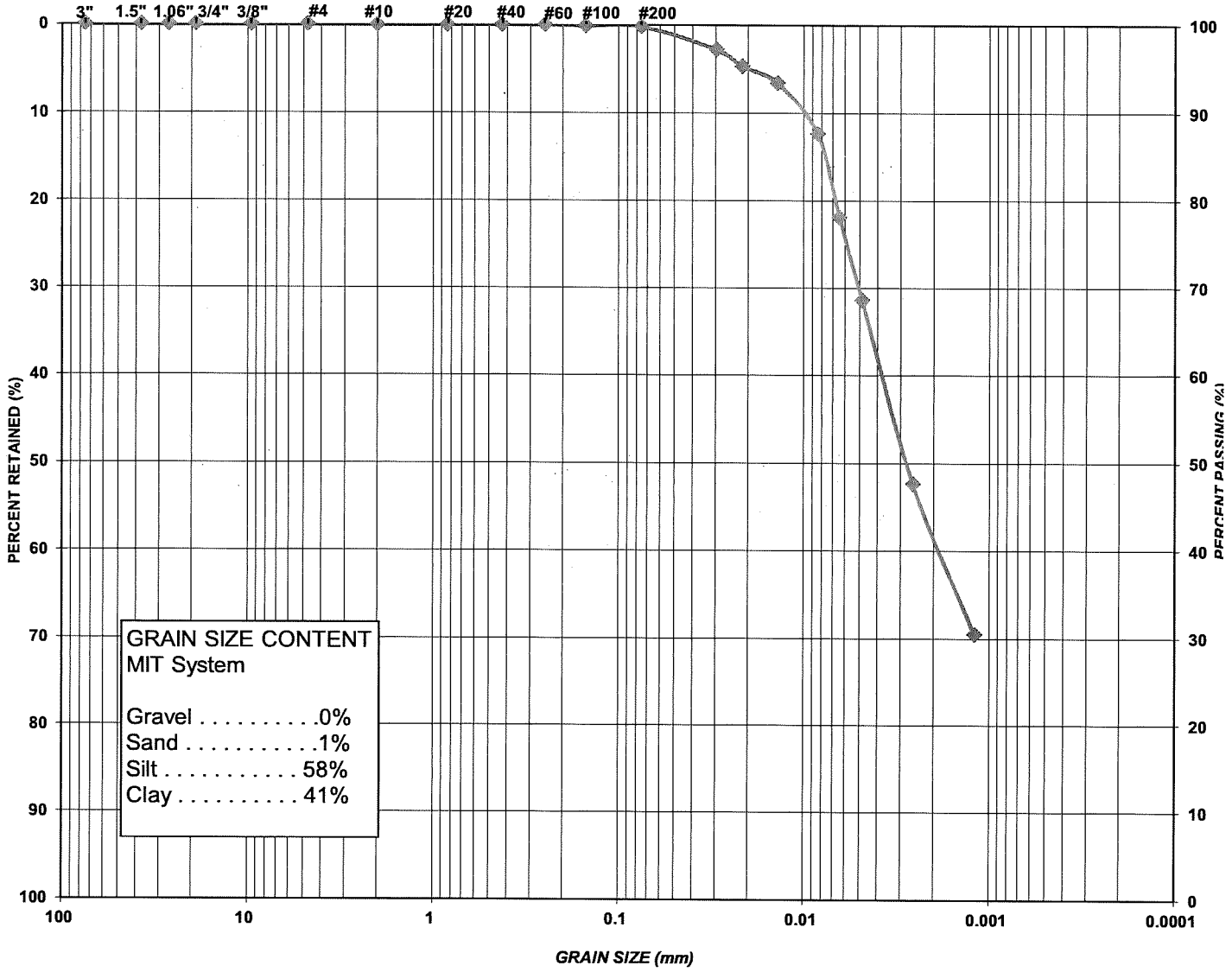
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**16**	TEST DATE:	**April 3, 2013**
SAMPLE NUMBER:	**3**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**1.52-2.29**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Silt and Clay, trace sand**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

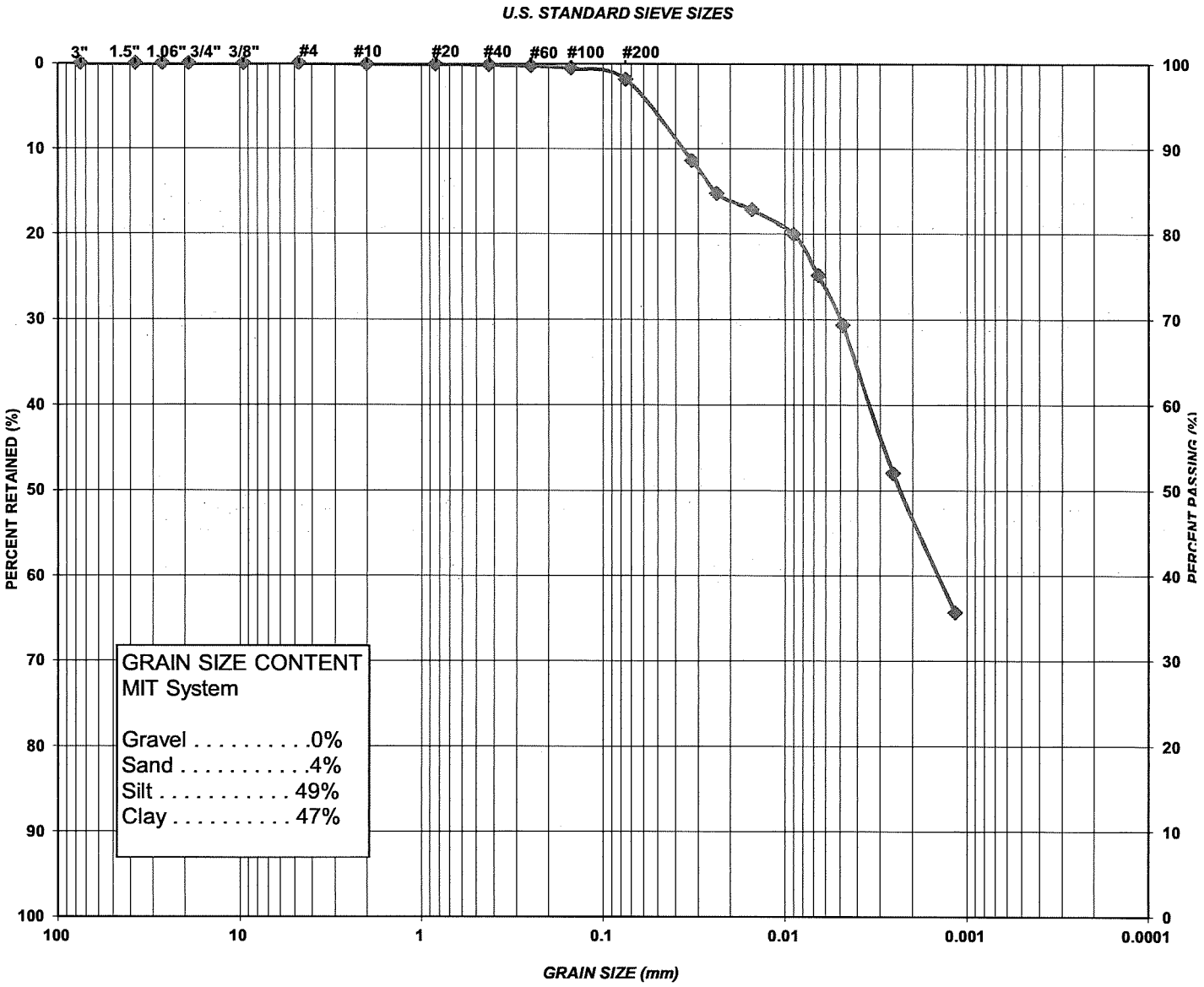
UNIFIED SYSTEM		COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
		GRAVEL		SAND			

Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**17**	TEST DATE:	**April 9, 2013**
SAMPLE NUMBER:	**3**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**2.29-3.05**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Silt and Clay, trace sand**		

GRAIN SIZE DISTRIBUTION



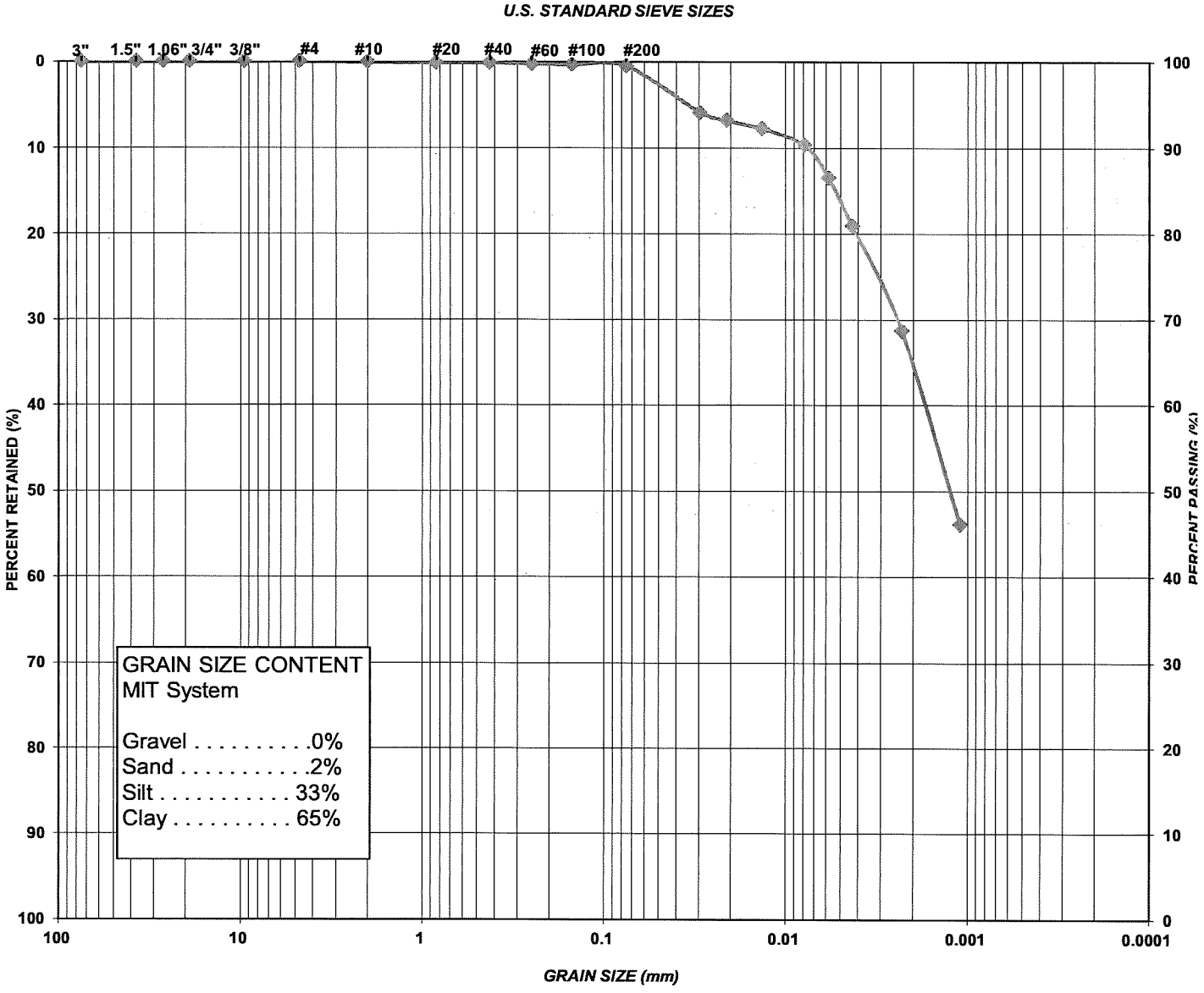
MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY	
		GRAVEL			SAND					
UNIFIED SYSTEM		COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY			
		GRAVEL		SAND						

Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**17**	TEST DATE:	**April 9, 2013**
SAMPLE NUMBER:	**4**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**3.05-4.57**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Silty Clay, trace sand**		

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

UNIFIED SYSTEM		COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
		GRAVEL		SAND			

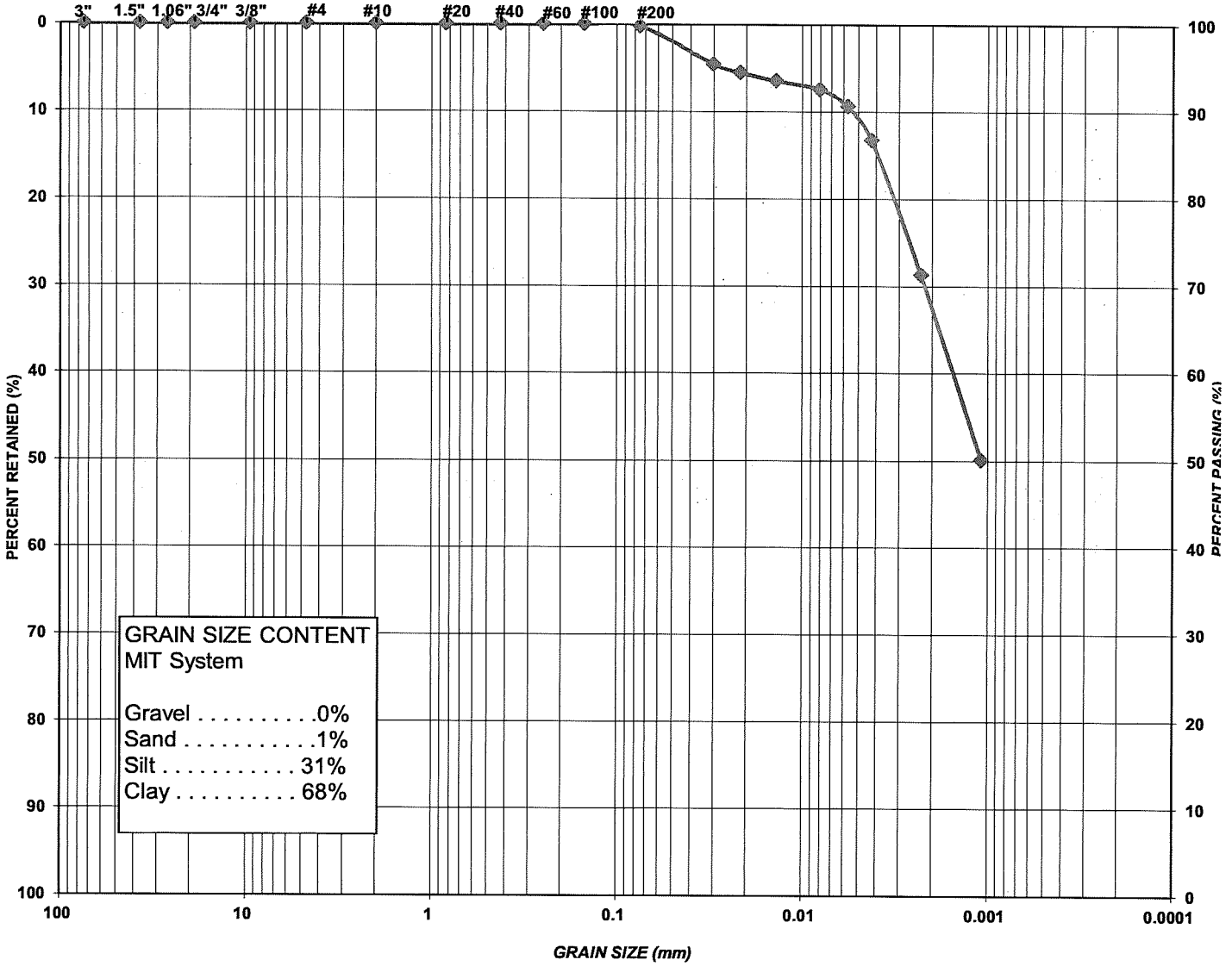
Terraprobe

HYDROMETER ANALYSIS TEST REPORT

PROJECT:	**Scenic View Subdivision, Phases 1, 2, 3**	FILE NO.:	**51-13-8005**
LOCATION:	**Sudbury, Ontario**	SAMPLE DATE:	**March 26, 2013**
CLIENT:	**Timestone Corporation**	SAMPLED BY:	**N.T.**
BOREHOLE NUMBER:	**17**	TEST DATE:	**April 4, 2013**
SAMPLE NUMBER:	**5**	TESTED BY:	**R.D.**
SAMPLE DEPTH (m):	**4.57-6.10**	LAB NO.:	**5163**
SAMPLE DESCRIPTION:	**Silty Clay, trace sand**		

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	CBBLS	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL			SAND				

UNIFIED SYSTEM		COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
		GRAVEL		SAND			

Sarah Vereault

From: Johnny Yang
Sent: May 8, 2024 8:38 AM
To: Robert Webb
Cc: Robert Langlois; John Zulich
Subject: Scenic View Subdivision - Water/Sanitary Sewer Capacity Review (WSSCR)
Attachments: Scenic View - WSSCR Sketch.pdf

Hello Rob,

Please accept this email as our request for a Water/Sanitary Sewer Capacity Review (WSSCR) for the proposed Scenic View Subdivision of Bancroft Street by Timestone Corporation c/o Zulich Enterprises. I've copied John Zulich on this email for information.

As shown in the conceptual plan attached, 375 semidetached units are proposed to be added to the existing municipal service at various connection points along Birmingham Dr and Dorsett Dr.

The proposed connection points descried by GIS ASSETID includes:

Sanitary (and peak flow):

Birmingham
- MH 21876 7.52 L/S
- MH 722904 2.76 L/S
- MH 722907 1.61 L/S

Dorsett
- MH21879 6.25 L/S
- MH 21881 2.68 L/S
- MH 734765 5.68 L/S
- MH 734764 1.45 L/S

Water:

Birmingham
- WM 3378110 150mm PVC
- WM 722859 200 Pipe
- WM 722884 200 Pipe

Dorsett
- WM 365754 150mm PVC
- WM 379174 150mm PVC
- WM 734783 200 Pipe
- WM 734787 Pipe unknown

All new pipes are proposed to be 200mm diameter.

Grinder pumps and low pressure forcemain will be utilized for the sanitary collection for 58 units as shown in Area 2&3 (FM) in the attached plan. The peak follow rates of these areas are estimated based on information provided by the manufacture. The rest of the peak flow values (gravity flow) are made up of both domestic demand and extraneous flow using parameters from the City's Engineering and Design Manual for per capita demand, population density, peaking and extraneous flow.

Please let me know if you need anything further. All fees for the above review will be paid directly by Timestone Corporation.

Thanks in advance,
Johnny

Johnny Yang, P.Eng., MASc
Civil Engineer
Sudbury, ON
Work: 705-806-4406

MH21881

DORSETT DRIVE

WM 3378110
150mm PVC

MH21876

WM 379174
150mm PVC

WM 365754
150mm PVC

MH21879

SWM POND
1600 sq.m

1

1.23
45-121.5

CAMBRIDGE CRESCENT

6

0.67
24-64.8

8

WM 734787
Unknown

MH734764

250mm PVC

300mm PVC

200mm PVC

2.08
42 - 113.4

BIRMINGHAM DRIVE

COVINGTON CRESCENT

5

STREET A

STREET C

WM 734783
200 Pipe

MH734765

LINK
(25m)

LINK
(25m)

LINK
(25m)

4.49
102-275.4

7

6.21
84-226.8

STREET B

2-FM

MH722904

MH722907

WM 722859
200 Pipe

WM 722884
200 Pipe

7 Pumps On
at peak flow

4 Pumps On
at peak flow

2.29
38 -102.6

3-FM

4

1.17
20-54

2.51
20-54

SWM POND
(2700 sq.m)

SWM POND
(2800 sq.m)

SWM POND
(1500 sq.m)

30m BUFFER

NAVANOD ROAD

XX Ha

YY Units -ZZ
Population

Area #

No.	ISSUE / REVISION	DD/MM/YY

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VERIFY SHEET SIZE AND SCALES. THE BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT:

CONSULTANT: www.jlrichards.ca

J.L.Richards
ENGINEERS • ARCHITECTS • PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROJECT NORTH

N

PROJECT:

DRAWING:

OPTION A
REVISED

DESIGN:	
DRAWN:	DRAWING #:
CHECKED:	
JLR #:	

PLOT DATE: April 24, 2024 9:19:49 AM

File Location: P:\32600\032395-000 - Zutich Scenic View Subdivision\05-Production\01-Civil\32395-000 - Scenic View.dwg