GEOTECHNICAL INVESTIGATION
ALTON MILLPOND AND DAM
VILLAGE OF ALTON
TOWN OF CALEDON

Prepared for:

ALTON MILLPOND REHABILITATION COMMITTEE
c/o THE ALTON DEVELOPMENT INC.

SARAFINCHIN Associates Ltd.
Consulting Engineers

Project T1874
20 February 2015

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GEOTECHNICAL INVESTIGATION
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TOWN OF CALEDON

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SARAFINCHIN
Consulting Engineers

Project T1874 20 February 2015

Alton Millpond Rehabilitation Committee
c/o The Alton Development Inc.
Seaton Group
25 Imperial Street, Suite 500
Toronto, Ontario
M5P 1B9

Attention: Mr. Jordan Grant

RE: GEOTECHNICAL INVESTIGATION
ALTON MILLPOND AND DAM
VILLAGE OF ALTON
TOWN OF CALEDON

EXECUTIVE SUMMARY

The Alton Millpond Rehabilitation Committee (AMRC) retained Sarafinchin Associates Ltd. to carry out a preliminary geotechnical site investigation in support of the proposed Alton Millpond and Dam rehabilitation which may include dredging of the existing millpond, and the construction of a new separation dyke between the rehabilitated millpond and the existing dam and main channel of Shaw's Creek, plus any repairs and minor modifications to the main dam.

The Alton Mill Dam is a low gravity structure constructed in about the 1880's and is comprised of stone masonry and concrete with two fixed weirs approximately 3.4 m high with a total span of 15.4 m between concrete abutments. The upstream headpond (millpond) covers an area of approximately two hectares with a water depth in the range of about 0.5 to 1.5 m.

This preliminary geotechnical investigation comprising boreholes at the north and south abutments indicate the abutments are backfilled with very loose to compact silty sand, and very loose to compact sand and gravel overlying dolostone bedrock. Testholes within the millpond indicated pond sediment comprised of silt, sand and organics and underlying sand and gravel with a thickness of about 2.2 to 2.9 m, overlying probable dolostone bedrock.

Observations from the investigation indicate that the existing dam is likely founded on relatively sound dolostone bedrock and may be considered stable with respect to bearing capacity failure or excessive settlement. Our preliminary geotechnical assessment of bearing capacity, settlement, seismic parameters, seepage and uplift and resistance to sliding are provided for use in preliminary dam safety review, conceptual planning and design stages.

For a detailed dam safety review, rehabilitation of dam structures, dam and millpond design and construction stages, this site is subject to further geotechnical investigation in conjunction with separate hydrological, hydraulic and structural assessments.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,
SARAFINCHIN Associates Ltd.
Consulting Engineers

Murray G. Sarafinchin, M.A.Sc., P.Eng.
President and Principal Engineer

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1.0 INTRODUCTION

This preliminary geotechnical site investigation by Sarafinchin Associates Ltd., as presented herein, was authorized for early 2015 by The Alton Millpond Rehabilitation Committee (AMRC). It is being provided in support of planning and conceptual design for the proposed Alton Millpond Rehabilitation Project. A dam safety review is not part of this report. A future geotechnical site investigation for dam safety review, final dam and millpond design and construction tendering and construction monitoring are required at a later stage.

The Alton Mill Dam is located in the Village of Alton in the Regional Municipality of Peel, approximately 340 m southwest of the intersection of Main Street and Queen Street West as shown on the Key Plan, Figure 1. The Dam is situated on Shaw's Creek which is a tributary of the Credit River. At the dam site Shaw's Creek flows in a northeasterly direction and is bounded by Queen Street West to the south. The small dam is a 3.8 m high stone masonry and concrete gravity structure originally constructed in about the 1880's. The top of the concrete weir (spillway) is at approximately Elev. 411.1 +/- m.

The dam is currently situated adjacent to the original stone mill building at the northeast area of the dam. The mill has been renovated and is currently utilized as the Aton Mill Arts Centre.

The stated project vision is to *"restore the beauty and function of the pond, improve the ecosystem health of Shaw's Creek, provide recreational and educational opportunities and resume its historic function as a provider of green energy."*

Key aspects of the project may include dredging of the existing millpond, and the construction of a new separation dyke between the rehabilitated millpond and the main channel of Shaw's Creek.

This Geotechnical Report presents our borehole and testhole findings, conclusions and recommendations of the subsurface investigation focusing on the existing dam and millpond area.

2.0 SITE DESCRIPTION

2.1 Site Features

Our site reconnaissance visits were carried out in January 2015. At the time of the site visits, the site was snow covered. The upstream millpond was frozen over and significant ice formation was observed to be present downstream of the dam. As such, visual observations were limited by these winter conditions.

The Alton Dam site is comprised of the low dam and abutment structures, the heritage mill building, the upstream millpond, and the downstream channelized reach of Shaw's Creek.

The upstream headpond (millpond) covers an area of approximately two hectares with a water depth in the range of about 0.5 to 1.5 m from the reported high water level (Elev. 412.13). A marsh area occupies a large part of the west millpond. The south bank of the millpond is covered in low vegetation and slopes up about 2 m to Queen Street West at a slope of about 2.5 horizontal to 1 vertical. It is believed that covered armourstone exists on the slopes. The north side of the millpond slopes up to a wooded area and two residential properties.

The downstream reach of Shaw's Creek through the Alton Mill property has a shallow depth (about 0.3 m+/-), is approximately 5 to 10 m wide and it is contained by concrete retaining walls on the mill side (north) and various concrete, armourstone and timber erosion protection/retaining structures along the south bank of private properties.

2.2 Site Topography

The regional topography in the Alton area generally slopes in a northeasterly direction towards the Credit River with Shaw's Creek being the primary watershed for the Alton Area. Locally, the topography at the Dam site is at approximate Elev. 413 m +/-. The reported high water level in the millpond is Elev. 412.13 and the water level downstream of the dam is at approximate Elev. 408 m +/-.

2.3 Geology

2.3.1 Surficial Geology

The overburden soil deposits in the Alton area are comprised of various glacial deposits. The area to the north of the dam site is predominantly comprised of ice-contact stratified drift whereas. The area south of the site is predominantly Port Stanley Till which is a sandy silt till that was deposited subglacially across the Alton area (Cowan 1976). The area in the immediate area of the site along Shaw's Creek is characterized by modern alluvial deposits of sand and gravel.

2.3.2 Bedrock Geology

The predominant bedrock unit in the Alton area is the Amabel Formation comprised of dolostone which is underlain by the Clinton (dolostone) and Cataract Group consisting of the Cabot Head Formation shale, the Manitoulin Formation dolostone (with shale) and the Whirlpool Formation sandstone. Bedrock outcrops at the ground surface along Queen Street, and west of Main Street.

Shale bedrock of the Queenston Formation underlies the entire area, however, this is deeply buried and it only outcrops to the southeast of Alton along the banks of the Credit River near Cataract.

2.3.3 Local Bedrock Outcropping

The following are observations and/or reports of bedrock outcropping by others at the Site:

- Immediately downstream of the dam structure and further downstream through the Alton Mill Site, bedrock is exposed along the creek bottom;

- It has been reported by AMRC that during installation of the recently constructed Bailey bridge, it was observed that bedrock was exposed in and around the bridge;

- The interior of the mill building has several signs of bedrock actually within the building including a bedrock outcrop that was found during renovation of the basement in what is now the Millrace Room. Another room (Mech 2) has an approximately 600mm (24 inches) high step-up floor as a result of a bedrock outcrop;

- It has been reported by AMRC that the subdivision to the south of the mill built in the 1980's (McLellan, Dods, Agnes Streets) encountered bedrock during underground site servicing and house construction;

- The Town Engineer who was involved with the recent construction of a storm sewer outfall structure located at the west end of the pond (just east of the James St. Bridge) reported to AMRC that the sewer outfall sits directly on bedrock; and

- A nearby rock core log by SPL Consultants Limited (Appendix B), located on Queen Street West approximately midway between Emeline Street and Agnes Street, indicates dolostone bedrock at the Borehole location with total core recovery, TCR of 75 to 100%; solid core recovery of 75 to 100%; and rock quality designation, RQD of 75 to 88%.

3.0 DESCRIPTION OF DAM

3.1 Dam Structure

The Alton Mill Dam is a low gravity structure which is reported to be comprised of stone masonry encapsulated in concrete. The dam has two fixed weirs approximately 3.4 m high spanning between the north and south abutments, and a centre concrete pier. The dam has a total span of approximately 15.4 m between the face of the north abutment and the face of the south abutment with each of the spillways having a width of approximately 6.5 m. The vertical distance from the top of the weir to the top of the abutment is approximately 2.3 m. The top of the abutments is at approximate Elev. 413.4 m and the base of the dam is at approximate Elev. 407.7 m. The dam is controlled by stacked timber flashboards

(stop logs) supported by steel angles. The top of the concrete weir (spillway) is at approximately Elev. 411.1 m. The reported high water level is Elev. 412.13 m. The concrete condition and strength of the dam structures are unknown.

3.2 Dam Foundation

Based on observations of exposed bedrock at the downstream base of the dam and considering the observed bedrock elevations in boreholes at each of the north and south abutments as well as the testholes in the upstream millpond area, it is a reasonable assumption that the dam is founded directly on the bedrock at approximate Elev. 407.6 m +/-, subject to confirmatory geotechnical borehole coring results.

3.3 Dam Abutments

The dam abutments are comprised of 1.5 m thick vertical concrete retaining walls which are assumed to extend down to the bedrock. The backfill to the abutments was found to be very loose to compact silty sand, and very loose to compact sand and gravel at the north abutment, and silty sand at the south abutment. Below the fill, native loose sandy silt layer was encountered. The sandy silt was observed to be light brown to grey/black, very moist to wet. An additional description of the abutment fill is provided in Section 4.2.1.

Our boreholes at the north and south abutments were terminated on probable dolostone bedrock at depths of 6.0 m to 6.4 m, or Elev. 407.1 and 407.4 m, respectively.

4.0 SUBSURFACE INVESTIGATION

4.1 Methodology

The subsurface investigation was carried out between January 26 and February 3, 2015, at which time a total of 4 boreholes and 8 testholes were advanced to varying depths between 1.2 m to 6.4 m. The borehole and testhole locations are shown on the attached Site Plan, Figure 2.

The boreholes were advanced using a track mounted, rotary drill rig equipped with hollow stem augers and standard penetration testing equipment (SPT, ASTM D1586). Testholes 1 to 4 were advanced using a portable Pionjar percussion sampler with a double length split spoon and manually driven Dynamic Cone Penetration test equipment (DCPT, ASTM D5778). The Testholes TH-H1 to TH-H4 were advanced using manual hand auger equipment.

The soil samples were sealed in air tight glass containers and returned to our CCIL certified laboratory for further classification and testing. All subsurface samples will be stored for a maximum of three months and then disposed of unless otherwise requested. Surplus borehole cuttings were contained in steel drums for temporary storage prior to final offsite disposal by the owner.

4.2 Subsurface Conditions

Boreholes and testholes were carried out for the dam abutments, the south bank of the millpond along Queen Street West, and on the ice sheet within the millpond. The major stratigraphic units encountered at the borehole and testhole locations are summarized as follows:

4.2.1 Dam Abutments

Boreholes 1 and 2 were located at the north and south abutments of the Alton Mill Dam.

In general, the boreholes encountered approximately 0.1 to 0.6 m of organic rich topsoil comprised of silty sand and organics, brown in colour and moist (frozen).

Below the surficial topsoil the boreholes encountered fill extending to depths of between approximately 4.1 to 5.8 m. The fill was observed to be predominantly very loose to compact silty sand and very loose to compact sand and gravel at the north abutment and silty sand at the south abutment. The silty sand to sand fill is characterized by SPT values of N = 0 to to 65 blows/300 mm penetration. The sand and gravel fill is characterized by SPT values of N = 7 to 12 blows/300 mm penetration.

Below the fill, a native loose sandy silt layer was encountered. The sandy silt was observed to be light brown to grey/black, very moist to wet.

The boreholes at the north and south abutments were terminated on probable dolostone bedrock which was encountered at the depths 6.0 m to 6.4 m, or Elev. 407.1 and 407.4 m, respectively. These bedrock levels under the abutments are relatively 1 to 2 m lower than our measured upstream bedrock levels, possibly due to steps in the horizontal bedded sedimentary bedrock, or early dam preconstruction removal of surficially weathered bedrock, or otherwise.

4.2.2 South Bank of Millpond

Boreholes 3A and 3B were located at the south bank of the Millpond adjacent to the north edge of Queen Street West. Our Borehole Logs are presented on Figures 5 to 6.

These boreholes encountered approximately 0.6 m of organic rich topsoil comprised of silty sand and organics, brown colour and moist (frozen).

Below the surficial topsoil the boreholes encountered fill extending to depths of 2.4 m in BH 3A and 1.2 m in BH 3B. The fill was observed to be predominantly loose to compact, silty sand and gravel. The silty sand and gravel is characterized by SPT values of N = 7 to 12 blows/300 mm penetration.

These boreholes BH 3A and BH 3B were terminated at depths of 2.4 and 1.2 m encountering practical drilling refusal on probable boulders, or snow covered armourstone slope protection.

4.2.3 Millpond Area

4.2.3.1 Pond Bottom Soundings

A marine sounding survey was carried out by our field engineering staff on the frozen ice sheet to measure the water depth at several locations throughout the millpond area. The survey locations and corresponding pond bottom elevations are shown on the attached

Figure, 4. In general, the water depths of the millpond were found to range from 0.8 to 1.8 m depth below the reported high water level of Elev. 412.13 m.

4.2.3.2 Pond Sediments and Inferred Bedrock Levels

Eight testholes were located at the Millpond area as shown on Figure 2. The Borehole Logs are presented on Figures 7 to 14.

The pond sediment at the testhole locations was observed to be predominantly silt, sand and organics. In Testholes 1 and 2 native compact brown sand and gravel was found to underlie the pond sediment. Testholes TH2, TH3, and TH4 were terminated at depths of 2.7 to 3.6 m below the current pond water level due to penetration cone refusal on probable dolostone bedrock. The inferred bedrock levels are at the testhole locations are shown on Figure 3. Testholes H1 to H4 were terminated at the depths of 0.4 to 1.5 m due to hand auger refusal on possible boulders/cobbles, or coarse sand and gravel.

The Testhole TH1 was terminated at a depth of 3.1 m due to penetration cone refusal. This refusal elevation is above the prevailing bedrock levels at other testhole locations, and therefore it is probable that the refusal is due to a possible extension of the dam centre pier foundation, or a boulder obstruction.

4.2.4 Groundwater

Short term open borehole groundwater levels were observed at depths of 4.8 m at the north dam abutment and 3.8 m at the south dam abutments, or Elev. 408.6 and Elev. 409.7 m., respectively.

Soil moisture observations suggest possible higher prevailing short term groundwater level in the boreholes is at about Elev. 411.7 m.

Long term groundwater level measurements by our office are recommended.

As previously mentioned, the reported high water level is at Elev. 412.13 m. For the dam and millpond rehabilitation it is proposed to raise the upstream reservoir level by 600 mm (2 ft.)

5.0 GEOTECHNICAL ASSESSMENT

5.1 Bearing Capacity of Existing Dam Foundation

Subject to confirmatory bedrock coring through the existing concrete base of the dam for detailed design stages, the dam may be inferred to be founded directly on relatively sound dolostone bedrock. Power auger drilling met with immediate grinding refusal upon encountering the bedrock indicating a relatively sound bedrock surface which is consistent with the general rock quality observations in our review of a nearby rock core log (Appendix A).

Typical factored bearing resistance for slightly weathered to sound dolostone is assumed to be greater than 1000 kPa (Ultimate Limit State). Serviceability limit state will not govern for foundations on sound rock. Higher available ULS bearing pressures are likely subject to confirmatory concrete coring through the lower dam sections, bedrock coring, strength testing and/or foundation load testing.

5.2 Settlement of Existing Dam Foundation

The existing dam is inferred to be founded directly on dolostone bedrock subject to geotechnical confirmation by bedrock coring. Settlement of foundations on sound rock are generally limited to the closure of open discontinuities and/or the compression of seams containing low strength infillings. The nearby rock core information by others (Appendix A) does not indicate the presence of any significant open discontinuities or seams in the rock mass. The dam shows signs of cracks. There were no observed major indications of settlement of the dam structure or abutments. Given the age of the dam structure, no significant additional settlement is expected for the existing small dam subject to our confirmatory bedrock coring.

5.3 Seismic Parameters

For a preliminary structural assessment in dam safety, the probabilistic earthquake parameters for the dam site, up to 1:1000-yr return period, are established based on data obtained from the Ontario Ministry of Natural Resources 2010 National Building Code of Canada seismic hazard calculator. The results are summarized in the following Table and details are provided in Appendix B.

Probability of Exceedance per Year	0.01 (40%/50 yrs)	0.0021 (10%/50 yrs)	0.001 (5%/50 yrs)	0.000404 (2%/50 yrs)
Peak horizontal ground acceleration (g)	0.007	0.023	0.034	0.057

5.4 Seepage and Uplift

Due to snow and ice cover no obvious seepage zones could be observed throughout the downstream dam abutments; however, minor seepage may be restricted by frozen ground conditions at the time of our winter site visit.

For planning and conceptual design purposes uplift pressures below the base of the dam may be assumed to vary linearly across the base of the dam from $P_u = \gamma H$ at the upstream edge of the dam foundation to $P_D = \gamma h$ at the downstream edge of the dam foundation;

where P_U = uplift pressure, upstream edge of dam foundation (kPa);

P_D = uplift pressure, downstream edge of dam foundation (kPa);

γ = unit weight of water (9.81 kN/m^3);

H = height of water above the base of the dam on the upstream side (m); and

h = height of water above the base of the dam on the downstream side (m).

Future bedrock coring should include groundwater level monitoring devices to better assess hydrostatic uplift conditions under varying seasonal fluctuations.

5.5 Resistance to Sliding of Existing Dam Foundation

For a mass concrete or masonry foundation on clean sound rock, the frictional resistance along the base of the dam may be assessed using an interface friction angle of $\delta = 35^{o}$ and a corresponding coefficient of friction, $\tan \delta = 0.7$ (2006 CFEM, 4th Ed).

It is unknown if the existing dam structure includes a shear key concreted into sound bedrock, however this is a favourable substructure, if dam sliding is problematic such as under high reservoir levels, high spillway flow conditions, and high uplift conditions.

Common remedial dam foundation base options using geotechnical input are available if it is found to be necessary.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Existing Dam

Based on our preliminary borehole and testhole findings for planning purposes, the existing small dam is assumed to be founded on relatively sound dolostone bedrock.

As such, the dam may be considered to be stable with respect to bearing capacity failure or excessive settlement. For dam safety review, or design and construction purposes, the detailed stability of the dam is subject to further geotechnical, hydrological and structural assessments of the dam structure and abutments. It is recommended that continuous concrete cores be taken through all existing dam structures for condition and strength determination.

6.2 Proposed Separation Structure

The proposed separation structure between the millpond and creek may comprise a low profile earthfill dyke to be designed and constructed of approved dredged materials and imported select soils and aggregates. Approved non organic cohesive and cohesionless soils dredged from the millpond bottom may be reused under fulltime geotechnical supervision. Other imported clay core, aggregate filter, armourstone shell, seepage and erosion control, and flow control weir devices will be required.

Alternatively a positive cut off wall, such as concrete or hybrid geomaterials, may be considered for the upstream separation structure, in which case founding into sound bedrock, overturning, underseepage, sliding, and the like, should be considered from a geotechnical viewpoint in the detailed design stage

The construction of a separation structure will require removal of the existing pond sediment and the underlying variable thickness of a sand and gravel layer in order to reach the surface of the underlying dolostone bedrock at a depth of about 3 to 4 m below the reported high water level (Elev. 412.13). Subject to adequate rock surface preparation, the sound dolostone bedrock is likely to provide sufficient foundation bearing resistance of about 1000 kPa (ULS) or greater, for either concrete or soil embankment dyke separation structures. Higher available ULS bearing pressures are likely subject to confirmatory bedrock coring, strength testing and/or foundation load testing.

Further geotechnical review is required for a dam safety review, and detailed design of proposed separation structures after the planning and conceptual design stage is developed.

6.3 Dam Safety Review

The owner is responsible for the safe management of this dam. Dam safety management is the management of risks associated with this dam, including release of upstream fluid as a result of structural failure, inadequate operation, planned operation, or any other cause. As part of the geotechnical consideration for a separate dam safety review, analysis and assessment in accordance with current Canadian Dam Association, 2007 Dam Safety Guidelines (2013 Edition) and Lakes and Rivers Improvement Act, Technical Bulletins (MNR 2011), the overall dam system includes the dam embankment and appurtenant structures, their foundations, abutments, and the reservoir. It is recommended that a geoengineering analyses should be performed to demonstrate that the dam, foundation, abutments, and separation dykes will remain stable under various hazards and loading conditions.

6.4 Possible New Dam Structures

It is understood the proposed dam and millpond rehabilitation has a slight raising of the upstream water level, therefore it may require stabilization measures to the existing dam, minor spillway changes, a fish ladder, abutments, dykes, weirs, and the like, in which case site specific geotechnical data should be obtained for each structure before the final design and construction stages.

7.0 CLOSURE

The information contained in this Sarafinchin Geotechnical Report is intended to provide preliminary geotechnical information to the first stage evaluation and planning for the redevelopment of the Alton Dam, and for the preliminary conceptual design of the proposed Alton Millpond rehabilitation project including mill pond dredging and the construction of a separation dyke or cutoff wall structure. Additional geotechnical input will be required for a dam safety review, and during the detailed review and design stage of the Alton Dam and Millpond rehabilitation project. As such, our office should be requested to provide additional geotechnical input including supplementary site investigations, review, analysis and/or design as may be required.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,
SARAFINCHIN Associates Ltd.

Scott Jeffrey, P.Eng.
Project Engineer

Murray G. Sarafinchin, M.A.Sc., P.Eng.
President and Principal Engineer

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- Mr. Bill Touzel, WESA, a Division of BluMetric Environmental Inc. (1)
- Mr. Quazi Alan, WESA, a Division of BluMetric Environmental Inc. (1)

Geotechnical Investigation
Alton Millpond and Dam
Village of Alton
Town of Caledon

FIGURES

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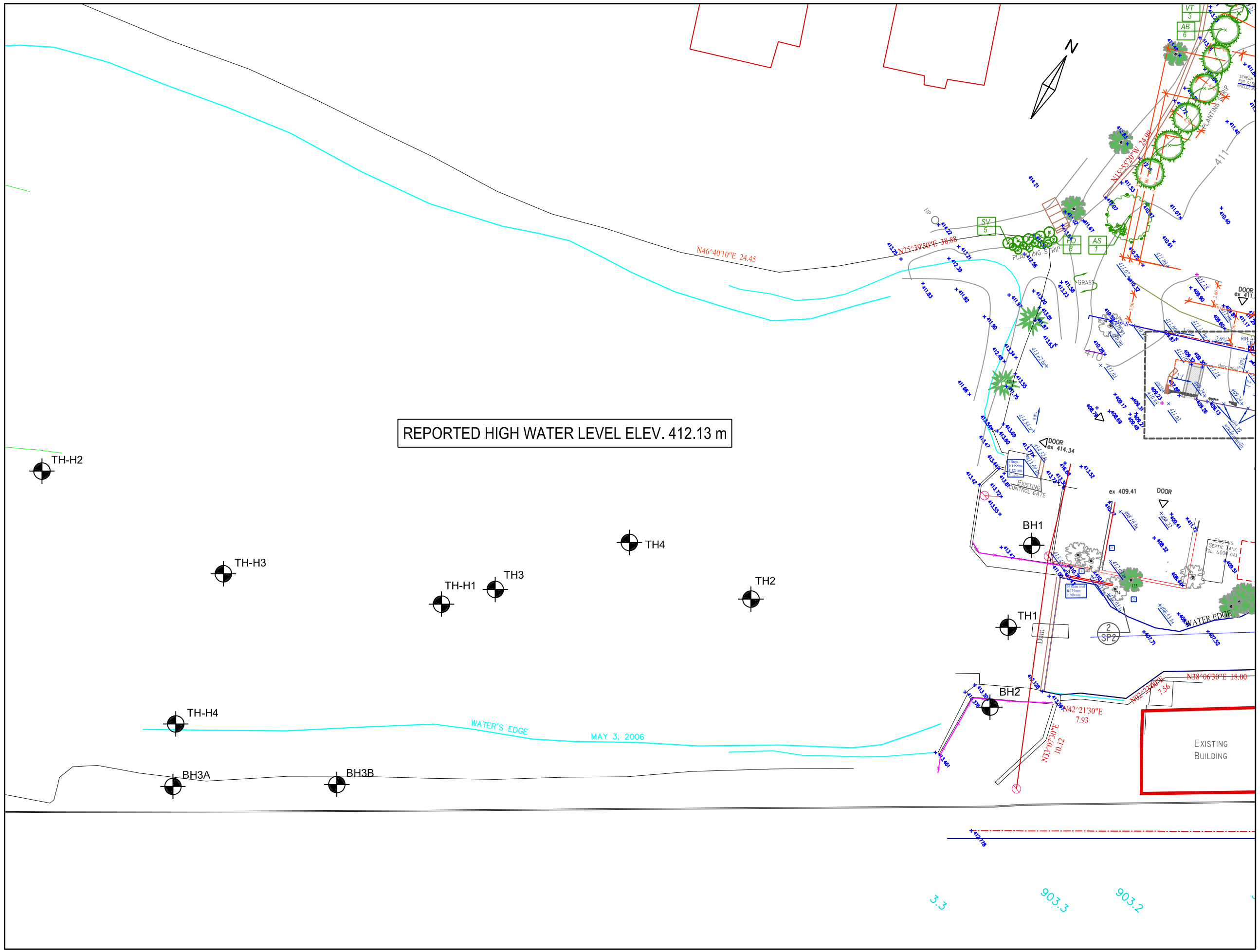
Figure 9 to 12	Testhole Logs TH1 to TH4
Figure 13 to 16	Testhole Logs TH-H1 to TH-H4

SARAFINCHIN
Consulting Engineers

Project: ALTON MILLPOND REHABILITATION
1402 QUEEN STREET WEST
ALTON, ONTARIO

Title: **KEY PLAN**

Drawn:	**EP**	Scale:	**N. T. S.**
Check:	**SAJ**	Project No.:	**T1874**
Date:	**15/02/17**	Figure No.:	**1**



LEGEND

BH2
SARAFINCHIN Borehole January 2015

TH2
SARAFINCHIN Testhole, February 2015

TH-H2
SARAFINCHIN Hand Auger Testhole, January 2015

Drawing Reference:
The Landplan Collaborative Ltd.
Landscape Architects
with it's Project No. 05-0034

No.	Description	Date
R3	For approval	15/02/19
R2	For review only	15/02/13
R1	For submission	15/02/03

REVISIONS:

Client:

Alton Millpond Rehabilitation Committee

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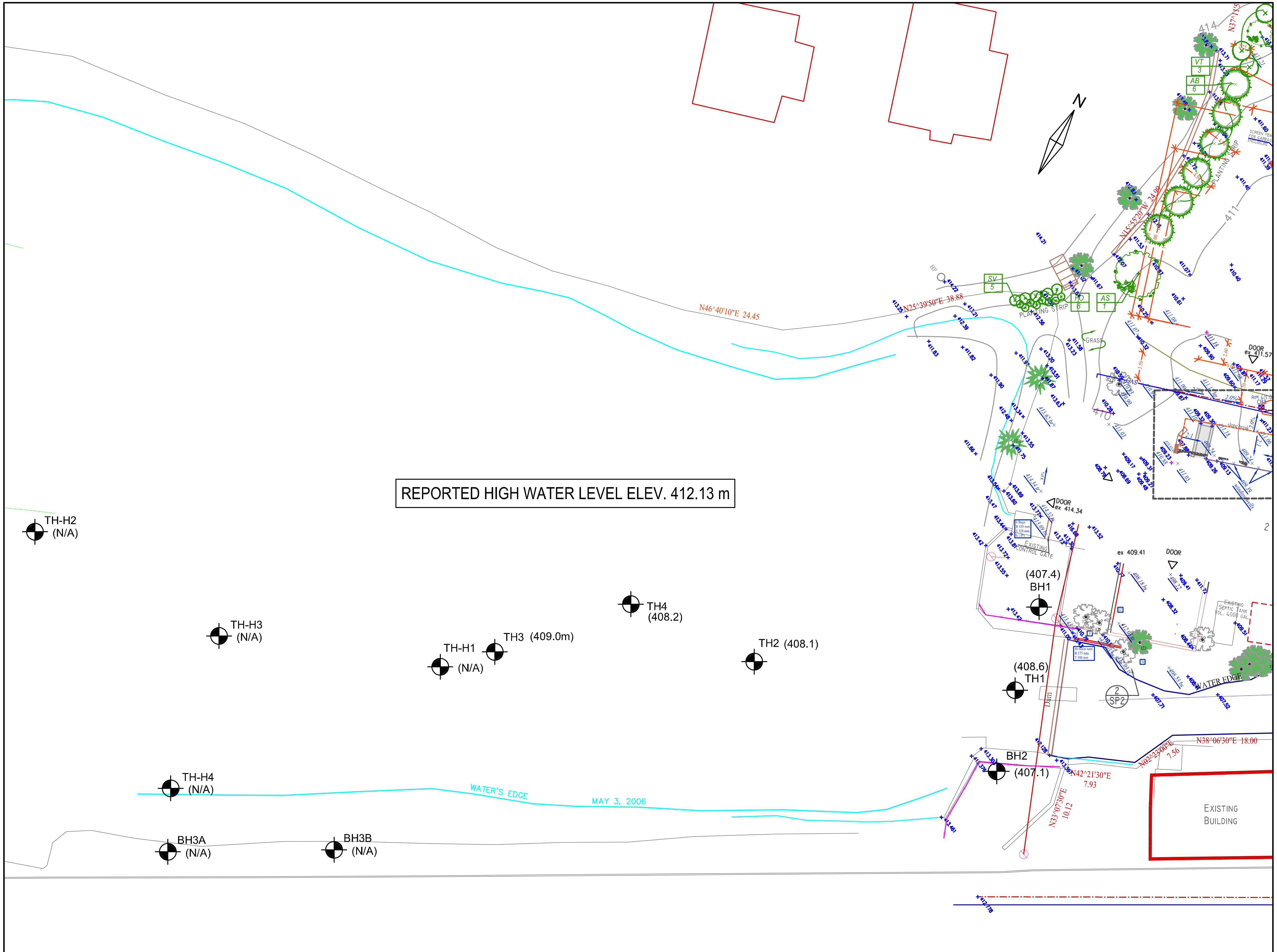
Title:

SITE PLAN SHOWING BOREHOLE AND TESTHOLE LOCATIONS

Project:

**GEOTECHNICAL INVESTIGATION
ALTON MILLPOND AND DAM
VILLAGE OF ALTON
TOWN OF CALEDON**

Drawn:	JC	Scale:	1:500
Check:	SAJ	Project No.:	T1874
Date:	15/02/04	Figure No.:	2



LEGEND

BH2 SARAFINCHIN Borehole January 2015

TH2 SARAFINCHIN Testhole, February 2015

TH-H2 SARAFINCHIN Hand Auger Testhole, January 2015

(410.82) Bedrock Elevation at Testhole Location (masl)

Drawing Reference:
The Landplan Collaborative Ltd.
Landscape Architects
with it's Project No. 05-0034

No.	Description	Date
R3	For approval	15/02/19
R2	For review only	15/02/13
R1	For submission	15/02/03

REVISIONS:

Client:

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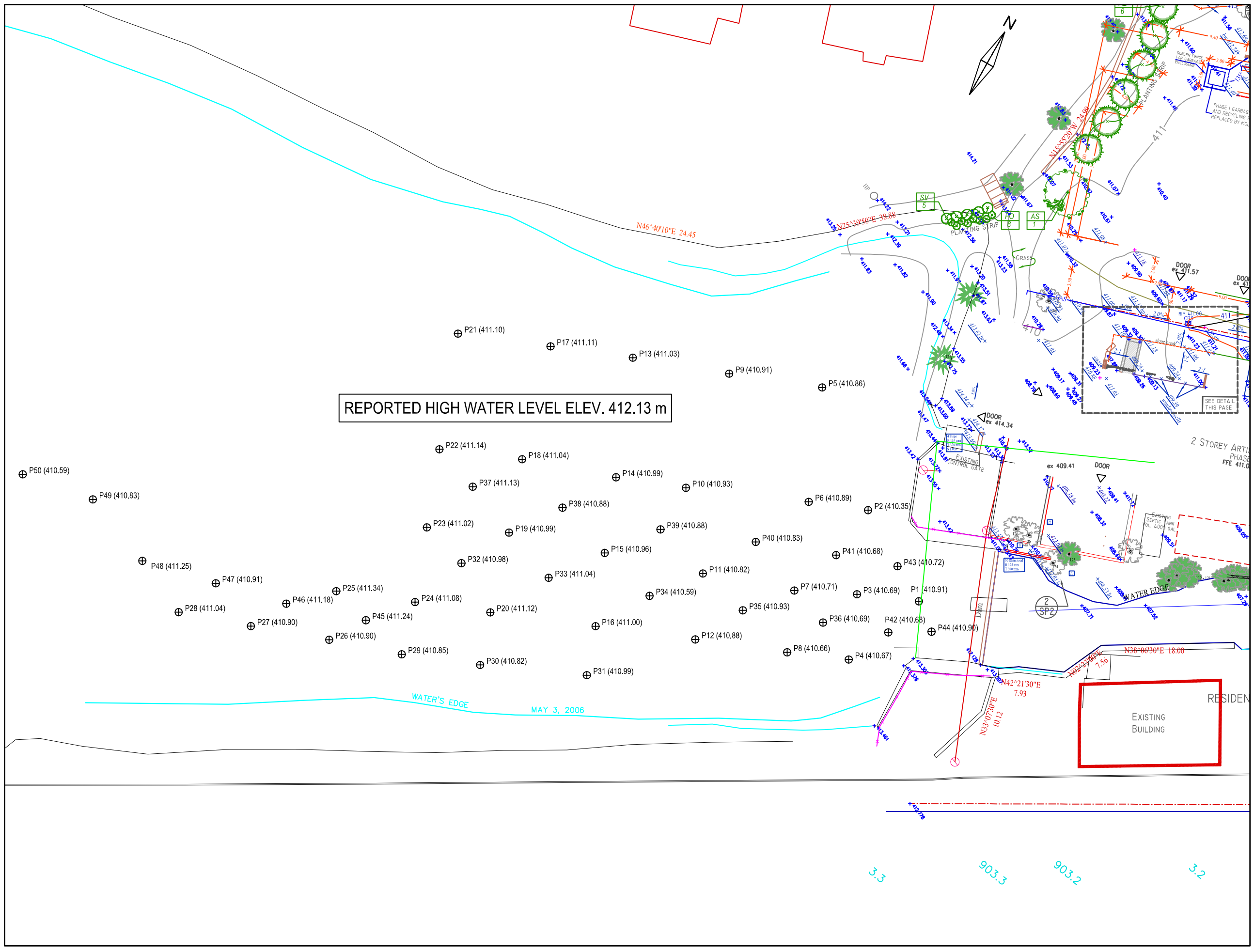
Title:

BEDROCK ELEVATIONS AT TESTHOLE LOCATIONS

Project:

GEOTECHNICAL INVESTIGATION ALTON MILLPOND AND DAM VILLAGE OF ALTON TOWN OF CALEDON

Drawn:	JC	Scale:	1:500
Check:	SAJ	Project No.:	T1874
Date:	15/02/04	Figure No.:	3



LEGEND

P11 (410.82)
⊕ SARAFINCHIN Survey Point and Pond Bottom Elevation (masl) January 2015

Drawing Reference:
The Landplan Collaborative Ltd.
Landscape Architects
with it's Project No. 05-0034

No.	Description	Date
R3	For approval	15/02/19
R2	For review only	15/02/13
R1	For submission	15/02/03

REVISIONS:

Client:

Alton Millpond Rehabilitation Committee

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Title:

POND BOTTOM ELEVATIONS

Project:

GEOTECHNICAL INVESTIGATION
ALTON MILLPOND AND DAM
VILLAGE OF ALTON
TOWN OF CALEDON

Drawn:	**JC**	Scale:	**1:500**
Check:	**SAJ**	Project No.:	**T1874**
Date:	**15/02/04**	Figure No.:	**4**

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG BH1

Figure No. 5

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 50	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests
0			413.4/0.0					
	TOPSOIL - SILT and SAND, compact, brown, moist (frozen), frequent organics		413.3 0.1	1	SS	64	73	
	FILL - SANDY SILT, compact, black/brown, moist, trace brick fragments and ash		412.7 0.7	2	SS	19	50	
1	FILL - SILTY SAND to SAND, loose to very loose, brown, moist to wet at about 1.8 m, some gravel below 2 m							
				3	SS	6	33	
2								
				4	SS	6	0	
3								
				5	SS	5	0	
			409.7					
	FILL - SAND and GRAVEL, very loose to compact, brown, wet, some silt		3.7					
4				6	SS	2	46	
				7	SS	14	38	
5								
			407.6					
	SANDY SILT - loose, grey/black, very moist, trace gravel, trace clay, organics		5.8 407.4	8	SS	55	57	
6	END OF BOREHOLE - Augers Refusal on Probable Dolostone Bedrock		6.0					
	NOTES:							
7	1. Borehole advanced on 15/01/26 with hollow stem augers and standard 50 mm diameter split spoon to 6.0 m.							
8	2. Short term water level during the drilling was 4.8 m.							
	3. Borehole was backfilled with bentonite upon completion.							
9								
10								

Dynamic Penetration Test
○ SPT ● Cone blows/0.3 m
20 40 60 80

Shear Strength Cu kPa
▲ Penetrometer ◆ Vane ⊠ Triaxial
50 100 150 200

Hydraulic Conductivity k_t cm/s
10^{-3} 10^{-4} 10^{-5} 10^{-6}

Water Content %
WP W WL
20 40 60 80

○/180 mm

0 5 10 15 **% axial strain at failure**

Bulk Density kg/m3

Instrumentation and Monitoring Equipment Installations

▼

Fieldwork Date: 15/01/26
Datum: Geodetic
Equipment: Track Mount D50

Survey Coordinates:
Vertical: 413.4 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: DW
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG BH2

Figure No. 6

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 50	Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests
0			413.5/0.0					
	TOPSOIL - SILTY SAND and ORGANICS, compact, brown, moist (frozen)		412.9	1	SS	20	13	
	FILL - SILTY SAND, compact to very loose, brown, moist to wet at about 1.8 m, some to trace gravel, sand and gravel layer at 1.5 m depth, trace organics		0.6	2	SS	24	8	
1								
				3	SS	8	50	
2								
				4	SS	3	6	
3								
				5	SS	3	0	
4			409.4					
	SILT and ORGANICS - loose, black, wet, trace wood piece		4.1					
			408.7					
5	SANDY SILT - loose, light brown, wet, organic staining		4.8	6	SS	7	50	
6								
				7	SS	50	0	
			407.1					
	END OF BOREHOLE - Augers Refusal on Probable Dolostone Bedrock (Limestone fragments recovered)		6.4					
7	NOTES:							
	1. Borehole advanced on 15/01/26 with hollow stem augers and standard 50 mm diameter split spoon to 6.4 m.							
8	2. Short term water level during the drilling was 3.8 m.							
	3. Borehole was backfilled with bentonite upon completion							
9								
10								

Dynamic Penetration Test
○ SPT ● Cone blows/0.3 m
20 40 60 80

Shear Strength Cu kPa
▲ Penetrometer ◆ Vane ⊠ Triaxial
50 100 150 200

Hydraulic Conductivity k_1 cm/s
10^{-3} 10^{-4} 10^{-5} 10^{-6}

Water Content %
WP W WL
20 40 60 80

155.102

○/130 mm

Bulk Density kg/m3

Instrumentation and Monitoring Equipment Installations

▼

0 15 5 10 **% axial strain at failure**

Fieldwork Date: 15/01/26
Datum: Geodetic
Equipment: Track Mount D50

Survey Coordinates:
Vertical: 413.5 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: DW
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG BH3A

Figure No. 7

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 50	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test (SPT ○ Cone ● blows/0.3 m; 20 40 60 80) / Shear Strength Cu kPa (Penetrometer ◆ Vane ✖ Triaxial; 50 100 150 200)	Hydraulic Conductivity k_1 cm/s (10^{-3} 10^{-4} 10^{-5} 10^{-6}) / Water Content % (WP W WL; 20 40 60 80)	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			413.7/0.0									
	TOPSOIL - SILTY SAND and ORGANICS, compact, brown, moist (frozen)		413.1	1	SS	6	50		○	●		
1	FILL - SAND and GRAVEL, compact, brown, moist, trace silt		0.6	2	SS	10	29		○	●		
2				3	SS	7	0		○			
	Auger refusal at 2.4 m depth		411.3									
	END OF BOREHOLE - Augers Refusal on Probable Boulder		2.4									
3	NOTES:											
	1. Borehole advanced on 15/01/26 with hollow stem augers and standard 50 mm diameter split spoon to 2.4 m.											
4	2. Borehole was dry and open upon completion.											
	3. Borehole was backfilled with bentonite upon completion.											
5												
6												
7												
8												
9												
10												

0 15 5 10 %axial strain at failure

Fieldwork Date: 15/01/26
Datum: Geodetic
Equipment: Track Mount D50

Survey Coordinates:
Vertical: 413.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: DW
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG BH3B

Figure No. 8

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 50	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests
0			414.0/0.0					
	TOPSOIL - SILTY SAND and ORGANICS, compact, brown, moist (frozen)			1	SS	14	63	
			413.4					
1	FILL - SILTY SAND and GRAVEL, loose, brown, moist, trace silt Auger refusal at 1.2 m depth.		0.6	2	SS	12	46	
	Moved 1 m west and met refusal at 1.2 m depth.		412.8					
	END OF BOREHOLE - Augers Refusal on Probable Boulder		1.2					
2	NOTES: 1. Borehole advanced on 15/01/26 with hollow stem augers and standard 50 mm diameter split spoon to 1.2 m. 2. Borehole was dry and open upon completion. 3. Borehole was backfilled with bentonite.							
3								
4								
5								
6								
7								
8								
9								
10								

Dynamic Penetration Test
○ SPT ● Cone blows/0.3 m
20 40 60 80

Shear Strength Cu kPa
▲ Penetrometer ◆ Vane ⊠ Triaxial
50 100 150 200

Hydraulic Conductivity k_i cm/s
10^{-3} 10^{-4} 10^{-5} 10^{-6}

Water Content %
WP W WL
20 40 60 80

Bulk Density kg/m3

Instrumentation and Monitoring Equipment Installations

0 15 5 10 **% axial strain at failure**

Fieldwork Date: 15/01/26
Datum: Geodetic
Equipment: Track Mount D50

Survey Coordinates:
Vertical: 414.0 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: DW
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH1

Figure No. 9

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test: SPT ○ Cone ● blows/0.3 m (20 40 60 80) / Shear Strength Cu kPa: Penetrometer ▲ Vane ◆ Triaxial ▣ (50 100 150 200)	Hydraulic Conductivity k_1 cm/s (10^{-3} 10^{-4} 10^{-5} 10^{-6}) / Water Content %: WP W WL (20 40 60 80)	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			411.7/0.0									▼
	ICE - 280 mm											
			411.4									
	POND WATER - 432 mm		0.3									
			411.0									
1	SILT and ORGANICS (POND SEDIMENT) - very loose, black, wet, trace sand, trace gravel		0.7	1	SS		15					
2			409.7									
	SAND and GRAVEL - loose, wet, dark brown, trace silt, trace organics		2.0	2	SS		21					
3			408.6						/275.1 mm			
	END OF TESTHOLE - Penetration Cone Refusal on Possible Dam Centre Pier Foundation or Bounder		3.1									
	NOTES:											
4	1. Testhole advanced on 15/02/03 with a manual Dynamic Penetration Cone and 50 mm diameter double length split spoon driven by percussion drill (Poinjar) to 3.1 m.											
	2. Blow counts presented are adjusted to standard weight hammer.											
5									0 15 5 10 %axial strain at failure			

Fieldwork Date: 15/02/03
Datum: Geodetic
Equipment: Pionjar

Survey Coordinates:
Vertical: 411.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH2

Figure No. 10

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test: SPT ○ Cone ● blows/0.3 m (20 40 60 80); Shear Strength Cu kPa: Penetrometer ▲ Vane ◆ Triaxial ■ (50 100 150 200)	Hydraulic Conductivity k_1 cm/s (10^{-3} 10^{-4} 10^{-5} 10^{-6}); Water Content %: WP W WL (20 40 60 80)	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			411.7/0.0									▼
	ICE - 330 mm											
			411.4									
	POND WATER - 381 mm		0.3									
			411.0									
1	SILT and ORGANICS (POND SEDIMENT) - very loose, black, wet, trace sand, trace gravel		0.7	1	SS		3					
2			409.5									
	SILT and SAND (POND SEDIMENT) - very loose to loose, dark brown, wet, some organics		2.2	2	SS		50					
			408.9									
3	SAND and GRAVEL - compact, brown, wet, trace silt		2.8	3	SS		30		/24.9 mm			
			408.1									
	END OF TESTHOLE - Penetration Cone Refusal on Probable Dolostone Bedrock		3.6									
4	NOTES: 1. Testhole advanced on 15/02/03 with a manual Dynamic Penetration Cone and 50 mm diameter double length split spoon driven by percussion drill (Poinjar) to 3.6 m. 2. Blow counts presented are adjusted to standard weight hammer.											
5									0 15 5 10 % axial strain at failure			

Fieldwork Date: 15/02/03
Datum: Geodetic
Equipment: Pionjar

Survey Coordinates:
Vertical: 411.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH3

Figure No. 11

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test (SPT / Cone, blows/0.3 m)	Shear Strength Cu kPa (Penetrometer / Vane / Triaxial)	Hydraulic Conductivity k_1 cm/s	Water Content % (WP / W / WL)	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			411.7/0.0											
	ICE - 178 mm		411.5											
	POND WATER - 330 mm		0.2											
			411.2											
	Bottom of Pond (Top of Sediment)		0.5											
1														
2														
									75 mm					
			409.0											
3	END OF TESTHOLE - Penetration Cone Refusal on Probable Dolostone Bedrock		2.7											
	NOTES:													
	1. Testhole advanced on 15/02/03 with a manual Dynamic Penetration Cone and 50 mm diameter double length split spoon driven by percussion drill (Poinjar) to 2.7 m.													
	2. Blow counts presented are adjusted to standard weight hammer.													
4														
5														

Dynamic Penetration Test: ○ SPT ● Cone blows/0.3 m; 20 40 60 80
Shear Strength Cu kPa: ▲ Penetrometer ◆ Vane ⊠ Triaxial; 50 100 150 200
Hydraulic Conductivity k_1 cm/s: 10^{-3} 10^{-4} 10^{-5} 10^{-6}
Water Content %: WP W WL; 20 40 60 80

0 15 5 10 %axial strain at failure

Fieldwork Date: 15/02/03
Datum: Geodetic
Equipment: Pionjar

Survey Coordinates:
Vertical: 411.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH4

Figure No. 12

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests
0			411.7/0.0					
	ICE - 356 mm							
			411.3					
	POND WATER - 254 mm		0.4					
			411.1					
	Bottom of Pond (Top of Sediment)		0.6					
1								
2								
3								
			408.2					
4	END OF TESTHOLE - Penetration Cone Refusal on Probable Dolostone Bedrock NOTES: 1. Testhole advanced on 15/02/03 with a manual Dynamic Penetration Cone and 50 mm diameter double length split spoon driven by percussion drill (Poinjar) to 3.5 m. 2. Blow counts presented are adjusted to standard weight hammer.		3.5					
5								

Dynamic Penetration Test
○ SPT ● Cone blows/0.3 m
20 40 60 80

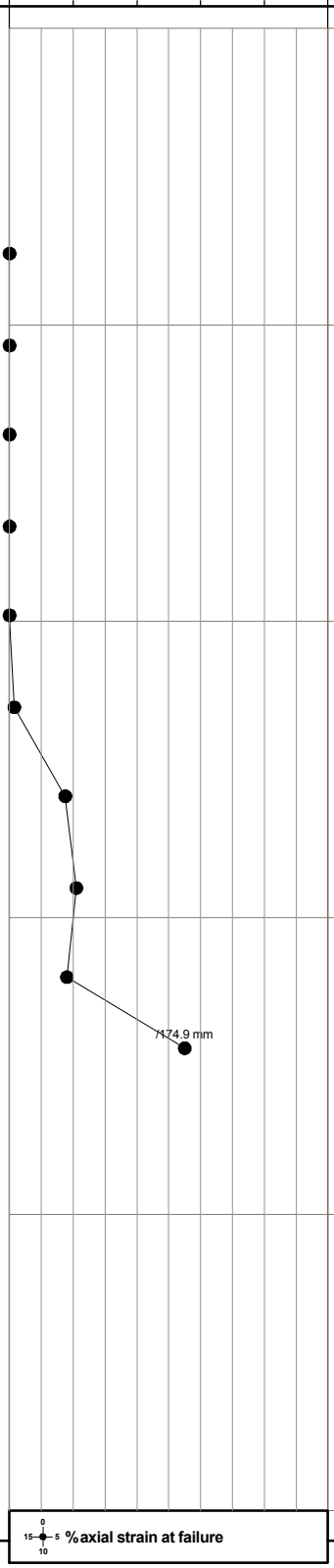
Shear Strength Cu kPa
▲ Penetrometer ◆ Vane ⊠ Triaxial
50 100 150 200

Hydraulic Conductivity k, cm/s
10^{-3} 10^{-4} 10^{-5} 10^{-6}

Water Content %
WP W WL
20 40 60 80

Bulk Density kg/m3

Instrumentation and Monitoring Equipment Installations



Fieldwork Date: 15/02/03
Datum: Geodetic
Equipment: Pionjar

Survey Coordinates:
Vertical: 411.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH-H1

Figure No. 13

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test (SPT ○ Cone ● blows/0.3 m; 20 40 60 80) / Shear Strength Cu kPa (Penetrometer ▲ Vane ◆ Triaxial ⊠; 50 100 150 200)	Hydraulic Conductivity k_1 cm/s (10^{-3} 10^{-4} 10^{-5} 10^{-6}) / Water Content % (WP W WL; 20 40 60 80)	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			411.7/0.0									▼
	ICE - 150 mm		411.5									
	POND WATER - 457 mm		0.2									
			411.1									
	SILT and ORGANICS (POND SEDIMENT) - very loose, black, wet, trace sand		0.6	1	AU							
1				2	AU							
	light brown fine grained sand observed at tip of auger at depth 1.5 m			3	AU							
			410.2									
	END OF TESTHOLE - Hand Auger Refusal		1.5									
	NOTES:											
	1. Testhole advanced on 15/01/29 with a hand auger to 1.5 m.											
2												
3												
4												
5												

0 15 5 10 **% axial strain at failure**

Fieldwork Date: 15/01/29
Datum: Geodetic
Equipment: Hand Excavation

Survey Coordinates:
Vertical: 411.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH-H2

Figure No. 14

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test (○ SPT ● Cone blows/0.3 m: 20 40 60 80) / Shear Strength Cu kPa (▲ Penetrometer ◆ Vane ⊠ Triaxial: 50 100 150 200)	Hydraulic Conductivity k_1 cm/s (10^{-3} 10^{-4} 10^{-5} 10^{-6}) / Water Content % (WP W WL: 20 40 60 80)	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			411.8/0.0									▼
	ICE - 254 mm											
			411.5									
	POND WATER - 915 mm		0.3									
1	fine grained sand observed at tip of auger at depth 1.2 m											
			410.6									
	END OF TESTHOLE - Hand Auger Refusal		1.2									
	NOTES:											
	1. Testhole advanced on 15/01/29 with a hand auger to 1.2 m.											
2												
3												
4												
5												

0 5 10 15 — % axial strain at failure

Fieldwork Date: 15/01/29
Datum: Geodetic
Equipment: Hand Excavation

Survey Coordinates:
Vertical: 411.8 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH-H3

Figure No. 15

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Description	Symbol	Elev. / Depth (m)	Sample Number	Type	Blows/0.3 m	Recovery %	Lab Tests
0	ICE - 280 mm		411.8/0.0					
			411.5					
	POND WATER - 584 mm		0.3					
			410.9					
1	SAND and GRAVEL - loose, brown to black, wet, some organics		0.9	1	AU			
			410.5	2	AU			
	SAND - loose to compact, brown, trace gravel, coarse grained		1.3 / 410.4	3	AU			
	END OF TESTHOLE - Hand Auger Refusal		1.4					
	NOTES:							
2	1. Testhole advanced on 15/01/29 with a hand auger to 1.4 m.							
3								
4								
5								

Dynamic Penetration Test
○ SPT ● Cone blows/0.3 m
20 40 60 80

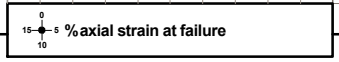
Shear Strength Cu kPa
▲ Penetrometer ◆ Vane ⊠ Triaxial
50 100 150 200

Hydraulic Conductivity k_1 cm/s
10^{-3} 10^{-4} 10^{-5} 10^{-6}

Water Content %
WP W WL
20 40 60 80

Bulk Density kg/m3

Instrumentation and Monitoring Equipment Installations



Fieldwork Date: 15/01/29
Datum: Geodetic
Equipment: Hand Excavation

Survey Coordinates:
Vertical: 411.8 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Project No.: T1874
Project: Alton Millpond Rehabilitation
Location: 1402 Queen Street West
Alton, Ontario

TESTHOLE LOG TH-H4

Figure No. 16

SARAFINCHIN
Consulting Engineers

Depth, metres Scale 1 to 25	Geologic Profile: Description	Symbol	Elev. / Depth (m)	Sample: Number	Type	Blows/0.3 m	Recovery %	Lab Tests	Dynamic Penetration Test (SPT ○ Cone ● blows/0.3 m) 20 40 60 80 / Shear Strength Cu kPa (Penetrometer ▲ Vane ◆ Triaxial ⊠) 50 100 150 200	Hydraulic Conductivity k_t cm/s 10^{-3} 10^{-4} 10^{-5} 10^{-6} / Water Content % (WP W WL) 20 40 60 80	Bulk Density kg/m3	Instrumentation and Monitoring Equipment Installations
0			411.7/0.0									▼
	ICE - 100 mm		411.6									
	POND WATER - 150 mm		0.1									
			411.4									
	SAND and ORGANICS - loose, color, wet, trace gravel		0.3	1	AU							
			411.3									
	END OF TESTHOLE - Hand Auger Refusal		0.4									
1	NOTES: 1. Testhole advanced on 15/01/29 with a hand auger to 0.4 m.											
2												
3												
4												
5												

0 15 5 10 **% axial strain at failure**

Fieldwork Date: 15/01/29
Datum: Geodetic
Equipment: Hand Excavation

Survey Coordinates:
Vertical: 411.7 m **Horizontal:** Refer to Figure 2

Sheet: 1 of 1
Logged: JC
Checked: SJ

Geotechnical Investigation
Alton Millpond and Dam
Village of Alton
Town of Caledon

APPENDIX

Appendix A	Nearby Core Hole Log by SPL
Appendix B	2010 National Building Code of Canada Seismic Hazard Values
Appendix C	Alton Dam Existing Conditions TSH Dwg. S1 dated Jan. 2006
Appendix D	Site Photographs

APPENDIX A

Nearby Core Hole Log by SPL

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH11-2

PROJECT: Geotechnical Investigation-Alton Village Wastewater Class EA
CLIENT: Regional Municipality of Peel
PROJECT LOCATION: Caledon, Ontario
DATUM: Geodetic
BH LOCATION: Queen St. W(see Drawing 1)

DRILLING DATA
Method: Solid Stem Augers/NQ Coring
Diameter: 115 mm
Date: Nov/22/2011

REF. NO.: 592-1073
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (50 100 150 200 250)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
413.1												
413.0 / 0.1	**ASPHALT:** 75 mm						413					
412.4 / 0.7	**GRANULAR FILL:** 625 mm (sand and gravel)		1	AS								
411.6	**FILL:** silty sand, some organics, trace gravel, brown, moist, loose		2	SS	5		412					
411.5 / 1.7	**DOLOSTONE:** greyish yellow TCR = 75% SCR = 75% RQD=75%		3	SS	50/150mm	W. L. 412.0 m Jan 09, 2012						
			1	CORE			411					
409.9 / 3.2	TCR = 98% SCR = 97% RQD= 88%		2	CORE			410					
408.4 / 4.7	TCR = 100% SCR =100 % RQD=83 %		3	CORE			409					
406.8							408					
6.3	**END OF BOREHOLE** Notes: 1) Auger refusal at 1.7 m on bedrock and Rock coring started at 1.7 m. 2) 19 mm flush mount piezometer installed upon completion. 3) Borehole was dry and open upon completion.						407					

SPL SOIL LOG 592-1073 -BOREHOLE LOGS.GPJ SPL.GDT 3/7/12

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3 : Numbers refer to Sensitivity ○ ε=3% Strain at Failure

APPENDIX B

2010 National Building Code of Canada
Seismic Hazard Values

Natural Resources Canada

Determine 2010 National Building Code of Canada seismic hazard values

Latitude and longitude values should be entered in decimal degree (DD.DDDD) or degree:minute:second (DD:MM:SS.S) format. UTM coordinates can be converted to latitude and longitude using the Canadian Spatial Reference System Service's online GSRUG application.

For more information see seismic hazard in Canada

Supporting documentation and calculators for other editions of the code

2010 National Building Code of Canada seismic hazard calculator

Jump to search results

Latitude
43.86

Longitude (in Canada should be entered as negative values)
-80.07

Number of closest points for interpolation
7 points ▼

Parameter to display on map (values for all 5 parameters will be determined)
Sa (0.2) ▼

Enter location place name (optional)
Alton MillPond

Type of structure (optional)
Dam

Company/Organization (optional)
Sarafinchin Associates Ltd.

Name (optional)

Email (optional)

Personal Information Collection Statement

The personal information you provide using the seismic hazard calculator form for the seismic hazard calculator is collected under the authority of the Resources and Technical Surveys Act and will be used by Natural Resources Canada to conduct research into earthquakes in Canada. The information may also be used to contact you for follow-up research or to confirm the data provided.

Please note that the information you provide using the seismic hazard calculator may be routed through

an American or other internationally-based server. However, in the event that this occurs, the information will be deleted from the American or internationally-based server after one week.

There are no legal or administrative consequences for refusing to provide the personal information requested. Under the Privacy Act, you have rights of access to, correction of, and protection of personal information.

The information you provide using this form is described in the following standard Personal Information Bank (PIB): Public Communications - PSU 914. For more information about this PIB and your privacy rights, please consult Info Source: Sources of Federal Government and Employee Information, which is published on the Internet by the Treasury Board of Canada Secretariat at: http://infosource.gc.ca/index-eng.asp.

Calculate

Page will reload with results inserted at the end of the page under the heading "Search Results"

Search Results

2010 National Building Code of Canada interpolated seismic hazard values

Determined for a 2% in 50 year (0.000404 per annum) probability of exceedence. Values are for "firm ground" (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g for spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA). Only 2 significant figures are to be used.

These values have been interpolated Using Shepards method from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.

Site Coordinates:43.86 °N 80.0699°W

User File Reference:Alton MillPond

Requested by:, Sarafinchin Associates Ltd.

National Building Code interpolated seismic hazard values

2%/50 years (0.000404 per annum) probability

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.161 g	0.100 g	0.060 g	0.020 g	0.057 g

Interpolated seismic hazard values at other probabilities

40%/50 years (0.01 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.024 g	0.014 g	0.008 g	0.003 g	0.007 g

10%/50 years (0.0021 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.067 g	0.041 g	0.025 g	0.008 g	0.023 g

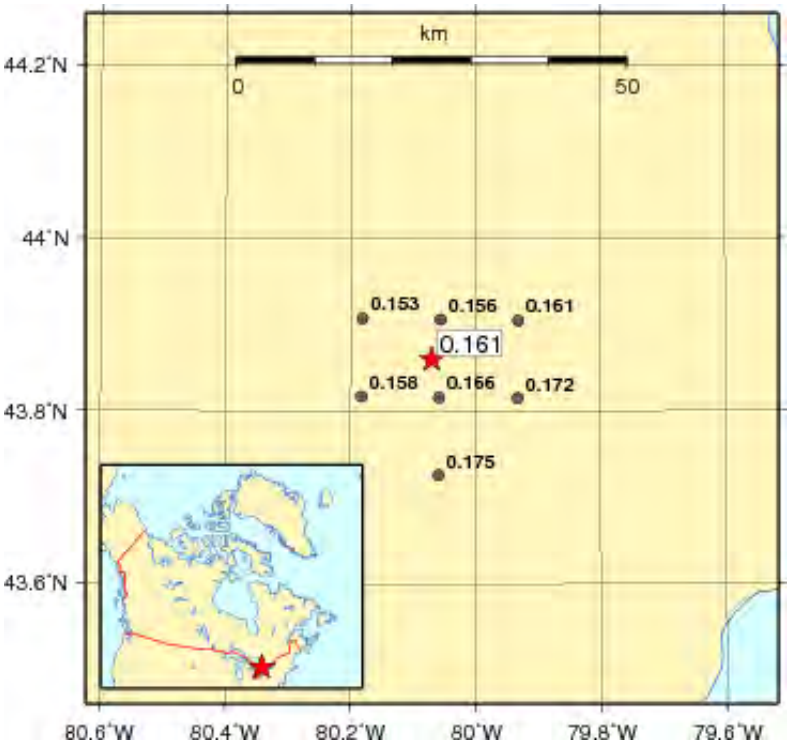
5%/50 years (0.001 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.102 g	0.063 g	0.040 g	0.013 g	0.034 g

Generate a pdf version of the interpolated NBCC 2010 values

Nearby points values for National Building Code probabilities

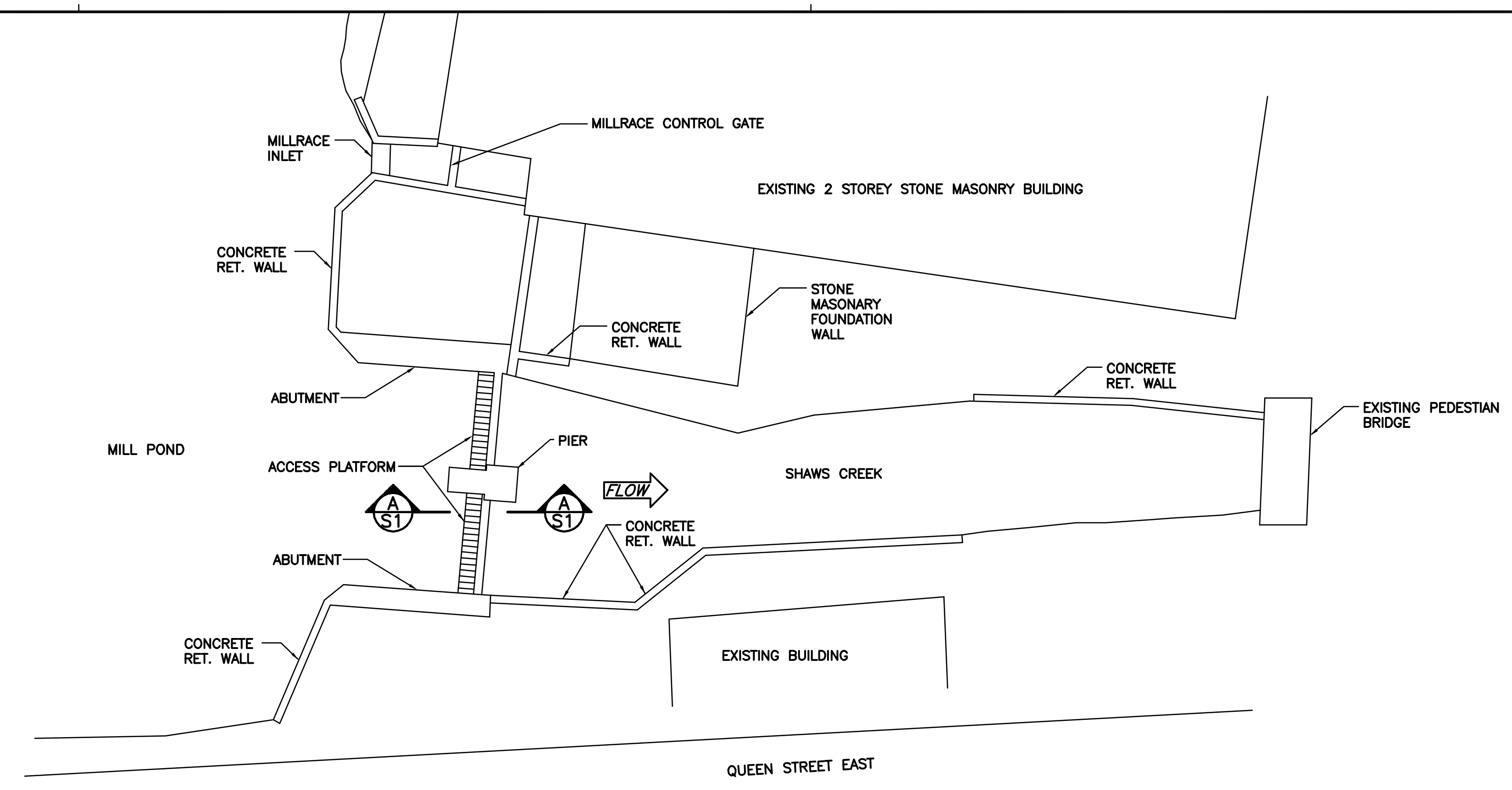
Distance		Latitude	Longitude	Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
14.926	km	43.726	-80.059	0.175	0.104	0.060	0.020	0.069
12.133	km	43.905	-79.932	0.161	0.101	0.061	0.020	0.056
12.067	km	43.815	-79.933	0.172	0.104	0.062	0.020	0.065
10.325	km	43.907	-80.181	0.153	0.096	0.059	0.019	0.050
10.184	km	43.817	-80.182	0.158	0.098	0.059	0.019	0.054
5.235	km	43.906	-80.056	0.156	0.098	0.060	0.020	0.053
4.985	km	43.816	-80.058	0.166	0.100	0.060	0.020	0.059
Interpolated		43.86	-80.0699	0.161	0.100	0.060	0.020	0.057



Date modified: 2013-07-23

APPENDIX C

Alton Dam Existing Conditions
TSH Drawings S1 dated January 2006

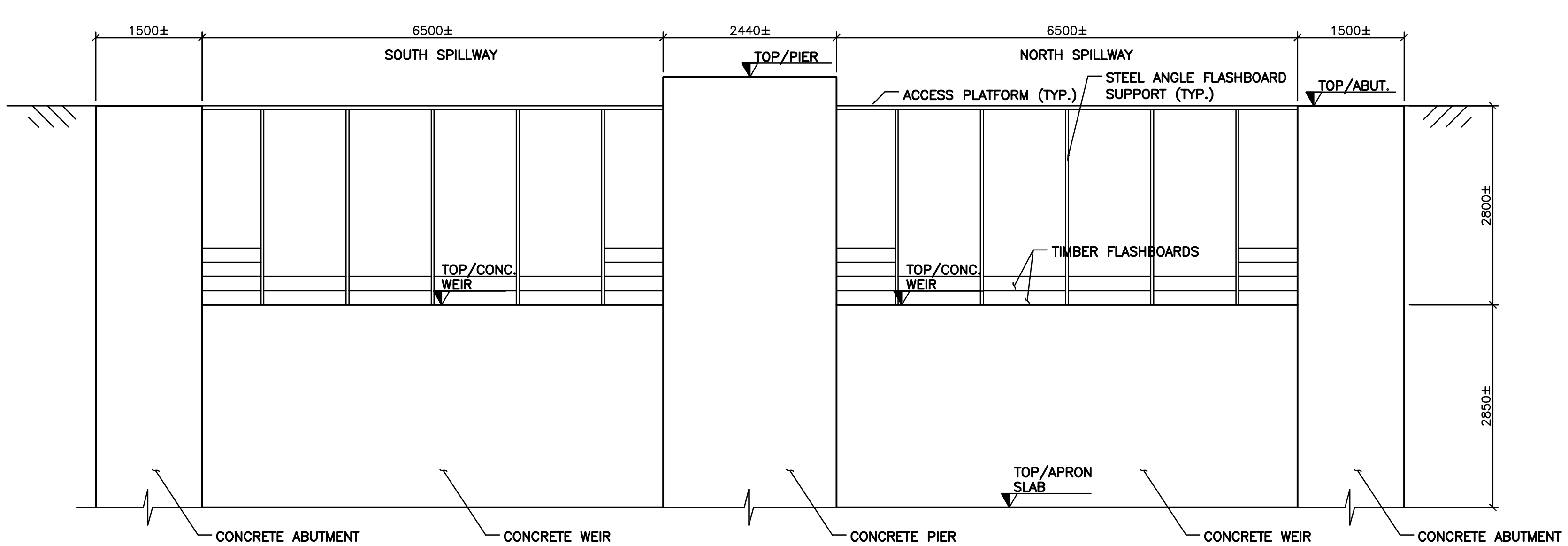


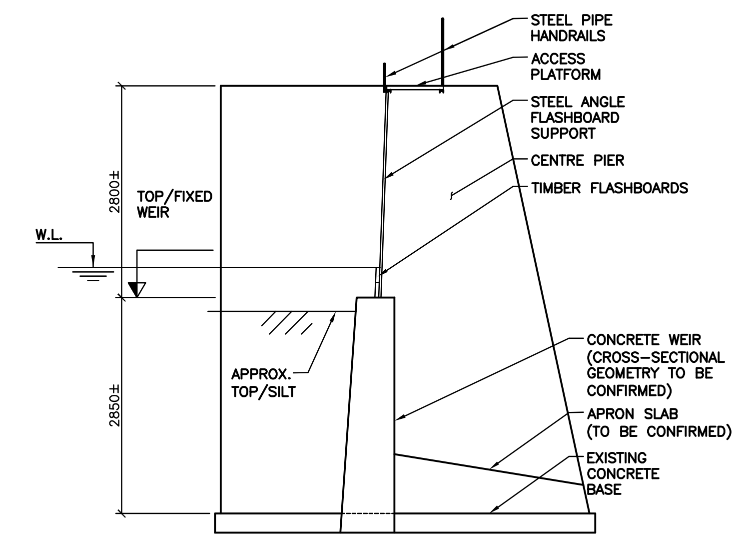
NOTES

- THIS DRAWING WAS PREPARED AS PART OF A DAM INSPECTION CONDUCTED BY TOTTEN SIMS HUBICKI AND IS TO BE READ AS PART OF THE ACCOMPANYING REPORT.
- THIS DRAWING IS BASED ON REFERENCE DRAWING ENTITLED "REPAIRS TO EXISTING CENTRE PIER", DATED APRIL 20, 1999 G1, PREPARED BY BAGGIO O.T. ASSOC. LTD.

PLAN

1:250





DOWNSTREAM ELEVATION

SCALE 1 : 50

SECTION A/S1

1 : 50

(CENTER PIER AND EXISTING WEIR)

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No.	DATE	BY	ISSUES / REVISIONS

CLIENT: ALTON DEVELOPMENT INC.

DRAWN BY:	CHECKED BY:
D. RICHMOND	M. SHALLHORN
DESIGNED BY:	APPROVED BY:
SCALE: AS SHOWN	DATE: JAN, 2006

PROJECT: DAM INSPECTION
ALTON MILL DAM
SHAWS CREEK

DRAWING: EXISTING CONDITIONS

PROJECT No.: 54-22243

DRAWING No. S1

APPENDIX D

Site Photographs

Photo 1– View of Millpond with heritage mill building and dam in background

Photo 2 – Upstream Millpond and heritage mill building

Photo 3 – Upstream headpond and Alton Dam, looking east

Photo 4 – Two weirs and centre pier of Alton Dam

Photo 5 – Alton dam weirs, view from Shaw's Creek north bank downstream of dam

Photo 6 – Geotechnical drilling and sampling at BH 3A