December 18, 2018

Geotechnical Investigation
471 Richmond Street West, Toronto

BRUCE A. BROWN ASSOCIATES LIMITED Project 18*4495
Consultants in the Environmental and Applied Earth Sciences

Contents

Appendix A: Statement of Limitations for Geotechnical Evaluations

Appendix B: Site Location Plan

Appendix C: Monitoring Well/Borehole Location Plan

Appendix D: Monitoring Well/Borehole Logs 1 - 3

Borehole Log Key & Soil Classification Key

Appendix E: Proposed Development, Preliminary Plan and profile

Distribution: 2 copies and 1 pdf to Client
1 copy to file

BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences
101-102Aerodrome Crescent
Toronto, Ontario, Canada M4G 4J4
Tel: (416) 424-3355 Email bruce@brownassociates.ca

Project 18*4495
December 18, 2018

Attn: Mr. Vahé Kouyoumdjian, P.Eng.

Manga Hotels (Richmond) Inc.
3279 Caroga Drive
Mississauga, ON L4V 1A3

E-mail: vahe@kingslakeprojects.com

Dear Mr. Kouyoumdjian,

Re: Geotechnical Investigation
465 – 471 Richmond Street West, Toronto

1.0 Summary

Brown Associates completed a geotechnical and hydrogeological investigation for this commercial property located on the south side of Richmond Street West midway between Spadina Avenue and Brant Street. It was originally developed with two Victorian houses, which were demolished in about 1939 favour of the current 2 storey building with partial basement, which occupies the western half of the site. Proposed future redevelopment has a residential component; therefore a Record of Site Condition must be acknowledged by Ontario Ministry of the Environment, Conservation and Parks (MECP) for which further confirmatory site characterization of soil and groundwater would be required in addition to this geotechnical assessment which was limited to the eastern half of the site.

Three boreholes were advanced to refusal in shale bedrock at between 9.3 and 9.8m depth below grade. All three boreholes were equipped with monitoring wells with standpipes extending to grade. A proposed redevelopment with three levels of parking beneath would have inverts just into sound bedrock, permitting very high loads, up to 7 mPa SLS, in sound rock, subject to verification inspection. Excavation may be supported using conventional H pile and lagging shoring to shale bedrock.

Dewatering is not likely to be required after initial pore water is removed, save and except to accommodate precipitation, since infiltration of standing water at any depth of excavation in overburden will be ineffective. Standpipe piezometers have been preserved for future reference, if required.

2.0 Introduction

2.1 Property Information

The address for the redevelopment property is 465-471 Richmond Street West, City of Toronto. Brown Associates Limited was originally retained by Mr. Vahé Kouyoumdjian, of Manga Hotels (Richmond) Inc., to prepare a Geotechnical Investigation for the subject property. The current principal contact person for Manga Hotels is as follows:

Attn: Mr. Vahé Kouyoumdjian, P.Eng.

Manga Hotels (Richmond) Inc.,
3279 Caroga Drive
Mississauga, ON L4V 1A3

E-mail: vahe@kingslakeprojects.com

2.2 General Description

The property is described as Lots 6 and 7, Registered Plan D-46. The property was formerly developed with two *circa* 1850s Victorian residences which were demolished in about 1939. The existing two-storey building with partial basement on the west side of the property was constructed in two stages between about 1943 and 1949. The eastern half of the property has been used for vehicle parking since that time. A Site Location Plan is attached as **Appendix B**.

2.3 History of Use

The property was originally developed with *circa* 1850's Victorian residences on the Richmond frontage. These typically had detached carriage houses to the rear, and typically had partial basements to about 1.5m depth below original grade. Both were demolished in about 1939 in favour of the existing commercial building.

2.4 Previous Reporting

No previous geotechnical or hydrogeological reports are known for the subject property. There is a history of previous investigations which is listed in a recent Phase 1 Environmental Report by Watters Environment Group Inc., dated August, 2017, prepared for Manga Hotels (Richmond) Inc. None of these other reports were available for review. The Watters report was completed to meet Canadian Standards Association requirements, and contained the following references:

Environmental Studies and Report, 460 and 471 Richmond Street West, Toronto, Ontario prepared by Erikson Environmental Consultants Inc., for Canadian Building Inspection Services Limited, dated 1993

Environmental Studies and Report, Part 2, 460 and 471 Richmond Street West, Toronto, Ontario prepared by Erikson Environmental Consultants Inc., for Canadian Building Inspection Services Limited, dated 1993

Phase 1 Environmental Site Assessment, 471 Richmond Street West, Toronto, prepared by Winchurch Environmental Inc., for 1027285 Ontario Ltd., dated August 1998

Phase II Subsurface Investigation, 460 and 471 Richmond Street West, Toronto, Ontario, prepared by Jacques Whitford Environment Limited for The Strashin Group, February 19, 1999

Phase 1 Environmental Site Assessment, 465-471 Richmond Street West, Toronto, Ontario, prepared by S2S Environmental Inc., for the First National Financial Corporation, January 10, 2006.

Brown Associates prepared an Initial Phase II environmental report dated December, 2018, in which soil and groundwater chemistry can be found. The only other intrusive testing program, by Jacques Whitford, comprised two boreholes advanced to about 2m below grade, finding demolition spoils with exceedances in PAHs and transition metals in both. References above to 460 Richmond may be a typographical error, since both parts of the site, including 465 Richmond, were in common ownership at all relevant times.

3.0 Field Investigations

Underground services were cleared by a private locator service, prior to mobilization with a drill rig. This service is a mandatory work item before drilling can take place.

The field investigation included geo-environmental drilling using a truck-mounted CME 75 continuous-flight hollow-stem power augurs, under the direction of our senior technologist on May 3, 2018. 3.0m length screens were set as low as possible in each borehole. Development of the three wells for groundwater response testing was completed on May 9, 2018. This investigation has been carried out in accordance with the Statement of Limitations, which is attached in **Appendix A,** and forms a part of this report. Flushmount well covers were set into concrete.

3.1 Borehole Construction

On May 3, 2018, boreholes were advanced to refusal into shale bedrock. All three were instrumented and developed as monitoring wells. MW/Borehole locations are shown on the attached **Appendix C**.

Boreholes were advanced using a truck-mounted CME 75 with 200mm standard flight hollow stem power augurs. Soil samples were obtained in intervals of 0.75m or 1.5m at greater depths using 50mm x 750mm standard split spoons. As the split spoon was advanced with Standard Force blows, penetration resistances, or "N" values, were recorded. Our senior technologist maintained field borehole logs. Borehole log summaries are attached in **Appendix D**.

Boreholes were advanced to contact shale bedrock and continued to augur through any weathered zone to augur refusal in sound rock. Generally 0.3 to 0.5m of rock was penetrated prior to total refusal.

3.2 Groundwater Monitoring Well Installation

Monitoring wells were instrumented by Determination Drilling, using 50mm diameter x 1500mm 10-slot screen for piezometers with a 50mm cone tip in each. These were followed by a 50mm threaded solid standpipe up to 100mm from grade and capped with a 50mm J-plug. The screened interval was set to bracket the noted colour change from brown to uniform grey at intermediate depth. Well screens were backfilled with well grade sand at depth and to 600mm above the top of 3m screens, followed by a bentonite seal from 600mm above screen to 460mm from grade where a standpipe with J-plug and flushmount protective cover was concreted into place. When well materials were handled, they remained in their protective plastic wrappings until entering the well, and the well installer used disposable nitrile gloves when handling the materials.

When no longer required, because they will not extend deeper than proposed redevelopment, the three wells may be decommissioned by removal during bulk excavation, but must be preserved until that time.

3.2.1 Well Development

Prior to chemical characterization of groundwater, wells were developed by removal of at least five well volumes during hydrogeological using a four stage 40mm diameter submersible 12 volt pump calibrated at 9 litres per minute flow. Drawdown for each well took less than one minute to void standpipes. Soil and groundwater quality are found in a separate Phase 2 environmental report prepared by Brown Associates in December, 2018.

3.3 Soil Stratigraphy

The reader is referred to the attached Borehole / Monitoring Well Logs found in **Appendix D**.

The entire east part of the site is finished with 50 to 75mm of asphaltic concrete which was generally in fair condition. No granular bedding was found in any test location. Pavement was underlain by fill materials to depths ranging from 0.8 to 1.4m below grade. Fill contained red brick, traces of glass and cinders and ash, topsoil and broken asphaltic pavement in a matrix containing sand and coarse gravels.

A deep sequence of undisturbed plastic, cohesive silt and clay-size till, transitioned to predominantly dense silt till by 2m depth, becoming very dense between 5 and 6m depth below grade, with a fine sandy silt till zone between 5.7 and 8.6m depth in BH-MW-1-18, and between 7.6 and bedrock at 9.5 in BH-MW-3-18. This material was not encountered in BH-MW-2-18. Shale bedrock with a very limited transition or weathered zone was found between 9.3 and 9.8m depth below grade. Shales belong to the Georgian Bay Formation, which is of Ordovician age.

4.0 Geotechnical Recommendations

4.1 Proposed Redevelopment

The proposed redevelopment is to extend across the entire site. Tentative design includes three levels of underground parking, which would place the structure founding 1 to nearly 3 meters into the shale bedrock, and with sumps and elevator pits set deeper into bedrock.

4.2 Shallow Foundations in Overburden

Shallow conventional foundations are possible in undisturbed soils. At depth of frost penetration or at the base of fill, if greater depth in any former basements, lightly loaded structures including a temporary sales pavilion, can be constructed on strip footings and column pads based on a safe allowable bearing capacity of 150 kPa SLS, (265 ULS) subject to a minimum pad dimension of 650mm to prevent punching and also subject to verification inspection by an experienced geotechnical engineer. A temporary sales pavilion may also be founded on shallow caissons augured at least 0.5m beyond disturbed soils.

4.3 Foundations on Bedrock

Concrete perimeter footings and column pads founded directly on top of shale beneath any weathered zone may be designed with bearing capacity of 5.0 mPa SLS (9.0 mPa ULS).

Perimeter strip footings and column pads advanced at least 1m into sound shale below the shale interface may be designed on the basis of 7 mPa SLS, subject to verification of rock soundness by an experienced geotechnical engineer. In general, rock may be cut to neat lines and walls foundations poured blind against rock faces.

4.4 Damp-Proofing Against Timber Lagging and Shales

A continuous waterproofing layer of drainage board with taped seams shall be provided, allowing tees through the bases at regular intervals to a collection drain inside the structure. This shall be attached to timber lagging, and concrete bases shall be cast directly against the waterproofing layer. Against shale faces, a second layer of drainage board is recommended to perform as a cushion to prevent tearing against sharp shale edges. In the alternative, gaps can be filled with urethane foam or larger gaps bridged with plywood to maintain a flush face on excavation perimeters. This is especially important if there are any minor fault faces or joints at an angle, resulting in a sawtooth rock face where wedges of rock are removed as over-excavation on the face in the direction of joint system slopes, which is generally the south side in this part of the City.

4.5 Drainage Beneath Building

Underdrains shall be spaced approximately 6m on centre in the granular bedding for the P3 concrete slab, and may be common trench with other utilities such as building sanitary drains and solid drains to convey perimeter drainage. Precast serial sumps for perimeter drains and underdrains are required, with the first chamber acting as a sediment trap.

Elevator sumps may require a skin coat at base to protect a proprietary waterproofing layer plus a minimal second skin coat above to protect the membrane while steel reinforcement is placed. If elevator sumps are cast blind against shale, a second sacrificial layer of drainage board or other means to smooth the rock faces may be required to ensure integrity up to underside of slab elevation.

4.6 Other Geotechnical Design Parameters

Lateral soil pressure for permanent structures may be determined using the following equation:

$P = K(\gamma H+q)$ where,

P = lateral earth pressure kPa	kPa
K = lateral earth pressure coefficient	0.4
γ = unit weight of soil	22.1 kN/M^3
H = depth of wall below finished grade	m
q = surcharge loads adjacent to wall	kPa

This formula assumes free-draining conditions created by perimeter drainage systems to prevent any hydrostatic pressures from building behind perimeter walls. In addition, surfaces should be impervious or sloping away from the perimeter to prevent infiltration around the bases.

For temporary shoring, where there are building foundations of services behind temporary shoring within a distance of 0.5H, K= Ko = earth pressure coefficient at rest should be 4.0, and where there are services between 0.5H and H beyond the wall, minor amounts of movement for temporary shoring is acceptable, K= may be 0.33.

Where slight to moderate ground movement is acceptable for temporary shoring K = Ka = 0.25 active earth pressure coefficient.

For the perimeter shoring system, utilizing H piles and timber lagging to bedrock, a design factor of safety should not be less than 2 times. Depth of pile penetration may be at least 1m into sound shale where the shaft is augured or may be calculated from the following expression, which assumes free draining conditions are established behind the lagging:

$R = 9\ c_u\ D(L-1.5D)$ where,

R = ultimate load to be restrained (kN)
c_u = undrained shear strength of soil (kPa) *use 50 kPa for overburden on this site
D = diameter of concrete filled shaft (m)
L = embedment depth of soldier pile.

Where cold air may enter via a shaft to below grade, frost protection can be achieved by extending any wall or footing to 1.2m below the contact with outside air, or by use of equivalent insulation. As a rule of thumb, 50mm of continuous Styrofoam SM is equivalent to 300mm of soil or granular backfill, and any combination of depth of cover and continuous insulation may be incorporated into an air shaft design.

A continuous interlocking caisson wall may be required proximate to neighbouring buildings to protect against settlement. The depth of foundations for the new building to the west was not verified.

4.7 Earthquake Design

Earthquake factors for v and F, as applied in the Ontario Building Code, may be taken as 0.05 and 1.0 respectively for this site. All overburden is considered to be Class C for earthquake design purposes.

The 2010 National Building Code of Canada interpolated seismic hazard values are determined for a 2% in 50 year (0.000404 per annum) probability of exceedance. Values are for "*firm ground*" (NBCC soil Class C, such as this site) with average overburden shear wave velocities of 360 – 760 $m.s^{-1}$.) 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 accelerations (PGA).

Only two significant figures are used. These values have been interpolated using Sheppard's Method from a 10 km spaced grid of points, based on site coordinates of 43.647446° North and -079.397789° West.

National Building Code Seismic Hazard values
2% in 50 years (0.000424 per annum) probability:

Sa(0.2)	**Sa(0.5)**	**Sa(1.0)**	**Sa(2.0)**	**PGA**
0.228	0.130	0.066	0.021	0.121g

4.8 Drainage Requirements

Perimeter drainage including Miradrain or equivalent and a drainage system beneath the floor slab will be required. Where the bases are cast against H pile and timber lagging, products such as Miradrain should be stapled to the lagging and carefully taped.

The base of drain should have tees constructed through the base or footing on about 6m on centre, discharging to an interior continuous perimeter sub-drain.

A system of drains should reflect the slopes of the basement floor, so that low points in the contact with clear stone bedding for slab can free-drain into the storm sewer discharge system. Separate sanitary drains are required for the basement floor drains because they may collect occasional oil and grease and the like from automobiles; however sanitary drains and perforate under-drains can be installed in common trench. A continuous under-drain system should extend around the inside of the perimeter footing and should also loop around the elevator sump, and around any other pump chambers or vaults set into the basement floor.

5.0 Water Discharge

5.1 Permitting for Discharges

Subject to controlling suspended solids, water generated from the site during the course of development and from any permanent control features, if required, is anticipated to be able to meet City of Toronto *Municipal Code Chapter 681*. If municipal storm sewers are available, there is a separate set of standards than those required to meet sanitary sewer or combined sewer standards. An agreement for discharge of groundwater is required from the City for both temporary discharge for dewatering during construction, and for any permanent discharge of groundwater.

During construction, dewatering to control precipitation is required, however control of groundwater is not anticipated following any initial drainage of pore water. Seepages from behind timber lagging are anticipated to dry quickly, after which pore water movement is expected to remain lower than rates of evaporation through an H pile and lagging face. Accordingly, a Permit to Take Water is not anticipated as a requirement under Reg. 387-04 under the Ontario *Water Resources Act*, since discharges in excess of 50 cubic meters per day (about 35 litres per minute, sustained) are not anticipated. Excavations into shale are not likely to yield water discharges in excess of rates of evaporation on excavated faces after initial interstitial water in fractures drains.

5.2 Managing Water During Excavation

In the course of excavation to intermediate depths, pore water in saturated soils will generally be removed in the course of bulk excavation of the soils without accumulation of standing water. Snow melt or precipitation combined with equipment operations could result in periodic discharges with high suspended solids. Precipitation control measures at intermediate depths of excavation would require either a temporary standing water area for settlement or discharge through one or more settlement tanks in tandem, so that fines would have a quiescent opportunity to settle out to meet sewer by-law requirements. In shallow excavation, minor precipitation will likely be absorbed. Sediment control will be an issue especially with intermediate depth excavation through fine-grained soils. Sumps and a ditch inlet are likely to be required for all intermediate depths above bedrock.

In the base of excavation, water discharge through properly engineered ditch inlets to barrel sumps should not have excessive suspended solids. A barrel sump in till is constructed by excavation and immediate placement of a layer of 270R geotextile against faces, standing a perforated 205 litre plastic or steel drum in the excavation and surrounding it immediately with clear 19mm limestone before enclosing the stone with the geotextile. Pumping from the barrel, as required, should not yield significant suspended solids.

For a parking garage floor founded beyond the shale bedrock, a skin coat of 50mm of concrete should not be required, except where a proprietary waterproofing membrane may be required, such as surrounding an elevator sump in bedrock. 100mm UNX perforate drains shall follow grades to gravity discharge to sumps, for which at least 250mm of clear 19mm limestone bedding and cover is required. Care is required to prevent use of excessively dusty limestone, which can contribute pozzolitic fines which can cement and blind filter fabrics over time.

6.0 Record of Site Condition

Until perimeter shoring and a first lift of heterogeneous soils are removed, it is not possible to take verification samples and to certify that the remaining soils on the site meet residential standards. Because there is a change in land-use sensitivity, a submission of a Record of Site Condition (RSC) package is required to be reviewed by Ontario Ministry of the Environment, Conservation and Parks and an acknowledgment posted on the Environmental Registry. The City is not permitted to issue final building permits for more sensitive uses until the registration is complete. City policy is not to accept lands in excess of 100 square meters, including road or lane widenings, unless there is a Record of Site Condition process for those lands. The City will retain an independent peer reviewer at the applicant's cost to review Phase 1 and 2 reports prior to accepting land dedications, including air rights for lane widenings.

On occasion, City planners may ask for an RSC as a condition of site plan approval, rezoning or removal of an H (hold) zoning designation, and can lead to a "*catch-22*" situation where an applicant requires site plan approval to get finance for construction and needs the cash flow for decommissioning, shoring and bulk excavation. It is wise to apply for separate foundation permitting, and on very large buildings it is not unusual to proceed on the basis of a conditional permit which is sometimes provided while the RSC process continues, since the process often takes several months from time of initial submission to MECP.

7.0 Closure

We trust that this information is sufficient for your present requirements. Should any questions arise, please do not hesitate to call. Thank you for this opportunity to once again be of service.

Yours very truly,

BRUCE A. BROWN ASSOCIATES LIMITED

Bruce A. Brown, Ph. D., RPP, MCIP, P. Eng., QPESA

REGISTERED PROFESSIONAL ENGINEER
B. A. BROWN
18/12/21
PROVINCE OF ONTARIO

Appendix A: Statement of Limitations for Geotechnical Evaluations

Bruce A. Brown Associates Limited

Geo-environmental Report
General Conditions and Limitations

Section 1: Use of the Report

1.1 The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation or if the project is not initiated within two years of the date of the report, Brown Associates should be given an opportunity to confirm that the recommendations are still valid.

1.2 Subsoils, groundwater, or other conditions which may affect design or implementation may differ between actual test locations and may not be appropriate for areas beyond those investigated.

1.3 The comments given in this report are intended only for the guidance of the design engineer. The number of test holes to determine all the relevant underground conditions which may affect construction costs, techniques and equipment choice, scheduling and sequence of operations, would be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual test hole data, as to how subsurface conditions may affect their work.

1.4 With the exception of instances where this firm is specifically retained to confirm field conditions, or to supervise construction or excavation, the responsibility of Bruce A. Brown Associates Limited shall be restricted to accurate interpretation of conditions at test location(s). No responsibility can be taken for the procedures or the sequence of effort carries out by any contractor, even when his final result would be to implement the recommended design, unless field supervision is requested form this firm.

Section 2: Follow Up

2.1 All details of the design and proposed construction may not be known at the time of submission of Brown Associates' report. It is recommended that Brown Associates be retained during the final design stage to review the design drawings and specifications related to foundations, earthworks, retaining systems and drainage, to determine that they are consistent with the intent of Brown Associates' report.

2.2 Retaining Brown Associates during construction is recommended to confirm and to document that the subsurface conditions throughout the site do not materially differ from those given in Brown Associates' report and to confirm and to document that construction activities did not adversely affect the design intent of Brown Associates' recommendations.

Section 3: Soil and Rock Conditions

3.1 Soils and rock descriptions in this report are based on commonly accepted methods of classification and identification employed in professional geotechnical practice. Classification and identification of soil and rock involves judgement and Brown Associates does not guarantee descriptions as exact, but implies accuracy only to the extent that is common in current geotechnical practice.

3.2 The soils and rock conditions described in this report are those observed at the time of study. Unless otherwise noted, those conditions form the basis of the recommendations in the report. The condition of the soil and rock may be significantly altered by construction activities (traffic, excavation, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil and rock must be protected from these changes or disturbances during and after construction.

Section 4: Logs of Test Holes and Subsurface Interpretations

4.1 Soil and rock formations are variable to a greater or lesser extent. The test hole logs indicate the approximate subsurface conditions only at the locations of the test holes. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of boring, the frequency of sampling and the uniformity of subsurface conditions. The spacing of test holes, frequency of sampling and type of boring also reflect budget and schedule considerations.

4.2 Subsurface conditions between test holes are inferred and may vary significantly from conditions encountered at the test holes.

4.3 Groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. These conditions may vary seasonally or as a consequence of construction activities on the site or on adjacent sites.

Section 5: Changed Conditions

5.1 Where conditions encountered at the site differ significantly from those anticipated in this report, either due to a natural variability of subsurface conditions or due to construction activities, it is a condition of the use, or reliance by the client, of this report that Brown Associates be notified of the changes and provided with an opportunity to review the recommendations of this report. Recognition of changed soil and rock conditions requires experience and it is recommended that an experienced geotechnical engineer be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Section 6: Drainage

6.1 Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage systems can have serious consequences. Brown Associates can assume no responsibility for the effects of drainage unless Brown Associates is specifically involved in the detailed design and follow-up site supervision and inspection during construction of the drainage system.

Appendix B: Site Location Plan

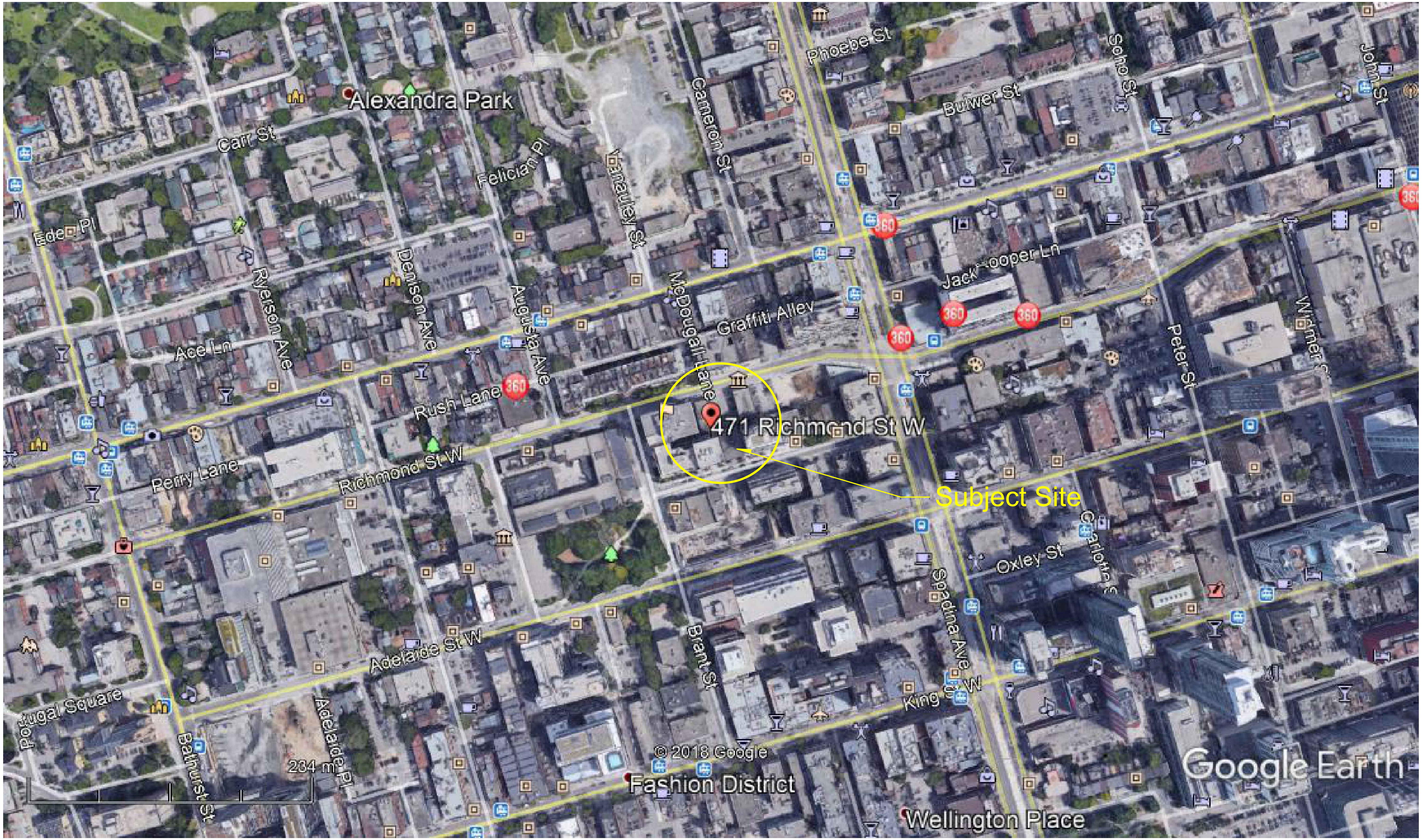


Figure:
1-0

Title:
Site Location
471 Richmond Street West, City of Toronto

Client:
Manga Hotels (Richmond) Inc.

Drawn By:
C. Colbourne, A.Sc.T.

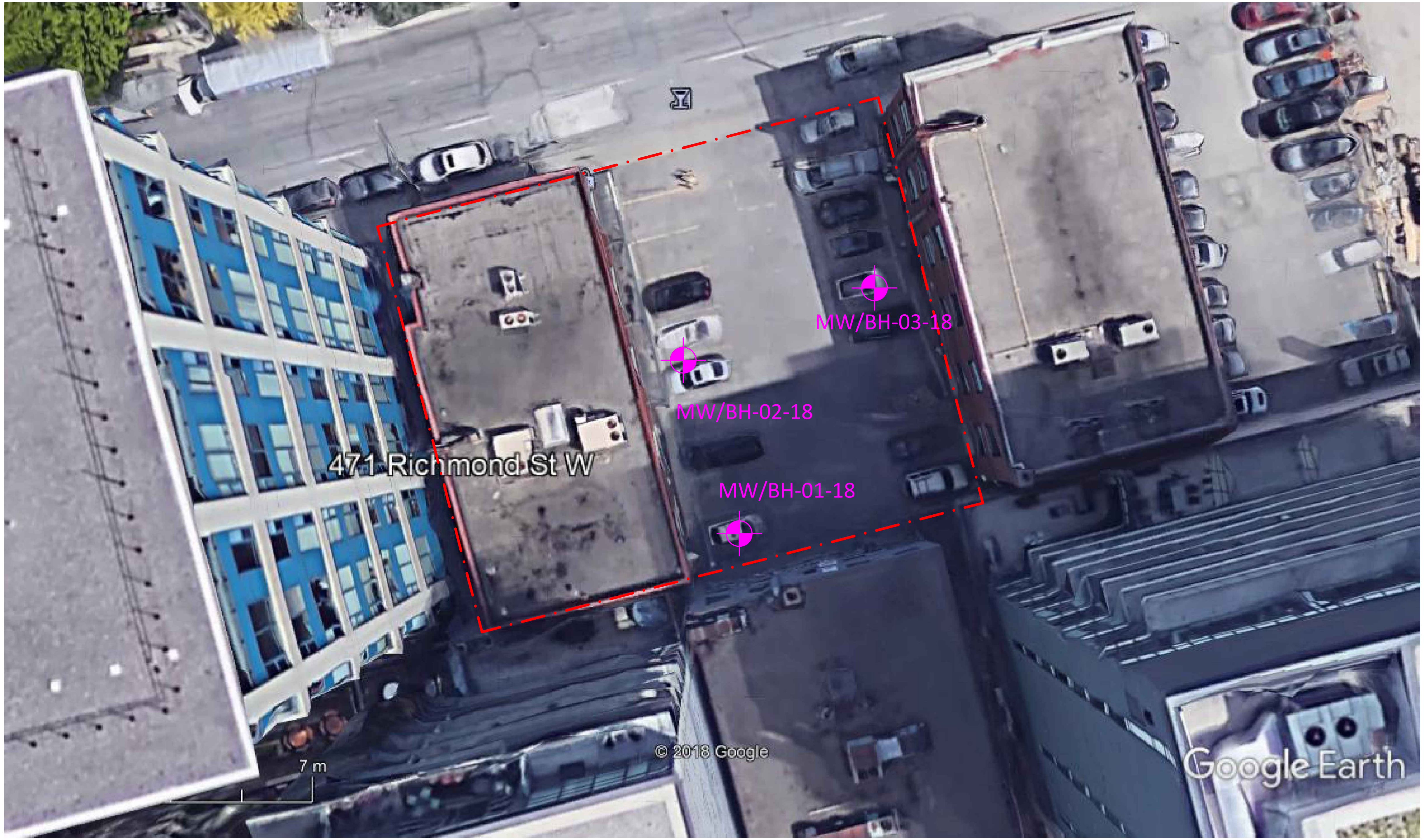
Date:
July 30, 2018

Project No.:
18*4495

Drawing No.:
4495180730-001

BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences
101–102 Aerodrome Crescent Toronto, Ontario
M4G 4J4 Tel [416] 424–3355

Appendix C: Monitoring Well/Borhole Location Plan



General site layout of 471 Richmond Street West, City of Toronto.

Notes:

(1) Site Drawing based on field notes of attending Technologist..

(2) Results compiled from boreholes advanced by Bruce A. Brown Associates Limited, as indicated.

(3) Scale as indicated on drawing.

DRAWING KEY

⊕	Boreholes / Monitoring Wells - Advanced by Bruce A. Brown Associates Limited, May 3, 2018.
— · — · —	Approximate existing property boundary.

Figure:	Title:	Client:	Drawn By:	Date:	
2-0	**Site Layout and Borehole Location Plan** 471 Richmond Street West, City of Toronto	Manga Hotels (Richmond) Inc.	C. Colbourne, A.Sc.T.	July 30, 2018	BRUCE A. BROWN ASSOCIATES LIMITED Consultants in the Environmental and Applied Earth Sciences 101–102 Aerodrome Crescent Toronto, Ontario M4G 4J4 Tel [416] 424–3355
			Project No.: 18*4495	Drawing No.: 4495180730-002	

Appendix D: MW/Borehole Logs, Key

BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences

101-102 Aerodrome Crescent
Toronto, Ontario, Canada M4G 4J4
Tel: (416) 424-3355, Email bruce@brownassociates.ca

Project Location: 147 Richmond Street West, City of Toronto

Client: Manga Hotels (Richmond) Inc.

Project Number: 17*4495

Date of Borehole: 03-May-18

Technologist: C.W. Colbourne, A.Sc.T.

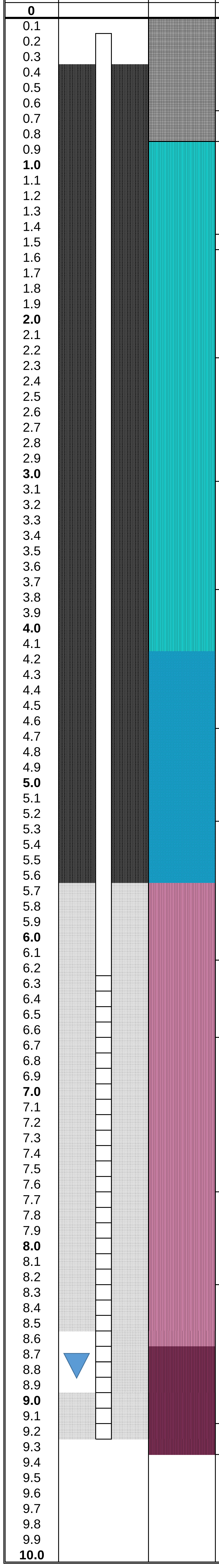
Drilling Contrator: Determination Drilling, Truck Mounted CME 75 with hollow stem augurs and 50mm x 0.06m Split Spoon driven by Standard force Hammer

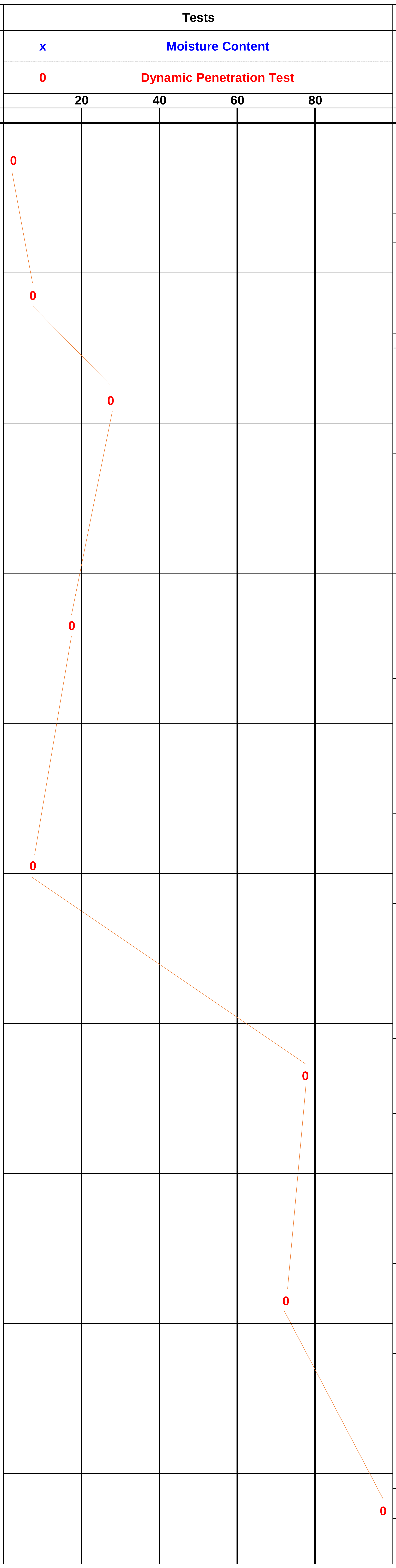
BH/MW Location: See site drawing

Bench Mark: Temp Bench Mark

TOR Elevation:

BOREHOLE LOG No. MW/BH-01-18





Sample Interval	Description	Elevation	Lab Sample No.	PID READING	% Recovery	Standard Penetration N-Blows per 0.30m	Moisture Content %
SS-1	Grade to 0.6mbgs FILL – 50mm of ASPHALT PAVEMENT underlain by SILTY CLAY with CINDERS and ASH, brown, slightly moist, non-plastic, non-cohesive, very loose, trace brick, coal, organics.		SOIL-4495-180502-01-001 (M&I & PAHs)	1.7	80	4	
SS-2				0.2	60	8	
SS-3				0.2	100	25	
	0.8mbgs to 3.7mbgs NATIVE – CLAYEY SILT / CLAYEY SILT TILL, brown changing to grey by 3.4mbgs, slightly moist, low to no plasticity, slightly to no cohesiveness, medium stiff to very stiff, mottled.						
SS-4				0.2	100	19	
SS-5	4.6mbgs to 5.2mbgs CLAY TILL – grey, slightly moist, medium plasticity, cohesive, medium stiff.			0.2	100	8	
SS-6				0.2	100	79	
	6.1mbgs to 8.2mbgs SAND / FINE SILTY SAND, grey, moist, non-plastic, non-cohesive, very dense.						
SS-7				0.2	100	74	
SS-8	9.1mbgs to 9.3mbgs SILT, grey, slightly moist, non-plastic, non-cohesive, very dense, trace gravel. Split spoon refusal at 9.3mbgs			0.2	100	100 (50 BLOWS FOR 125mm)	

Borehole terminated at 9.3mbgs, 50mm x 3.05m No.:10 slotted piezometer installed at 9.23mbgs followed by 50mm solid stand pipe to 0.15mbgs. The piezometer was backfilled with well sand to 0.6m above the slotted interval followed by bentonite seal up to 0.3mbgs. Standpipe was fitted with a 50mm J-Plug and well fitted with a flush mounted protective cover cemented into place. Groundwater levels were established on May 9, 2018 to be 8.83mbgs.

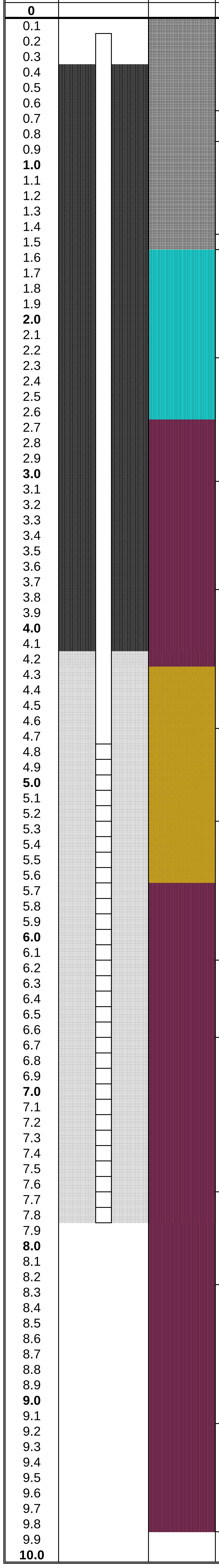
BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences

101-102 Aerodrome Crescent
Toronto, Ontario, Canada M4G 4J4
Tel: (416) 424-3355, Email bruce@brownassociates.ca

Project Location: 147 Richmond Street West, City of Toronto
Project Number: 17*4495
Technologist: C.W. Colbourne, A.Sc.T.
Client: Manga Hotels (Richmond) Inc.
Date of Borehole: 03-May-18
Drilling Contrator: Determination Drilling, Truck Mounted CME 75 with hollow stem augurs and 50mm x 0.06m Split Spoon driven by Standard force Hammer

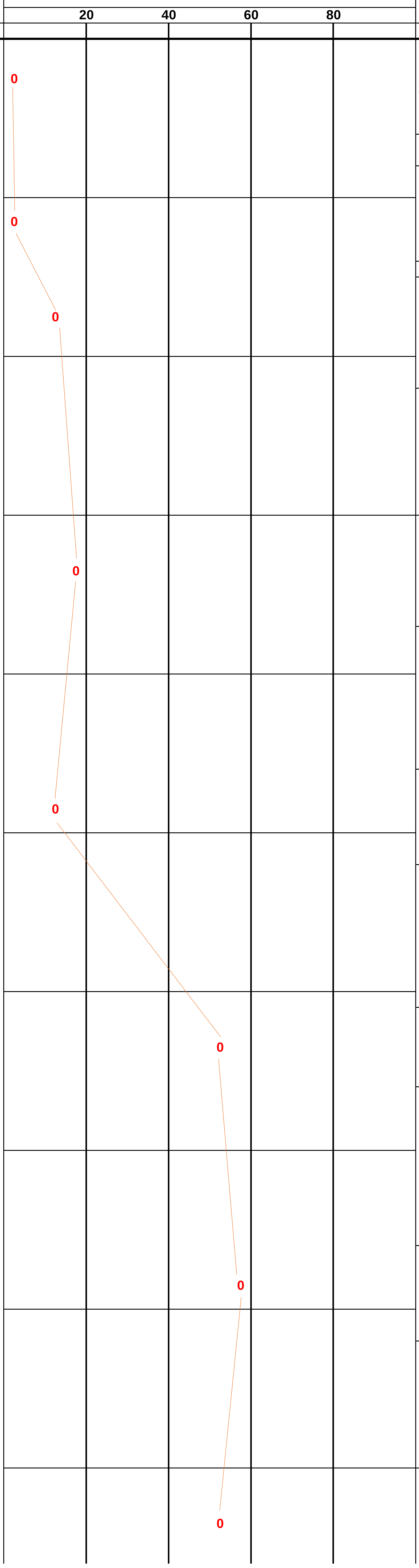
BH/MW Location: See site drawing
Bench Mark: Temp Bench Mark
TOR Elevation: 0.9m above grade

BOREHOLE LOG No. **MW/BH-02-18**



Tests

x Moisture Content
0 Dynamic Penetration Test



Sample Interval	Description	Elevation	Lab Sample No.	PID READING	% Recovery	Standard Penetration N-Blows per 0.30m	Moisture Content %
SS-1	Grade to 0.6mbgs FILL – 50mm TO 60mm OF ASPHALT PAVEMENT underlain by SILTY CLAY some CINDERS some ASH some COARSE GRAVEL some SAND, brown to black to ochre, moist, non-plastic, non-cohesive, very loose, trace glass and trace red brick fragments.		SOIL-4495-180502-02-002 (M&I & PAHs)	0.2	100	<2	
SS-2	0.8mbgs to 1.4mbgs FILL- SILTY CLAY some SAND, brown / very loose, moist, low plasticity, slightly cohesive, ochre staining present.			0.1	100	4	
SS-3	1.5mbgs to 2.1mbgs NATIVE – CLAYEY SILT TILL, brown, slightly moist, non-plastic, non-cohesive, medium dense, mottled.			0	100	14	
SS-4	3mbgs to 3.7mbgs NATIVE - SILT TILL, brown to grey, slightly moist, non-plastic, non-cohesive, medium dense, mottled.			0	100	19	
SS-5	4.6mbgs to 5.2mbgs CLAY, grey, moist, medium plasticity cohesive, stiff, trace gravel.			0	100	13	
SS-6				0	100	52	
SS-7	6.1mbgs to 9.8mbgs SILT TILL, grey, dry, non-plastic, non-cohesive, very dense, trace cobble at 6.4mbgs, trace sand inclusions from 7.6mbgs to 9.2mbgs.			0	100	58	
SS-8				0	100	54	

Borehole terminated at 9.8mbgs, 50mm x 3.05m No.:10 slotted piezometer installed at 7.78mbgs followed by 50mm solid stand pipe to 0.15mbgs. The piezometer was backfilled with well sand to 0.6m above the slotted interval followed by bentonite seal up to 0.3mbgs. Standpipe was fitted with a 50mm J-Plug and well fitted with a flush mounted protective cover cemented into place. Groundwater levels were established on May 9, 2018 to be dry.

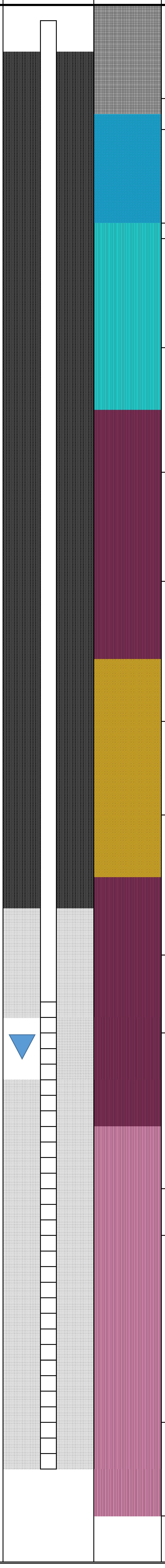
BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences

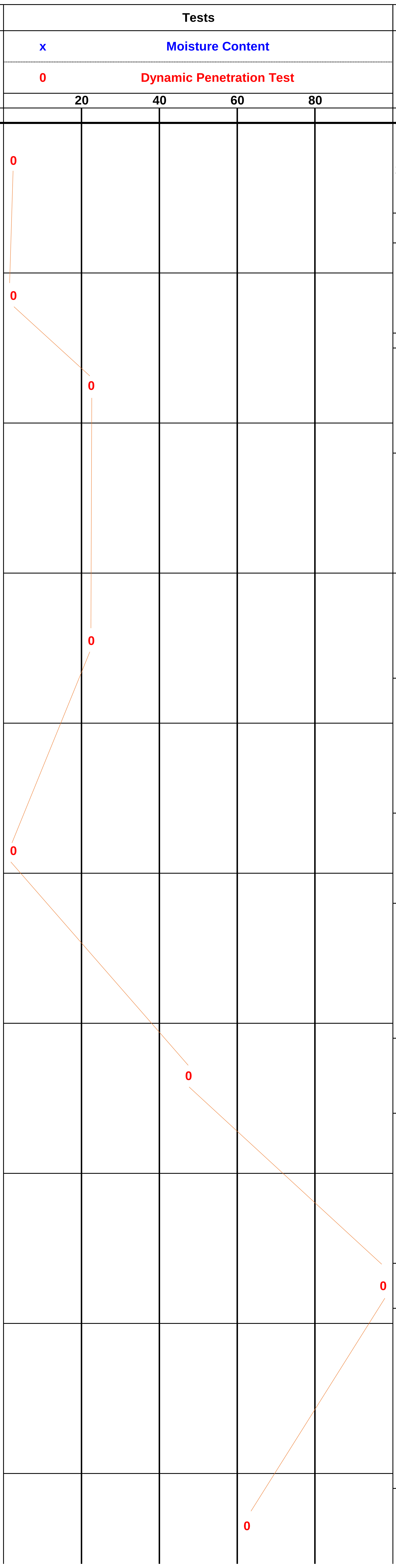
101-102 Aerodrome Crescent
Toronto, Ontario, Canada M4G 4J4
Tel: (416) 424-3355, Email bruce@brownassociates.ca

Project Location: 147 Richmond Street West, City of Toronto
Project Number: 17*4495
Technologist: C.W. Colbourne, A.Sc.T.
Client: Manga Hotels (Richmond) Inc.
Date of Borehole: 03-May-18
Drilling Contrator: Determination Drilling, Truck Mounted CME 75 with hollow stem augurs and 50mm x 0.06m Split Spoon driven by Standard force Hammer

BH/MW Location: See site drawing
Bench Mark: Temp Bench Mark
TOR Elevation:

BOREHOLE LOG No. MW/BH-03-18





Sample Interval	Description	Elevation	Lab Sample No.	PID READING	% Recovery	Standard Penetration N-Blows per 0.30m	Moisture Content %
SS-1	Grade to 0.6mbgs FILL – 75mm of ASPHALT PAVEMENT underlain by a homogeneous blend of SILTY SAND, CLAY, CONCRETE RUBBLE, ASPHALT RUBBLE, RED BRICK FRAGMENTS, TOPSOIL, brown, moist, non-plastic, non-cohesive, very loose.		SOIL-4495-180502-02-002 (M&I & PAHs)	9.4	100	<3	
SS-2	0.8mbgs to 1.4mbgs NATIVE – SILTY CLAY, brown, moist, low plasticity, slightly cohesive, soft, ochre staining, mottled.				100	4	
SS-3	1.5mbgs to 2.1mbgs CLAYEY SILT TILL, brown, slightly moist, non-plastic, non-cohesive, loose, ochre staining.				100	20	
SS-4	3mbgs to 3.7mbgs SILT TILL, brown to grey, slightly moist, non-plastic, non-cohesive, medium dense, mottled.				50	21	
SS-5	4.6mbgs to 5.2mbgs CLAY, grey, moist, medium plasticity, cohesive, very stiff.				100	<4	
SS-6	6.1mbgs to 6.7mbgs SILT TILL, grey, dry, non-plastic, non-cohesive, dense, sand in tip of split spoon sampler.				100	47	
SS-7	7.6mbgs to 7.9mbgs SILTY SAND, grey, moist, non-plastic, non-cohesive, very dense, split spoon refusal at 7.9mbgs.				100	100 (50 BLOWS FOR 75mm)	
SS-8	9.1mbgs to 9.7mbgs Alternating seams of SILT and FINE SAND, grey, moist sand dry silt, non-plastic, non-cohesive, very dense.				100	64	

Depth in Metres: 0, 0.1 … 10.0

Borehole terminated at 9.7mbgs, 50mm x 3.05m No.:10 slotted piezometer installed at 9.42mbgs followed by 50mm solid stand pipe to 0.15mbgs. The piezometer was backfilled with well sand to 0.6m above the slotted interval followed by bentonite seal up to 0.3mbgs. Standpipe was fitted with a 50mm J-Plug and well fitted with a flush mounted protective cover cemented into place. Groundwater levels were established on May 9, 2018 to be 6.78mbgs.

Borehole Log Key and Soil Classification Key

Major Divisions			Colour / Symbol	Letter Symbol	Typical Description
Coarse Grained Soils, More than 50% of material is larger than No. 200 sieve size.	Gravel and Gravelly Soils, More than 50% of coarse fractions retained on No. 4 sieve	Clean Gravels (little or no fines)	▨	GW	Well- graded gravels, gravel sand mixtures, little or no fines
			▨	GP	Poorly grade gravels, gravel-sand mixtures, little or no fines
		Gravels With Fines (Appreciable amount of fines)	▨	GM	Silty gravels, gravel-sand-silt mixtures
			▨	GC	Clayey gravels, gravel-sand clay mixtures
	Sand and Sandy Soils, more than 50% of coarse fraction passing No. 4 sieve	Clean Sand (Little or no fines)	▨	SW	Well-graded sands, gravelly sands, little or no fines
			▨	SP	Poorly-graded sands, gravelly sands, little or no fines
		Sands with Fines (Appreciable amount of fines)	▨	SM	Silty-sands, sand-silt mixtures.
			▨	SC	Clayey sands, sand-clay mixtures
Fine Grained Soils, more than 50% of material is smaller than No. 200 sieve size	Silts and Clays,	Liquid limit less than 50	▨	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▨	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays,	Liquid limit greater than 50	▨	MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			▨	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils			▨	PT	Peat, humus, swamp soils with high organic contents

Bruce A. Brown Associates Limited.

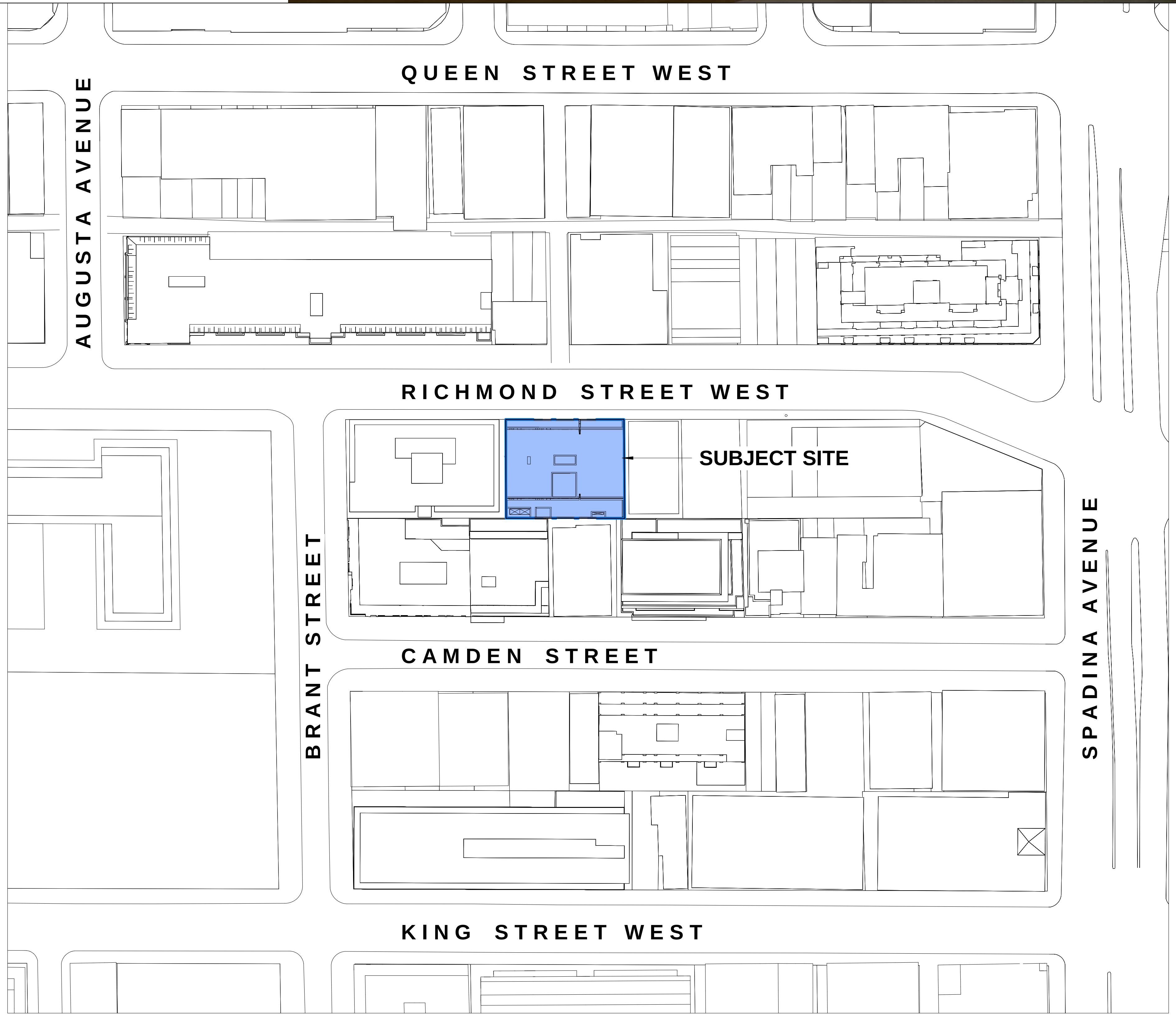
Appendix E: Proposed Development, Preliminary Plan

471 RICHMOND STREET W.
TORONTO ON M5V 1X9
PROJECT NO. 1806

GENERAL NOTES

1. This drawing to be read in conjunction with all other drawings comprising the complete set of approved drawings for this development.
2. All work to be done in conformance with the 2012 Ontario Building Code (O.B.C., as amended).
3. For Landscaping, refer to landscape drawings.
4. For proposed grading, refer to ground floor plan and landscape drawings.
5. All perimeter existing information indicated taken from survey.
6. Type "B" loading space and garbage staging area will have a grade of no more than 2% and made of at least 200mm reinforced concrete. An unencumbered vertical clearance is 4.1m min.

LIST OF DRAWINGS



1 Context Plan
A000 1 : 1000

TORONTO City Planning Division

Toronto Green Standard Version 3.0
Statistics Template

For Mid to High-Rise Residential and All Non-Residential Development

The Toronto Green Standard StatisticsTemplate is submitted with Site Plan Control Applications and stand alone Zoning Bylaw Amendment applications. Complete the table and copy it directly onto the Site Plan submitted as part of the application. Refer to the full Toronto Green Standard for Mid to High-Rise Residential and All Non-Residential Development (Version 2.0) for the complete set of standards and detailed specifications: www.toronto.ca/greendevelopment

For Zoning Bylaw Amendment applications: complete **General Project Description and Section 1.**

For Site Plan Control applications: complete **General Project Description, Section 1 and Section 2.**

Toronto Green Standard Statistics

General Project Description	Proposed
Total Gross Floor Area	**9685.1sm**
Breakdown of project components (m2):	–
Residential	–
Retail	–
Commercial	–
Industrial	–
Institutional/other (Hotel)	**9685.1sm**
Total number residential units *(residential only)*	N/A

Section 1: For Stand Alone Zoning Bylaw Amendment Applications and Site Plan Control Applications

Automobile Infrastructure	**Required**	Proposed	Proposed (%)
Number of parking spaces	**19**	27	–
Number of parking spaces deidcated for priority LEV parking	**8**	8	–
Number of parking spaces with EVSE	**5**	5	–
Cycling Infrastructure	**Required**	Proposed	Proposed (%)
Number of long-term bicycle parking spaces *(residential)*	**N/A**	N/A	–
Number of long-term bicycle parking spaces *(all other uses)*	**2**	2	–
Number of long-term bicycle parking *(residential and all other uses)* located on:	–	–	–
a) first storey of building	–	0	–
b) second storey of building	–	0	–
c) first level below-ground (also indicate % of net area of level occupied by bicycle parking)	–	2	100%
d) second level below-ground (also indicate % of net area of level occupied by bicycle parking)	–	0	–
e) other levels below-ground (also indicate % of net area of level occupied by bicycle parking)	–	0	–
Number of short-term bicycle parking spaces *(residential only)*	**N/A**	N/A	–
Number of short-term bicycle parking spaces *(all other uses)*	**5**	5	–
Number of male shower and change facilities *(non-residential only)*	**0**	1	–
Number of female shower and change facilities *(non-residential only)*	**0**	1	–
Tree Planting & Soil Volume	**Required**	Proposed	Proposed (%)
Total Soil Volume (40% of the site area ÷ 66 m2 × 30 m2).			

CONSULTANT TEAM

ARCHITECT
Sweeny &Co Architects Inc.
134 Peter Street, Suite 1601
Toronto Ontario M5V 2H2
416.971.6252

PLANNING & URBAN DESIGN
Bousfields Inc.
3 Church Street, Suite 200
Toronto ON M5E 1M2
416.947.9744

LANDSCAPE
NAK Design Group Inc.
411 Richmond St. E,
Toronto ON M5A 3S5
416.340.8100

TRANSPORTATION
LEA Consulting Ltd.
625 Cochrane Drive, 9th Fl.
Markham ON L3R 9R9
905.470.0015

CIVIL ENGINEER
LEA Consulting Ltd.
625 Cochrane Drive, 9th Fl.
Markham ON L3R 9R9
905.470.0015

WIND
Gradient Wind Engineering
127 Walgreen Road
Ottawa Ontario K0A 1L0
613.836.0934

ENVIRONMENTAL
Bruce A. Brown Associates Ltd.
109 Vanderhoof Ave., Suite 2
Toronto ON MAG2H7
416.424.3355

SURVEYOR
Land Survey Group Inc.
777 The Queensway, Unit 1
Toronto ON M8Z 1N4
416.467.8023

ISSUED / REVISED

No.	Description	Date

Sweeny&Co Architects

134 Peter Street
Suite 1601
Toronto ON
Canada M5V
2H2

P 416.971.6252
F 416.971.5420
E info@andco.com
W sweenyandco.co

PROJ. NAME
Hotel at Richmond
465-471 Richmond Street West

OWNER
Manga Hotels (Richmond) Inc.

DWG TITLE
Cover Page

DATE : 03/26/18
SCALE : 1 : 1000
DRAWN : PD, RR
CHECKED : DC, DS
PROJ. No. : 1806
DWG No. A000

C:\Users\phillip\Documents\18-06-05_471 Richmond st w_Central_phillip.rvt
7/6/2018 4:24:05 PM