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September 13, 2013

File No. 13-1409-002

Bridgman Collaborative Architecture Ltd
678 Main Street
Winnipeg, Manitoba
R3B 1E4

ATTENTION: Mr. Wins Bridgman

RE: Proposed Development at 480 Keenleyside Street, Winnipeg, Manitoba
Geotechnical Foundation Investigation and Assessment

Dear Mr. Bridgman:

This letter outlines KGS Group's geotechnical site investigation and provides foundation recommendations for the proposed East Elmwood Community Centre development at 480 Keenleyside Street in Winnipeg.

1.0 BACKGROUND

The proposed East Elmwood Community Centre development is to be located at 480 Keenleyside Street in Winnipeg, Manitoba. The site of the proposed development is shown on Figure 1.

2.0 TEST HOLE DRILLING PROGRAM

On August 23, 2013, KGS Group supervised the drilling of six test holes (TH13-01 to TH13-06) at the site. The approximate locations of the test holes are shown on Figure 1. One test hole (TH13-01) was drilled within the proposed footprint of the building while the remaining five test holes were drilled within the proposed parking lot, service road and alternate building location. Test hole, TH13-01, located just north of the existing playground was drilled to practical refusal at a depth of 18.90 m±. Nested within TH13-01 is a Casagrande standpipe piezometer installed in the silt till at 18.90 m below existing grade and a pneumatic piezometer installed in the silty clay at 11.23 m below existing grade. Test hole, TH13-02, located immediately west of the existing ball diamond was also drilled to practical refusal at a depth of 21.03 m±. Test hole, TH13-03, was drilled northwest of the existing wading pool and west of the ball diamond bleachers to a depth of 3.05 m±. Test hole, TH13-04, was drilled west of the ball diamond just east of the property limit to a depth of 3.05 m±. Test hole, TH13-05, was drilled northwest of the ball diamond to a depth of 3.05 m±. Test hole, TH13-06, was drilled in centre field of the ball diamond to a depth of 3.05 m±.

The test holes were advanced with a truck mounted Acker MP8 drill rig contracted from Paddock Drilling Ltd. of Brandon, Manitoba, using 125 mm diameter solid stem continuous flight augers. Representative soil samples were collected directly off the auger flights at 1.5 m (5 ft) intervals or at any change in soil strata and visually classified in the field. Clay samples were tested with a field Torvane to evaluate consistency and estimate undrained shear strength.

Standard Penetration tests (SPT) were conducted in the silt till layer to determine the relative density of the till. Upon completion of the drilling, the test holes were examined for indications of squeezing and seepage and then backfilled with auger cuttings and bentonite chips.

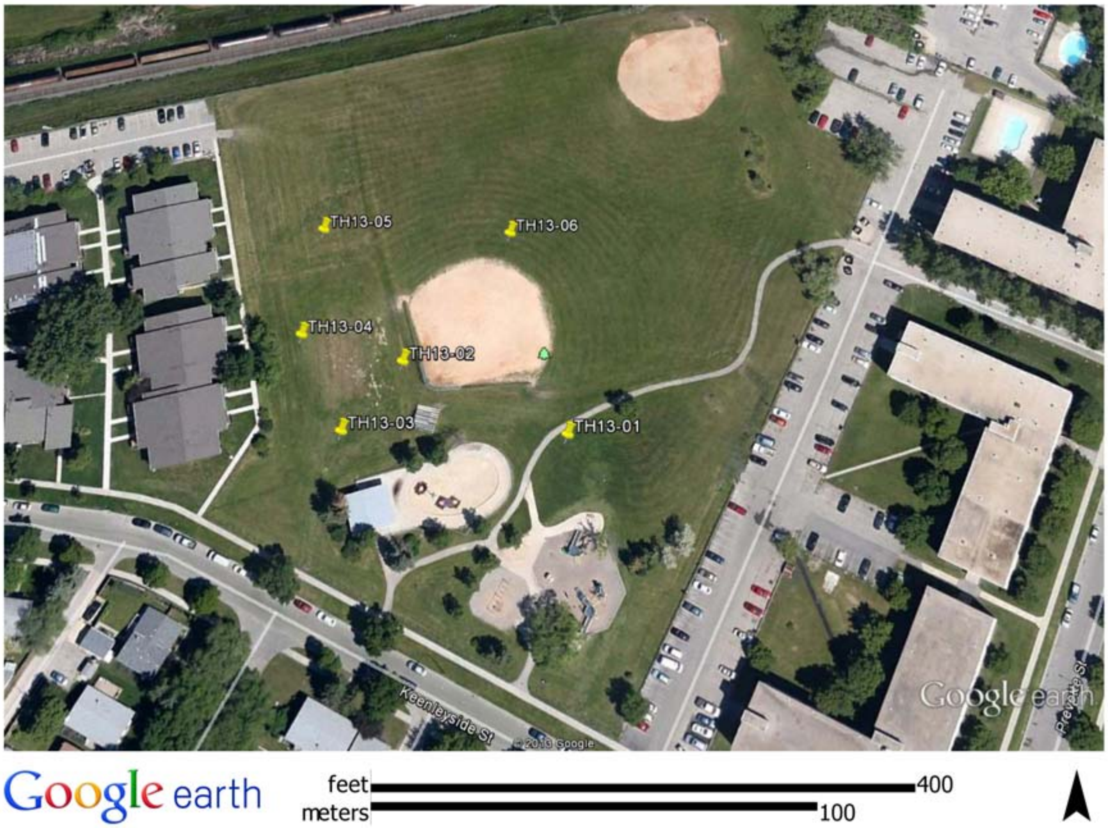


Figure 1: Aerial View Showing Approximate Test Hole Locations

3.0 INVESTIGATION RESULTS

3.1 STRATIGRAPHY

In general, the stratigraphy consists of upper thin layers of topsoil, clay fill, silty clay and silt underlain by high plasticity silty clay, which is underlain by silt till. Thin layers of granular fill underlain by clay fill were also encountered within the upper 1.2 m± of TH13-02, TH13-03 and TH13-04.

A topsoil layer approximately 0.3 m± thick was encountered in TH13-01 and TH13-06. Beneath the topsoil was a 0.45 m± to 1.2 m± thick layer of clay fill. The clay fill was black to light brown in colour, dry to damp, stiff in consistency, of intermediate to high plasticity, and contained trace amounts of fine to coarse grained sand. Beneath the clay fill was a layer of silty clay that extended to a depth of 0.6 m± to 2.4 m± below existing grade. The silty clay was brown in colour, damp, stiff in consistency, of high plasticity, and contained trace amounts of silt nodules and oxidation. Beneath the silty clay layer was a 0.15 m± to 0.75 m± thick layer of silt. The silt was tan in colour, moist, soft in consistency, of low to intermediate plasticity, and contained trace fine grained sand and oxidation. Beneath the silt was a massive layer of highly plastic silty clay that extended to a depth of 16.0 m± to 17.4 m± below existing grade. The silty clay was brown to grey in colour, moist, stiff to firm in consistency and decreasing in stiffness with depth to soft from 4 m± above the till interface , of high plasticity, and contained trace amounts of silt nodules and gypsum nodules.

Underlying the silty clay was a layer of silt till that extended to a depth of 18.9 m± to 21.03 m± below existing grade where power auger refusal occurred. The silt till was dark tan to grey in colour, moist to wet, compact, and contained some fine to coarse grained sand and trace amounts of fine to coarse grained gravel. The relative density of the till was estimated from an SPT with an uncorrected blow count ($N_{uncorrected}$) of 23 in TH13-02 to 25 in TH13-01.

3.2 GROUNDWATER CONDITIONS

Upon completion of the drilling, the water level in the silt till was noted at 9.14 m± and 9.75 m± below existing grade, respectively in TH13-01 in TH13-02. Piezometric groundwater conditions measured on September 4, 2013, show a similar piezometric till pressure of 9.38 m below existing grade and a piezometric clay pressure of 5.95 m below existing grade.

In general, the groundwater level at the site is interpreted to be generally static through the highly plastic silty clays with a slight downward hydraulic gradient through the clays down to the till.

Groundwater levels at the site will fluctuate seasonally and following precipitation events (eg. rain, snow melt, etc). For design and construction purposes, it should also be assumed that a perched groundwater level exists within the silt layer located up to 3 m± below grade.

4.0 BUILDING FOUNDATION OPTIONS

Shallow foundations are not typically used in Winnipeg for lightly loaded structures due to the expansive nature of the soils in the City. This is due to settlement, both total and differential of shallow foundations, which are typically unacceptable for most structures, and makes deep foundations the preferred option to support lightly loaded structures in Winnipeg.

Suitable deep foundation types for consideration include cast-in-place concrete piles or driven pre-cast concrete or timber end-bearing piles. If settlement and differential settlement can be tolerated, the building can be constructed on a structural slab-on-grade.

4.1 CAST-IN-PLACE CONCRETE PILES

Cast-in-place concrete piles founded on sound competent till may be used to support the proposed building. The recommended factored end-bearing value and factored skin friction for limit state design of the piles are as follows:

	Serviceability Limit State (SLS) values (kPa)	Ultimate Limit State (ULS) values (kPa)
Factored unit shaft resistance	14.5	18
Factored unit end-bearing resistance	150	187.5

Shaft friction should be neglected along that portion of the pile that extends through the upper 3 m± below existing grade consisting of topsoil, fill, silty clay and silt. A geotechnical resistance factor (Φ) of 0.4 has been assumed for the recommended factored compressive resistance values.

During test hole drilling, water infiltration was observed from within the silt till however, any water inflows can be controlled by conventional high-capacity pumping equipment. Should heavy groundwater inflow be encountered, concrete placement should be completed using tremie or pump-in methods. Casing of the pile excavation may be required as squeezing of the hole may occur near or within the silt till stratum due to softer strengths and possible water infiltration in this layer. Casing of the pile may also be required near grade to prevent sloughing of the silt as well as possible water infiltration in this layer.

Prior to placement of concrete in the hole, the base of the hole must be mechanically cleaned to obtain a sound bearing surface.

4.2 PRE-CAST CONCRETE END-BEARING DRIVEN PILES

Pre-cast concrete piles driven to practical refusal on the underlying till are also suitable to support the proposed building. Below, are the estimated factored Limit States compressive resistance values recommended for driven, end bearing, prestressed, pre-cast concrete piles when driven to practical refusal on the underlying till or bedrock:

Pile Diameter	Serviceability Limit State (SLS) value (kN)	Ultimate Limit State (ULS) value (kN)
300 mm diameter	445	560
350 mm diameter	625	785
400 mm diameter	800	960

A geotechnical resistance factor Φ of 0.4 has been assumed in estimating the factored resistances for compressive loading conditions.

To minimize the potential for rebound during pile driving the spacing between adjacent piles should be a minimum of three (3) pile diameters from centre to centre. Pre-boring a minimum of 4 m is recommended prior to driving the piles.

4.3 DRIVEN TAPERED TIMBER PILES

Tapered timber piles driven to practical refusal on the underlying till may also be used to support the proposed structure and can be assigned the following factored end-bearing resistance values:

Pile Diameter	**Serviceability Limit State (SLS) value (kN)**	**Ultimate Limit State (ULS) value (kN)**
300 mm diameter	155	195

A geotechnical resistance factor Φ of 0.4 has been applied in estimating the factored geotechnical resistance for compressive loading conditions.

Typically, timber piles are available with 300 mm butt diameter (12 inch) tapering down to a 200 mm to 225 mm (8 to 9 inch) tip diameter. Careful attention will be required during driving, especially as the pile approaches refusal, to avoid breaking the pile.

Similar to pre-cast concrete end-bearing driven piles, to minimize the potential for rebound during pile driving the spacing between adjacent piles should be a minimum of three (3) pile diameters from centre to centre. Pre-boring a minimum of 4 m is recommended prior to driving the piles.

4.4 GENERAL PILE COMMENTS

All piles should have a minimum length of 6 m and minimum 150 mm void form should be installed below all grade beams and pile caps to protect against potential uplift. Full-time inspection by experienced geotechnical personnel during construction of the piles is recommended.

Where Pile Driving Analysis (PDA) Testing is undertaken on a minimum of 5% of the piles driven at the site, an increased geotechnical resistance factor of 0.5 could be utilized on the pile resistance as determined by CAPWAP and field results. A geotechnical resistance factor of 0.6 could be utilized on pile resistance if a static load test is undertaken on a minimum of two piles at the site.

If either PDA testing or static load testing is undertaken, they should be completed under the supervision of an experienced geotechnical engineer and KGS Group should review the results of any testing and pile capacities. KGS Group recommends that the PDA testing followed by CAPWAP analysis be completed initially for the first 3 to 5 piles driven on site at the start of construction to confirm the ULS values and to allow for a geotechnical resistance factor of $\Phi = 0.5$ to be applied to final design. KGS Group can arrange this testing to be completed on your behalf.

4.5 STRUCTURAL SLAB-ON-GRADE

The proposed building foundation may consist of a structural slab-on-grade and the underlying silty clay can be assigned an unfactored bearing capacity of 200 kPa. The following is recommended for this alternative:

- Sub-excavate the surfacial soils (approx 3 m± below grade) including the topsoil, clay fill, silty clay and silt layer to the subgrade design elevation and proof-roll compact the native soil subgrade. The silt layer is relatively thin and shallow and should be completely excavated and replaced with compacted granular sub base. A non-woven geotextile separator should also be placed over the excavated subgrade prior to sub base placement.

- A minimum 150 mm thick layer of granular base and 300 mm thick layer of sub base should be placed immediately below the slab.

- All granular should be placed in maximum 150 mm thick lifts and compacted to 98% Standard Proctor Dry Density (SPMDD). Granular base and sub base materials should be supplied in accordance with City of Winnipeg standard material specifications.

- The final ground elevation around the perimeter of the building should be sloped away at a minimum 2% grade, to protect against surface water ponding.

Some seasonal movement and/or differential settlement and potential cracking of the concrete slab may occur over time with grade-supported slabs. This alternative should be selected only if cracking and differential settlement is acceptable for the building. Where this is deemed unacceptable a structural floor slab supported on intermediate piles should be utilized as discussed in sub-section's 4.1 through 4.4.

5.0 PARKING LOT AND SERVICE ROAD PAVEMENT STRUCTURE

The parking lot and service road pavement structure is recommended to consist of:

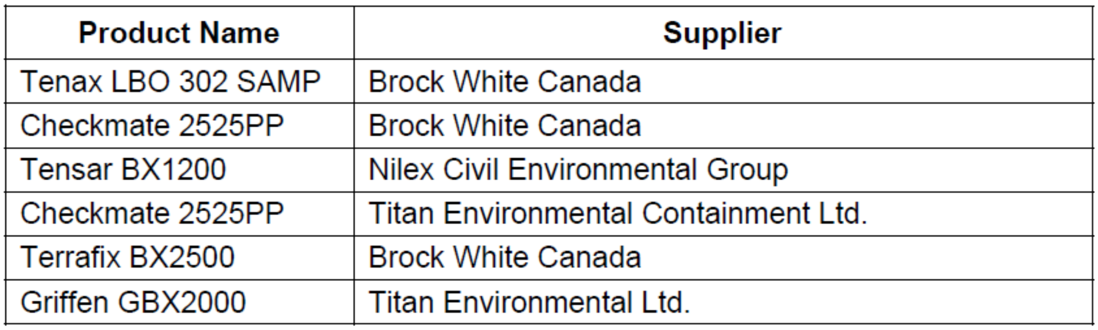
- a proof-roll compacted subgrade,
- a non-woven geotextile separator fabric,
- 300 mm of 50 mm limestone or recycled concrete sub base material,
- 75 mm of 20 mm-minus limestone or recycled concrete base material, and
- 100 mm of asphalt pavement.

Materials should be supplied and installed in accordance with the City of Winnipeg Standard Construction Specifications.

The silt layer is extremely sensitive to moisture content and vibration and is generally a poor construction platform and foundation for road construction. According to the test holes, the silt layer was encountered in all test holes, but is relatively thin and somewhat shallow in TH13-06. It is recommended that this silt layer be completely excavated and replaced with suitable compacted clay backfill or granular backfill to the subgrade elevation. Total removal of the silt will minimize pavement distress resulting from frost heave and generally increase the overall life-cycle of the parking lot and service road pavement. If replacement of the silt layer is not feasible, a geogrid combined with an underlying non-woven geotextile separator should be placed over the silt layer before the sub base is placed.

Table 1 provides recommended geogrid products and suppliers:

TABLE 1
RECOMMENDED GEOGRID PRODUCTS AND SUPPLIERS



Product Name	Supplier
Tenax LBO 302 SAMP	Brock White Canada
Checkmate 2525PP	Brock White Canada
Tensar BX1200	Nilex Civil Environmental Group
Checkmate 2525PP	Titan Environmental Containment Ltd.
Terrafix BX2500	Brock White Canada
Griffen GBX2000	Titan Environmental Ltd.

6.0 SUMMARY

Based on drilling six test holes at the site, the stratigraphy is interpreted to generally consist of a thin upper layer of topsoil, clay fill, silty clay and silt to approximately 3 m± below ground surface where a thick layer of highly plastic silty clay is encountered. The highly plastic silty clay is underlain by a compact layer of silt till. Water infiltration was observed from the silt till at 9.14 m± and 9.75 m± below existing grade immediately after drilling.

It is recommended that the proposed East Elmwood Community Centre building development be supported on piles. A slab-on-grade foundation can be used if seasonal movement, differential settlement and cracking of the slab is acceptable.

The parking lot and service road pavement structures can be founded on the insitu clay subgrade prepared by proof-roll compaction and separated from the granular base using a non-woven geotextile.

It is recommended that unsuitable upper soils consisting of topsoil, clay fill and silt layer encountered in TH13-01 to TH13-06 be excavated and replaced with suitable compacted material for all foundation recommendations. A geogrid underlain by a non-woven geotextile fabric should be considered if replacement of the unsuitable soils is not feasible.

7.0 GEOTECHNICAL INVESTIGATION STATEMENT OF LIMITATIONS

The geotechnical investigation findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practice. The findings and recommendations are based on the results of field and laboratory investigations, combined with an interpolation of soil and groundwater conditions found at and within the depth of the test holes drilled by KGS at this site. If conditions encountered during construction appear to be different from those shown by the test holes drilled by KGS or if the assumptions stated herein are not in keeping with the design, this office should be notified in order that the recommendations can be reviewed and modified if necessary.

This report has been prepared for Bridgman Collaborative Architecture Ltd to whom this report has been addressed and any third party use of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

8.0 CLOSING

If you have any questions regarding the enclosed information or require additional information, please call the undersigned at (204) 896-1209.

Prepared by,

Bruno Pierre Arpin, P.Eng.
Geotechnical Engineer

Approved by,

Dr. Dami Adedapo, Ph. D., P. Eng.
Senior Geotechnical Engineer

BPA/DAA/jr
Enclosure

PROVINCE OF MANITOBA
13SEPT2013
B. P.
ARPIN
Member
24582
REGISTERED PROFESSIONAL ENGINEER

APPENDIX A

TEST HOLE LOGS
East Elmwood Community Center
(480 Keenleyside Street, Winnipeg, MB)

KGS GROUP

SUMMARY LOG

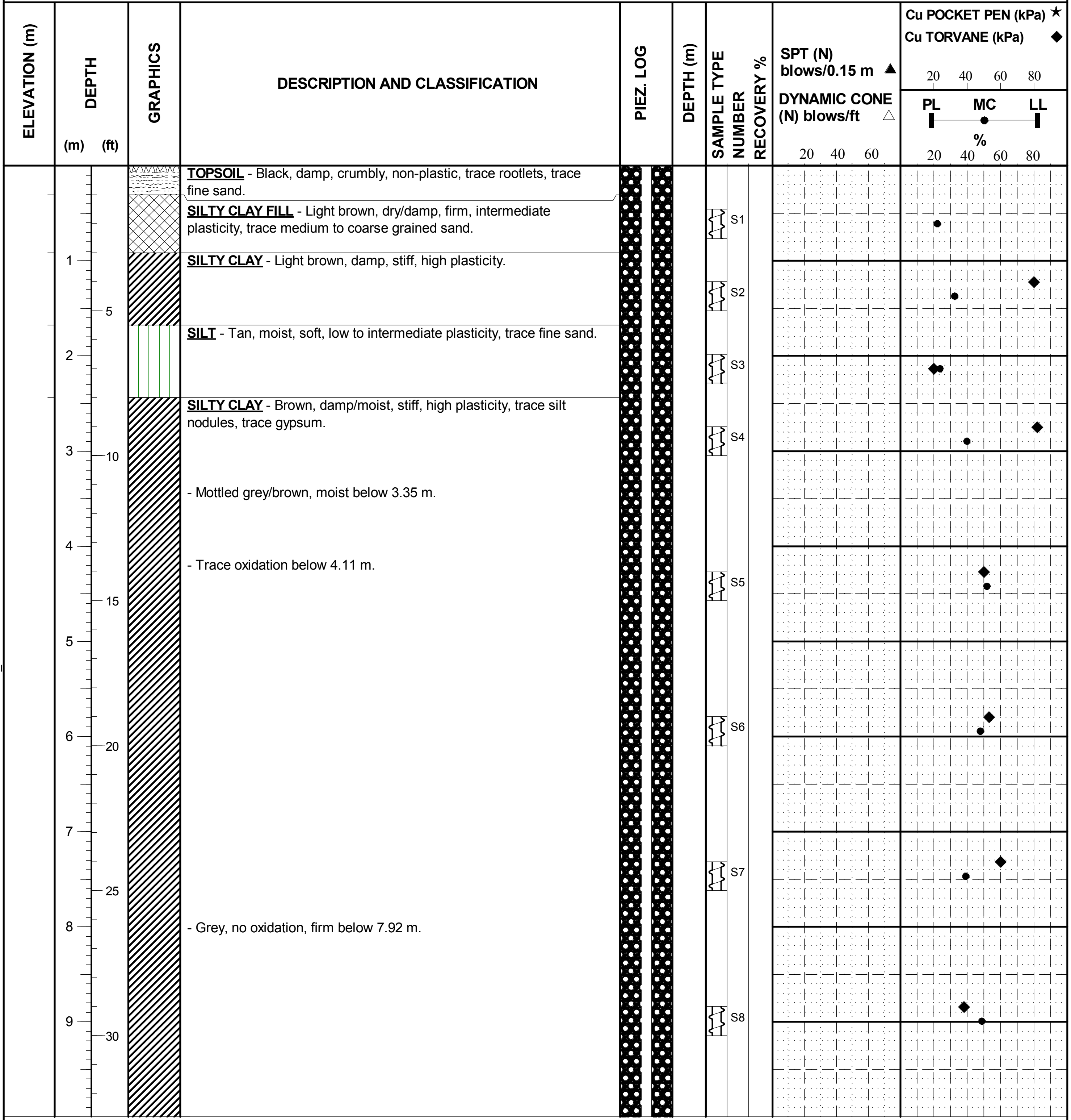
REFERENCE NO.

HOLE NO.
TH13-01

SHEET 1 of 2

CLIENT	**BRIDGMAN COLLABORATIVE ARCHITECTURE LTD**
PROJECT	**East Elmwood Community Centre**
SITE	**480 Keenleyside Street, Winnipeg, MB**
LOCATION	**Rec Centre Option 2**
DRILLING METHOD	**125 mm ø Solid Stem Auger, Truck Mounted ACKER MP8 Drill Rig**

JOB NO.	**13-1409-002**
GROUND ELEV.	
TOP OF PVC ELEV.	
WATER ELEV.	
DATE DRILLED	**8/23/2013**
UTM (m)	N **5,530,060** E **638,444**



TOPSOIL - Black, damp, crumbly, non-plastic, trace rootlets, trace fine sand.

SILTY CLAY FILL - Light brown, dry/damp, firm, intermediate plasticity, trace medium to coarse grained sand.

SILTY CLAY - Light brown, damp, stiff, high plasticity.

SILT - Tan, moist, soft, low to intermediate plasticity, trace fine sand.

SILTY CLAY - Brown, damp/moist, stiff, high plasticity, trace silt nodules, trace gypsum.

- Mottled grey/brown, moist below 3.35 m.

- Trace oxidation below 4.11 m.

- Grey, no oxidation, firm below 7.92 m.

SAMPLE TYPE ⌇ Auger Grab ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

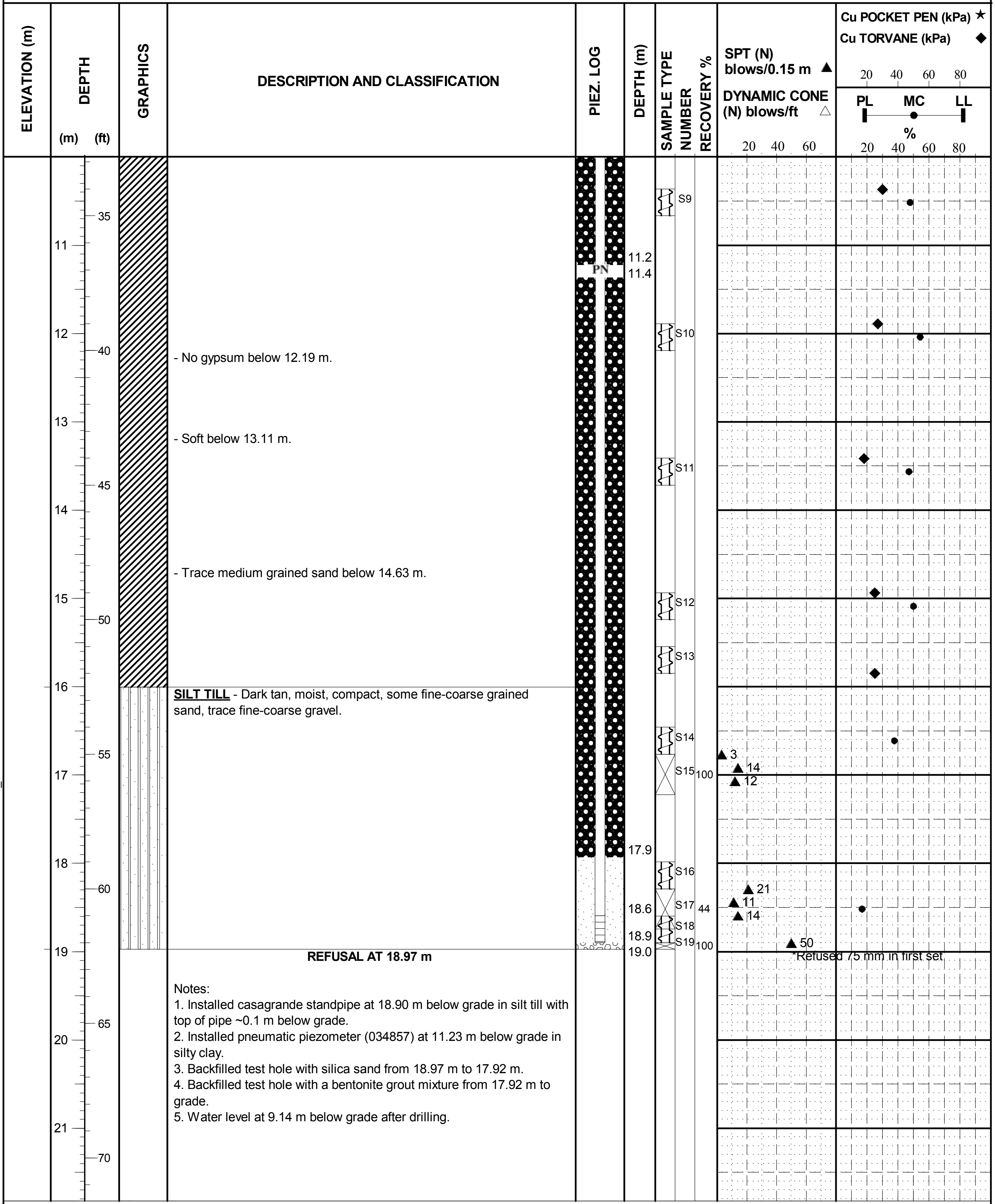
KGS GROUP

SUMMARY LOG

REFERENCE NO.

HOLE NO.
TH13-01

SHEET 2 of 2



- No gypsum below 12.19 m.

- Soft below 13.11 m.

- Trace medium grained sand below 14.63 m.

SILT TILL - Dark tan, moist, compact, some fine-coarse grained sand, trace fine-coarse gravel.

REFUSAL AT 18.97 m

Notes:
1. Installed casagrande standpipe at 18.90 m below grade in silt till with top of pipe ~0.1 m below grade.
2. Installed pneumatic piezometer (034857) at 11.23 m below grade in silty clay.
3. Backfilled test hole with silica sand from 18.97 m to 17.92 m.
4. Backfilled test hole with a bentonite grout mixture from 17.92 m to grade.
5. Water level at 9.14 m below grade after drilling.

SAMPLE TYPE ⌇ Auger Grab ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2013\13-1409-002\DESIGN\GEOLOGS\KEENLEYSIDE_JRB.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO.

HOLE NO.
TH13-02

SHEET 1 of 3

CLIENT	**BRIDGMAN COLLABORATIVE ARCHITECTURE LTD**
PROJECT	**East Elmwood Community Centre**
SITE	**480 Keenleyside Street, Winnipeg, MB**
LOCATION	**Rec Centre Option 1**
DRILLING METHOD	**125 mm ø Solid Stem Auger, Truck Mounted ACKER MP8 Drill Rig**

JOB NO.	13-1409-002
GROUND ELEV.	
TOP OF PVC ELEV.	
WATER ELEV.	
DATE DRILLED	8/23/2013
UTM (m)	N 5,530,072 E 638,390

ELEVATION (m) | **DEPTH** (m) (ft) | **GRAPHICS** | **DESCRIPTION AND CLASSIFICATION**

GRANULAR FILL - Reddish brown, damp, loose, with fine to med grained sand, with low plasticity clay.

SILTY CLAY FILL - Black, dry, stiff, low plasticity, trace fine to medium grained sand.

SILTY CLAY - Brown, damp/moist, very stiff, intermediate to high plasticity.

SILT - Tan, moist, soft, low to intermediate plasticity.

SILTY CLAY - Brown, moist, stiff, high plasticity, trace silt nodules.

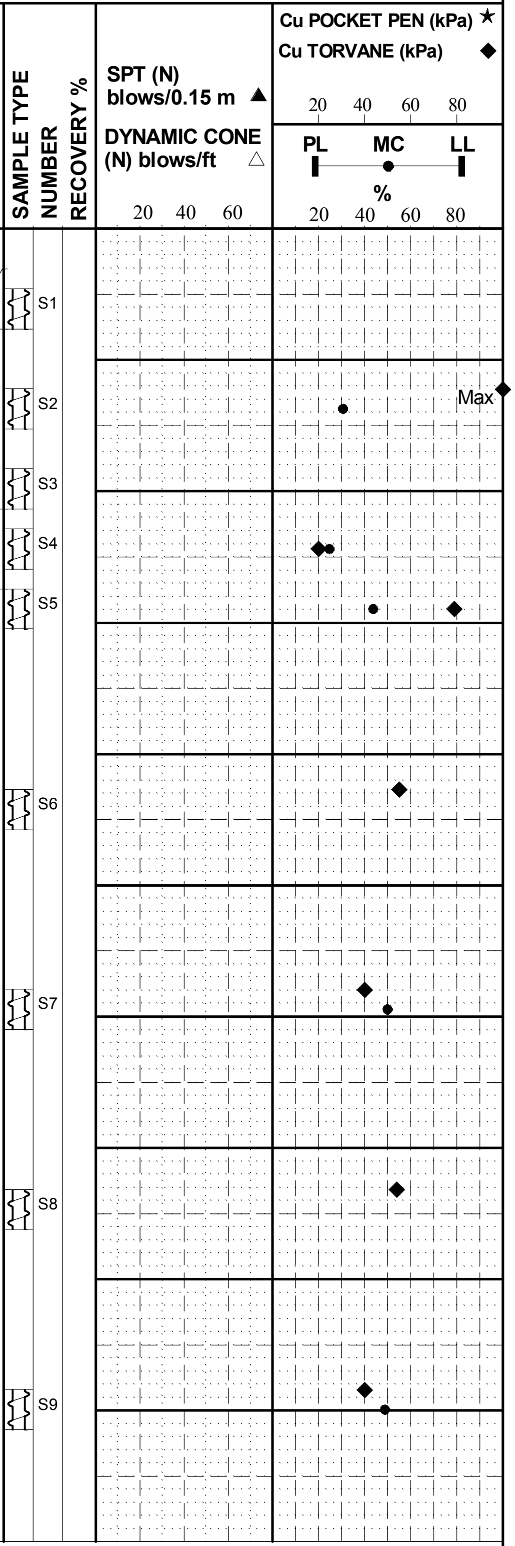
- Mottled grey/brown, trace gypsum below 3.05 m.

- Firm below 5.18 m.

- Stiff from 7.16 m to 7.62 m.

- No gypsum below 7.62 m.

- Grey below 8.23 m.



SAMPLE TYPE ⌇ Auger Grab ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

KGS GROUP

SUMMARY LOG

REFERENCE NO.

HOLE NO.
TH13-02

SHEET 2 of 3

ELEVATION (m) | DEPTH (m) (ft) | GRAPHICS | DESCRIPTION AND CLASSIFICATION | SAMPLE TYPE | NUMBER | RECOVERY % | SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △ | Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆ PL MC LL %

- Trace fine gravel (15 mm) at 13.11 m.
- Soft below 13.11 m.

- Trace medium grained sand below 15.85 m.

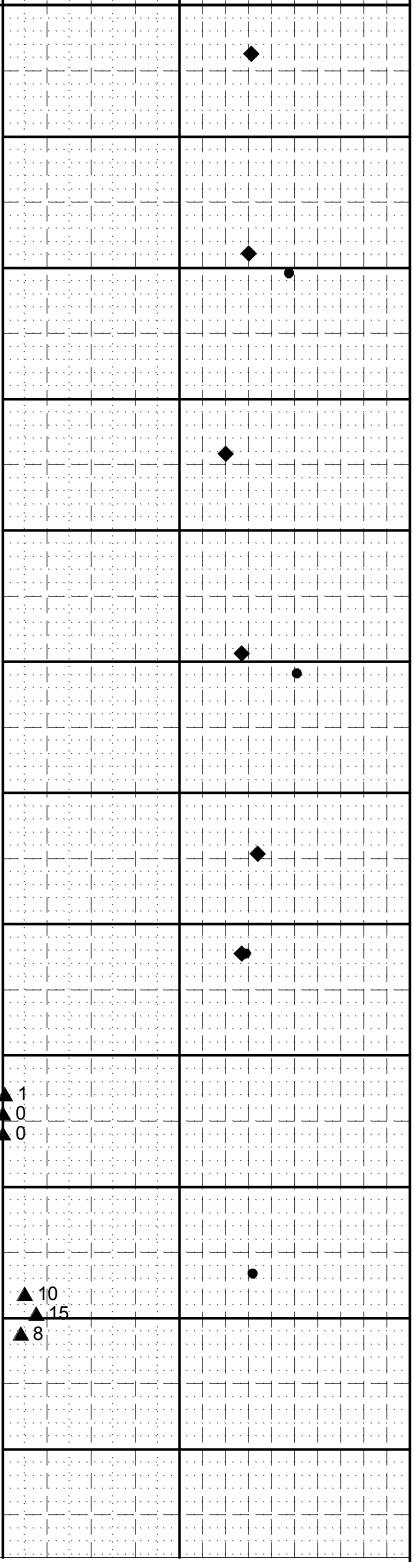
SILT TILL - Greyish tan, wet, very loose, some fine to coarse grained sand, trace fine gravel.

- Some fine to coarse grained gravel, compact below 18.90 m.

REFUSAL AT 21.03 m

Notes:
1. Water level at 9.75 m below grade after drilling.

SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m
Auger Grab	S10		
Auger Grab	S11		
Auger Grab	S12		
Auger Grab	S13		
Auger Grab	S14		
Auger Grab	S15		
Auger Grab	S16		
Split Spoon	S17	100	1 0 0
Auger Grab	S18		
Split Spoon	S19	56	10 15 8



Depth scale (m): 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
Depth scale (ft): 35, 40, 45, 50, 55, 60, 65, 70

SAMPLE TYPE ⌇ Auger Grab ☒ Split Spoon

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
J. BARTZ

APPROVED
B.P. ARPIN

DATE
9/12/13

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2013\13-1409-002\DESIGN\GEO\LOGS\KEENLEYSIDE_JRB.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO.

HOLE NO. **TH13-02**

SHEET 3 of 3

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △ 20 40 60	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆ 20 40 60 80 PL MC LL % 20 40 60 80
	22 23 24 25 26 27 28 29 30 31 32 33	75 80 85 90 95 100 105 110		2. Test hole squeezed at 11.58 m below grade after drilling. 3. Backfilled test hole with auger cuttings from 21.03 to 0.30 m and bentonite grout mixture from 0.30 m to grade.					

SAMPLE TYPE Auger Grab ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2013\13-1409-002\DESIGN\GEO\LOGS\KEENLEYSIDE_JRB.GPJ

KGS GROUP

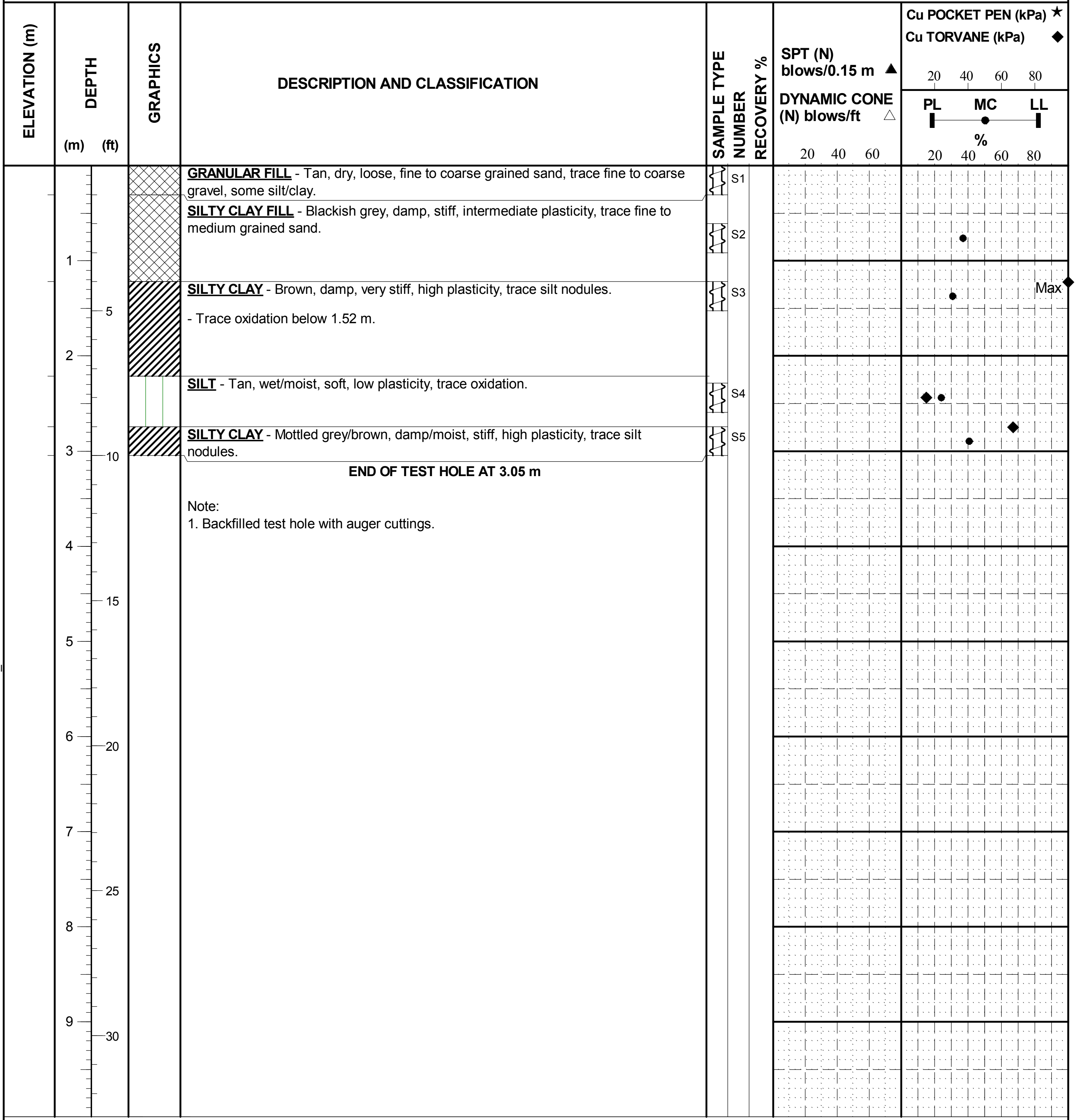
SUMMARY LOG

REFERENCE NO.

HOLE NO.
TH13-03

SHEET 1 of 1

CLIENT	**BRIDGMAN COLLABORATIVE ARCHITECTURE LTD**	JOB NO.	13-1409-002
PROJECT	**East Elmwood Community Centre**	GROUND ELEV.	
		TOP OF PVC ELEV.	
SITE	**480 Keenleyside Street, Winnipeg, MB**	WATER ELEV.	
LOCATION	**Parking Lot / Service Road**	DATE DRILLED	8/23/2013
DRILLING METHOD	**125 mm ø Solid Stem Auger, Truck Mounted ACKER MP8 Drill Rig**	UTM (m)	N 5,530,061 E 638,377



GRANULAR FILL - Tan, dry, loose, fine to coarse grained sand, trace fine to coarse gravel, some silt/clay.

SILTY CLAY FILL - Blackish grey, damp, stiff, intermediate plasticity, trace fine to medium grained sand.

SILTY CLAY - Brown, damp, very stiff, high plasticity, trace silt nodules.

- Trace oxidation below 1.52 m.

SILT - Tan, wet/moist, soft, low plasticity, trace oxidation.

SILTY CLAY - Mottled grey/brown, damp/moist, stiff, high plasticity, trace silt nodules.

END OF TEST HOLE AT 3.05 m

Note:
1. Backfilled test hole with auger cuttings.

SAMPLE TYPE ⌇ Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

KGS GROUP

SUMMARY LOG

REFERENCE NO.

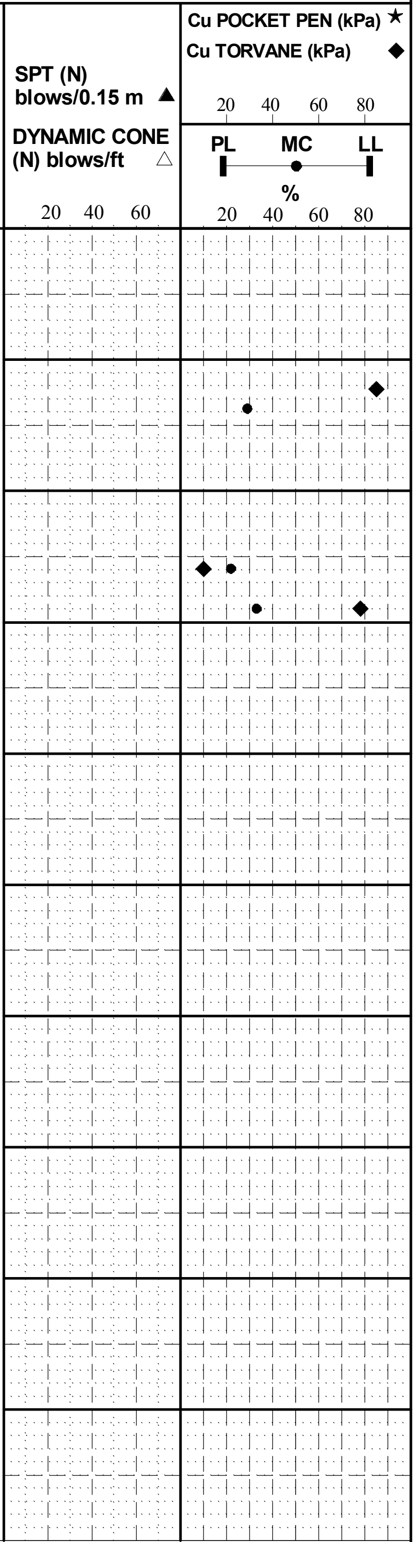
HOLE NO. **TH13-04**

SHEET 1 of 1

CLIENT	BRIDGMAN COLLABORATIVE ARCHITECTURE LTD
PROJECT	East Elmwood Community Centre
SITE	480 Keenleyside Street, Winnipeg, MB
LOCATION	Parking Lot / Service Road
DRILLING METHOD	125 mm ø Solid Stem Auger, Truck Mounted ACKER MP8 Drill Rig

JOB NO.	13-1409-002
GROUND ELEV.	
TOP OF PVC ELEV.	
WATER ELEV.	
DATE DRILLED	8/23/2013
UTM (m)	N 5,530,087 E 638,370

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %
			GRANULAR FILL - Tan, dry, loose, fine grained sand, some med to coarse grained sand, trace fine gravel, some silt/clay.	⌇	S1	
			SILTY CLAY FILL - Blackish grey, damp, very stiff, low plasticitity, trace fine to medium grained sand.	⌇	S2	
	1		**SILTY CLAY** - Brown, damp, stiff, high plasticity.	⌇	S3	
	5					
	2		- Trace oxidation below 2.13 m.			
			SILT - Tan, wet/moist, soft, low plasticity.	⌇	S4	
			SILTY CLAY - Motlled grey/brown, damp, stiff, high plasticity, trace silt nodules.	⌇	S5	
	3 10		**END OF TESTHOLE AT 3.05 m**			
			Note: 1. Backfilled test hole with auger cuttings.			
	4					
	15					
	5					
	6 20					
	7					
	25					
	8					
	9 30					



SAMPLE TYPE	⌇ Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2013\13-1409-002\DESIGN\GEO\LOGS\KEENLEYSIDE_JRB.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO.

HOLE NO. **TH13-05**

SHEET 1 of 1

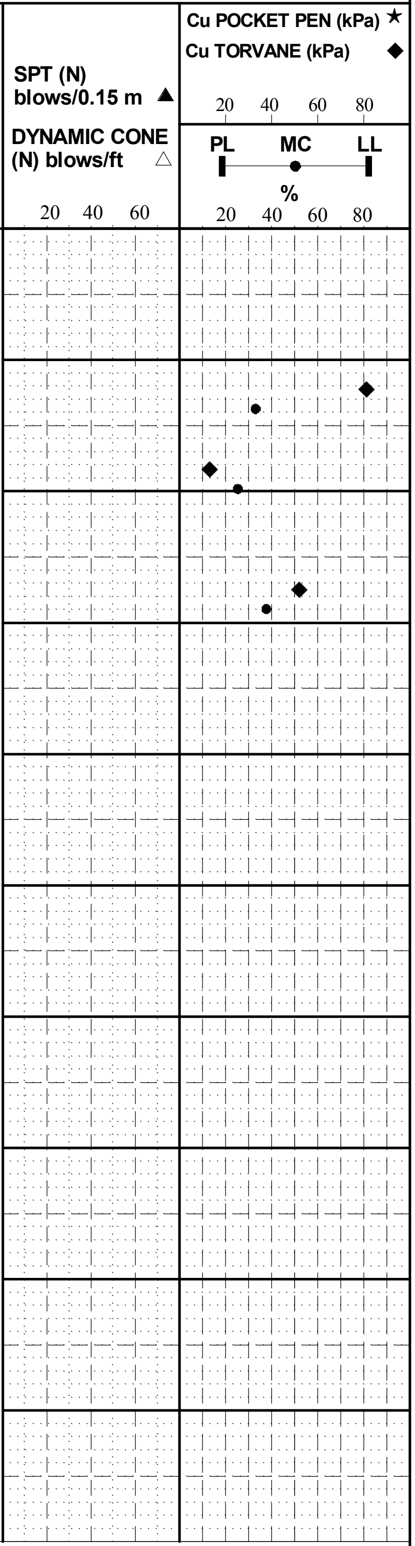
CLIENT BRIDGMAN COLLABORATIVE ARCHITECTURE LTD
PROJECT East Elmwood Community Centre
SITE 480 Keenleyside Street, Winnipeg, MB
LOCATION Parking Lot
DRILLING METHOD 125 mm ø Solid Stem Auger, Truck Mounted ACKER MP8 Drill Rig

JOB NO. 13-1409-002
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 8/23/2013
UTM (m) N 5,530,129
E 638,363

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %
			SILTY CLAY FILL - Black, dry/damp, crumbly, low plasticity, trace organics/rootlets, some fine to medium grained sand. - Trace fine to coarse grained gravel at 0.15 m.	Auger Grab	S1	
			SILTY CLAY - Blackish grey, damp, stiff, high plasticity. - Brown, trace silt nodules below 1.22 m.	Auger Grab	S2	
			SILT - Tan, moist, soft, low plasticity.	Auger Grab	S3	
			SILTY CLAY - Mottled grey/brown, damp, stiff, high plasticity, trace silt nodules, trace gypsum.	Auger Grab	S4	

END OF TESTHOLE AT 3.05 m

Note:
1. Backfilled test hole with auger cuttings.



SAMPLE TYPE Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2013\13-1409-002\DESIGN\GEO\LOGS\KEENLEYSIDE_JRB.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO.

HOLE NO.
TH13-06

SHEET 1 of 1

CLIENT BRIDGMAN COLLABORATIVE ARCHITECTURE LTD

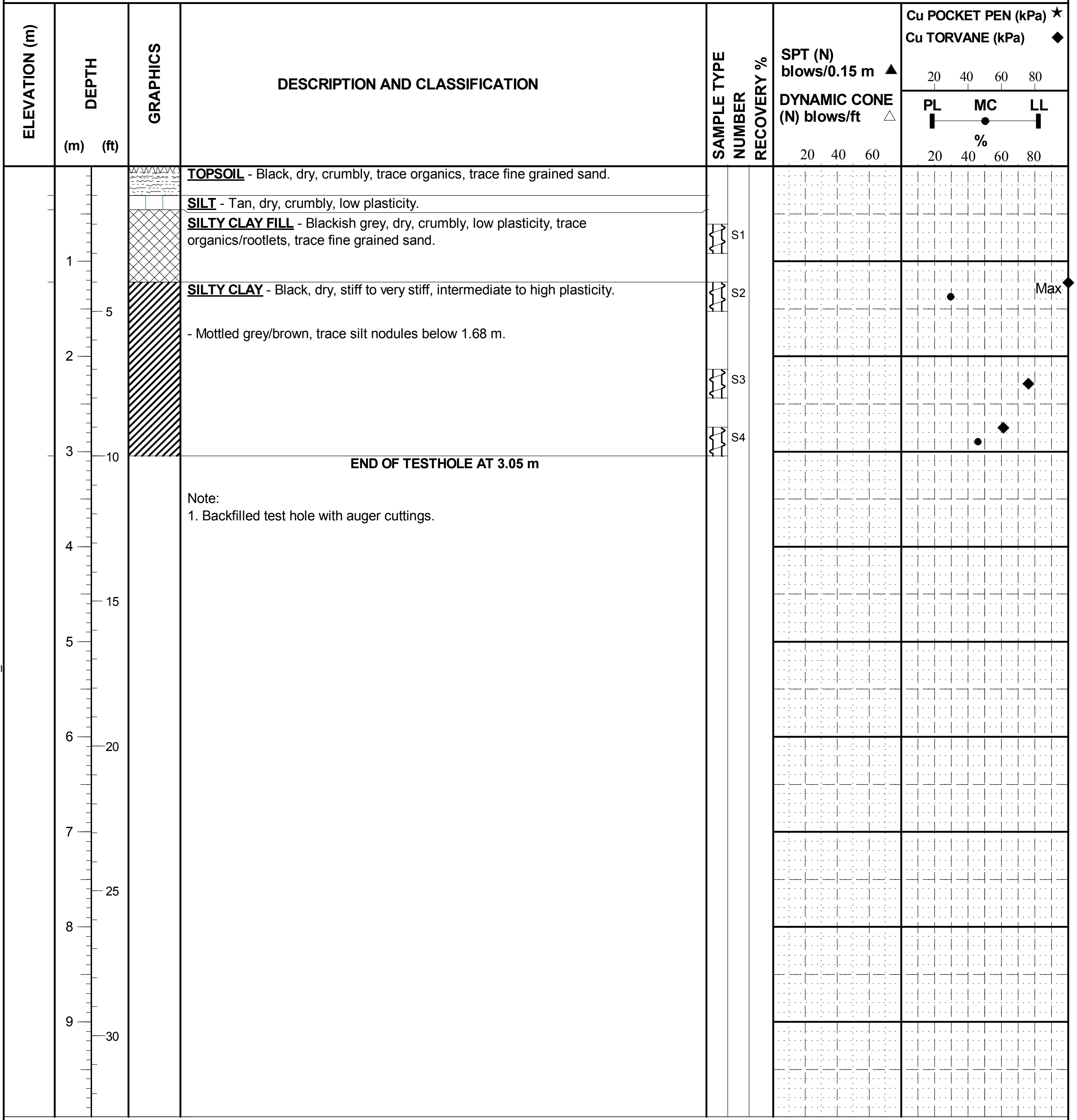
PROJECT East Elmwood Community Centre

SITE 480 Keenleyside Street, Winnipeg, MB

LOCATION Parking Lot

DRILLING METHOD 125 mm ø Solid Stem Auger, Truck Mounted ACKER MP8 Drill Rig

JOB NO. 13-1409-002
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 8/23/2013
UTM (m) N 5,530,129
E 638,363



TOPSOIL - Black, dry, crumbly, trace organics, trace fine grained sand.

SILT - Tan, dry, crumbly, low plasticity.

SILTY CLAY FILL - Blackish grey, dry, crumbly, low plasticity, trace organics/rootlets, trace fine grained sand.

SILTY CLAY - Black, dry, stiff to very stiff, intermediate to high plasticity.

- Mottled grey/brown, trace silt nodules below 1.68 m.

END OF TESTHOLE AT 3.05 m

Note:
1. Backfilled test hole with auger cuttings.

SAMPLE TYPE ⌇ Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	J. BARTZ	B.P. ARPIN	9/12/13