KGS GROUP

Transit Comfort Stations – Geotechnical Engineering Report

Revision:
Final_Rev 1

KGS Group Project:
25-0535-006

Date:
December 15, 2025

PREPARED BY:

Trevor Schellenberg, P.Eng.
Geotechnical Engineer

APPROVED BY:

Tony Ng, M.Sc., P.Eng.
Geotechnical Special Advisor

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
KGS Group
No. 245

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) in accordance with the agreement between KGS Group and KGS Group (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

This report is based on information made available to KGS Group by KGS Group. Unless stated otherwise, KGS Group has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this report apply only as they existed at the time of KGS Group's work.

Third Party Use of Report

Any use a third party makes 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.

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 Group at the site at the time of drilling. If conditions encountered during construction appear to be different from those shown by the test holes drilled by KGS Group or if the assumptions stated herein are not in keeping with the design, KGS Group should be notified in order that the recommendations can be reviewed and modified if necessary.

1.0 INTRODUCTION

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) geotechnical department was retained internally to complete geotechnical investigations with soil sampling program and geotechnical design report for seven (7) Transit Comfort Stations, as per City of Winnipeg Tender 999-2024. The seven (7) project sites investigated were all located within Winnipeg, Manitoba, and included Seel Station, Silver Avenue at Sturgeon Road, Old Commonwealth Path at Waterford Green Common, Salter Street at Southhall Drive, Raleigh Street at Knowles Avenue, Redonda Street at Pandora Avenue, and Sage Creek Boulevard and Burning Glass Road. Beaumont Station was initially a proposed project site, but it was replaced with Sage Creek Boulevard and Burning Glass Road as directed by the City of Winnipeg.

The report, dated May 23, 2025, summarized the results of the field investigation, laboratory test results, foundation recommendations including thickened edge and mat slabs, helical piles, and recommendations for slab-on-grade, frost penetration, seismic site classification, backfilling and temporary excavations for the proposed developments.

This report has been re-issued as Rev1 to include foundation recommendations for lightly loaded structures at the Redonda Street Comfort Station such as exterior light standards.

2.0 PROJECT UNDERSTANDING

The City of Winnipeg intends to construct seven (7) transit comfort stations at seven (7) different locations across the City of Winnipeg within developed land. Based on drawings provided by the City of Winnipeg Transit Department, it is understood that each of the proposed single story transit comfort stations will be constructed on a concrete pad having a footprint area of 2.48 x 4.79 m (8.14 x 15.72 ft) or 11.9 m^2 (127.9 ft^2) with the building itself having a slightly smaller footprint. The existing concrete sidewalks will be extended, or a new sidewalk will be built to access the comfort stations at the following sites: Seel station, Silver Avenue at Sturgeon Road, Salter Street at Southhall Drive, and Redonda Street at Pandora Avenue. Drawings of the proposed comfort stations are provided in Appendix A.

3.0 INVESTIGATION PROGRAM

3.1 Utility Locates

Prior to conducting the geotechnical test hole investigations and sampling, KGS Group obtained clearances from public utility companies for underground facilities at each project sites to ensure existing underground utilities were not damaged. Test holes at two (2) sites, Old Commonwealth Path at Waterford Green Common (TH25-03) and Sage Creek Boulevard at Burning Glass Road (TH25-07), were relocated due to insufficient space near underground utilities to conduct safe drilling activities, as shown in drawings 25-0101-004-C07 and 25-0101-004-C02, respectively. Test hole TH25-03 was relocated from the north side of Old Commonwealth Path to the south side, and for TH25-07, location option 3, on the southeast corner of the intersection was chosen as opposed to location options 1 and 2.

3.2 Test Hole Investigation and Sampling

The test hole drilling and sampling program was completed on April 7, 10, and 11, 2025, under continuous supervision by KGS Group, while drilling services were provided by Maple Leaf Drilling Ltd. of Winnipeg, Manitoba. Drilling was performed using a Mobile B37X (April 7) and an Acker MP5 (April 10 and 11) track mounted geotechnical drill rigs equipped with 125 mm diameter solid stem auger (SSA) and a Standard Penetration Test (SPT) auto-hammer.

Each test hole, except for TH25-02, was advanced to the proposed depths of 9.14 m (30 ft), below ground surface (BGS) while TH25-02 encountered SPT refusal at a depth of 6.48 m (21.25 ft) in silt till. Test holes TH25-03 and 07 were relocated due to the presence of underground utilities, as described in section 3.1.,

Soil samples were collected directly off the auger flights and SPT sampler at intervals of 0.75 to 1.5 m (2.5 to 5 ft). The soil samples were visually classified in the field in accordance with the modified Unified Soil Classification System (USCS). During the drilling investigation, in-situ testing was conducted to assess soil properties including an SPT on the surface of TH25-02 to confirm granular material's relative density and thickness. Handheld Torvane tests were conducted on cohesive soils to assess the undrained shear strength. Upon completion of drilling, test holes were examined for evidence of soil sloughing and groundwater conditions. All test holes were backfilled with auger cuttings and bentonite chips and excess auger cuttings were left on-site adjacent to the test holes.

Test hole locations are shown on Figure 1 below. Universal Transverse Mercator (UTM) Zone 14U coordinates and test hole elevations were collected using a Trimble DA2 Catalyst GNSS system with an accuracy of ± 10 cm and are provided in Table 1.

Reference drawings illustrating the locations of the proposed Transit Comfort Stations were marked up to indicate the test hole locations and are included in Appendix A. The test hole logs are included in Appendix B, and laboratory test results are provided in Appendix C.

3.3 Laboratory Testing

Laboratory tests were completed on representative soil samples to determine relevant properties for correlation to engineering parameters. The laboratory testing was completed at a soils laboratory certified by the Canadian Council of Independent Laboratories (CCiL). Testing included twenty-eight (28) moisture contents and seven (7) Atterberg limits. Soils samples will be retained for a maximum of eight (8) weeks following submission of this report before being disposed.

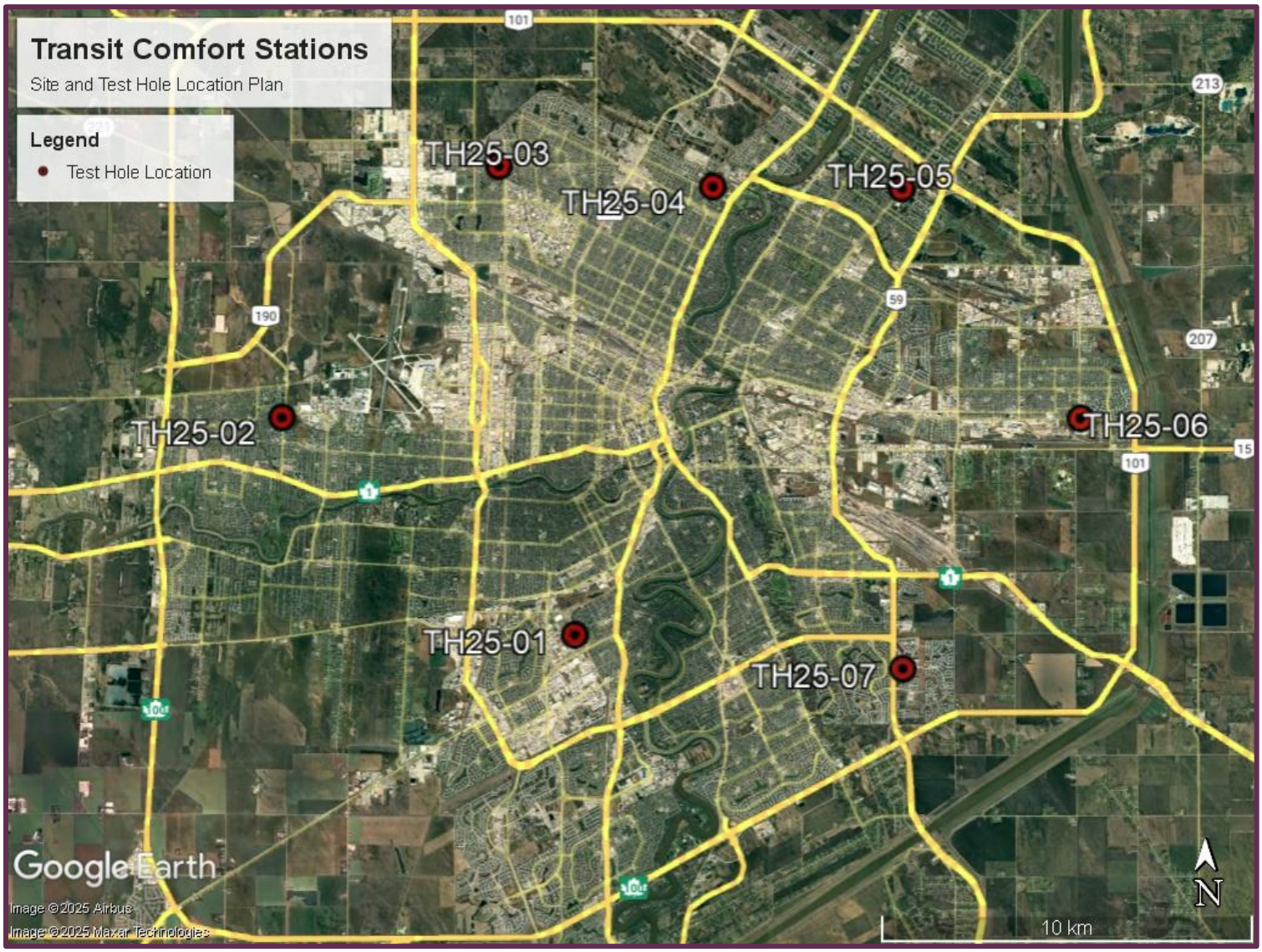
TABLE 1: SUMMARY OF TEST HOLE LOCATIONS AND DEPTHS

Test Hole ID	Location	UTM Coordinates[1, 2]			Test Hole Depth (m)	Reference Drawing in Appendix C
		Northing (m)	Easting (m)	Surface Elev. (m)		
TH25-01	~4m W of SW Transit Corridor, ~20.5m SE of Seel Ave.	5,522,648	631,694	231.79	9.14	25-0107-004-C01
TH25-02	~15m W of Sturgeon Rd., ~75 m S of Silver Ave.	5,528,295	623,667	239.18	6.48	25-0107-004-C05
TH25-03	~10m S of Old Commonwealth Path, ~ 62m W of Garton Ave.	5,535,184	629,343	232.05	9.14	25-0107-004-C07
TH25-04	~39m SE of Salter St., ~24.5m NE of Southhall Dr.	5,534,773	635,118	230.45	9.14	25-0107-004-C06
TH25-05	~12.5m NE of Knowles Ave. ~21.5m SE of Raleigh St.	5,534,846	640,208	231.20	9.14	25-0107-004-C03
TH25-06	~47m N of Pandora Ave., ~4m E of Redonda St.	5,528,794	645,174	234.02	9.14	25-0107-004-C04
TH25-07	~18.8m S of Sage Creek Blvd., ~3m E of Burning Glass Rd	5,521,953	640,550	233.88	9.14	25-0107-004-C02

Notes:

1. Test hole coordinates and elevation were collected using a Trimble GPS system with an accuracy of ± 10 cm.
2. All UTM coordinates located in Zone 14U.

FIGURE 1: TEST HOLE LOCATION PLAN



4.0 STRATIGRAPHY AND GROUNDWATER

4.1 Stratigraphy

In general, the stratigraphy at the seven (7) sites has been interpreted by KGS Group to consist of topsoil or gravel fill overlying a layer of clay fill, overlaying silty clay, overlaying low and high plasticity clays, overlying silt or clay till. Detailed test hole logs are included below within Appendix B and lab testing results are provided within Appendix C.

Topsoil – A surficial layer of topsoil was encountered at the surface of all the test holes except TH25-02, having a thickness of approximately 51 mm (2 inches). The topsoil was generally black, frozen and contained some roots.

Gravel Fill – A layer of 19 mm down gravel fill was encountered at the surface of test hole TH25-02 and was approximately 178 mm (7 inches) in thickness. This gravel fill serves as the surface of the parking lot at the Matt Jonsson Memorial Skatepark. The gravel fill was brown to grey in color, dry to damp, and compact in terms of relative density. The moisture content of the gravel fill was 5% based on one (1) completed test.

Clay Fill – A clay fill layer was encountered below the topsoil layer in test holes TH25-03, TH25-04, TH25-05, and TH25-07. The layers ranged from 863 to 1778 mm (2.8 to 5.8 ft) in thickness. The clay fill was generally black, frozen, loose, low to high plasticity, contained some silt, some coarse sand, some fine sand, trace to some fine gravel, and some organics.

Moisture contents of the clay fill ranged from 31 to 36% as measured from three (3) tests. An undrained shear strength of the clay fill, measured using a handheld Torvane, was 56 kPa, classifying the soil as stiff, in terms of consistency. One (1) Atterberg limits test was completed on a sample of clay fill at a depth of 1.68 m (5.5 ft), BGS in TH25-07. The test results indicated a liquid limit of 78, plastic limit of 26, and plasticity index of 52.

Silty Clay (CL-ML) – A layer of silty clay was encountered below the clay fill layer in test hole TH25-04 and was approximately 1.2 m (4 ft) in thickness. The layer was brown in color, and moist.

Moisture content of the silt clay was 23% as measured from one (1) test. The undrained shear strength of the silty clay, as measured using a handheld Torvane, was 15 kPa, classifying the soil as soft, in terms of consistency. One (1) Atterberg limits test was completed on a sample of silty clay at a depth of 1.7 m (5.5 ft), BGS. The test results indicated a liquid limit of 21, plastic limit of 17, and plasticity index of 4, classifying the soil as low plasticity.

Clay (CL) – A layer of lean clay (low plasticity clay) was encountered below the topsoil layer in test hole TH25-01, below the clay fill layers in TH25-03 and TH25-05, and below the upper high plasticity clay in TH25-06. The layers ranged from 305 to 1168 mm (1.0 to 3.8 ft) in thickness. The lean clay was generally black to brown in colour, frozen, damp to moist, silty, contained trace oxidation, and trace fine gravel.

Moisture content of the lean clay ranged from 25% to 38% as measured from three (3) tests. The undrained shear strength of the lean clay was measured using a handheld Torvane indicating undrained shear strength of 15 to 70 kPa, classifying the soil as soft to stiff, in terms of consistency. Three (3) Atterberg limits tests

were completed on the lean clay samples at depths ranging from 0.6 to 2.1 m (2.0 to 7.0 ft), BGS. The test results indicated liquid limits ranging from 24 to 42, plastic limit ranging from 14 to 16, and plasticity indexes ranging from 8 to 28 classifying this layer as low plasticity.

Clay (CH) – Fat clay (high plasticity clay was encountered below the lean clay in TH25-01, TH25-03, TH25-05 and TH25-06, below the gravel fill in TH25-02, below the silty clay in TH25-04, and below the clay fill layer in TH25-07. The layer thicknesses ranged from 3.05 to 7.92 m (10 to 26 ft). The fat clay was generally grey to brown in color, damp to moist, and contained some silt, trace fine gravel, trace silt pockets, trace oxidation, trace gypsum, trace roots.

Moisture contents of the fat clay ranged from 27% to 59%, as measured from twenty-two (22) tests. The undrained shear strength of the clay was measured using a handheld Torvane, with values ranging from 30 to 100 kPa, which generally decreased with depth, classifying the soil as firm to stiff in terms of consistency. Two (2) Atterberg limits tests were completed on select samples at depths of 1.21 and 2.74 m (4 and 9 ft) in TH25-02 and TH25-06. The test results indicated a liquid limit of 58 to 97, plastic limits of 16 to 30, and plasticity indexes of 42 to 67, classifying the clay as high plasticity (CH).

Silt Till – Silt till was encountered underlying the clay strata in TH25-02 at a depth of 3.05 m (10 ft) BGS, with a thickness of 3.4 m (11.3 ft). The silt till was brown in color, damp to moist, compact, and contained some silt pockets, some fine gravel, some 19 mm down pieces of granite, some coarse sand, some fine sand.

The moisture content of the silt till was 10% and 16% as measured from two (2) tests. Power auger refusal was encountered at 6.4 m (21 ft) (ele. 232.7 m), and SPT refusal was at 6.5 m (21.3 ft), BGS respectively. SPT on the silt till required 50 blow per 80 mm of penetration, classifying the material as very dense, in terms of relative density.

Clay Till –Clay till was encountered underlying the fat clay strata in TH25-03 at a depth of 7.2 m (23.5 ft) BGS, with a thickness of 2.0 m (6.5 ft). The clay till was grey in color, moist, firm, and contained trace fine gravel, trace fine sand, trace silt pockets and trace gypsum.

The moisture content of the clay till was 41% as measured from one (1) test.

4.2 Groundwater and Sloughing Conditions

Groundwater seepage and soil sloughing conditions were recorded during and upon completion of drilling each test hole. The groundwater seepage and soil sloughing conditions observed within the completed test holes are summarized in Table 2 below. In general test holes were dry upon completion with sloughing depth ranging from 6.4 to 9.1 m BGS.

TABLE 2: OBSERVED GROUNDWATER AND SLOUGHING CONDITIONS

Test Hole ID	Test Hole Depth (m)	Observed Water Depth During Drilling (m)	Depth of Water Upon Completion of Drilling (m)	Observed Sloughing Conditions Upon Completion of Drilling
TH25-01	9.14	None Encountered	None Encountered	Test hole caved to 6.4 m
TH25-02	6.48	None Encountered	None Encountered	Test hole caved to 5.8 m
TH25-03	9.14	None Encountered	None Encountered	Test hole caved to 7.3 m
TH25-04	9.14	None Encountered	None Encountered	Test hole remained open to 9.14 m
TH25-05	9.14	3.96	None Encountered	Test hole remained open to 9.14 m
TH25-06	9.14	None Encountered	None Encountered	Test hole caved to 9.0 m
TH25-07	9.14	2.90	None Encountered	Test hole caved to 8.8 m

Groundwater levels will fluctuate seasonally and following precipitation events; as such, the actual groundwater level at the time of construction could differ from the conditions observed on-site during the drilling investigation. The foundation contractor may want to dig a small test pit on the project site to determine groundwater levels at the time of construction.

4.3 Potential Difficult Conditions

One of the proposed sites, on the north side of Old Commonwealth Path, has several underground utilities. Similarly, at Sage Creek Boulevard and Burning Glass Road project site, location options 1 and 2 have various underground utilities. During construction, the Contractor will need to take precautions during excavation and foundation construction.

Additionally, groundwater inflows will likely be encountered within the clay layers of TH25-05 and TH25-07 at depths of 3.96 m and 2.90 m, respectively. A summary of the locations where groundwater were observed during and after drilling is described in Table 2 above.

5.0 FOUNDATION RECOMMENDATIONS

KGS Group recommends and presents below the use of thickened edge slab, mat foundation or helical piles, as suitable foundation options for the proposed Transit Comfort Stations. Alternative foundation options such as driven precast concrete piles, driven steel H piles, cast-in-place concrete piles, were not considered suitable for these lightly loaded structures.

It is understood that the Redonda Street Comfort Station will include lightly loaded structures such as exterior light standards which can be supported by cast-in-place concrete friction piles.

5.1 Limit States Design

The foundation considerations described in this report follow Limit State Design (LSD) guidelines. Limit State Design requires consideration of two (2) main loading states: Ultimate Limit State (ULS) and Serviceability Limit State (SLS). The ULS are primarily concerned with collapse mechanisms of the structure and safety, and the SLS present conditions or mechanisms that restrict or constrain the intended use, function, or occupancy of the structure under expected service or working loads.

For pile foundation design, LSD prescribes Geotechnical Resistance Factors (Φ) that are based upon the method used to evaluate pile capacity to obtain the factored ULS pile capacity values.

The estimated unfactored ULS values provided below represent the nominal (ultimate) geotechnical resistance, R_n. A geotechnical resistance factor (Φ) should be applied to determine the factored geotechnical resistance as presented in the following equation:

$$\Phi R_n \geq \Sigma \alpha_i S_{ni}$$

where:

Φ – geotechnical resistance factor
R_n – nominal (ultimate) geotechnical resistance
$\Sigma \alpha_i S_{ni}$ – summation of the factored overall load effects for a given load combination

Unfactored ULS values shown in the tables below should be multiplied by the appropriate resistance factor to determine the factored geotechnical resistance.

5.2 Cast-In-Place Concrete Friction Piles

Straight shaft cast-in-place (CIP) concrete friction piles may be used to support the proposed exterior light standards at the Redonda Street Comfort Station. CIP friction piles may be designed based upon the estimated unfactored ULS skin friction values provided in Table 3 below. It is anticipated that full ULS capacity will be mobilized within 10 to 15 mm of pile movement, therefore ULS will govern the design and SLS capacities are not provided. Piles designed as friction piles should be designed to support the loads by shaft resistance only with no contribution from end-bearing. Straight shaft cast-in-place concrete piles should be at least 8.0 m (26.2 ft) long to protect against frost jacking. For design purposes, where piles will be exposed to frost, the upper 2.5 m (8.2 ft) below final ground should be neglected when determining pile capacities, and a

poly wrapped and greased Sonotube should be placed around the upper 2.5 m of the pile shaft to protect against frost jacking. A geotechnical resistance factor of 0.4 should be applied to the ULS values shown in Table 3 to determine the factored geotechnical resistance in axial compression, and a geotechnical resistance factor of 0.3 should be applied to determine the factored uplift resistance of the pile.

TABLE 3: ESTIMATED AVERAGE SKIN FRICTION RESISTANCE FOR LIMIT STATE DESIGN

Approximate Depth Below Existing Grade (m)	Soil Type	Unfactored Ultimate Limit State, ULS (kPa)
0.0 to 2.5	–	–
2.5 to 9.1	Fat Clay (CH)	35

5.2.1 ADDITIONAL CIP PILE RECOMMENDATIONS

Additional CIP pile recommendations are provided below:

- The spacing between adjacent piles should be a minimum of three-pile diameters center to center. If closer pile spacings are required, KGS Group can review the specific configuration and whether a reduction in capacity is required.
- Although groundwater seepage and sloughing was not encountered in test hole drilled at the Redonda Station (TH25-06), the contractor should bring temporary full length steel sleeves and pumps to site to use during installation of CIP piles to limit groundwater seepage into drilled shafts if encountered and to maintain the integrity of the shaft excavation as required. Where groundwater seepage cannot be adequately controlled using pumps, placement of concrete using tremie methods may be required.
- To resist tensile forces from frost action on piles (frost jacking), all concrete piles shall be reinforced their entire length and be designed by an experienced structural engineer and have a minimum embedment length of 8 m.
- A poly wrapped and greased Sonotube should be placed around the upper 2.5 m of the pile shaft to protect against frost jacking.
- All concrete piles should utilize CSA Type HS sulphate resistant cement.
- The reinforcement and concrete must be placed immediately following the drilling and inspection of each pile shaft to prevent disturbance to the foundation soil during subsequent construction activity. Where this is not possible on the day of drilling, the pile hole should be refilled with soil cuttings and later re-drilled once concrete is ready to place.
- Groundwater should be removed from the pile hole prior to pouring concrete. Where this is not possible tremie methods may be required. At all times during removal of the steel sleeve(s), a head of concrete shall be maintained sufficiently above the sleeve bottom to limit sloughing and seepage into the pile excavation.
- A minimum 150 mm void form should be used below all grade beams and pile caps to protect against potential uplift from frost heave.
- Detailed construction records and full-time inspection by experienced geotechnical personnel is recommended throughout construction of foundations to verify the soil and encountered conditions are

consistent with the findings of this investigation, and that piles are installed according to the project specification s and meet the intent of the geotechnical design.

5.3 Thickened Edge Slab

A thickened edge slab founded on compact granular fill at a minimum embedment depth of 0.6 m BGS may be used to support the proposed building at this site. KGS Group has provided the LSD parameters for thickened edge slabs bearing on compact granular material overlying stiff native clay in Table 4. The recommended SLS values are anticipated to limit settlement to 25 mm.

TABLE 4 THICKENED EDGE SLAB FOUNDATION PARAMETERS

Project Site	Bearing Soil Type	SLS (kPa)	ULS (kPa)
Silver Avenue at Sturgeon Road, Old Commonwealth Path at Waterford Green Common, Raleigh Street at Knowles Avenue, Redonda Street at Pandora Avenue and Sage Creek Boulevard and Burning Glass Road (TH25- 02, 03, 05, 06 and 07)	Clay/Clay Fill	49	146
Seel Station and Salter Street at Southhall Drive (TH25-01 and 04)	Clay/Clay Fill	37	111

Note: A geotechnical resistance factor of 0.5 should be applied to the ULS values shown in Table 4 to determine the factored geotechnical resistance.

The following is recommended for the thickened edge slab foundation:

- Thickened edge slabs should be founded at a minimum embedment depth of 0.6 m below final exterior grade and should bear on a layer of compacted granular base materials with a minimum thickness of 0.6 m and shall be provided with appropriate insulation.
- Insulation should be comprised of a 50 mm (minimum) thick rigid synthetic material. Insulation should be installed at a minimum depth of 600 mm below the final exterior grade to protect from damage; extend outward laterally 2.4 m (minimum) beyond the perimeter of the structure; and, be placed on the vertical face of the exterior footing, wall, grade beam, or slab. The surface of the insulation should slope downward away to promote positive drainage away from the structure. To avoid damage to the rigid insulation, the first lift of fill immediately above the insulation should not contain particle sizes larger than 15 mm. A layer of ridged insulation with a minimum thickness of 50 mm should also be placed on the underside of the concrete slab.
- The exposed native subgrade should be proof rolled with heavy wheeled equipment to detect soft areas. Where soft or unsuitable materials such as topsoil, organics, soft silts or clays are encountered at the sub-grade level, unsuitable materials should be over excavated and removed down to firm to stiff native clay. Where unsuitable materials are encountered and over excavation is required, these areas

can be backfilled with compacted granular fill. For thickened edge slabs excavations should extend laterally 600 mm (2 ft) beyond the edges of the slab.

- The contractor must make a conscious effort to protect the finished subgrade surface from getting wet and direct runoff away from the excavation.
- Following examination and approval of the exposed subgrade, a woven geotextile and a bi-axial geogrid should be placed over the subgrade materials with proper overlapping of the joints then backfilled with new granular materials. To ensure proper performance of the geogrid layer, the geogrid must be placed flat without kinks or folds. Cover geotextile and geogrid layers with new granular material ensuring that the placement or handling of the granular material does not damage the geotextile or geogrid layers.
- Damaged portions of the geotextile and geogrid layers must be removed and replaced. Repair patches must provide a minimum of 450 mm overlap to the damaged area in all directions.
- Granular fill should conform to City of Winnipeg CW 3110 – R22 dated November 15, 2022, for Granular Base Course (Granular A or B) and should be submitted to KGS Group for approval prior to importing to site. Granular fill beneath the slab should have a minimum thickness of 600 mm and should be placed in maximum 150 mm lifts and compacted to 98% Standard Proctor Maximum Dry Density (SPMDD) within 2% of the optimum moisture content.
- Granular fill placement should be monitored by qualified geotechnical personnel to ensure that the material supplied, and compaction criteria of the granular fill is achieved and is in accordance with the recommendations presented in this report.
- To allow for proper compaction, new granular fill materials must be placed and compacted in a thawed and unfrozen state. Heating and hoarding of granular material stockpiles will be required if construction is to proceed under freezing conditions.
- The entire extent of the controlled granular fill should be capped at the surface with a minimum of 150 mm (6 in) of compacted clay and be sloped away at a minimum 2% grade to provide positive drainage away from the building's pad and to reduce the potential for surface water to pond at the surface. Alternatively, capping materials could consist of concrete or asphalt.

5.4 Mat Foundation

If some movement can be tolerated, the transit comfort stations may be supported on a shallow mat foundation founded on compacted granular fill. Mat foundations will experience differential movements associated with variations in moisture content and frost related movements. While some movements will likely occur over time, a uniformly prepared subgrade will reduce post-construction differential movement.

To limit frost related movements, mat foundations should be constructed on non-frost susceptible granular materials extending to the depth of frost penetration (2.0 m) below the final exterior graded surface. The non-frost susceptible fill should extend horizontally to a minimum of 600 mm (2 ft) beyond the edges of the concrete pad and contain less than 5% fines (silt and clay) content. Rigid insulation should be installed to further reduce the potential for frost penetration below mat foundations supported on non-frost susceptible granular fill. If some movement can be tolerated, partial removal and replacement of 2/3 the depth of the frost zone (1.3 m) with non-frost susceptible granular fill can be considered.

Typically, the coefficient of subgrade reaction is required for a mat foundation design. The estimated vertical modulus of subgrade reaction, based on the findings of the geotechnical investigation and recommendations from the Canadian Foundation Engineering Manual, is presented in Table 5 .

TABLE 5: MODULUS OF SUBGRADE REACTION

Project Site	Vertical Modulus of Subgrade Reaction, k_{v1} (MPa/m)[1]
Seel Station, Old Commonwealth Path at Waterford Green Common, Redonda Street at Pandora Avenue (TH25-01, 03 and 06)	8
Salter Street at Southhall Drive, Raleigh Street at Knowles Avenue, and Sage Creek Boulevard and Burning Glass Road (TH25-04, 05 and 07)	10
Silver Avenue at Sturgeon Road (TH25-02)	15

Note 1: k_{v1} is for 1 ft (0.3 m) x 1 ft (0.3 m) plate, Modulus for actual footing with width of b and length of m, $k_{vb} = (k_{v1}/(b)*[(m+0.15)/1.5m)$, where b and m are provided in meters.

The following support preparations should be completed for this option:

- Sub-excavate the topsoil, granular fill, clay fill and clay materials as required to the design subgrade elevation, 1.3 to 2.0 m below final ground surface. The exposed native subgrade should be proof rolled with heavy wheeled equipment to detect soft areas. Soft areas should be over-excavated a minimum of 600 mm and replaced with base or subbase materials compacted to a minimum of 98% of the Standard Proctor Maximum Dry Density (SPMDD) within 2% of the optimum moisture content.
- Excavation and placement of granular fill should extend horizontally to a minimum of 600 mm (2 ft) beyond the concrete slab edges.
- Once the bottom of excavation is exposed, the native subgrade surface should be examined and approved by qualified geotechnical personnel, prior to placing granular fill. Bearing soils that become frozen, dried, or softened should be removed and replaced with granular base course material compacted to 98% SPMDD and within 2% of the optimum moisture content.
- The contractor must make a conscious effort to protect the finished subgrade surface from getting wet and direct runoff away from the excavation.
- Minimal groundwater seepage was observed during the drilling investigations. KGS Group should be contacted if a significant amount of water seepage is observed at the time of installation to determine if a foundation drainage system is required.
- Following examination and approval of the exposed subgrade, a woven geotextile and a bi-axial geogrid should be placed over the subgrade materials with proper overlapping of the joints then backfilled with

new granular materials. To ensure proper performance of the geogrid layer, the geogrid must be placed flat without kinks or folds. Cover geotextile and geogrid layers with new granular material ensuring that the placement or handling of the granular material does not damage the geotextile or geogrid layers.

- Damaged portions of the geotextile and geogrid layers must be removed and replaced. Repair patches must provide a minimum of 450 mm overlap to the damaged area in all directions.
- Granular fill should be placed as soon as possible after the placement of the geotextile and geogrid to prevent disturbance during subsequent construction activity.
- It is recommended that new granular materials should have a maximum uncompacted lift thickness of 150 mm and be compacted with vibration.
- New granular fill materials should conform to the City of Winnipeg standard CW3110 Granular A or B base course and should be submitted to KGS Group for approval prior to importing to site. Granular fill should be placed in 150 mm (6 inch) lifts and compacted to 98% Standard Proctor Maximum Dry Density (SPMDD) within 2% of optimum moisture.
- To allow for proper compaction, new granular fill materials must be placed and compacted in a thawed and unfrozen state. Heating and hoarding of granular material stockpiles will be required if construction is to proceed under freezing conditions.
- The entire extent of the controlled granular fill should be capped at the surface with a minimum of 150 mm (6 in) of compacted clay and be sloped away at a minimum 2% grade to provide positive drainage away from the building's pad and to reduce the potential for surface water to pond at the surface. Alternatively, capping materials could consist of concrete or asphalt.

KGS Group should be consulted if the pad is to be constructed above existing grade on fill material, so appropriate recommendations and procedures can be provided for the placement of fill below mat foundations.

5.5 Helical Piles

A helical pile foundation is a proprietary system and the final design including the helix configuration, required installation torque and the associated loads that can be achieved, are generally established by each installer. Helical piles can be configured with multiple helices to achieve capacity at shallower depths if desired, or advanced to a target bearing stratum. Helical piles can typically be installed using available hydraulic equipment when equipped with an appropriate drive head attachment. A helical pier manufacturer with support engineering services should be contacted to provide preliminary recommendations for pile configuration and design capacities. There are numerous helical pile installers in the region and pile configurations and specifications will vary.

Helical piles typically have a smaller shaft diameter and a large diameter helix bearing plate(s) and need to be installed a fair distance away from existing structures or underground utilities such that helix bearing plate does not damage structures or existing foundations as it is advanced. Additionally, there should be sufficient spacing between existing foundations at the final depth of the helix bearing plates(s) generally assumed to be three-times the diameter of the largest foundation element.

Based on the soil conditions encountered within the test holes, cobbles and boulders were not encountered at the project sites. Cobbles and boulders are known to be present in till materials such as those encountered in test holes TH25-02 and TH25-03. Cobbles and boulders have potential to obstruct helical pile installations preventing the pile from achieving the minimum required embedment depth, required torque, or may damage the piles' helices during installation. The helical pile designer should carefully evaluate the soil profile and determine at what depth to terminate piles. In some cases, pile capacity and configuration can be evaluated before final installations by completing a test installation.

In all cases, helical pile design and installation should consider the following:

- The ULS capacity of the pile will be governed by the manufacturer's specified maximum capacity for piles in compression and considers the pile shaft, helix bearing plate and the plate's connection to the shaft, pile extension joints, and any structural connections or brackets.
- The required installation torque to achieve the required pile capacity is to be provided by the helical pile manufacturer/designer. Generally, piles are installed to a "refusal" torque which should not exceed the manufacture's maximum torque rating.
- If abrupt refusal on cobbles/boulders is encountered the helical pile designer should avoid "flat spinning" of the pile. Continuing to rotate the pile without downward advancement will result in excessive disturbance of the soils near the pile tip and significantly reduce the capacity of the pile.
- The helical plate shall be normal to the central shaft (within 3º) over its entire length.
- During installation, the torque applied to the helical pile should be continuously monitored to avoid pile damage, monitor subsurface soil consistency and to verify final installation torque. The final installation torque should be recorded for each pile installed.
- Spacing of the helical piles should be determined by the helical pile designer, and the specific arrangement of helical piles should consider potential reduction in capacity related to group effects.
- Piles should be designed in accordance with appropriate geotechnical engineering principles pertaining to a helical pile foundation.
- The design of helical piles for protection from frost related movements is the responsibility of the helical pile designer who is ultimately responsible for the final helical pile foundation system design.

6.0 INTERIOR SLABS

6.1 Soil Supported Slabs

Interior floor slabs may consist of either a slab-on-grade or structural slab construction. Floor slabs constructed at grade are susceptible to movement due to the swelling of underlying clay-type soils. The magnitude of swell can vary considerably and is based on the natural moisture content and plasticity of the soil. Swell is typically higher for slabs constructed over areas where trees have recently been removed. A slab on grade should only be selected if some movements and cracking of the floor slab can be tolerated and must be insulated to prevent disturbing frozen soil through heat transfer.

The estimated magnitude of displacement due to swelling of soils below the floor slabs constructed at grade ranges between 25 and 70 mm. If the potential for movement and cracking of the interior slab is unacceptable, the floor should be constructed as a structural slab. Under no circumstance should slab-on-grade construction take place during freezing conditions or on frozen ground or while frozen ground is thawing. The following is recommended for the support of a slab-on-grade:

- Remove fill layers, soft or unsuitable materials encountered below slabs down to the native stiff clay. Proof rolling and compaction of the clay subgrade soil should be completed using a heavy pad foot roller under the supervision of an experienced geotechnical engineer to identify unsuitable or soft soil such as organics, fill or soft clay are encountered, they should be sub-excavated with an additional 600 mm and backfilled with compacted granular sub-base to 98% Standard Proctor Maximum Dry Density (SPMDD).
- The contractor must protect the finished subgrade surface from excessive moisture during construction and promote runoff away from the subgrade.
- Site grading fill placed to raise the site to finished grade (i.e., fill placed above the existing ground surface) can consist of a sub-base granular fill if properly moisture conditioned to within 2% of optimum moisture content and compacted to 98% SPMDD.
- A minimum 150 mm of granular base over 300 mm of sub-base should be placed immediately below the floor slab. All granular fills should be placed in maximum 150 mm thick lifts and compacted to 98% SPMDD. A non-woven geotextile fabric should be placed as a separator between the native subgrade materials and compacted granular fill.
- The granular base course and sub-base course should be well-graded and be free of organics and frozen materials supplied in accordance with appliable standard specifications, such as City of Winnipeg CW 3110 – R22 dated November 15, 2022. Sieve analysis and compaction testing of the granular base and sub-base materials should be conducted by qualified geotechnical personnel to ensure that the materials supplied, and percent compactions are in accordance with design specifications.

All mechanical services or piping that would be buried within the engineered fill should be designed to accommodate potential slab movement.

6.2 Structural Slabs

Where slab movements cannot be tolerated, structural floor slabs are recommended. Structural floor slabs constructed over a minimum 150 mm void space to reduce the potential of movement due to swelling or frost heave from the underlying soil.

6.3 Exterior Sidewalk Slabs

Exterior grade supported concrete pads (including sidewalks) will be subjected to seasonal vertical movements related to frost. Connection and tie-in details between the exterior concrete slabs and rigid structures element such as grade beams, pile caps or interior slabs should account for this potential frost jacking. To minimize the frost heave movements, consideration should be given to the use of rigid synthetic insulation, extending outward laterally (minimum 1.8 m length and about 100 mm thick) and beneath the structure.

7.0 ADDITIONAL CONSTRUCTION CONSIDERATIONS

7.1 Frost Penetration

The depth of frost penetration will vary depending on air temperature, ground cover, the type of any fill material used during development and other factors. The expected depth of frost penetration has been estimated, assuming a design freezing index of 2375°C-days, taken as the coldest winter over a 10-year period. The estimated maximum depth of frost penetration is 2.0 m, assuming bare ground and no insulation cover. The fine soils can heave upon freezing and it must be considered in the foundation and slab-on-grade design. Good site drainage must also be maintained after development.

Only well-graded granular materials should be utilized as structural backfill material as they are less susceptible to the effects of frost heave than the fills and high plasticity clay encountered at the site.

Soil in contact with foundation elements can freeze to the foundations and develop adfreeze bonding, which can result in uplift forces. The 5th Edition of the Canadian Foundation Engineering Manual (CFEM 2023) recommends the following adfreeze bond stresses for soil and foundation materials:

- 65 kPa for fine grained soils frozen to wood or concrete;
- 100 kPa for fine grained soils frozen to steel; and
- 150 kPa for saturated gravel frozen to steel.

To calculate the frost uplift force, the adfreeze bond stress should be applied to the perimeter of the foundation elements within the depth of frost. A resistance factor should be determined by the helical pile designer (should they be used) and applied to the unfactored ULS skin friction values to determine the frost uplift resistance of the pile. Forst resistance for thickened edge slabs will be provided by the self-weight of the slab and loading from the building above.

The depth of utility burial should be below the depth of frost penetration (minimum 2.5 m) and not within a zone of permafrost. Water lines or other lines that cannot be allowed to freeze should consider local practice. Shallow lines can be protected using closed cell extruded polystyrene insulation. The amount and extent of insulation required will be dependent on several factors including the thermal regime around the pipe, the depth of burial, surface conditions, and fluid temperature, if present.

7.2 Seismic Site Classification

In accordance with the 2020 National Building Code of Canada (NBCC), Table 4.1.8.4.-B, the site class, S, for seismic site designation, X_S, is based on the average properties of soil and rock in the top 30 m. Based on the results of the investigation, the project site class may be considered Site Class D based on the average shear strength of 50 to 100 kPa; therefore, the site designation is X_D.

7.3 Cement Type for Foundation Concrete

It is recommended that concrete in contact with soil use a high sulphate-resistant cement (HS or HSb). A maximum water to cement ratio of 0.40 should be specified in accordance with Table 2, CSA A23.1-04 for concrete with very severe sulphate exposure (S1). Concrete which may be exposed to freezing and thawing should be adequately air entrained to improve freeze-thaw durability in accordance with Table 5 in the CSA A23.1-04.

7.4 Existing Underground utilities

Additional consideration must be made to ensure the utilities are not damaged during construction in areas that have underground utilities. Specifically, there is an abundance of underground utilities at the south side of Old Commonwealth Path at Waterford Green Common and the north side of Sage Creek Boulevard and Burning Glass Road.

7.5 Surface and Subsurface Drainage

The final ground elevation around the perimeter of the structures should be sloped a minimum 2% to promote positive drainage away from the perimeter of all structures and to protect against surface water ponding. Parking lots, unloading areas and landscaping within a zone of approximately 2.0 m of the exterior perimeter of any structure should be sloped at a minimum gradient of 5% to compensate for future loss of grade that may result from potential settlement. Downspouts should be positively directed away from structures and beyond the backfill zone.

Granular material should be used for backfilling during site preparation. Free draining granular material should consist of Granular Base Course (Granular A or B) per the City of Winnipeg CW 3110 – R22 dated November 15, 2022. Backfill materials should be compacted uniformly in maximum 150 mm lifts to at least 98% SPMDD.

7.6 Temporary Excavations

All trenching and excavations should conform to the latest version of Manitoba Occupational Health and Safety Regulations (OH&S). A side slope of 2H:1V can be used for all excavations that have a maximum depth of 1.5 m. Excavations deeper than 1.5 m should be reviewed and designed prior to construction by an experienced professional engineer with an expertise in geotechnical engineering.

Open excavation side slopes should be covered to prevent from drying, or saturation and surface runoff should be directed away from excavations. Surcharge loads such as soil stockpiles, equipment, etc. should be kept a minimum of 1 m or a distance equal to the depth of excavation away from the edge of excavation, whichever is greater.

If a deep excavation with a shoring system is considered, KGS Group recommends that an excavation and shoring plan should be prepared and submitted by a registered Professional Engineer who is skilled for these designs.

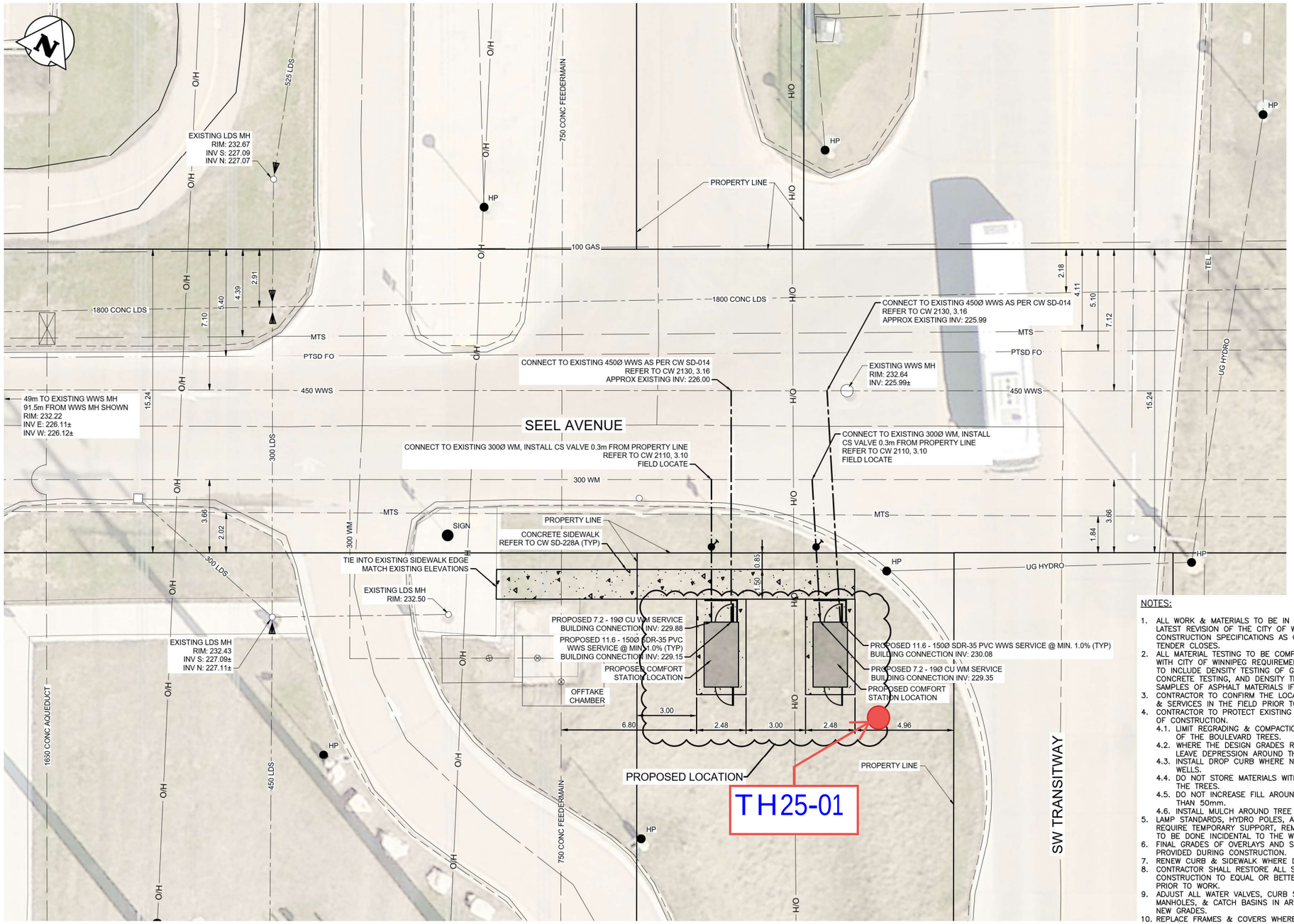
7.7 Construction Inspection

KGS Group should be retained to complete the following inspection services during construction (if required):

- Detailed construction records and full-time inspection by experienced geotechnical personnel is recommended throughout construction of the helical pile installation (if required) to confirm that piles are installed according to the project specifications and meet the designed intent.
- Observe proof rolling of sub-grade materials beneath slabs. Proof rolling inspection by an experienced geotechnical engineer is required to identify unsuitable or soft areas which will need to be sub-excavated and replaced with compacted granular materials.
- Additional sieve testing of granular base and sub-base materials to ensure that the supplied granular materials meet the graduation requirements specified for these materials.
- Compaction testing of sub-grade materials, and sub-base/base granular materials should be completed to ensure materials are compacted properly and meet the minimum compaction requirements specified for this project.

APPENDIX A

Reference Drawings



EXISTING SITE PLAN

SCALE:1:100

0 2.0 4.0 6.0 8.0m

SCALE: 1:100m (24"x36")

LOCATION PLAN

SCALE:1:300,000

KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PROFILE	PROPOSED
300 LDS	LAND DRAINAGE SEWER	300 LDS		TEST HOLE			TRAFFIC SIGNAL	
250 WWS	WASTE WATER SEWER	250 WWS		GUY WIRE			SOUTH OR EAST DITCH	
GAS	GAS	GAS		LIGHT STANDARD			NORTH OR WEST DITCH	
HYDRO	HYDRO	HYDRO		BACK OF CURB			NORTH OR WEST GUTTER	
M.T.S.	M.T.S.	M.T.S.		ASPHALT MILL & FILL			SOUTH OR EAST GUTTER	
150 WM	WATERMAIN	150 WM		ASPHALT OVERLAY			℄ PROFILE	
	HYDRANT			CONCRETE			EDGE OF ALLEY LHS	
	VALVE			PVMT. REPAIR FABRIC			EDGE OF ALLEY RHS	
	MANHOLE			LANDSCAPING			NORTH OR WEST P.	
	CATCH BASIN			PROPERTY LINE			SOUTH OR EAST P.	
	CURB INLET			GEODETIC BENCHMARK		UG/GRS	GARAGE/PARKING SLAB	
T–MTS H–HYDRO	POLES		231.334	ELEVATION	32.231	77777	WINDOW/DOOR SILL	

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????? ELEV. XXX.XX — COORDINATE SYSTEM: CGVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:100	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025-03-18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

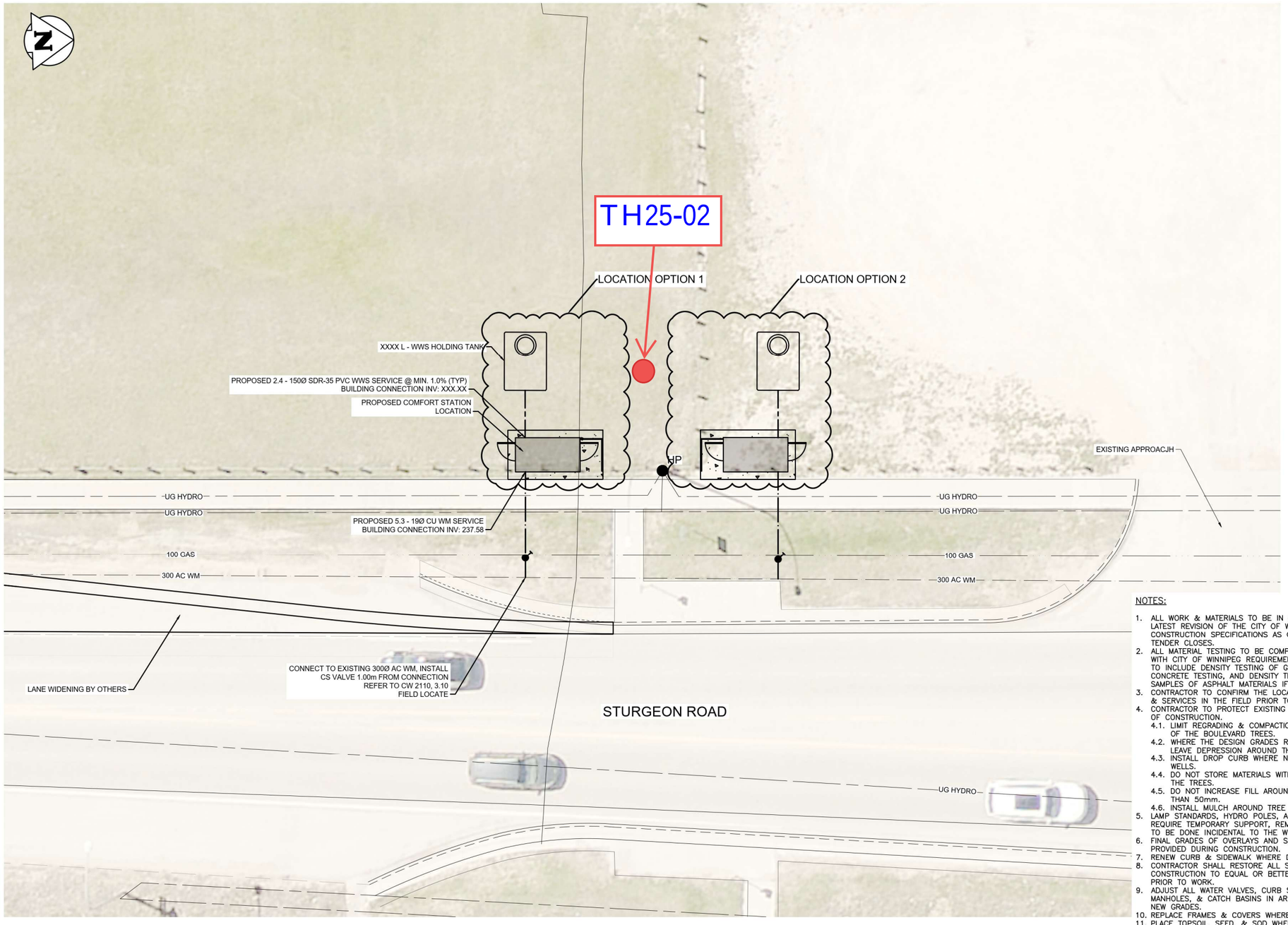
CONSULTANT DRAWING NO.
25-0107-004-C01

THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
SEEL STATION
SITE PLAN

SHEET 1 OF XX
COMPUTER FILE NAME 25-0107-004_CALL.DWG
CITY DRAWING NUMBER N/A

U:\TMS\25-0107-00A\25-0107-004_CALL.DWG
PLOT 1:1 (A-1) 2025-03-26



EXISTING SITE PLAN

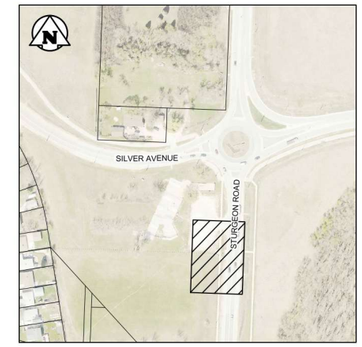
SCALE:1:100

0 2.0 4.0 6.0 8.0m

SCALE: 1:100m (24"x36")

LOCATION PLAN

SCALE:1:300,000



KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

300 LDS	LAND DRAINAGE SEWER	300 LDS		TEST HOLE			TRAFFIC SIGNAL	
250 WWS	WASTE WATER SEWER	250 WWS		GUY WIRE			SOUTH OR EAST DITCH	
GAS				LIGHT STANDARD			NORTH OR WEST DITCH	
HYDRO				BACK OF CURB			NORTH OR WEST GUTTER	
M.T.S.				ASPHALT MILL & FILL			SOUTH OR EAST GUTTER	
150 WM	WATERMAIN	150 WM		ASPHALT OVERLAY			℄ PROFILE	
	HYDRANT			CONCRETE			EDGE OF ALLEY LHS	
	VALVE			PVMT. REPAIR FABRIC			EDGE OF ALLEY RHS	
	MANHOLE			LANDSCAPING			NORTH OR WEST ℙ	
	CATCH BASIN			PROPERTY LINE			SOUTH OR EAST ℙ	
	CURB INLET			GEODETIC BENCHMARK		UG/GRS	GARAGE/PARKING SLAB	
	POLES T-MTS H-HYDRO		231.334	ELEVATION	32.231	77777	WINDOW/DOOR SILL	
EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PROFILE	PROPOSED

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????? ELEV. XXX.XX — COORDINATE SYSTEM: CGVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:100	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025-03-18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

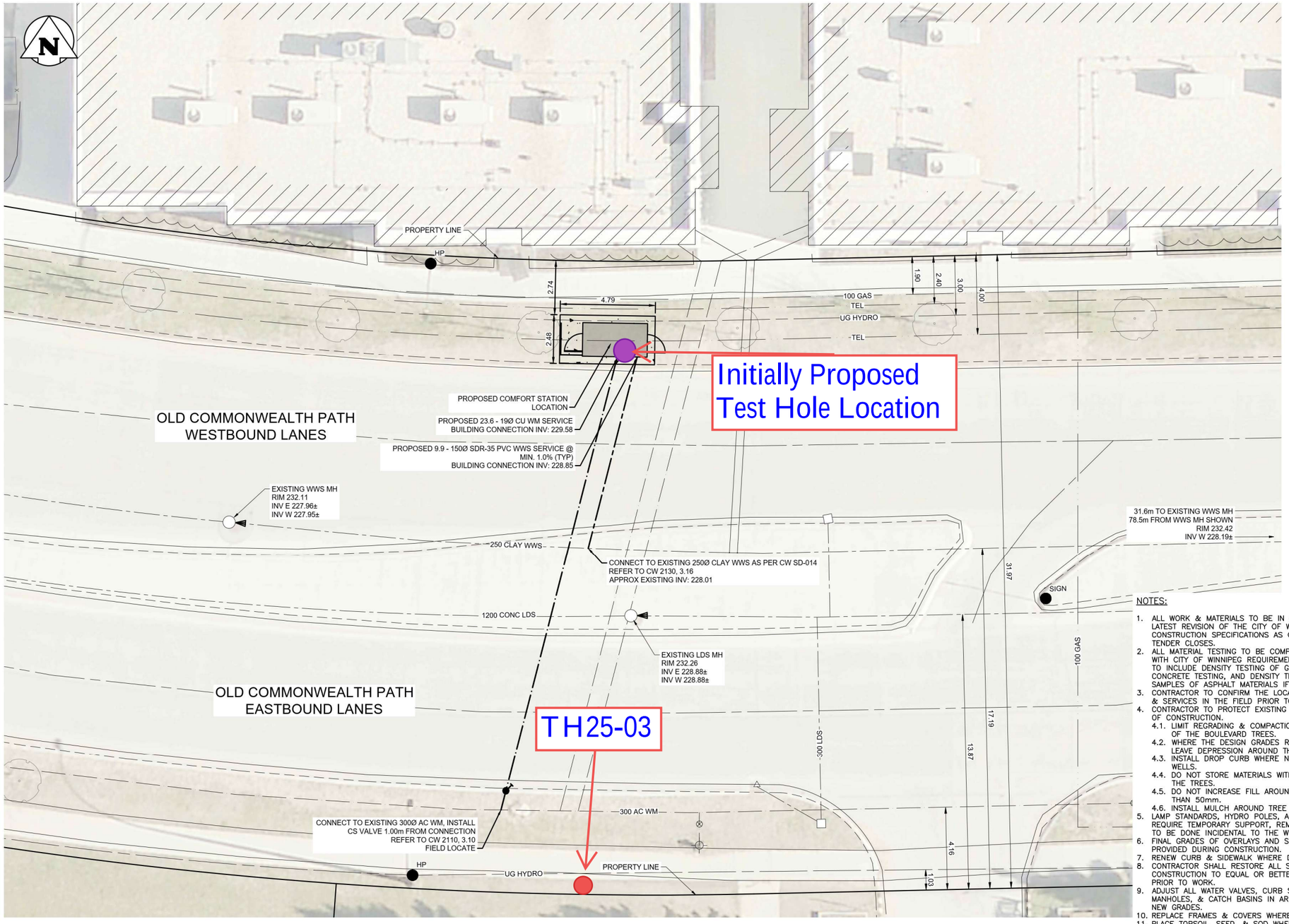
CONSULTANT DRAWING NO.
25–0107–004–C05

THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
SILVER AVENUE AT MURRAY PARK
SITE PLAN

SHEET 1 OF XX
COMPUTER FILE NAME 25–0107–004_CALL.DWG
CITY DRAWING NUMBER N/A

U:\TMS\25-0107-00A\25-0107-004_CALL.DWG
PLOT 1:1 (A-1) 2025-03-26



EXISTING SITE PLAN

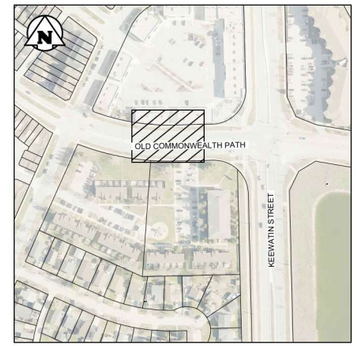
SCALE:1:100

0 2.0 4.0 6.0 8.0m

SCALE: 1:100m (24"x36")

LOCATION PLAN

SCALE:1:300,000



KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PROFILE	PROPOSED
300 LDS	LAND DRAINAGE SEWER	300 LDS		TEST HOLE			TRAFFIC SIGNAL	
250 WWS	WASTE WATER SEWER	250 WWS		GUY WIRE			SOUTH OR EAST DITCH	
GAS	GAS	GAS		LIGHT STANDARD			NORTH OR WEST DITCH	
HYDRO	HYDRO	HYDRO		BACK OF CURB			NORTH OR WEST GUTTER	
M.T.S.	M.T.S.	M.T.S.		ASPHALT MILL & FILL			SOUTH OR EAST GUTTER	
150 WM	WATERMAIN	150 WM		ASPHALT OVERLAY			℄ PROFILE	
	HYDRANT			CONCRETE			EDGE OF ALLEY LHS	
	VALVE			PVMT. REPAIR FABRIC			EDGE OF ALLEY RHS	
	MANHOLE			LANDSCAPING			NORTH OR WEST ℄	
	CATCH BASIN			PROPERTY LINE			SOUTH OR EAST ℄	
	CURB INLET			GEODETIC BENCHMARK		LHS/RHS	GARAGE/PARKING SLAB	
	POLES T–MTS H–HYDRO		231.334	ELEVATION	32.231	77777	WINDOW/DOOR SILL	

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????? ELEV. XXX.XX — COORDINATE SYSTEM: CGVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:100	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025-03-18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

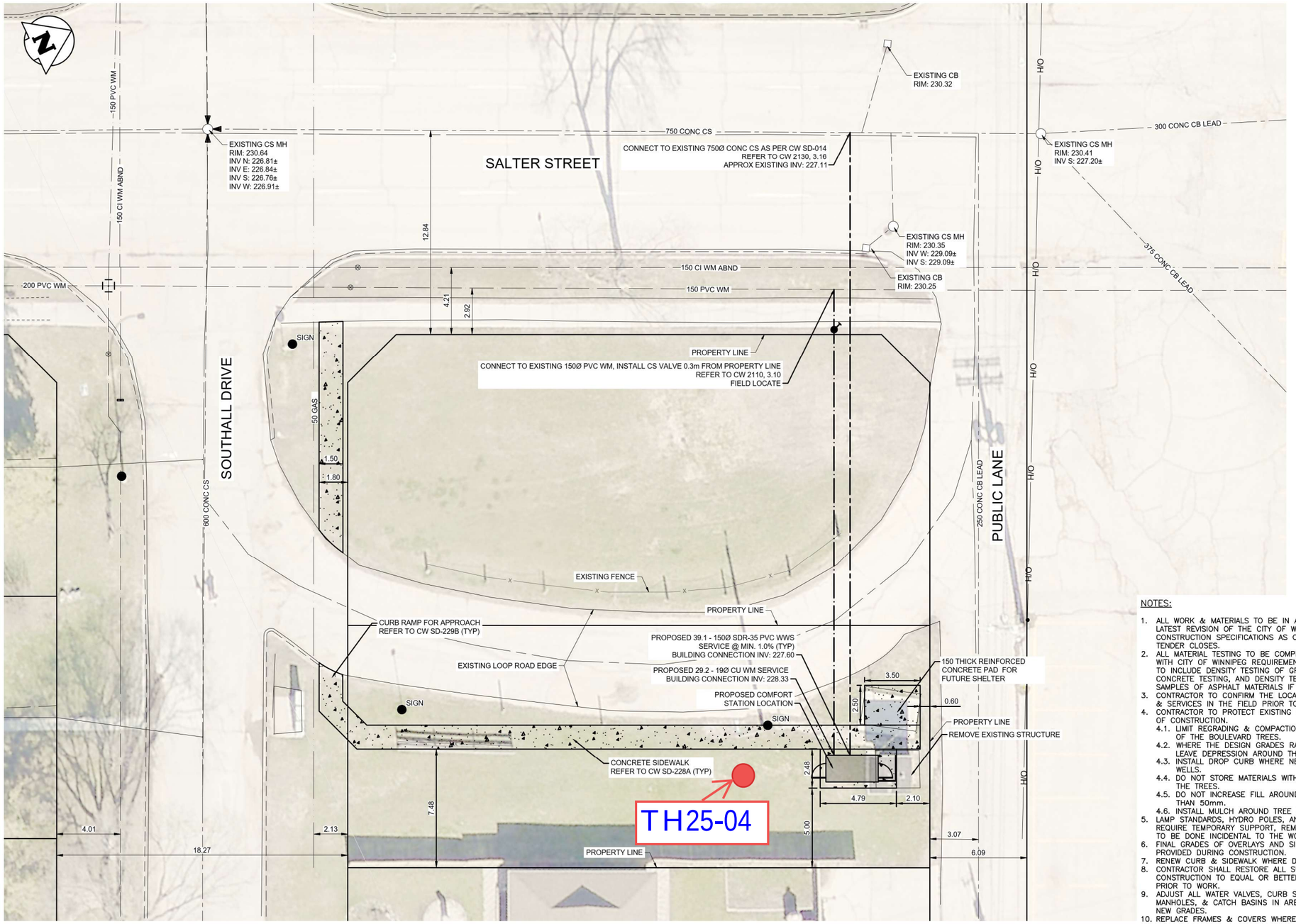
CONSULTANT DRAWING NO.
25-0107-004-C07

THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
OLD COMMONWEALTH PATH AT WATERFORD G.C.
SITE PLAN

SHEET 1 OF XX
COMPUTER FILE NAME: 25-0107-004_CALL.DWG
CITY DRAWING NUMBER: N/A

U:\TWS\25-0107-004\25-0107-004_CALL.DWG
PLOT 1:1 (A-1) 2025-03-28



EXISTING SITE PLAN

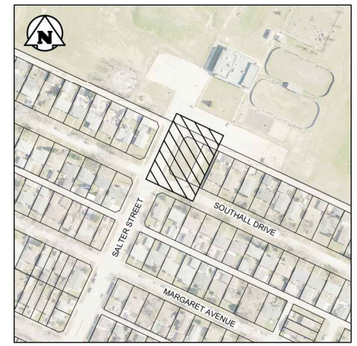
SCALE:1:125

0 2.0 4.0 6.0 8.0 10.0m

SCALE: 1:125m (24"x36")

LOCATION PLAN

SCALE:1:300,000



KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

EXISTING	LEGEND–PLAN	PROPOSED
300 LDS	LAND DRAINAGE SEWER	300 LDS
250 WWS	WASTE WATER SEWER	250 WWS
— · · —	GAS	— · · —
— — — —	HYDRO	— — — —
— · · —	M.T.S.	— · · —
150 WM	WATERMAIN	150 WM
✧	HYDRANT	✚
⊗	VALVE	⊗
○	MANHOLE	●
□	CATCH INLET	■
▽	CURB INLET	▼
⊿H	POLES T–MTS H–HYDRO	
EXISTING	LEGEND–PLAN	PROPOSED

EXISTING	LEGEND–PLAN	PROPOSED
	TEST HOLE	
⊣	GUY WIRE	
⊶	LIGHT STANDARD	⊷
— — — —	BACK OF CURB	— — — —
	ASPHALT MILL & FILL	
	ASPHALT OVERLAY	
	CONCRETE	
	PVMT. REPAIR FABRIC	
	LANDSCAPING	
—	PROPERTY LINE	
⌀	GEODETIC BENCHMARK	▲
231.334	ELEVATION	32.231
EXISTING	LEGEND–PLAN	PROPOSED

EXISTING	LEGEND–PROFILE	PROPOSED
⊶	TRAFFIC SIGNAL	
▽ ▽	SOUTH OR EAST DITCH	▽ ▽
△ △	NORTH OR WEST DITCH	△ △
⊡ ⊡	NORTH OR WEST GUTTER	⊡ ⊡
○ ○	SOUTH OR EAST GUTTER	○ ○
✕ ✕	℄ PROFILE	✕ ✕
⊡ ⊡	EDGE OF ALLEY LHS	⊡ ⊡
○ ○	EDGE OF ALLEY RHS	○ ○
◇ ◇	NORTH OR WEST ℙ	
○ ○	SOUTH OR EAST ℙ	
US/BUS ℙ	GARAGE/PARKING SLAB	
77777	WINDOW/DOOR SILL	
EXISTING	LEGEND–PROFILE	PROPOSED

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????? ELEV. XXX.XX — COORDINATE SYSTEM: CGVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:125	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025-03-18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

CONSULTANT DRAWING NO.
25-0107-004-C06

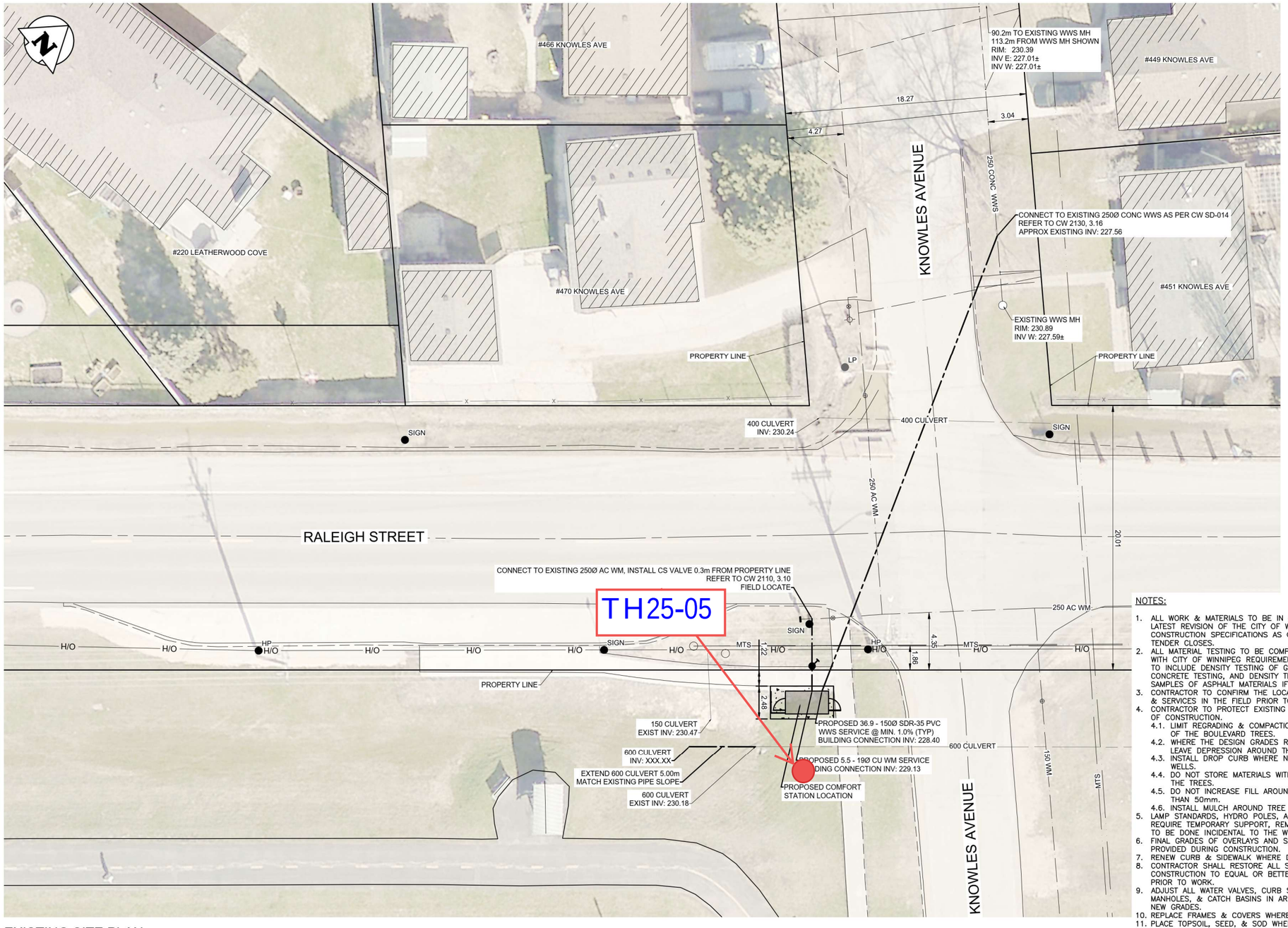
THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
SALTER STREET AT SOUTHALL DRIVE
SITE PLAN

SHEET	OF
1	XX

COMPUTER FILE NAME: 25-0107-004_CALL.DWG
CITY DRAWING NUMBER: N/A

U:\PWS\25-0107-004\25-0107-004_CALL.DWG
PLOT 1:1 (A-1) 2025-03-28



EXISTING SITE PLAN

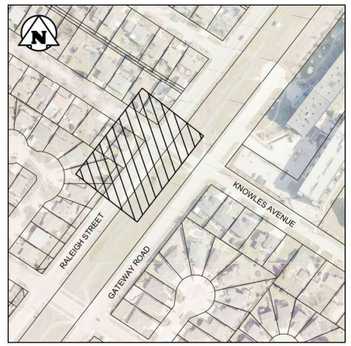
SCALE:1:150

0 3.0 6.0 9.0 12.0m

SCALE: 1:150m (24"x36")
1:300m (11"x17")

LOCATION PLAN

SCALE:1:300,000



KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PROFILE	PROPOSED
300 LDS	LAND DRAINAGE SEWER	300 LDS		TEST HOLE			TRAFFIC SIGNAL	
250 WWS	WASTE WATER SEWER	250 WWS		GUY WIRE			SOUTH OR EAST DITCH	
	GAS			LIGHT STANDARD			NORTH OR WEST DITCH	
	HYDRO			BACK OF CURB			NORTH OR WEST GUTTER	
	M.T.S.			ASPHALT MILL & FILL			SOUTH OR EAST GUTTER	
150 WM	WATERMAIN	150 WM		ASPHALT OVERLAY			℄ PROFILE	
	HYDRANT			CONCRETE			EDGE OF ALLEY LHS	
	VALVE			PVMT. REPAIR FABRIC			EDGE OF ALLEY RHS	
	MANHOLE			LANDSCAPING			NORTH OR WEST ℄	
	CATCH BASIN			PROPERTY LINE			SOUTH OR EAST ℄	
	CURB INLET			GEODETIC BENCHMARK		UNDERSIDE OF SLAB	GARAGE/PARKING SLAB	
	POLES T–MTS H–HYDRO		231.334	ELEVATION	32.231	77777	WINDOW/DOOR SILL	

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????
ELEV. XXX.XX
COORDINATE SYSTEM: CGVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:150	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025–03–18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

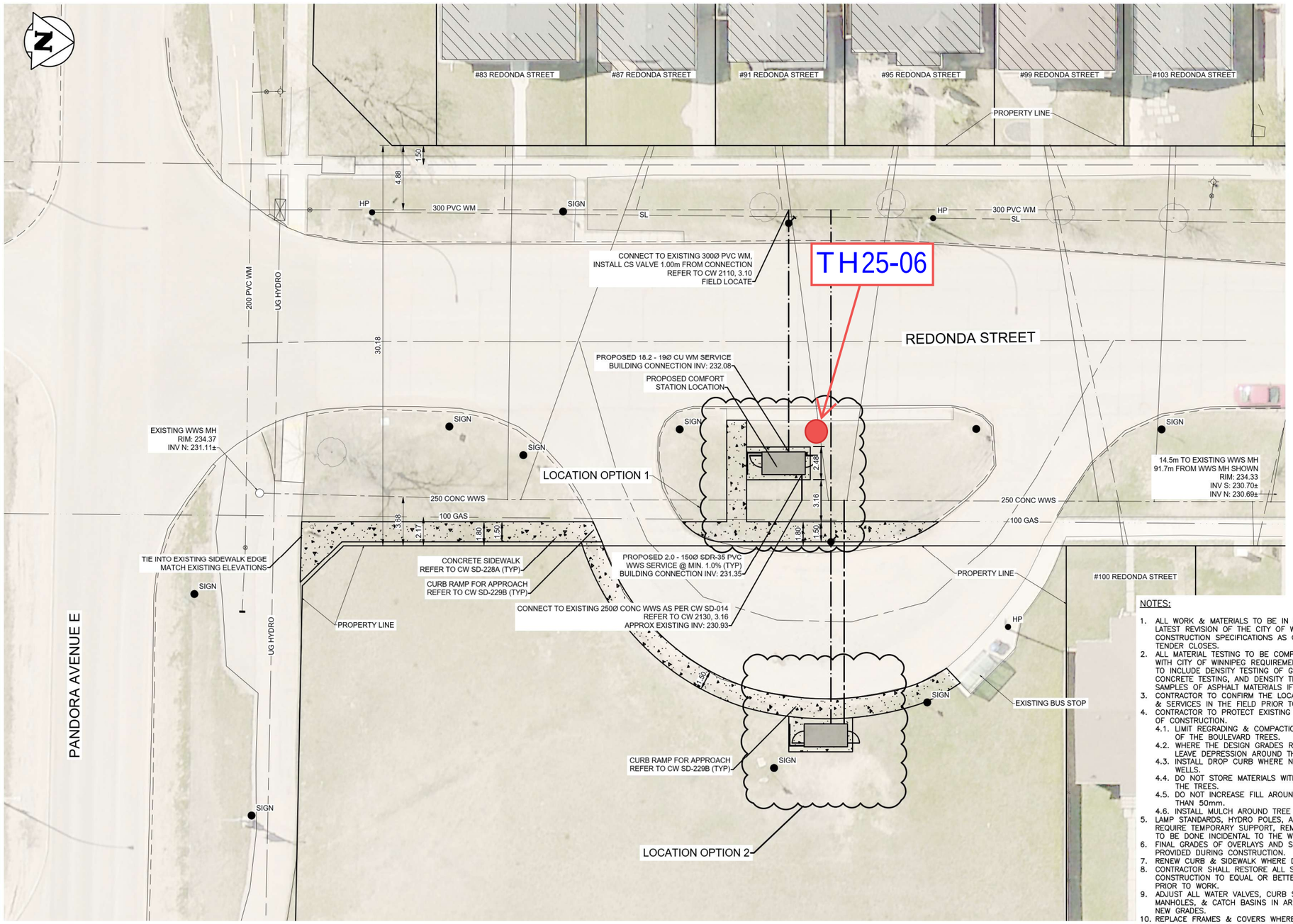
CONSULTANT DRAWING NO.
25–0107–004–C03

THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
RALEIGH STREET AT PANDORA AVENUE
SITE PLAN

SHEET 1 OF XX
COMPUTER FILE NAME: 25–0107–004_CALL.DWG
CITY DRAWING NUMBER: N/A

U:\TMS\25-0107-004\25-0107-004_CALL.DWG
PLOT 1:1 (A–1) 2025-03-26



EXISTING SITE PLAN

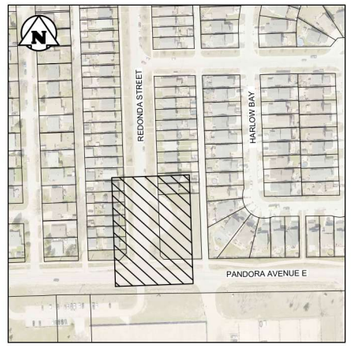
SCALE:1:150

0 3.0 6.0 9.0 12.0m

SCALE: 1:150m (24"x36")
1:300m (11"x17")

LOCATION PLAN

SCALE:1:300,000



KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PROFILE	PROPOSED
300 LDS	LAND DRAINAGE SEWER	300 LDS		TEST HOLE			TRAFFIC SIGNAL	
250 WWS	WASTE WATER SEWER	250 WWS		GUY WIRE			SOUTH OR EAST DITCH	
	GAS			LIGHT STANDARD			NORTH OR WEST DITCH	
	HYDRO			BACK OF CURB			NORTH OR WEST GUTTER	
	M.T.S.			ASPHALT MILL & FILL			SOUTH OR EAST GUTTER	
150 WM	WATERMAIN	150 WM		ASPHALT OVERLAY			℄ PROFILE	
	HYDRANT			CONCRETE			EDGE OF ALLEY LHS	
	VALVE			PVMT. REPAIR FABRIC			EDGE OF ALLEY RHS	
	MANHOLE			LANDSCAPING			NORTH OR WEST ℄	
	CATCH BASIN			PROPERTY LINE			SOUTH OR EAST ℄	
	CURB INLET			GEODETIC BENCHMARK		UNDERSIDE OF SLAB	GARAGE/PARKING SLAB	
	POLES T–MTS H–HYDRO		231.334	ELEVATION	32.231	77777	WINDOW/DOOR SILL	

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????? ELEV. XXX.XX — COORDINATE SYSTEM: CSVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:150	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025-03-18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

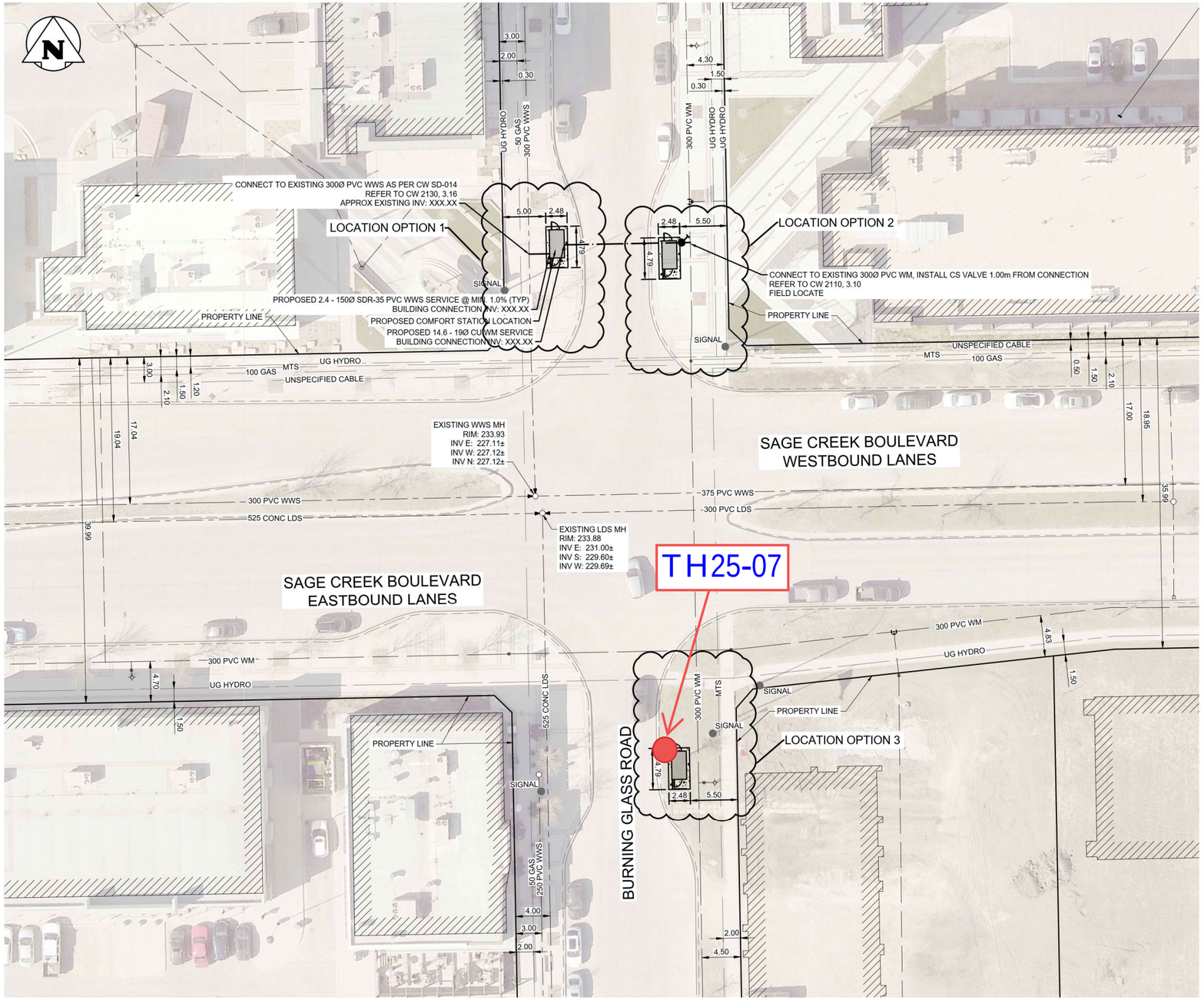
CONSULTANT DRAWING NO.
25-0107-004-C04

THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
REDONDA STREET AT PANDORA AVENUE
SITE PLAN

SHEET 1 OF XX
COMPUTER FILE NAME 25-0107-004_CALL.DWG
CITY DRAWING NUMBER N/A

U:\TMS\25-0107-004\25-0107-004_CALL.DWG
PLOT 1:1 (A-1) 2025-03-26



EXISTING SITE PLAN

SCALE:1:250

0 5.0 10.0 15.0 20.0m

SCALE: 1:250m (24"x36")
1:500m (11"x17")

LOCATION PLAN

SCALE:1:300,000

KEY PLAN

SCALE:1:2500

NOTES:

1. ALL WORK & MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS AS OF THREE DAYS BEFORE TENDER CLOSES.
2. ALL MATERIAL TESTING TO BE COMPLETED IN ACCORDANCE WITH CITY OF WINNIPEG REQUIREMENTS. MATERIAL TESTING TO INCLUDE DENSITY TESTING OF GRANULAR MATERIAL, CONCRETE TESTING, AND DENSITY TESTING AND CORE SAMPLES OF ASPHALT MATERIALS IF APPLICABLE.
3. CONTRACTOR TO CONFIRM THE LOCATION OF ALL UTILITIES & SERVICES IN THE FIELD PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO PROTECT EXISTING TREES WITHIN LIMITS OF CONSTRUCTION.
   - 4.1. LIMIT REGRADING & COMPACTION OF THE ROOT ZONE OF THE BOULEVARD TREES.
   - 4.2. WHERE THE DESIGN GRADES RAISES THE BOULEVARD, LEAVE DEPRESSION AROUND THE TREE.
   - 4.3. INSTALL DROP CURB WHERE NEEDED TO DRAIN TREE WELLS.
   - 4.4. DO NOT STORE MATERIALS WITHIN THE DRIP LINE OF THE TREES.
   - 4.5. DO NOT INCREASE FILL AROUND TRUNK BY MORE THAN 50mm.
   - 4.6. INSTALL MULCH AROUND TREE WELL WHERE DIRECTED
5. LAMP STANDARDS, HYDRO POLES, AND ANCHORS THAT REQUIRE TEMPORARY SUPPORT, REMOVAL OR REPLACEMENT, TO BE DONE INCIDENTAL TO THE WORKS.
6. FINAL GRADES OF OVERLAYS AND SIDEWALKS TO BE PROVIDED DURING CONSTRUCTION.
7. RENEW CURB & SIDEWALK WHERE DIRECTED.
8. CONTRACTOR SHALL RESTORE ALL SURFACE DISTURBED BY CONSTRUCTION TO EQUAL OR BETTER CONDITION THAN PRIOR TO WORK.
9. ADJUST ALL WATER VALVES, CURB STOPS HYDRANTS, MANHOLES, & CATCH BASINS IN AREA OF WORK TO MATCH NEW GRADES.
10. REPLACE FRAMES & COVERS WHERE DIRECTED.
11. PLACE TOPSOIL, SEED, & SOD WHERE DIRECTED.
12. MAINTAIN MINIMUM 2.60m COVER OVER WWS AND WM SERVICE LINES.

LOCATIONS OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF THE EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

WARNING

NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.

TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.

SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PLAN	PROPOSED	EXISTING	LEGEND–PROFILE	PROPOSED
300 LDS	LAND DRAINAGE SEWER	300 LDS		TEST HOLE			TRAFFIC SIGNAL	
250 WWS	WASTE WATER SEWER	250 WWS		GUY WIRE			SOUTH OR EAST DITCH	
	GAS			LIGHT STANDARD			NORTH OR WEST DITCH	
	HYDRO			BACK OF CURB			NORTH OR WEST GUTTER	
	M.T.S.			ASPHALT MILL & FILL			SOUTH OR EAST GUTTER	
150 WM	WATERMAIN	150 WM		ASPHALT OVERLAY			℄ PROFILE	
	HYDRANT			CONCRETE			EDGE OF ALLEY LHS	
	VALVE			PVMT. REPAIR FABRIC			EDGE OF ALLEY RHS	
	MANHOLE			LANDSCAPING			NORTH OR WEST ℙ	
	CATCH BASIN			PROPERTY LINE			SOUTH OR EAST ℙ	
	CURB INLET			GEODETIC BENCHMARK		USC/RHS ℬ	GARAGE/PARKING SLAB	
	POLES T–MTS H–HYDRO		231.334	ELEVATION	32.231	77777	WINDOW/DOOR SILL	

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ??????? ELEV. XXX.XX — COORDINATE SYSTEM: CGVD28

NO.	REVISIONS	DATE	BY
A	ISSUED FOR 30% REVIEW	25/04/02	BJM

KGS GROUP

DESIGNED BY	GLG	CHECKED BY	BJM
DRAWN BY	JTW	APPROVED BY	XXX
HOR. SCALE:	1:250	RELEASED FOR CONSTRUCTION:	
VERTICAL:	N/A		
DATE	2025-03-18	DATE	–

ENGINEER'S SEAL

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

CONSULTANT DRAWING NO.
25-0107-004-C02

THE CITY OF WINNIPEG
WINNIPEG TRANSIT DEPARTMENT
TRANSIT INFRASTRUCTURE

PROJECT TITLE
TRANSIT COMFORT STATIONS – 2025
SAGE CREEK STATION
SITE PLAN

SHEET 1 OF XX
COMPUTER FILE NAME: 25-0107-004_CALL.DWG
CITY DRAWING NUMBER: N/A

U:\LPMS\25-0107-004\25-0107-004_CALL.DWG
PLOT 1:1 (A-1) 2025-03-28

APPENDIX B

Test Hole Logs

KEY TO SYMBOLS

LITHOLOGIC SYMBOLS


Clay (CH, high plasticity)


Clay (CL, low plasticity)


Silty Clay (CL-ML)


Fill


Poorly Graded Gravel (GP)


Till (mix of gravel, sand, clay and silt)


Topsoil

SAMPLER SYMBOLS


Auger Grab


SPT Split Spoon

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - Liquid Limit
PL - Plastic Limit
PI - Plastic Index
MC - Moisture Content
DD - Dry Density
NP - Non-Plastic
-200 - Percent Passing No. 200 Sieve
TV - Torvane (kPa)
PP - Pocket Penetrometer (kPa)
PSA - Particle Size Analysis
TOC - Top Of Casing

PN - Pneumatic Piezometer
VW - Vibrating Wire Piezometer
PID - Photoionization Detector
ppm - Parts Per Million
▽ Water Level During Drilling
▼ Water Level Upon Completion of Drilling
▼ Water Level Remeasured/Static

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT NAME	Transit Comfort Stations - Geotechnical Investigation	**LOCATION**	Winnipeg, Manitoba

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-01

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	231.79 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-7-2025
DESCRIPTION	~4m W of SW Transit Corridor, ~ 20.5m SE of Seel Ave.	**UTM (m)**	N 5,522,648
DRILL RIG / HAMMER	Mobile B37X Track Mounted Drill Rig with Auto-Hammer		E 631,694 Zone 14
METHOD(S)	0.0 m to 9.1 m: 125 mm ø SSA		

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEV (m)	DRILLING/ DIGGING REMARKS	WATER LEVEL	SAMPLE TYPE	NUMBER
				TOPSOIL - 51 mm, Black, frozen, some roots.	231.7				S1
231	1.0			**CLAY (CL)** - 1168 mm, Black, frozen, low plasticity, trace fine gravel. - Light brown, moist, soft, silty below 0.5 m. - LL=24, PL=16, PI=8 at 0.6 m.					S2
					230.6				
		5		**CLAY (CH)** - Grey, damp, firm, high plasticity. - Stiff below 1.5 m.					S3
230	2.0								S4
				- Moist, trace silt pockets, trace gypsum below 2.0 m.					
229	3.0	10							S5
									S6
228	4.0								
		15							S7
227	5.0								
				- Firm below 5.2 m.					S8
226	6.0	20							
						- Sloughing and squeezing below 6.4 m upon completion of drilling.			S9
225	7.0								
		25							
224	8.0								
									S10
223	9.0	30							
					222.6				
222	10.0			Notes: 1. End of test hole at 9.1 m. 2. Test hole caved to 6.4 m upon completion of drilling/digging. 3. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.					

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS
▽ **During Drilling/Digging** on 4-7-2025 None Encountered
▼ **Upon Completion** on 4-7-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-02

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	239.18 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-7-2025
DESCRIPTION	~ 15m W of Sturgeon Rd., ~75 m S of Silver Ave.	**UTM (m)**	N 5,528,295
DRILL RIG / HAMMER	Mobile B37X Track Mounted Drill Rig with Auto-Hammer		E 623,667 Zone 14
METHOD(S)	0.0 m to 6.5 m: 125 mm ø SSA		

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEV (m)	DRILLING/ DIGGING REMARKS	WATER LEVEL	SAMPLE TYPE	NUMBER	RECOVERY %	BLOWS/0.15 m	N-VALUE
239				**GRAVEL FILL** - 178 mm, Brown to grey, dry to damp, compact, 19 mm down.	239.0				S1	100	26	29
									S1a		20	
				CLAY (CH) - Black, frozen, high plasticity, some fine gravel, trace roots.							9	
238	1.0			- Brown to grey, damp, some gypsum below 0.9 m.					S2			
		5		- LL=58, PL=16, PI=42 at 1.2 m.					S3			
	2.0			- Some silt pockets, stiff below 1.5 m.					S4			
237												
									S5			
	3.0	10			236.1							
236				**SILT TILL** - Brown, damp to moist, compact, some silt pockets, some fine gravel, some 19 mm down pieces of granite, some coarse sand, some fine sand.					S6			
	4.0											
235				- Difficult drilling below 4.3 m.					S7			
		15										
	5.0								S8			
234												
	6.0	20				- Sloughing and squeezing below 5.8 m upon completion of drilling.						
233				- Very dense below 6.4 m.	232.7				S9	50	50/ 80mm	+100
	7.0			Notes: 1. End of test hole at 6.5 m. 2. Refusal encountered in silt till at a depth of 6.5 m. 3. Test hole caved to 5.8 m upon completion of drilling/digging. 4. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.								
232												
		25										
	8.0											
231												
	9.0	30										
230												
	10.0											
229												

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS
▽ **During Drilling/Digging** on 4-7-2025 None Encountered
▼ **Upon Completion** on 4-7-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-03

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	232.05 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-7-2025
DESCRIPTION	~ 10m S of Old Commonwealth Path, ~62m W of Garton Ave.	**UTM (m)**	N 5,535,184
DRILL RIG / HAMMER	Mobile B37X Track Mounted Drill Rig with Auto-Hammer		E 629,343 Zone 14
METHOD(S)	0.0 m to 9.1 m: 125 mm ø SSA		

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEV (m)	DRILLING/ DIGGING REMARKS	WATER LEVEL	SAMPLE TYPE	NUMBER
232				**TOPSOIL** - 51 mm, Black, frozen, trace roots.	232.0				
				CLAY FILL - 863 mm, Black, frozen, low plasticity, trace fine gravel.	231.1				S1
231	1.0	5		**CLAY (CL)** - Brown, damp to moist, firm, low plasticity, silty. - LL=42, PL=14, PI=28 at 0.9 m.	230.5				S2
				CLAY (CH) - Grey, damp to moist, stiff, high plasticity, trace silt pockets, trace gypsum.					S3
230	2.0								S4
229	3.0	10		- Firm below 3.0 m.					S5
228	4.0	15							S6
227	5.0								S7
226	6.0	20							
225	7.0			- Transition to clay till below 7.0 m.	224.9				S8
				CLAY TILL - Grey, moist, trace fine gravel, trace fine sand, trace silt pockets, trace gypsum.		- Sloughing and squeezing below 7.3 m upon completion of drilling.			S9
224	8.0	25							
									S10
223	9.0	30			222.9				
222	10.0			Notes: 1. End of test hole at 9.1 m. 2. Test hole caved to 7.3 m upon completion of drilling/digging. 3. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.					

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS
▽ **During Drilling/Digging** on 4-7-2025 None Encountered
▼ **Upon Completion** on 4-7-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-04

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	230.45 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-10-2025
DESCRIPTION	~39m SE of Salter St., ~24.5m NE of Southhall Dr.	**UTM (m)**	N 5,534,773
DRILL RIG / HAMMER	Acker MP5 Track Mounted Drill Rig with Auto-Hammer		E 635,118 Zone 14
METHOD(S)	0.0 m to 9.1 m: 125 mm ø SSA		

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEV (m)	WATER LEVEL	SAMPLE TYPE	NUMBER
230				**TOPSOIL** - 51 mm, Black, frozen, trace roots.	230.4			S1
				CLAY FILL - 1473 mm, Black, frozen, low plasticity, some silt.				
	1.0							S2
229		5			228.9			
				SILTY CLAY (CL-ML) - Brown, moist, soft, low plasticity.				S3
	2.0			- LL=21, PL=17, PI=4 at 1.7 m.				
228					227.7			
				CLAY (CH) - Grey, damp, stiff, high plasticity.				S4
	3.0	10		- Trace silt pockets, trace gypsum, trace oxidation below 3.0 m.				S5
227								
	4.0							S6
226		15						
	5.0							S7
225								
	6.0	20		- Firm below 6.1 m.				
224								S8
	7.0							
223		25						
	8.0							S9
222								
	9.0	30			221.3			
221				Notes: 1. End of test hole at 9.1 m. 2. Test hole remained open to 9.1 m upon completion of drilling/digging. 3. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.				
	10.0							
220								

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS
During Drilling/Digging on 4-10-2025 None Encountered
Upon Completion on 4-10-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-05

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	231.20 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-10-2025
DESCRIPTION	~12.5m NE of Knowles Ave. ~21.5m SE of Raleigh St	**UTM (m)**	N 5,534,846
DRILL RIG / HAMMER	Acker MP5 Track Mounted Drill Rig with Auto-Hammer		E 640,208 Zone 14
METHOD(S)	0.0 m to 9.1 m: 125 mm ø SSA		

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEV (m)	WATER LEVEL	SAMPLE TYPE	NUMBER
231				**TOPSOIL** - 51 mm, Black, frozen, trace roots.	231.2			
				CLAY FILL - 1778 mm, Black, frozen, low plasticity, some silt, some black organics, some fine gravel, some fine sand.				S1
	1.0							
230		5						S2
					229.4			S3
	2.0			**CLAY (CL)** - Brown, moist, firm, low plasticity, silty.				
229				- LL=40, PL=16, PI=24 at 2.1 m.				S4
					228.8			
				CLAY (CH) - Grey, damp to moist, stiff, high plasticity, trace silt pockets, trace gypsum.				S5
	3.0	10		- Moist to wet below 3.0 m.				S6
228						▽		
	4.0							
227		15						S7
	5.0							
226								S8
	6.0	20		- Firm below 6.1 m.				
225								S9
	7.0							
224		25						
	8.0							
223								S10
	9.0	30			222.1			
222				Notes: 1. End of test hole at 9.1 m. 2. Test hole remained open to 9.1 m upon completion of drilling/digging. 3. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.				
	10.0							
221								

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS
▽ **During Drilling/Digging** 3.96 m on 4-10-2025
▼ **Upon Completion** on 4-10-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-06

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	234.02 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-10-2025
DESCRIPTION	~47m N of Pandora Ave., ~4m E of Redonda St.	**UTM (m)**	N 5,528,794
DRILL RIG / HAMMER	Acker MP5 Track Mounted Drill Rig with Auto-Hammer		E 645,174 Zone 14
METHOD(S)	0.0 m to 9.1 m: 125 mm ø SSA		

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEV (m)	DRILLING/ DIGGING REMARKS	WATER LEVEL	SAMPLE TYPE	NUMBER
				TOPSOIL - 51 mm, Black, frozen, trace roots.	234.0				
				CLAY (CH) - 1473 mm, Black, frozen, high plasticity, some silt, trace roots, trace organics.					
233	1.0			- Brown, low plasticity, silty below 1.1 m.					S1
		5			232.5				S2
				CLAY (CL) - Brown, stiff, low plasticity, trace oxidation, silty.	232.2				S3
232	2.0			**CLAY (CH)** - Grey, damp to moist, stiff, high plasticity.					
				- Firm below 2.7 m.					S4
231	3.0	10		- LL=97, PL=30, PI=67 at 2.7 m.					
				- Silt lens from 3.3 m to 3.4 m.					S5
				- Trace silt pockets, trace gypsum, trace oxidation below 3.4 m.					
230	4.0								S6
		15							
229	5.0								S7
228	6.0	20							
									S8
227	7.0								
		25							
226	8.0			- Silt lens from 8.1 m to 8.2 m.					S9
225	9.0	30			224.9	- Sloughing and squeezing below 9.0 m upon completion of drilling.			
				Notes: 1. End of test hole at 9.1 m. 2. Test hole caved to 9.0 m upon completion of drilling/digging. 3. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.					
224	10.0								

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS
▽ **During Drilling/Digging** on 4-10-2025 None Encountered
▼ **Upon Completion** on 4-10-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

KGS GROUP

TEST HOLE LOG

HOLE NO.
TH25-07

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT	**Transit Comfort Stations - Geotechnical Investigation**	**SURFACE ELEV.**	233.88 m
LOCATION	Winnipeg, Manitoba	**START DATE**	4-11-2025
DESCRIPTION	~18.8m S of Sage Creek Blvd., ~3m E of Burning Glass Rd	**UTM (m)**	N 5,521,953
DRILL RIG / HAMMER	Acker MP5 Track Mounted Drill Rig with Auto-Hammer		E 640,550 Zone 14
METHOD(S)	0.0 m to 9.1 m: 125 mm ø SSA		

ELEV (m)	DEPTH (m)	DEPTH (ft)	DESCRIPTION AND CLASSIFICATION	ELEV (m)	DRILLING/ DIGGING REMARKS	WATER LEVEL	SAMPLE TYPE	NUMBER
			TOPSOIL - 51 mm, Black, frozen, some coarse sand, some fine sand, trace roots.	233.8				S1
								S2
233	1.0		**CLAY FILL** - 1473 mm, Black, frozen, high plasticity, some silt, some fine gravel, some coarse sand, some fine sand. - Grey and black, and fine gravel below 0.3 m. - Black, trace silt, trace oxidation below 0.6 m. - LL=78, PL=26, PI=52 at 1.2 m.					S3
		5		232.4				
232	2.0		**CLAY (CH)** - Grey, damp to moist, stiff, high plasticity, trace silt pockets.					S4
231	3.0	10	- Firm from 3.0 m to 4.3 m.			▽		S5
								S6
230	4.0	15	- Trace gypsum below 4.6 m.					S7
229	5.0							S8
228	6.0	20	- Firm below 6.1 m.					
227	7.0							S9
		25						
226	8.0							S10
225	9.0	30		224.7	- Sloughing and squeezing below 9.0 m upon completion of drilling.			
224	10.0		Notes: 1. End of test hole at 9.1 m. 2. Test hole caved to 8.8 m upon completion of drilling/digging. 3. Test hole backfilled with auger cuttings and bentonite chips. An approximate 2.4 m of bentonite seal at surface.					

PL MC LL
Cu TORVANE (kPa) ◆
qu POCKET PEN (kPa) ★
SPT (N) BLOWS/0.30 m ▲
20 40 60 80

WATER LEVELS	▽ **During Drilling/Digging**	2.90 m on 4-11-2025
	▼ **Upon Completion**	on 4-11-2025 Dry

CONTRACTOR **Maple Leaf Drilling Ltd.**
INSPECTOR **R. NAUTH**
APPROVED T. SCHELLENBERG
DATE 5-9-2025

KGS_LOG_U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_GINT LOGS.GPJ

APPENDIX C

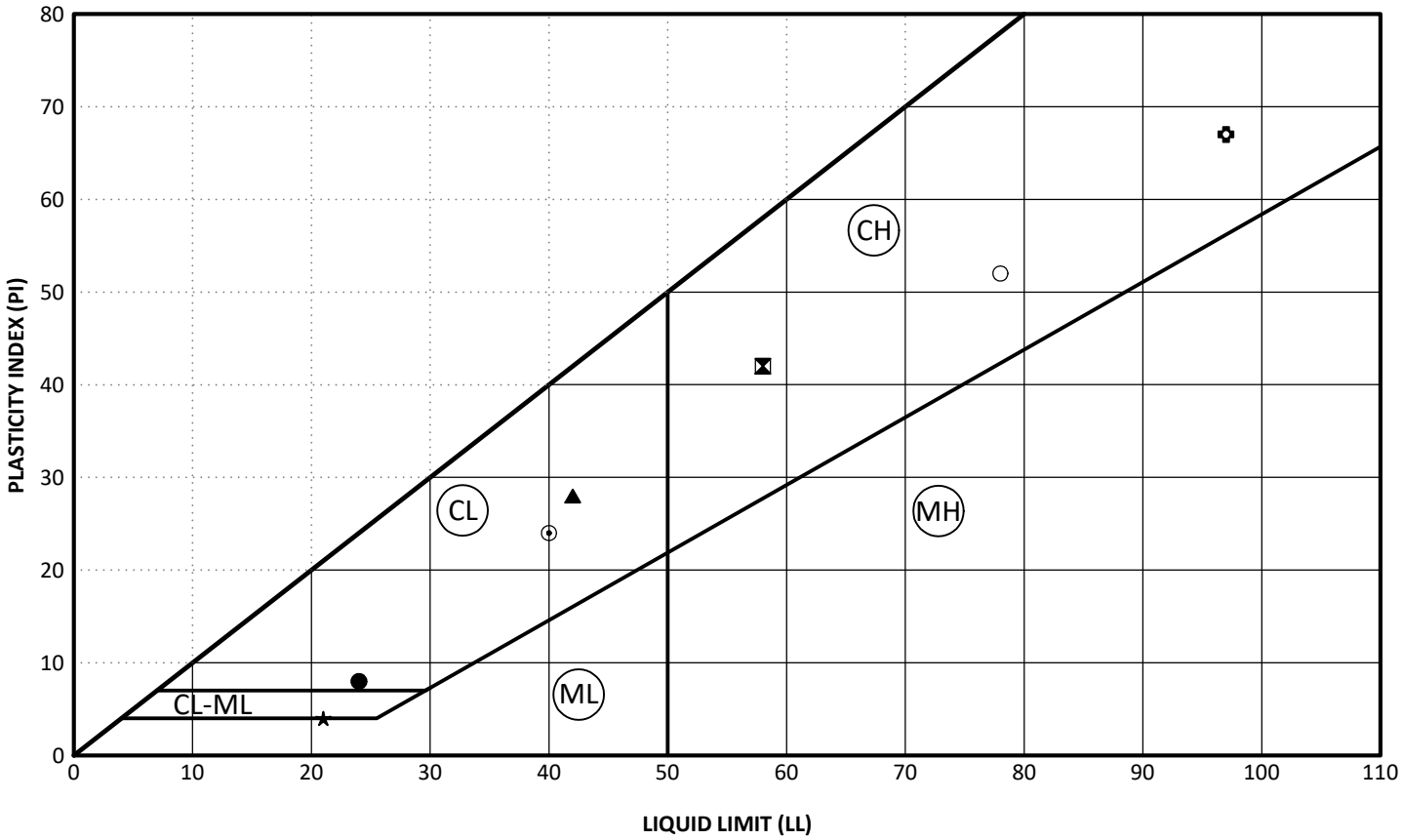
Summary of Laboratory Test Results

SUMMARY OF INDEX TESTS

Test Hole ID	Sample No.	Depth (m)	Class-ification	Max Size (mm)	<75 µm Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Moisture Content (%)	Dry Density (kN/m3)	Specific Gravity	Satur-ation (%)	Void Ratio
TH25-01	S2	0.6	CL			24	16	8	25				
TH25-01	S4	1.7	CH						42				
TH25-01	S6	3.2	CH						49				
TH25-01	S8	5.2	CH						52				
TH25-01	S10	8.2	CH						49				
TH25-02	S1	0.2	FILL						5				
TH25-02	S3	1.2	CH			58	16	42	27				
TH25-02	S5	2.7	CH						33				
TH25-02	S7	4.3	SILT TILL						16				
TH25-02	S8	4.9	SILT TILL						10				
TH25-03	S2	0.9	CL			42	14	28	38				
TH25-03	S4	2.7	CH						54				
TH25-03	S6	4.3	CH						59				
TH25-03	S7	5.2	CH						53				
TH25-03	S10	8.5	CLAY TILL						41				
TH25-04	S2	1.2	FILL						31				
TH25-04	S3	1.7	CL-ML			21	17	4	23				
TH25-04	S5	3.2	CH						49				
TH25-04	S7	5.2	CH						56				
TH25-04	S9	8.2	CH						46				
TH25-05	S2	1.2	FILL						36				
TH25-05	S4	2.1	CL			40	16	24	30				
TH25-05	S7	4.3	CH						48				
TH25-05	S9	6.7	CH						49				
TH25-05	S10	8.2	CH						41				
TH25-06	S1	0.2	CH						41				
TH25-06	S2	1.2	CL						28				
TH25-06	S4	2.7	CH			97	30	67	47				
TH25-06	S7	5.2	CH						52				
TH25-06	S9	8.2	CH						50				
TH25-07	S3	1.2	FILL			78	26	52	32				
TH25-07	S5	2.7	CH						34				
TH25-07	S7	4.3	CH						51				
TH25-07	S9	6.7	CH						42				
TH25-07	S10	8.2	CH						46				

* Moisture conditioned and remolded sample.
** Assumed specific gravity.

ATTERBERG LIMITS



	HOLE	DEPTH (m)	SAMPLE #	LL	PL	PI	SAND (%)	SILT (%)	CLAY (%)	SILT & CLAY (%)	MC (%)	CLASSIFICATION
●	TH25-01	0.6	S2	24	16	8					25	CL
⊠	TH25-02	1.2	S3	58	16	42					27	CH
▲	TH25-03	0.9	S2	42	14	28					38	CL
★	TH25-04	1.7	S3	21	17	4					23	CL-ML
⊙	TH25-05	2.1	S4	40	16	24					30	CL
✿	TH25-06	2.7	S4	97	30	67					47	CH
○	TH25-07	1.2	S3	78	26	52					32	FILL

A-LINE PLOT (NO CI) U:\FMS\25-0535-006\25-0535-006_TRANSIT COMFORT STATIONS_ GINT LOGS.GPJ

KGS GROUP

CLIENT	**KGS GROUP**	**PROJECT NO.**	25-0535-006
PROJECT NAME	Transit Comfort Stations - Geotechnical Investigation	**LOCATION**	Winnipeg, Manitoba
TESTED BY	Stantec	**DATE TESTED**	April 22, 2025

KGS
GROUP

Experience in Action