6th October, 2025
File No. USG2146

Town of Innisfail
4943 - 53rd Street
Innisfail, Alberta
T4G 1A1

ATTENTION: Mr. Steven Kennedy, Director of Operations

Dear Mr. Kennedy,

SUBJECT: Napoleon Residential Subdivision
Alternative Foundation Recommendations
Within the S.W. ¼ of 32-37-27 W4
Innisfail, Alberta

1 INTRODUCTION

Union Street Geotechnical Ltd. (Union Street) was retained by the Town of Innisfail to provide comments on possible alternative foundation recommendations for proposed residential development within the Napoleon Residential Subdivision located with the S.W. ¼ of 32-37-27 W4 in Innisfail, Alberta. While performing deep utility installation Quality Assurance materials testing, it was noted that portions of the site contained subgrade that is considered quite sensitive in nature and constructing typical shallow foundations may prove difficult if similar subgrade conditions are encountered during residential construction. As such, the following recommendations where provided.

2 REFERENCED REPORT

The following was referenced while compiling this letter:

4726 - 78A Street Close
Red Deer, Alberta
T4P 2J2

Bus: 403-350-9688
www.unionstreetgeo.ca

- Allen, Trevor, "*Geotechnical Investigation Report, Napoleon Southwest Development, Innisfail, Alberta*", compiled by ParklandGeo Ltd., Project No. 2406346RD, dated 13th December, 2024, Rev. 0.

In summary:

- Eight boreholes were drilled across the site on the 12th November, 2024;
- The area of interest relative to bearing for shallow foundations, from 1.0 m to 2.0 m below grade generally consisted of sand or clay;
- Repetitive traffic may result in significant weakening/failure of the subgrade;
- The subgrade conditions are considered suitable for traditional shallow foundations bearing on the native clay or sand with a ULS bearing capacity of 225 kPa for strip footings;
- If soft, wet, and/or weak soils are encountered as the bearing subgrade for shallow foundations, an alternative configuration may be required; and,
- The groundwater table ranged from 2.76 m to 2.90 m below grade following an eight-day recharge period.

3 SHALLOW FOUNDATIONS

As per the referenced report, shallow foundations are a suitable foundation system to support the proposed residential development. However, some soft, wet, and sensitive soils have been observed while undertaking materials testing QA during deep installation activities and recommendations for shallow foundations bearing on a gravel mat have been requested by the client.

Shallow foundations are an optional foundation system for the proposed development at this site. Footings founded at depths below 1.5 m, in continually heated residences, founded on native sand or clay will likely not be subject to movements by frost. Footings founded above this depth may be subject to movement by frost, and therefore, will require insulation and/or heating to prevent frost penetration below the

footing. Shallow foundations should not be placed on organic, non-structural fill, soft, wet, frozen, or high plastic soil.

The following recommendations are made for shallow foundations bearing on a gravel mat at this site:

1. Over excavate the basement, exposing undisturbed native clay or sand subgrade, by 0.41 m. Based on the proposed development, a footing depth of 1.0 m to 2.0 m below grade is expected;

2. Prepare the founding subgrade surface by removing any pockets of soft and/or saturated soil to a uniform native bearing surface. The founding surface must be maintained in an undisturbed state. The surface should not be left exposed to the environment which could result in wetting, softening, or drying;

3. Ensure the excavation extends beyond the outer edge of the proposed footing by at least the width of the footing;

4. Place a geotextile, such as Solmax Mirafi N-Series, or approved equivalent, on the prepared, exposed subgrade according the manufactures recommendations. Place a weeping tile system around the perimeter of the proposed development footprint;

5. Place a minimum 0.41 m of structural fill, a low to medium plastic 75 mm pit-run, compacted to a minimum 98% SPDD, on the geotextile which bears on the native till. Ideally, the bearing stratum will be similar for the entire structure to maintain equal reactionary effects of changing load and moisture content conditions;

6. The footings must be adequately reinforced to distribute the applied loads and also have sufficient stiffness to distribute local overstresses;

7. Design strip footings deeper than 1.0 m, founded a minimum 0.41 m of structural fill bearing on the native subgrade, for ULS Design with an ultimate bearing capacity of 240 kPa. The factored ULS capacity can be calculated by multiplying the ultimate capacity by a resistance factor of 0.5. For SLS Design,

an allowable bearing capacity of 80 kPa can be used for strip footings on the structural fill. The SLS bearing capacity is based on limiting settlement to less than 25 mm. The bearing capacity values recommended above are only applicable to a strip footing with a maximum width of 1.2 m or a pad footing with maximum dimensions of 1.5 m x 1.5 m. For square pad footings, the bearing capacity values can be increased by 20%. If larger size footings are required, the footing size and settlement potential should be reviewed;

8. The minimum width for a footing as required by the applicable building code must be used in design regardless of bearing capacity considerations;

9. A qualified geotechnical engineer must inspect all subgrade shallow foundation bearing surfaces prior to placing structural fill and prior to pouring footings;

10. If wet, soft, or frozen subgrade is encountered as the bearing surface for the structural fill, these areas must be further excavated; and,

11. In cases where footings support a wall, granular backfill is ideal because it provides subsurface drainage on the exterior of the wall (lowers the hydrostatic pressure) and tends to settle less than uncompacted clayey soil backfill. Where granular backfill of walls is used, a clay cap is recommended for porous surface areas to prevent the influx of surface water.

Basement walls must be designed to support the horizontal loads imposed by the earth behind the wall. If the backfill behind the walls cannot be fully drained, the hydrostatic forces from impounded water must be added to the wall loads. Any surcharge loading at the top of these walls, such as parked vehicles, must also be included in the wall loading. The structural design of these walls must provide mechanisms to prevent leakage, such as water stops and planned shrinkage joints to minimize random cracking. The exterior of the walls requires heavy water proofing materials.

Place a minimum 350 mm of impermeable clay soil at the exterior surface to reduce surface infiltration into the granular backfill. Provide factory installed geotextile wrapped plastic perforated subdrain pipes around the base of basement or retaining

walls, in the structural fill, on the cohesive subgrade. Provide for gravity discharge of the subdrain pipe to a frost-free sump, which is drained by gravity or level activated pumping.

The soil properties to use in the design of basement and retaining walls are given in Table 3.1. These values are estimated based on soil index properties.

TABLE 3.1: SOIL PROPERTIES FOR BASEMENT AND RETAINING WALL DESIGN

Soil Type	K_o	Unit Weight (kN/m^3)	Friction Angle
Granular Fill	0.36	21.1	40°
Clay	0.53	17.3	28°

4 CLOSURE

Our scope includes a visual assessment of the subgrade soil and a review of a report performed by others, and does not include subsurface exploration, laboratory analyses, surveying, or structural design recommendations of any kind. Our mandate has been to review and recommend, which we have completed by means of this letter. Our findings are based upon the information obtained from the referenced field observations and reports, and, as no subsurface exploration or laboratory analysis has been performed, is not a guarantee of site conditions. We have had no mandate to design any elements of the structure, and accept no responsibility for such design or design review. Additionally, the subgrades bearing capacity may be altered due to natural events or contractor activities and it is outside Union Street's scope of work to ensure uniform conditions throughout the construction process.

Should you have any questions, require more information, or wish to discuss site conditions, please feel free to contact us, anytime.

Respectfully,

Union Street Geotechnical Ltd.

Compiled By:



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Union Street Geotechnical Ltd.
RM SIGNATURE:
RM APEGA ID#: 80317
DATE: 6 October, 2025
PERMIT NUMBER: P12644
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

6th October, 2025
Joshua Wilson, P.Eng.
Geotechnical Manager

Union Street Geotechnical