



re: Geotechnical Design Summary Details
Proposed Residential Development
40 Beechcliffe Street – Ottawa, Ontario

to: Habitat For Humanity – **Erin O'Connor** – eoconnor@habitatgo.ca

date: September 18, 2025

file: PG7521-MEMO.03

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide the geotechnical design summary details for Phase 1 and Phase 2 of the proposed Residential Development. The current memorandum should be read in conjunction with Paterson Group Report PG7521-1 Revision 1 dated July 23, 2025.

Relevant design information is presented in Table 1 - Summary of Design Details for the subject blocks. The relevant design and inspection information includes the following:

- Legal block/unit number
- Street Name
- Proposed Building Type
- Existing ground surface elevations, based on topographic survey by others
- Proposed finished grade elevation
- Proposed Underside of Footing (USF) elevations
- Bearing resistance values at SLS
- Seismic Site Class
- Maximum permissible grade raise
- Estimated engineered fill thickness below USF
- Lightweight fill (LWF) recommendations, if applicable

Grading Plan Review

Paterson reviewed the following grading plans prepared by DSEL for the aforementioned development:

- 40 Beechcliffe Street - Grading Plan - Project No. 24-1416, Sheet No. 7 of 12, Revision 4 dated September 15, 2025

Due to the presence of a silty clay deposit below the proposed residential development, the proposed development will be subjected to grade raise restrictions based on the shear strength and consistency of the underlying silty clay.





Based on our review of the grading plans provided, the proposed grading at the subject lots is generally within the recommended permissible grade raise restriction of 1 m above the existing ground surface as provided in the Paterson Geotechnical Report referenced above.

Bearing Resistance Values for Foundation Design

Based on our review of the above noted grading plans, it is expected that the buildings will be founded over conventional shallow footings placed on undisturbed, compact silty sand, very stiff to firm silty clay or engineered fill over an approved fill or native soil bearing surface.

Strip footings, up to 2 m wide, and pad footings, up to 4 m wide placed in an undisturbed, compact silty sand, very stiff to firm silty clay or engineered fill over an approved fill or native soil bearing surface can be designed using a bearing resistance value at SLS of **100 kPa** and a factored bearing resistance value at ULS of **150 kPa** incorporating a geotechnical factor of 0.5 at ULS.

Fill is expected to be encountered at the design founding elevation for several structures and as identified in Table 1 and the aforementioned Geotechnical Report. Provisions should be carried for the removal of a minimum 500 mm thick layer of fill, proof-rolling using suitably sized compaction equipment and reinstatement using engineered fill as identified in the aforementioned Geotechnical Report.

An undisturbed soil bearing surface consists of a surface from which all topsoil and deleterious materials, such as loose, frozen or undisturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

Footings designed using the above noted bearing resistance value at SLS given above will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard. Based on our review of the grading plan, all units were noted to be provided with sufficient soil cover to footings against frost action.



Landscaping Considerations

Tree Planting Restrictions

In accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines), Paterson completed a soils review of the site to determine applicable tree planting setbacks for trees planted within a public right-of-way (ROW).

Atterberg limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. The above-noted test results were completed on samples taken at depths between the anticipated underside of footing elevation and a 3.5 m depth below finished grade

Based on the results of the above noted Atterberg limit tests, the residential development contains low to medium potential for soil volume change for tree planting according to the City of Ottawa Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines.

Low to Medium Potential for Soil Volume Change

A low to medium potential for soil volume change was encountered between anticipated underside of footing elevations and 3.5 m below preliminary finished grade as per City Guidelines. Based on our Atterberg Limits test results, the modified plasticity limit does not exceed 40% in these areas. The following tree planting setbacks are recommended for the low to medium potential for soil volume change where trees are located near buildings founded on cohesive soils.

Large trees (mature height over 14 m) can be planted within these areas provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space).

Tree planting setback limits may be reduced to 4.5 m for small (mature tree height up to 7.5m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the conditions noted below are met:

- The foundations are founded upon or are underlain by clayey soils. If they are not, as is anticipated for a portion of the subject site, there is no applicable setback.
 - Based on our review, all structures will be subject to a setback.
- The underside of footing (USF) is 2.1 m or greater below the lowest finished grade for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan.



- Based on our review, structures that do not meet the 2.1 m requirement will encounter fill at the design founding elevation which will be removed and replaced for engineered fill. The recommended thickness of engineered fill (min. 500 mm) far exceeds the depth required to accomplish the 2.1 m depth requirement for tree planting purposes such that this requirement is considered satisfied by the currently proposed grading. Should fill not be encountered at the design founding elevation, the associated minimum depth of engineered fill is to be placed below the front portion of the structures footing for the subject structures as identified on the final column of Table 1 as to satisfy this requirement.
- A small tree must be provided with a minimum of 25 m³ of available soils volume while a medium tree must be provided with a minimum of 30 m³ of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.
- The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect.
- The foundation walls for sidewalls of structure facing the tree are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).

Grading surrounding the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan

Swimming Pools

The in-situ soils are considered to be acceptable for swimming pools. Above ground swimming pools must be placed at least 5 m away from the residence foundation and neighboring foundations. Pool construction should be assessed against the presence of sewer infrastructure constructed throughout the rear-yards during the permitting review stage. Otherwise, pool construction is considered routine and can be constructed in accordance with the manufacturer's requirements.

Aboveground Hot Tubs

Additional grading around the hot tub should not exceed permissible grade raises. Otherwise, hot tub construction is considered routine and can be constructed in accordance with the manufacturer's specifications.



Installation of Decks or Additions

Additional grading around proposed deck or addition should not exceed permissible grade raises and should be verified against the footprint of rear-yard sewer infrastructure. Otherwise, standard construction practices are considered acceptable

Berm Grading

Based on our review, the berm grades proposed throughout the subject site approximately range between 2.0 and 2.5 m high and are located behind the proposed structures and at the northern property boundary. The berm is recommended to be placed as identified in Section 5.2 of the current Geotechnical Report. Crushed stone should not be used for these purposes, as this will affect the suitability of the berms grading with respect to grade raise restrictions.

Based on our review of the proposed berm configurations, height and footprint, the proposed berms are considered acceptable from a geotechnical perspective such that the berm will not negatively impact adjacent structures and infrastructures from a grade raise and settlement perspective. Any adjustments to the proposed berm grading for any of the three berms should be reviewed and confirmed as acceptable by Paterson prior to undertaking their construction. Placement and compaction of berm fill material is recommended to be verified by Paterson personnel during the construction phase.

We trust that the current submission meets your immediate requirements.

Best Regards,

Paterson Group Inc.

Udhaya Ramachandran, E.I.T.



Drew Petahtegoose, P.Eng.

Attachments

- Table 1 - Summary of Design Details



Table 1 - Summary of Design Details
PG7521 - Habitat For Humanity - 40 Beechcliffe Street - Phase 1 & 2 - Ottawa, ON

Phase Number	Lot/Block Number	Unit Number	Street Name	Existing GS Front	Proposed GS Front	Existing GS Rear	Proposed GS Rear	Underside of Footing Elevation	Bearing Resistance Value at SLS	Anticipated to Encounter Fill at USF with Proof-Rolling	Seismic Site Class*	Frost Check Front	Frost Check Rear	Permissible Grade Raise	Engineered Fill Thickness below USF Front	Engineered Fill Thickness below USF Rear	Above Permissible Grade Raise Front	Above Permissible Grade Raise Rear	Minimum Thickness LWF in Garage and Front Porch	Minimum Thickness LWF and Extents	Tree Planting Setback Applicability	Eng. Fill Below Front of Structures USF for Tree Planting if Fill Not Encountered at USF	
				(m)	(m)	(m)	(m)	(m)	(kPa)		(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
Phase 1	Block 1	Unit 1	Beechcliffe Street	88.46	88.65	88.66	88.91	86.53	100	No	X _E	2.12	2.38	1.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00	
		Unit 2	Beechcliffe Street	88.46	88.65	88.67	88.91	86.53	100	No	X _E	2.12	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 3	Beechcliffe Street	88.47	88.71	88.72	88.91	86.53	100	No	X _E	2.18	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 4	Beechcliffe Street	88.52	88.73	88.72	88.91	86.53	100	No	X _E	2.20	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
Phase 1	Block 2	Unit 1	Beechcliffe Street	88.27	88.55	88.50	88.88	86.53	100	Yes	X _E	2.02	2.35	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.08
		Unit 2	Beechcliffe Street	88.27	88.58	88.50	88.91	86.53	100	Yes	X _E	2.05	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.05
		Unit 3	Beechcliffe Street	88.35	88.62	88.50	88.91	86.53	100	Yes	X _E	2.09	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.01
		Unit 4	Beechcliffe Street	88.42	88.64	88.50	88.91	86.53	100	Yes	X _E	2.11	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
Phase 1	Block 3	Unit 1	Beechcliffe Street	88.52	88.73	88.72	88.91	86.53	100	Yes	X _E	2.20	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 2	Beechcliffe Street	88.47	88.71	88.72	88.91	86.53	100	Yes	X _E	2.18	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 3	Beechcliffe Street	88.46	88.65	88.67	88.91	86.53	100	Yes	X _E	2.12	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 4	Beechcliffe Street	88.46	88.65	88.66	88.91	86.53	100	Yes	X _E	2.12	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
Phase 1	Block 4	Unit 1	Beechcliffe Street	88.05	88.31	88.17	88.81	86.47	100	Yes	X _E	1.84	2.34	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.26
		Unit 2	Beechcliffe Street	88.05	88.32	88.16	88.85	86.47	100	Yes	X _E	1.85	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.25
		Unit 3	Beechcliffe Street	88.10	88.36	88.16	88.85	86.47	100	Yes	X _E	1.89	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.21
		Unit 4	Beechcliffe Street	88.18	88.36	88.22	88.85	86.47	100	Yes	X _E	1.89	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.21
Phase 1	Block 5	Unit 1	Beechcliffe Street	88.23	88.41	88.47	88.77	86.43	100	Yes	X _E	1.98	2.34	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.12
		Unit 2	Beechcliffe Street	88.15	88.47	88.47	88.81	86.43	100	Yes	X _E	2.04	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.06
		Unit 3	Beechcliffe Street	88.04	88.42	88.45	88.81	86.43	100	Yes	X _E	1.99	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.11
		Unit 4	Beechcliffe Street	88.04	88.40	88.28	88.81	86.43	100	Yes	X _E	1.97	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.13
		Unit 5	Beechcliffe Street	88.12	88.37	88.28	88.81	86.43	100	Yes	X _E	1.94	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.16
Phase 1	Block 6	Unit 1	Beechcliffe Street	88.50	88.56	88.60	88.75	86.39	100	Yes	X _E	2.17	2.36	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 2	Beechcliffe Street	88.35	88.54	88.56	88.77	86.39	100	Yes	X _E	2.15	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 3	Beechcliffe Street	88.35	88.53	88.53	88.77	86.39	100	Yes	X _E	2.14	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 4	Beechcliffe Street	88.31	88.52	88.53	88.77	86.39	100	Yes	X _E	2.13	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 5	Beechcliffe Street	88.31	88.46	88.58	88.77	86.39	100	Yes	X _E	2.07	2.38	1.00	0.50	0.50	0.00	0.00	0.00	0.00	n/a	Yes	0.03
Phase 2	Block 7	Unit 1	Beechcliffe Street	88.58	88.87	88.85	88.99	86.61	100	No	X _E	2.26	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 2	Beechcliffe Street	88.58	88.86	88.82	88.99	86.61	100	No	X _E	2.25	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 3	Beechcliffe Street	88.59	88.80	88.66	88.97	86.61	100	No	X _E	2.19	2.36	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 4	Beechcliffe Street	88.59	88.78	88.66	88.97	86.61	100	No	X _E	2.17	2.36	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
Phase 2	Block 8	Unit 1	Beechcliffe Street	88.62	88.88	88.76	88.99	86.61	100	No	X _E	2.27	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 2	Beechcliffe Street	88.62	88.89	88.76	88.99	86.61	100	No	X _E	2.28	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00
		Unit 3	Beechcliffe Street	88.66	88.86	88.79	88.99	86.61	100	No	X _E	2.25	2.38	1.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	Yes	0.00

Notes:
 - Proposed grade raise information was based on the following grading plans prepared by DSEL.
 - Habitat for Humanity - 40 Beechcliffe Street - Grading Plan - Project No. 24-1416, Sheet No. 7 of 12, Revision 4 dated September 15, 2025
 - For units requiring additional engineered fill to meet tree planting setbacks (2.1 m of cover between finished grade and USF) the requirement for the engineered fill to accommodate this requirement is not considered pertinent where fill is encountered at USF and is removed and replaced for a layer of engineered fill that will exceed tree planting requirements.
 - Revision 0 - September 18, 2025