

TO Sandy Cummings, P.Eng., PMP Program Manager, Project Delivery West	FROM Michael Walker, P.Eng., PE, PMP Division Manger
COMPANY Parks Canada Agency	MCSL BRANCH 2711 - Regina
RE Rock Creek Campground – Shower Building Foundation Review – Additional Geotechnical Recommendations Grasslands National Park, SASK	DATE May 24, 2018 FILE NUMBER 2121-00548-02

Introduction

McElhanney Consulting Services Ltd (McElhanney) has prepared this technical memorandum summarizing our additional geotechnical recommendations following the review of the structural drawings provided by Wolfrom Engineering Ltd., for the Rock Creek Campground Shower Building (Project No, W16072, Dated May 11,2018).

Structural Drawing Specifications:

It is understood that a thicken edge raft slab near grade is being proposed. The slab will be founded on native soils or engineered fill on top of undisturbed soil. See Figure 1 and 2 for the structural details proved for geotechnical review.

FOUNDATION: THICKENED EDGE SLAB

1. Thickened edge slab designed for a maximum bearing pressure of 150 kPa.
2. All footings shall extend a minimum of 500mm into native undisturbed soil, and bear on a level surface capable of supporting the maximum design pressure.
3. Footing excavations & footings to be protected from frost at all times, during construction.
4. Concrete for footings, pads and piers shall be 30 MPa @ 28 days. Use Sulphate Resisting Type 50 cement, 40mm max aggregate size, 90mm slump and 3% to 5% air entrainment.
5. A continuous layer of rigid insulation (minimum 100mm thickness) shall be placed over the exterior face of the foundation, extending vertically 300mm below grade and laterally a minimum distance of 1.8m away from the foundation. The insulation shall be covered with a minimum of 300mm of soil cover (low permeability material) to provide protection against damage, and should be positively sloped away from the foundation.
6. Slab sub-base & over excavated footings to be built up of 'C-Base' granular fill compacted to 95% Standard Proctor Density in maximum 200mm lifts. Final lift to be 150mm 'A-Base' granular fill compacted to 98% Standard Proctor Density. All compaction densities to be confirmed by an independent testing agency prior to placement of any concrete.

Figure 1 – Foundation Specifications from the Structural General Notes (Wolfrom Engineering Ltd., Project No. W16072, Sheet No. S0.0 Dated May 11, 2018)

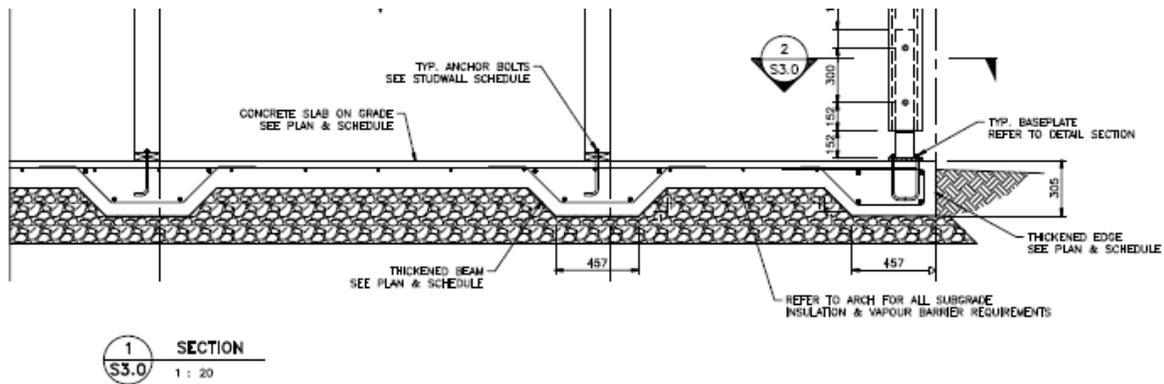


Figure 2 – Foundation Specifications from the Structural General Notes (Wolfrom Engineering Ltd., Project No. W16072, Sheet No. S3.0 Dated May 11, 2018)

Additional Geotechnical Recommendations:

These recommendations should be read in conjunction to those previously provided in McElhanney’s geotechnical report provided for the project (Geotechnical Assessment Memo for Rock Creek Campground & Day Use Area, Grasslands National Park, Sask, McElhanney June 28, 2016).

The following revised bearing capacity recommendations are provided for a shallow foundation then those previously recommended (greater than 1.0 m depth). The factored bearing pressures for design (CFEM, 4th Edition) provided in Table 1 below are based on proposed foundation and expected subsurface conditions (compact/stiff fine-grained sand, silty sand, and or silty clay),

Table 1 Summary of Factored Bearing Capacity

Subgrade Soil	Minimum Depth to Base of Foundation, (m)	Factored Bearing Capacity (kPa) ¹	
		Ultimate Limit State	Serviceability Limit State ²
Native fine-grained soils Compact/Stiff	0.3	100	100
Native fine-grained soils Compact/Stiff	0.6	150	150
Engineered Fill (Compacted Sand and Gravel over fine sand/silty sand/silty clay)	0.3	150	150

Notes:

1. Canadian Foundation Engineering Manual, 4th Edition, Canadian Geotechnical Society, Bitech Publishing Ltd., Richmond, BC. The ultimate resistance factor values are based on semi-empirical data and are calculated using a geotechnical resistance factor of 0.5.
2. For settlements of less than the maximum 25 mm.

It is recommended that for foundations shallower than 1.5 m burial (required for frost protection) should be protected with a rigid polystyrene insulation as per the recommendations provided in the geotechnical memo prepared by McElhanney (2016) also provided in the structural notes, bullet 5 (Figure 1). See Figure 3 for insulation details which is provided based on the building being in service for three seasons and unheated during the winter months. To protect against frost the insulation should be provided beneath the entire area of the floor slab and extend a minimum of 1.8 m out from the edge of the foundation with a minimum cross-fall of 4%. A 150 mm of bedding sand, gravel or crush base course should be placed under the insulation on the prepared subgrade.

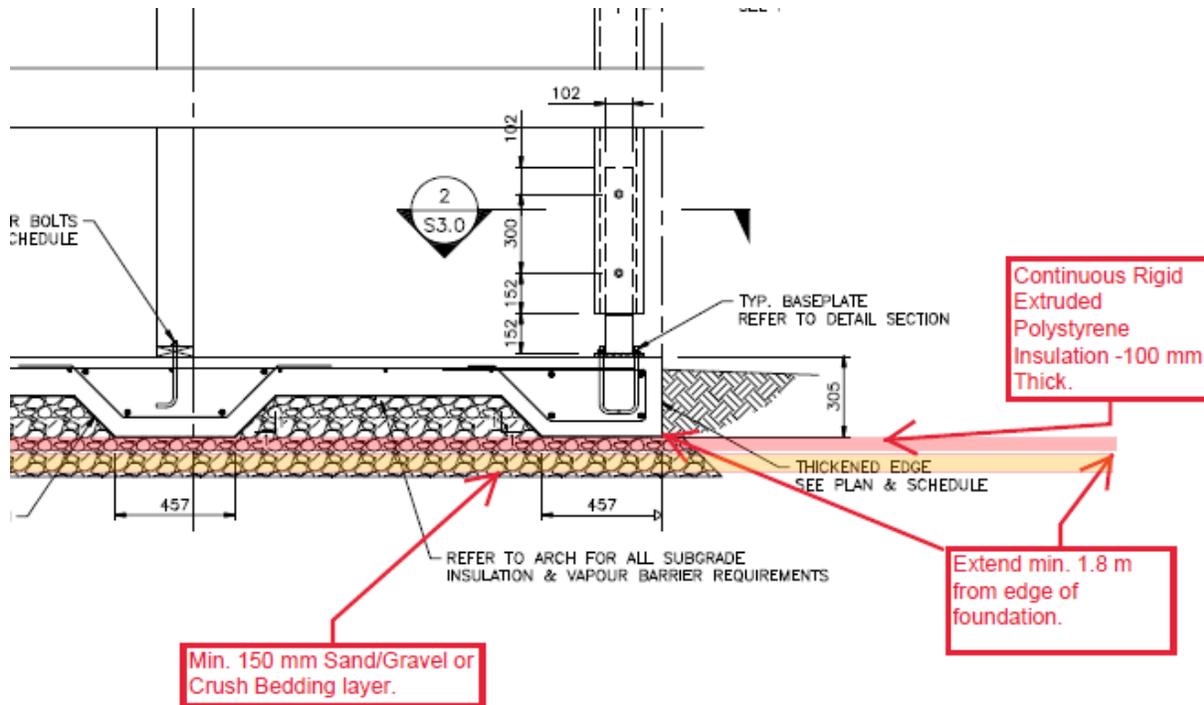


Figure 3 – Insulation Details for Unheated Building (Based on foundation section in Figure 2)

Closure

Should you have any queries, please do not hesitate to contact the undersigned.

Respectfully submitted,

McElhanney Consulting Services Ltd.




Shiloh Carlson, P.Eng.
Senior Geotechnical Engineer
scarlson@mcelhanney.com