

M Sloping Sites (Greater than 20 DEG / 36%) Geotechnical Report **Master Requirement SPE 105**



Purpose

Development on or adjacent to sloping sites may be adversely affected by, or adversely affect, slope and site stability, sub-surface soil conditions, ground water and surface drainage. Legislation governing requirements for these sites include:

- **Section 56 of the Community Charter.** If land has potential for landslides, a Qualified Professional must report the land may be used safely for the use intended and that a registered covenant restricting the use of the land must be in place.
- **The British Columbia Building Code 2006.** The Geotechnical Letters of Assurance ensures that an application complies with the British Columbia Building Code and that there will be professional field review during construction.

Subsequent to this legislation, the APEGBC Guidelines were developed to provide direction for Qualified Professionals who must assess life risk tolerance and assure the land is safe for the intended use.

Background

Site stability, sub-surface soil conditions, bearing capacity and the effects of ground water and surface drainage can negatively affect development on or adjacent to sloping sites. The potential negative effects of constructing on a slope generally increase as the degree of slope increases. Some of these impacts may include:

1. The disturbance or removal of existing trees, vegetation and ground cover through the construction and excavation process which can dramatically affect slope stability and existing surface water characteristics,
2. Excavations and changes to ground water patterns which can alter slope stability, and
3. Deep excavations which can result in hydrostatic pressures against foundation walls.

In order to avoid unnecessary delays applicants are advised to request a Pre-Application appointment to determine the involvement of Qualified Professionals on their project to assess the risk involved in construction and provide professional letters of assurance.

Please note **Geotechnical Letters of Assurance** and a **Geotechnical Report** will be required if:

- the development is on or within 10 metres of a slope greater than 20 degrees (36%)
- the development is within 10 metres of the base of a slope greater than 30 degrees (54%)

Pursuant to S. 56 of the Community Charter the Building Inspector considers that construction would be on land that is subject to flooding, mud flows, debris flows, debris torrents, erosion, land or slip rock falls.

Professionals providing geo-scientific or engineering services for clients need to follow APEGBC guidelines outlining Provincial legislation requiring “that a Professional Engineer or Professional Geoscientist indicate whether the residential development will be ‘safe’ from the effects of landslides”. (Guidelines for Legislated Landslide Assessment for Proposed Residential Developments in BC, APEGBC, revised May 2010).

Note: Any professional involved in a project must have the proper professional registration requirements and be ‘in good standing’ with APEGBC. The Building bylaw of the District of North Vancouver requires professional proof of liability insurance at time of building permit application.

A building permit application will only be accepted with the following:

- required reports by Qualified Professionals, including Landslide Assessment Report in accordance with the APEG Guidelines and a Geotechnical Report signed and sealed by a P. Geotechnical Engineer,
- a reference by the Structural Engineer on the Project Data Sheet to both the Assessment Report and the Geotechnical Report,
- Appendix D (see APEGBC Guidelines),
- Letters of Assurance,
- Proof of Liability Insurance (Schedule F),
- two complete sets of sealed architectural plans,
- two complete sets of P. Eng sealed structural building plans, and
- a recent topographical survey sealed by a registered BCLS.

Note: A building permit will not be issued until:

1. The Building Inspector has reviewed and accepted the reports by qualified professionals.

2. The owner of the land covenants with the District to use the land only in the manner determined and certified by the Professional Engineer as enabling the safe use of the land for the use intended. The covenant must contain conditions respecting the reimbursement by the covenantor for any expenses that may be incurred by the covenantee as a result of a breach of the covenant, and the covenant must be registered under section 219 of the Land Title Act.

Requirements for Landslide Assessment Reports

Please refer to the APEGBC Guidelines, revised May 2010 for full guidelines including Risk Tolerance Criteria and Appendix D, Landslide assessment assurance statement.

Requirements for Geotechnical Report - Terms of Reference

The *Geotechnical Report* must provide a response to all headings identified in the Geotechnical Report – Terms of Reference identified below. Incomplete reports will be found NOT acceptable and will result in delays.

- Credentials:** *Geotechnical Reports* are to be prepared by a specialist professional engineer with expertise in Geotechnical engineering. A geotechnical report must reference other relevant reports by qualified professionals, APEGBC Guidelines and Section 56 of the Community Charter.
- Statutes:** Section 56 of the Community Charter is applicable where the study is undertaken for the purpose of addressing hazardous issues for a Building Permit.
- Background Information:** *Geotechnical Reports* shall include a review of available background information, including reports by qualified professionals.
- Landslide Assessment report.** The *Geotechnical Report* must reference the Landslide Assessment Report undertaken by a Qualified Professional.
- Property Description:** *Geotechnical Reports* shall include both legal and street addresses of the subject property, and also a plan showing the location of the property relative to the pertinent slope condition. Any existing restrictive covenants relative to land use or natural hazards shall be identified and attached to the report.
- Excavations:** *Geotechnical Reports* shall provide a clear assessment of hazards associated with the removal of ground for the purpose of constructing a building or structure. The report should address stability of cut slopes, the location and extent of excavated cuts, the potential impact on adjacent properties, temporary dewatering including pumping and measures to prevent deposit of sediment or soil on adjacent properties, streets or services.

Geotechnical Reports shall provide design of shoring and underpinning systems as may be required.

- Bearing Capacity of Soil:** *Geotechnical Reports* shall provide a clear assessment of the bearing capacity of the soil for the support of the building and other structures including retaining walls.

□ Structural Consideration of the Soil including Slope Stability and Seismic Loading: *Geotechnical Reports* shall provide a clear assessment of the stability of slopes supporting or loading against the building and the design of Geotechnical aspects of the interaction between ground and building.

An analysis of the slope stability of the site should include those portions of the site not directly impacted by construction. Special consideration should identify areas considered sensitive to disturbance or destruction of terrestrial habitat as well as potential impact on adjacent properties.

□ Backfill and Fill: *Geotechnical Reports* shall provide a clear assessment of backfill against and affecting building and retaining walls. Consideration should include the impact of fill on slope stability and impacts on neighbouring properties.

□ Permanent Dewatering: *Geotechnical Reports* shall provide clear assessment of the installation of drainage systems to maintain groundwater at design levels and pressure. This review should include:

- pumping, drainage and cut off of ground water,
- pumping, perimeter and under-slab drainage to maintain the building free of surface run-off, ground seepage and precipitation,
- the design of the moisture or waterproofing membranes for the building walls or slab and
- assessment of impact on neighbouring properties.

□ Other: *Geotechnical Reports* should provide, where required, clear assessment of compaction of engineered fill, permanent underpinning and the Geotechnical aspects of deep foundations.

□ Report Submission: the engineer of record shall seal Geotechnical Reports. Where required, engineering reports will be included within a restrictive covenant registered against the land title.

□ Peer Review: The District regularly obtains a peer review of *Geotechnical Reports* by independent engineering consultants. Any concerns resulting from a peer review will be directed to the engineer of record for consideration. *Geotechnical Reports* will not be accepted until concerns arising from a peer review are satisfactorily resolved.

Requirements for Geotechnical Letters of Assurance

□ Letters of Assurance are to be submitted in the form provided in the British Columbia Building Code.

□ As a minimum requirement Geotechnical engineers must indicate on Schedule B responsibility as follows:

Geotechnical – Temporary:

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|------------------|--------------|
| • 7.1 Excavation | ALL PROJECTS |
| • 7.2 Shoring | ALL PROJECTS |

- 7.3 Underpinning IF APPLICABLE*
- 7.4 Temporary construction dewatering ALL PROJECTS

Geotechnical – Permanent:

- 8.1 Bearing capacity of soil ALL PROJECTS
- 8.2 Geotechnical aspects of deep found IF APPLICABLE*
- 8.3 Compaction of engineered fill ALL PROJECTS
- 8.4 Structural consideration of soil ALL PROJECTS
- 8.5 Backfill ALL PROJECTS
- 8.6 Permanent dewatering IF APPLICABLE*
- 8.7 Permanent underpinning IF APPLICABLE*

Plumbing:

- 4.2 Site and foundation drainage systems ALL PROJECTS

*These are site dependent and may be required as well.

Contacts

Permits Supervisor
604-990-2480

Planning, Permits and Properties
355 West Queens Road
North Vancouver, BC V7N 4N5

Tel 604-990-2480
Fax 604-984-9683
email building@dnv.org