

# **TERMS OF REFERENCE**

## **Requirements for Professional Engineers/Geoscientists undertaking GEOTECHNICAL REPORTS/FLOOD HAZARD ASSESSMENT REPORTS**

November 2009

The Board of the Regional District of Central Kootenay provides the following information to assist Professional Engineers/Geoscientists engaged in the preparation of Geotechnical Reports/Flood Hazard Assessment Reports. The Terms of Reference are intended to provide guidance and assistance only and are not to be taken as being limited or necessarily comprehensive. Not all the items listed in this document may be required or expected in all cases. Consequently, reports will vary in size and complexity. The list is intended as a useful checklist for the proponent and report author. This list is based on the Flood Hazard Area Land Use Management Guidelines produced by the Province in 2004.

### **A GENERAL REQUIREMENTS:**

- 1.0 Property description, name of owners, legal description, street address/geographical location, including a location map depicting the property location and any other regionally significant information used in the report.
- 2.0 Acknowledgement that the report is prepared for the Regional District of Central Kootenay as a pre-condition to the issuance of:
  - 2.1 A Building Permit and any conditions in this report shall be included in a Restrictive Covenant under Section 56 of the *Community Charter* and filed against the title of the subject property; or
  - 2.2 A Site Specific Exemption from the provisions of Floodplain Management Bylaw 2080, 2009 under Section 910 of the *Local Government Act*, and any conditions in this report shall be included in a Restrictive Covenant under Section 219 of the *Land Title Act* and filed against the title of the subject property.
- 3.0 Acknowledgement that the report has been prepared for and at the expense of the owner of the subject property and that the engineer has not acted for or as an agent of the Regional District of Central Kootenay in the preparation of the report.
- 4.0 Where applicable a detailed site plan showing the location of the proposed structure relative to the property boundaries.
- 5.0 A topographic and geomorphological description of the site and a statement as to the type and location of natural hazards that may affect the site.
- 6.0 A reference to any previous geotechnical studies that have been completed on the site and surrounding area or scientifically relevant sites elsewhere.
- 7.0 An assessment of the nature, extent, magnitude, frequency (probability) and potential effect of all flood and debris flow hazards that may affect the property, including a description of the scientific methodology used to define the parameters. The methodology should be

described in sufficient detail as to facilitate a professional review of the study, by or on behalf of, the Regional District of Central Kootenay if deemed necessary.

- 8.0 Recommendations and assessments stating what mitigative works, construction and maintenance are required in terms of the works ability to reduce the potential impact of the hazard. Particular consideration should be given to Section 5.7 of the Provincial "Flood Hazard Area Land Use Management Guidelines".
- 9.0 Where mitigation works and/or actions are proposed, an assessment of the effects that the proposed works and/or actions may have on other properties including public infrastructure must be included in the report. *Where mitigative works and/or actions designed to reduce hazards are contemplated, prior to completing the report and expending time and money on detailed design, the proponent should confirm that the works and/or actions proposed will be accepted by local government and that they would meet regulatory requirements.*
- 10.0 For issuance of a *Building Permit*: Letters of Assurance B-1 and B-2, as required per Section 2.6 of the B.C. Building Code, are to be submitted relative to the structure and applicable drawings making the subject property safe for the intended use. Further, a Schedule C-B, as per Section 2.6 of the B.C. Building Code shall be submitted to the Building Department by the Professional Engineer prior to occupancy of the subject structure.
- 11.0 Additional information should be included on any other matters that, in the Engineer's opinion, should be known to the Regional District or brought to the attention of the Building Inspection and/or Planning Departments.
- 12.0 Any recommendations that the Engineer believes appropriate. Note that the explanation provided in answer to the points above should be in sufficient detail and clarity to permit inclusion in a Section 219 Covenant of the Land Title Act.
- 13.0 The report submitted must include the signature and seal of a B.C. Registered Professional Engineer, with experience in geotechnical engineering, **verifying that the land may be used safely for the use intended** as required under *Section 56* of the *Community Charter*.

## **B. HAZARD SPECIFIC REQUIREMENTS:**

- 1.0 For Lakes, Ponds, Marsh Areas and Reservoirs:
  - 1.1 Where an existing FCL is deemed inappropriate provide details of the calculation and confirmation that Provincial guidelines were considered in the process.
  - 1.2 Where applicable provide shoreline profile(s) starting from below low water level to a point some distance above the safe building area(s), depicting the F.C.L., maximum wave run-up, existing and/or proposed mitigation works, natural boundary, safe lines (if any) and any other relevant shoreline features.
- 2.0 For Watercourses:

- 2.1 Where an existing F.C.L. shown on a floodplain map is deemed inappropriate provide details of the calculation and confirmation that Provincial guidelines were considered in the process.
  - 2.2 For property adjacent to, or within a meandering and/or braided river floodplain, use air photographs, maps and other information to describe and assess relevant ongoing river processes (including ice and/or debris jamming) that may pose a hazard to the property.
- 3.0 For Alluvial Fans and/or Areas Subject to Debris Flows:
- 3.1 Suitably scaled topographic map depicting the following where appropriate: watershed area, fan boundaries, existing and abandoned channels, hydraulic structures, existing and proposed mitigation works, potential avulsion and overland flow paths (thinking in terms of a 1:200 year flood event), features on the fan that would serve to give direction to and/or impede overland and/or channel avulsion flow paths and the property boundaries.
  - 3.2 Where applicable, channel cross-sections and stream profile(s).
  - 3.3 Where applicable, depths of flow and velocities used in analysis.
  - 3.4 Where applicable, centerline profile(s) from debris flow start zone(s) too toe of run out zone(s).
  - 3.5 Assessment of the sensitivity of the watershed area, with respect to hydrology and sediment and debris loading. The assessment should include reference to pertinent Watershed Assessment Reports, Terrain Stability Maps and other reports which may be available from the Province or private tenure holders.
  - 3.6 Assessment of long term channel bed load and debris maintenance requirements in relation to any recommended flood hazard mitigation measures.
  - 3.7 Where existing channel capacity and topographic features on the fan are identified as features contributing to the safe use of the property, provide an assessment of the effects (if any) of any future changes to the channel or fan. This information is required to identify land use and/or in-stream work measures that may be required for the land use decision maker to put in place to ensure the longevity of the features contributing to the safe use of the property. Examples of such measures include the maintenance of the channel discharge capacity and the operation and maintenance of protective structures.
  - 3.8 Plans, cross-sections, and design specifications for proposed building foundation treatments and other site-specific mitigation measures.
- 4.0 Areas Protected by Standard Dikes:
- 4.1 Map(s) depicting; existing and proposed dikes, dike right-of-ways, dike access routes and easements, areas protected by the dikes, and property boundaries.

- 4.2 A summary of all comments and concerns raised through consultation with the Diking Authority and the Inspector of Dikes office complete with statements on how each comment or concern is addressed in the report.

**C. ADDITIONAL ELEMENTS TO BE GIVEN CONSIDERATION:**

- 1.0 Regional and/or a site map and/or air photograph overlay depicting: the existing property boundaries; all water courses, alluvial fans and areas exposed to debris flow hazards; hydraulic structures, existing and proposed flood protection works; proposed safe building sites; and any other relevant regional or site specific information.
- 2.0 Review of all relevant restrictive covenants registered on title for the subject property and any relevant nearby properties (copies of covenants should be attached to the report).
- 3.0 Review of all relevant local government land use policies, guidelines and regulations including; floodplain and other relevant bylaws, Official Community Plan or Rural Land Use Bylaws, development permit area requirements and policy statements.
- 4.0 Description of site visits complete with documentation of observations.
- 5.0 Review of current and historical air photographs.
- 6.0 Review of historical flood information including; Water Survey of Canada hydrometric data (discharges, flow depths and velocities), Environment Canada climate data, local government and Provincial reports, local newspaper archives, and interviews with local residents.
- 7.0 Location of all proposed safe building sites by specifying building setback distance(s) from the natural boundary of watercourse(s) and/or map notation. Areas depicted on maps must be delineated with sufficient accuracy and detail as to allow the preparation of legal reference plan(s) for attachment to a restrictive covenant.
- 8.0 Where applicable; Flood Construction Levels by prescribing an elevation above the natural boundary of a watercourse or natural ground elevation at the building site, or by specifying a geodetic elevation, or by a combination of the above. Geodetic elevations should be referenced to Geodetic Survey of Canada datum or some other datum acceptable to the land use decision maker.

w:\departments\plandept\floodplain-4910-20\new (after bylaw 2080 adopted)\tor peng report\_md.doc