Subject: Guidelines for Geotechnical Reports

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Contacts	**Standards Affected**
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GUIDELINES FOR GEOTECHNICAL REPORTS

Background:

Geotechnical engineering reports contain information on the application of scientific methods and engineering principles to the acquisition, interpretation and use of knowledge of soils and rocks to the solution of engineering problems.
The extent and the nature of the information supplied in a report could vary from the raw geotechnical data to the detailed foundation design which may use interpreted and processed data. Geotechnical reports often form the basis for other engineers (either Ministry or Consultants) to carry out design work. Geotechnical reports may also be used for outlining ground conditions for contractors. While some agencies provide geotechnical data reports only for reference, not part of the contract documents, other agencies include geotechnical interpretive reports and geotechnical design summary reports as part of the contract documents. Some project owners believe that presenting all available geotechnical information pertaining to the site in a clearly written comprehensive report, helps the project owner in obtaining a realistic bid and reduce contingencies. There are also project owners who fear that the reports may be used by contractors as a vehicle for claims.

In a 1996 forum called Geotechnical Reports in Underground Construction (ref. B.M.Bohlke “Geotech Design Reports get a Litmus Test” ASCE Civil Engineering; Dec.1996, pp. 47-49) representatives of project owners, design engineers, contractors and lawyers discussed the end effects of geotechnical reports. Owners indicated that a poorly written and ambiguous report could be used against them in a claim. The contractors’ position paper stated that the geotechnical design summary report is a business document, to provide to the designer and the bidder a detailed picture of the geologic conditions and the way they are expected to behave during tunneling. The engineers’ position paper stated that contractors are generally overly optimistic about ground conditions when making bids because they want to offer a low, competitive price for the work. The engineers’ consensus was that, after the bid, contractors invoke “changed conditions” claims too quickly (for each section of ground in a worse state than anticipated) when they could wait to see how the project progresses, accounting for both better and worse ground. The engineers’ paper recommended that because of the unpredictability of the subsurface, a range of values should be given for some parameters, accompanied by an explanation as to how conditions outside that range will be handled.

Apart from the contractual concerns, the composition of a geotechnical report is also important from the quality management point of view. The main objective of the guidelines presented in this document is to help produce comprehensive yet concise geotechnical reports for the Ministry in a consistent format.

Any geotechnical report whether it is dealing with terrain evaluation, site investigation, route design investigation, foundation design, cut or fill (soil or rock) slope stability, contaminated site investigations, terrain evaluation, geological hazard evaluations, material source suitability, or pavement design, should contain the following generic format:

Generic Format for preliminary or final geotechnical reports:

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Executive Summary. Brief to the point summary not exceeding one page of findings and design recommendations

Terms of Reference. Outline terms of reference and scope, identify requesting source. Find out geotechnical requirements from the project manager, structural engineer or the geometric designer at the beginning of the assignment and keep track of changing requirements thus terms of reference.

Background information/ review of existing data. Provide site description. Describe, topography and geology (in terms of engineering significance and engineering properties), seismic ground motion data, lab data, groundwater and drainage information. Provide location map, National Topographic Series 1:50,000 map reference, e.g. 92B/12, Longitude and Latitude, Universal Transverse Mercator co-ordinates if possible. Provide plan profile where applicable, site history if available.

Site investigation. Describe what is needed in light of existing information, provide specific rationale for the scope and methods of site investigation to make it possible for reviewers to assess the adequacy of the investigation. Describe what was carried out. Show location of testholes or pits or geophysical lines if any. Present field test results using Ministry format (see E-Mail Attachments for sample borehole logs and rock core logs). Include field observations at the site, soils and existing conditions.

Laboratory testing. List the tests done and present the results using Ministry format.

Evaluation and analysis. Discussion of the site investigation and laboratory test results and their implications on the proposed facility or the stability of the site investigated. The seismic assessment should be provided. Describe analyses performed, assumptions, parameters and methods used (use two methods for analyzing slope stability or calculating bearing capacities where practical). Provide foundation or slope design information in terms of both static and dynamic (seismic) design if required and state what safety factors are in place. Provide anticipated range of settlement for foundations and fills and F_oS of fill. Apply your field observation of the site conditions and existing foundations if any, on your choice of foundation type.

Sand and Gravel Sources/ Disposal Areas. Provide legal description, status (Crown, lease, etc.). Describe potential sand and gravel sources, tested or estimated material properties and projected quantities. Describe investigation methodology. Provide recommendations on waste or surplus material disposal areas.

Design Recommendations , including the Design of Pavement Structures. Point out possible foundation and construction difficulties, effects on the existing adjacent structures and suggest methods of overcoming these difficulties, recommend the preferred type of foundation, describe why and suggest possible alternatives (value engineering) where possible. Refer to findings of field investigation, lab test findings and analyses results. Point out that the geotechnical engineer should be given appropriate opportunity to review the geotechnical aspects of the completed design prior to construction. **Discuss predicted effects of the recommended work on the environment (water quality, etc.). Provide recommendations on mitigation measures.** Provide specifications and special provisions for construction contract. Provide cost estimates for the recommended work.

Literature References
Provide a list of references used in the preparation of the report.

Appendices:
Correspondence
Soils & rock core logs (make sure standard disclaimers are included with the logs in contract drawings), test hole location plan, design profile for new roads, pit development plan, drawings, plan & profile, photos.

Quality control of work:
Reports must be signed and stamped both by the author and the reviewer. It is the responsibility of the author and the reviewer to determine the appropriateness and accuracy of input data and the correctness of the computed results. Use of computer programs does not free the Professional Engineer or the Professional Geoscientist from this responsibility.

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