

Technical Circular T-10/99
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To: All Regional Managers, Professional Services
All Regional Geotechnical & Materials Engineers
All Major Projects Directors VIHP, OLBP, CCR
All Major Projects Geotechnical Coordinators
All Regional Bridge Engineers
H.Q. Engineering Branch, Chief Bridge Engineering
H.Q. Engineering Branch, Senior Bridge Engineer
H.Q. Engineering Branch, Chief Geotechnical, Materials & Pavement Engineer
H.Q. Engineering Branch, Manager, Geotechnical Engineering

Subject: **FOUNDATION DESIGN**

Purpose:

The purpose of this Technical Circular is to clarify the method to be used in foundation design for all Ministry projects.

Background:

After the adoption of Limit State Design by Ontario, geotechnical engineers have been asked by structural engineers to carry out foundation design using **Limit State Design**. The current National Building Code of Canada (1995 edition) allows the use of either Limit State Design or **Working Stress Design**. The Canadian Highway Bridge Design Code foundations section is still not finalized.

In the early application of Limit State Design, serious anomalies were found with respect to foundation design and the Ontario Highway Bridge Design Code was amended. At present, several Provinces and States do not use Limit State Design for geotechnical work. Limit State Design courses with respect to geotechnical engineering applications are just being established in the Universities in B.C.

To date, most of the geotechnical Limit State Designs have been achieved by soft conversion, i.e., doing the design with Working Stress Methods and converting the results to fit the Limit State Design format. A majority of geotechnical engineers employed or contracted by the Ministry do not have confidence in geotechnical Limit State Design due to lack of proven success of geotechnical Limit State method. Until the calibration of geotechnical Limit State resistance factors, particularly with respect to deep foundation design is complete, this lack of confidence in geotechnical Limit State Design will

continue. A Finite Difference Method analysis conducted by the Ministry in 1999 on a shallow foundation design indicated that Limit State Design produces less conservative design than the traditional Working Stress Design. To determine the appropriateness of the Resistance Factors, The United States National Cooperative Highway Research Program is also carrying out research on geotechnical Limit State Design. Geotechnical Limit State Design is still in its infancy and, probably, two more years will be needed before confidence in the Limit State Design could be established.

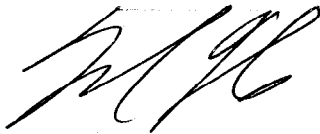
Procedure:

Until further notice, **Working Stress Design shall be used for geotechnical design.** Interaction with structural design shall be the responsibility of both the geotechnical and the structural engineers of the project.

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