



NRC Publications Archive Archives des publications du CNRC

Proposal for Test Fill on Ontario Highway 417 Bozozuk, M.

For the publisher's version, please access the DOI link below./ Pour consulter la version de l'éditeur, utilisez le lien DOI ci-dessous.

Publisher's version / Version de l'éditeur:

<https://doi.org/10.4224/20358703>

Technical Note (National Research Council of Canada. Division of Building Research), 1969-07-01

NRC Publications Record / Notice d'Archives des publications de CNRC:

<https://nrc-publications.canada.ca/eng/view/object/?id=f113f9e8-3c73-45fd-82ad-2d8469057a31>

<https://publications-cnrc.canada.ca/fra/voir/objet/?id=f113f9e8-3c73-45fd-82ad-2d8469057a31>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at

<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site

<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

Questions? Contact the NRC Publications Archive team at

PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

Vous avez des questions? Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.





NATIONAL RESEARCH COUNCIL OF CANADA

DIVISION OF BUILDING RESEARCH

No.

540

TECHNICAL NOTE

LIMITED DISTRIBUTION

PREPARED BY M. Bozozuk

CHECKED BY

APPROVED BY CBC

DATE

July 1969

PREPARED FOR Department of Highways of Ontario

SUBJECT PROPOSAL FOR TEST FILL ON ONTARIO HIGHWAY 417

Foundation design problems in the clay areas of the Ottawa and St. Lawrence River valleys are especially difficult because of the sensitivity and compressibility of the Leda clay. The Geotechnical Section of DBR/NRC has, therefore, taken a special interest in the performance of this unusual soil. Many laboratory studies have been carried out in recent years and several full-scale observations of earth embankments and buildings have been made. The field studies are especially valuable to design engineers but opportunities for this type of research are limited.

The new Highway 417 will cross areas of Leda clay in which the overconsolidation of the clay is especially appropriate for full-scale loading tests. The Division's interest is in the short- and long-term behaviour in terms of magnitude and rate of settlement, generation and dissipation of excess pore pressures, distribution of lateral movement within the fill and in the foundation soil, and the distribution of horizontal and vertical earth pressures within and along the base of the fill. An embankment could also be used to study the distribution of negative skin friction on end-bearing piles, especially to determine the variation of the constant K within and below the embankment as it deforms due to consolidation of the foundation soil.

From preliminary studies, the Bowesville Road area appears to be an ideal location for a special test fill both from the research aspect and for immediate use that DHO will have in planning and designing future construction between Ottawa and the Quebec border as well as in other similar soil areas. The following proposal is made on the basis of a cooperative study between DHO and DBR in which DHO will construct the fill and DBR staff will make the necessary soil investigation, supply and install instrumentation, and carry out the analysis.

PURPOSE

(a) To measure the performance of a test fill in order to improve designs and predictions of the behaviour of embankments on marine clay. Observations on the magnitude and rate of settlement during and subsequent to construction, the magnitude and rate of pore pressure dissipation, and a check on factors of safety for stability purposes are required.

(b) To measure the accumulation of load due to negative skin friction on a steel H-pile and a circular pipe-pile driven through the fill. This information is required to assess the actual loads on the numerous long H-piles being used in this clay.

REQUIREMENTS

1. Construct a fill to full highway size -

- (a) one part to have a bearing pressure of 80 per cent of the preconsolidation pressure
- (b) a second part to have a bearing pressure of 125 per cent of the preconsolidation pressure or constructed to a $FS \approx 1.05$ against shear failure
- (c) with a width of roadway identical to that of Highway 417
- (d) with side slopes of 2:1, identical to that of Highway 417
- (e) with a length sufficient to ensure that plane strain analysis is applicable.

INSTRUMENTATION

1. Vertical settlement measurements

- (a) Deep bench marks
- (b) Spiral foot gauges in foundation soil and within test fill, distributed under the centreline and horizontally to beyond the toe
- (c) Fluid settlement gauges, at base and mid-height of fill.

2. Horizontal movements

- (a) Vertical inclinometer tubes in foundation clay to a depth of ≈ 40 ft, located at shoulder, mid-slope, toe, and beyond the toe. Those tubes passing through the fill will be protected by a casing
- (b) Inclinometer tubes in test fill only, located mid-way between the centreline and the shoulder, at the shoulder, and midway between the toe and shoulder
- (c) Horizontal movement plates to be located on a 6- by 6-ft grid, spaced horizontally and vertically in the fill. The ends of the wires to terminate in a well located at the centreline of the fill.

3. Pore pressure measurements

Geonor open standpipe and vibrating wire piezometers to be installed at centreline and distributed vertically from the top to the bottom of the compressible clay and located radially from the centreline at the shoulder, at mid-slope, near the toe, and outside of the embankment.

4. Earth pressures

Total pressure cells to be installed to measure horizontal pressures near the top of the fill between the centreline and the shoulder, along the base towards the toe, and vertically at the centreline. Vertical pressures will be measured at the base of the test fill.

5. Test piles for skin friction measurements

- (a) End-bearing steel H-pile with rod gauges and strain gauges
- (b) End-bearing pipe-pile with rod gauges and strain gauges

(c) Small diameter pipe-piles of various lengths.

The results from the pipe-pile will complement the observations on the steel H-pile which will be used more frequently on Highway 417.
