

# memorandum



To: Alfred Ho  
Head, Structural Section  
Southwestern Region

Date: 1993 04 16

From: Foundation Design Section  
Room 315, Central Bldg.  
Downsview

Re: Wellington Road Underpass  
W.P. 476-89-05, Site 19-369  
Hwy 401, District 2, London

The fieldwork for this project was commenced on 1993 01 25, and completed on 1993 02 11. Since the fieldwork and laboratory tests have been completed, an advanced recommendation is submitted to enable you to proceed with the design. In the absence of the E-plan, the final foundation investigation report cannot be submitted on or before 93 04 30 and we will require at least six weeks from the date of receiving the E-plan.

Fieldwork comprised of three sampled boreholes and Dynamic Cone Penetration Test adjacent to these holes. In addition, Dynamic Cone Penetration Test was carried out at five locations.

It is proposed to widen Highway 401 to a divided eight lane facility without altering the median. As a part of the widening, the existing bridge will be replaced with four span (approximately 20.5 m end spans and 22.5 m centre spans) structure. The new underpass will be located approximately 30 m east of the present intersection and the profile grade of Wellington Road will be set at about E1. 269.0±.

The existing bridge is a single span reinforced concrete rigid frame structure. The clear span between the face of the abutments is about 33.0 m. The approach embankment as well as the structure appear in good condition. However, the reinforcement of the deck has been exposed and corroded at several locations and also minor cracks have been noticed on the abutment walls.

It appears from the structural drawings that the abutments of the existing bridge are supported on approximately 4.4 m wide footings placed at about elevation 258.5.

The topography of the site, with the exception of the existing crossing (embankment fill) is generally flat to gently undulating.

The subsoil stratigraphy at this site consists of very stiff to hard clayey silt interbedded with compact to very dense silty sand to sandy silt layers varying in thickness from a minimum of 1.3 m to a maximum of 7.2 m.

The groundwater level was encountered about 6.9 m to 11.7 m (E1. 253.6 to E. 249.3) below the existing ground level.

Considering the subsoil conditions at this site, it is recommended that the piers be supported on spread footings placed at about El. 258.5. The design of the pier foundations placed at a level not higher than El. 258.5 may be carried out assuming the following bearing capacities:

Factored Bearing Capacity at U.L.S. = 450 kPa

Bearing Capacity at S.L.S. Type II = 300 kPa

The foundation for the abutments may be founded on engineered fill placed on competent ground. The existing approach fill as well as any spongy or soft areas observed within the base width of the proposed embankment should be removed before placing the engineered fill. The engineered fill should be placed as per Figure 3 annexed to this memo. The following bearing capacity values are recommended for the design of the abutment foundations placed on engineered fill:

Factored Bearing Capacity at U.L.S. = 800 kPa

Bearing Capacity at S.L.S. Type II = 350 kPa

Earth pressure should be computed as per Section 6.1.2.2 of the Code and an unyielding condition may be assumed for the computations. The Granular "A" or "B" backfill should be in accordance with the Special Provision No. 109F03. The following parameters are recommended for the granular backfill.

	<u>Granular "A"</u>	<u>Granular "B"</u>
Angle of Internal Friction	$\phi = 35^\circ$	$\phi = 30^\circ$
Unit Weight ( $\text{kN/m}^3$ )	$\gamma = 22.8$	$\gamma = 21.2$

The maximum approach fill height is expected to be about 7.0 m. No major stability problems are anticipated for the approach embankments constructed with 2 horizontal to 1 vertical side slopes. The fill should consist of well compacted acceptable material. The topsoil as well as any spongy or soft areas observed within the base width of the embankment should be removed before placing the fill.

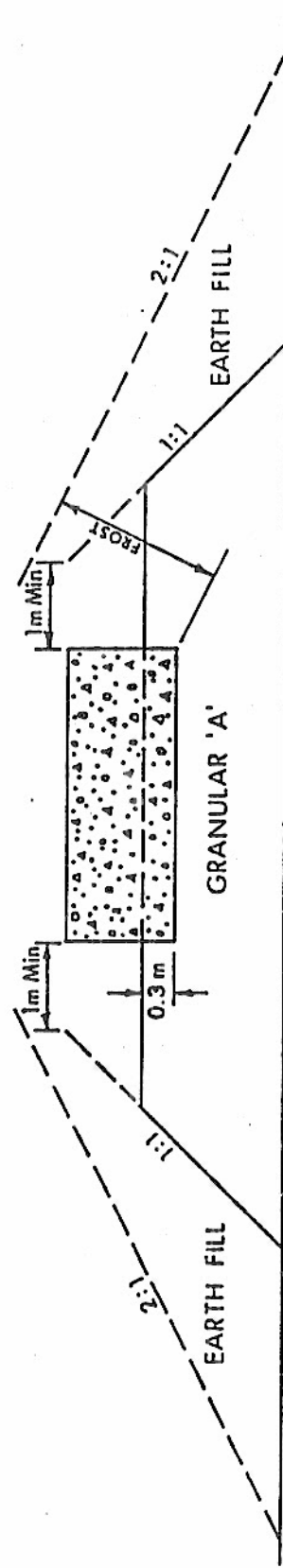
The footings should have a minimum of 1.2 m earth cover for the frost protection.

Roadway protection will be required on the east side of Wellington Road for the construction of abutments and piers.

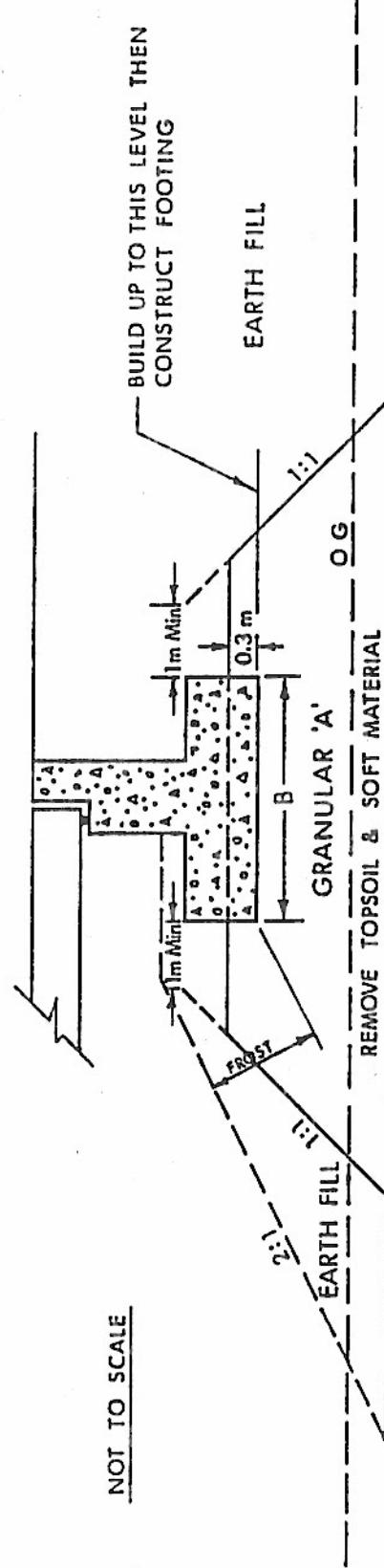
*M. Vasavithasan*

M. Vasavithasan, P. Eng.  
Foundation Engineer

for  
P. Payer, P. Eng.  
Sr. Foundation Engineer



X SECTION



NOT TO SCALE

LONGITUDINAL SECTION

- NOTES:
- 1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A' & EARTH FILL.
  - 2 - PLACE GRANULAR 'A' & EARTH FILL TO BOTTOM OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT M T O STANDARDS.
  - 3 - CONSTRUCT CONCRETE FOOTING.
  - 4 - PLACE REMAINDER OF GRANULAR 'A' & EARTH FILL AS REQUIRED.