

G.I.-30 SEPT. 1976

GEOCRES No. _____

DIST. A REGION _____

W.P. No. _____

CONT. No. _____

W. O. No. 93-11029

STR. SITE No. _____

HWY. No. Q.E.W.LOCATION Sanitary Sewer Construction
Crossing of Q.E.W @ East Port DriveNo of PAGES -

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____

MEMORANDUM



To: P.B. Kuyntjes, C.E.T.
Engineering Services Officer
Burlington District

Date: December 29, 1993

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

Tel: 235-3731
Fax: 235-5240

Re: Contract No. RHW-93-52(S)
Sanitary Sewer Construction -
Crossing of QEW/East Port Drive
District 4, Burlington

As requested, this office has reviewed the drawings No. 93-S-40 and SH-1 illustrating the proposed tunnels and temporary sheet pile cofferdam respectively submitted in conjunction with the sanitary sewer Q.E.W. crossing from the west end of Wark Avenue to the South Gateway. The subsurface conditions at the site consist of native sand and silts submerged below the groundwater table and overlain by fill material approximately 3 to 4 metres in thickness. It appears that both the 100m - 600mm diameter tunnel beneath the Q.E.W. and the 83m - 525mm diameter tunnel beneath Eastport Dr. with invert elevations of approximately 73m± will be advanced within the saturated cohesionless silts and sands. Based on our review of the subsurface and site conditions and the proposed procedures of tunnelling and shaft sinking, the following comments are provided.

TEMPORARY SHEET PILE COFFERDAM

Location

The drawings reveal a shaft working area at the proposed manhole #2 location designed presumably to facilitate the tunnelling operation and the installation of the manhole itself once the tunnelling is completed. However, there does not appear to be any shoring schemes proposed to facilitate the construction of the other manholes at the site. Both manholes are situated within proximity of existing utilities and roadways and hence may jeopardize these structures. Although an open cut segment is shown on drawing 93-S-40 at the manhole #1 location it is uncertain as to whether the manhole #1 and #3 work can be conducted without some method of shoring protection.

Type

The installation of steel sheet piling involves a driving process that must penetrate the subsoils. The penetrability of the silts and sands must therefore be evaluated. This penetrability is a function of the denseness and gradation of the subsoils. Without this pertinent data, we cannot comment on the suitability of the steel sheeting scheme.

Design

Assuming that the subsoil conditions enable steel cofferdam installation, the

cofferdam must be designed to withstand applicable earth and water pressures. The hydrostatic and surcharge pressures appear correct on drawing SH-1 (see Design Criteria) but the soil pressure should be computed depending on the soil material being retained. The soil pressure diagram is applicable to cohesive soils being supported by a braced excavation assuming that the soil is completely submerged (buoyant unit weight). However, it should be noted that the soil above the water table acts as a surcharge load below the water table. For cohesionless soils, such as medium to dense sands, the pressure envelope proposed by Terzaghi and Peck ($0.65 K_a \gamma H$) should be used. Again, not knowing the composition of the fill material, we cannot comment on the acceptability of the earth pressure calculations.

Construction

Sheet pile cofferdams can produce an effective dewatering scheme provided that the depth of penetration is sufficient to offset the unbalanced hydrostatic head. To prevent boiling at the base of the sheeted excavation, "D" the depth of penetration below the base of the excavation (3377 mm) must be greater than the head of water (H) above the footing base (see attached typical sketch). It appears that this requirement has been satisfied at the proposed manhole #2 location.

TUNNELLING

Microtunnelling Specifications

Soils such as sands and silts below the prevailing water will not stand unsupported and hence will ravel unless special construction measures are taken. Microtunnelling with slurry shield is one method of controlling this potentially unstable environment. It is recommended, however, that specifications regarding the equipment type, slurry shield and general tunnelling procedure be submitted for our review.

Quality Control

It is further recommended that settlement and ground vibration monitoring be employed as a performance specification. A ground settlement/ground vibration monitoring program within the longitudinal and transverse limits of the tunnel should therefore be planned and executed.

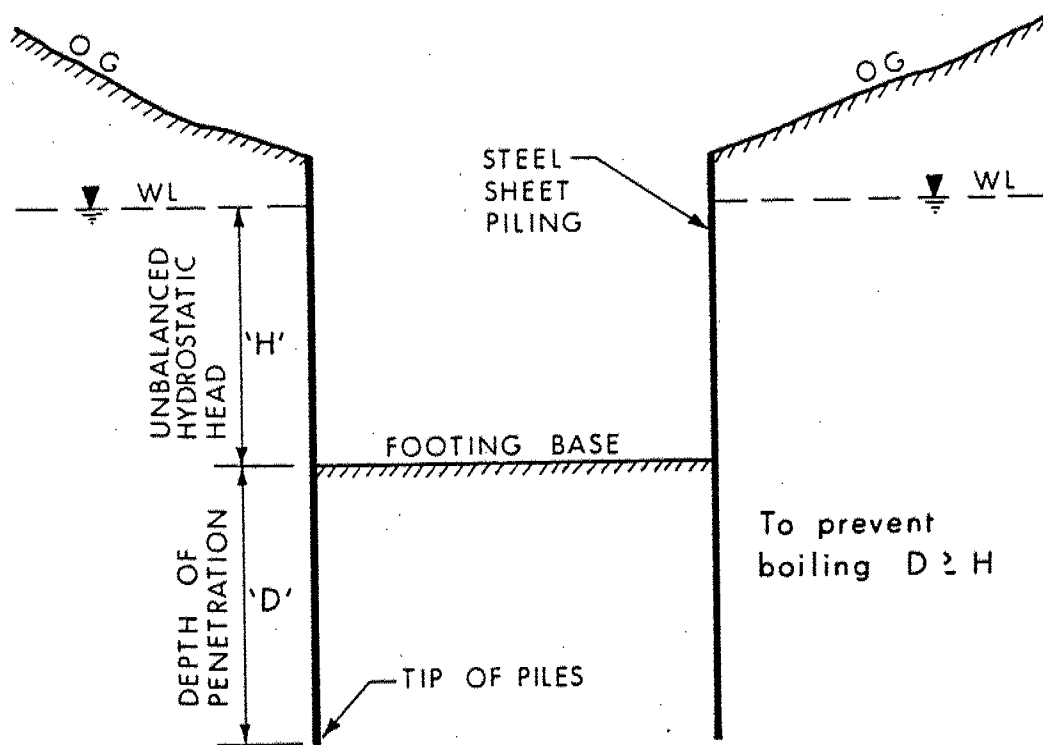
We trust the above comments satisfy your request. If you have any comments or queries, please do not hesitate to contact this office.



T. Sangiuliano, P. Eng.
Foundation Engineer

for

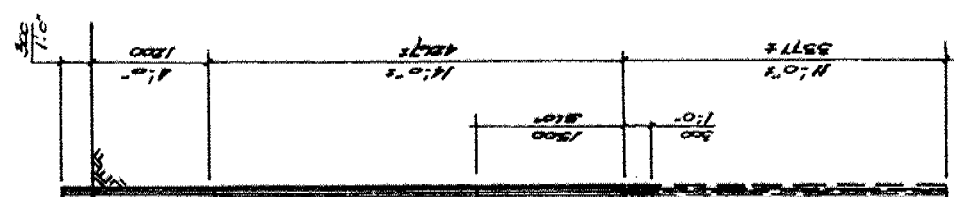
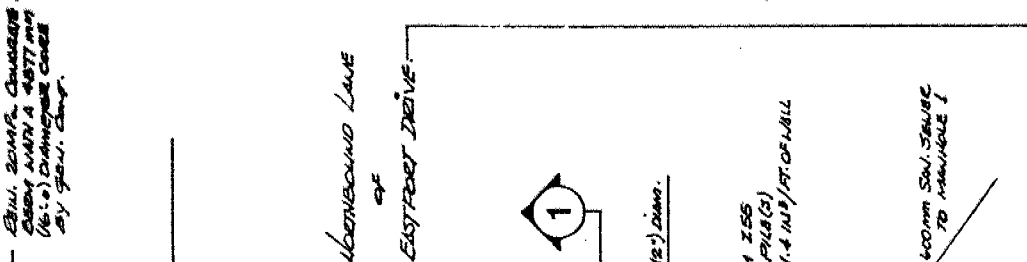
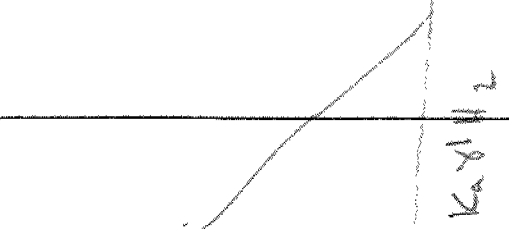
P. Payer, P. Eng.
Senior Foundation Engineer



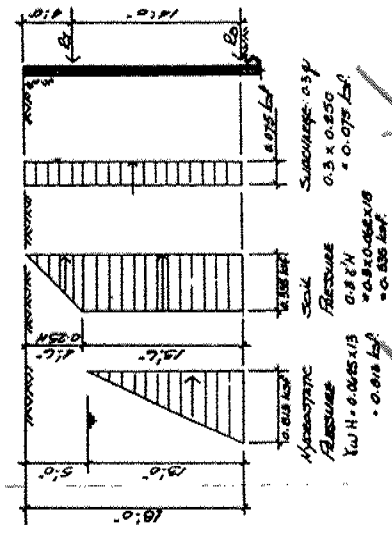
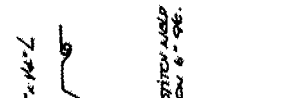
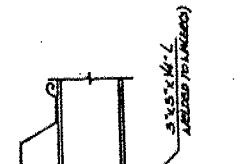
COFFERDAM CONSTRUCTION

WP 120-87-09

FIG 7



①



expenses and delays
caused by Contractor

Steel Sheet Piling

1:40

PROCESSES

- Install sheet piles from ground surface at approx. el. 78.1.
- With excavation at approx. el. 76, install continuous water.
- Complete excavation to approx. el. 72.4.
- On completion of excavation, immediately install 300mm thick reinforced concrete slab.
- Install 1500mm (5 foot) high reinforced 20R2 concrete berm with 4876mm 16 foot diameter core and 1070mm (42 inch) diameter sleeves on centerline of 600 diameter sewers to inside face of sheets with light bulkhead at sheets.
- When microtunnelling equipment is in place and sealed at the respective sleeves, pull back piles at sleeve location so the bottom of the piles are at the top of the sleeves or 250mm (10 inches) below top of the berm.
- On completion of tunnelling and installation of Manhole No. 2, remove the continuous water, and extract all the sheet piles.

DETAIL OF SHEET PILE
CROWN(3)

2369 5H-1

PIETZ LIMITED 47 Industrial Parkway North, Suite 200 AMERICA, ON L4M 3B8 416-754-2456 FAX 416-754-1992	PROCESSED SUN/11/01 3:24:48 SUITED AT MANULIFE 5/2 GEN MANULIFE COMPANY 12- ADVANTAGE, Ontario	NAME: TITANI Temporary SHEET FILE COPYMASTER	RECORDED BY: ALICE MORSE REASON: 01 J.R.	REASON: ALICE MORSE REASON: 01 J.R.	REASON: 01 SH-1
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