

Memorandum

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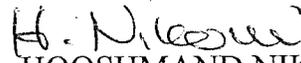
To: MR. HARDEEP TAKHAR
District Office Chief
Office of Water Quality Program

Date: November 5, 2006

Attention: Khaliq Taheri

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From:  PANCHANATHAM N. SUNDARAM/
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Division of Engineering Services


HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

Subject: To Estimate Rate of Seepage (Flow Rate) into Excavations

At your request, we have made an estimate of the water seepage (flow rate) into excavations within the project area. It is our understanding that this “seepage rate” will be included in the dewatering specifications to allow the contractor to estimate the amount of dewatering in this project.

To arrive at this seepage rate, we have made use of the following documents:

1. Geotechnical Reports prepared in-house for retaining walls and soundwalls.
2. Geotechnical Investigation Reports prepared by Consultants, Inc.
3. Project Plans.

Using the geotechnical data from the above documents, we identified the areas where excavation will extend below the groundwater table. Using soils information from the nearby borings we prepared a typical subsoil profile at these locations and selected an average value for the coefficient of permeability using standard correlations.

Seepage Rate (Flow Rate):

We developed typical excavation cross-sections for each of the retaining walls, bridge abutments, and pump plant where the groundwater level is expected to be above the foundation elevation. Using these cross-sections, we calculated the seepage rate into the

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excavation, using the method outlined in the FHWA "Highway Subdrainage Design" Manual, Report No.FHWA-TS-80-224.

Our estimate of the seepage rate into excavations is 250 l/day/m^2 (6.1 gallons/day/ft²) of cross-sectional area of the excavation (this includes excavation side walls/slopes and bottom) below the static groundwater table. Please note that the seepage rate is for cost estimates only and could vary depending upon the season when construction is active and variations in soil or rock type within which excavation is being made. For our seepage rate analysis, we assume a coefficient of permeability of 0.3 m/day. However, the Contractor can choose his own coefficient of permeability to compute the seepage rates. Typical values of permeability depending upon the soil type are provided in Tables 2 and 3 of the Federal Highway Report "Highway Subdrainage Design" (No. FHWA-TS-80-224, 1980). Please ensure that the revised seepage rate arrived at by the Contractor is reviewed by our Office.

Please call Panchanatham Sundaram at (510-622-8821), Meng-Hsi Hung (510-286-7245) or Hooshmand Nikoui (510-286-4811), if you have any questions.

c: TPokrywka, HNikoui, KKitamura, MHung, PNSundaram, Daily File, Route File,

PSundaram/mm

