

Memorandum

To: JOSEPH PRATT - MS #5
Office of Structure Foundations
Division of Structures and Foundations

Date: June 9, 2000
File: 11-SD-5-KP 51.18
EA: 11-0301U1

Carmel Mountain Road U.C. (Widen & Outer Right)
Bridge No. 57-0314R/L/S

From: DEPARTMENT OF TRANSPORTATION
ENGINEERING SERVICE CENTER
Division of Materials Engineering and Testing Services – MS #5
Office of Testing and Technology Services

Subject: Corrosion Review for Carmel Mountain Road U.C. (Widen & Outer Right)

We have completed our corrosion mitigation review of the Carmel Mountain Road U.C. project outlined in a May 8, 2000 memorandum sent to Doug Parks of the Corrosion Technology Branch. Our review is based on corrosion test results of soil samples, summarized information from the Log of test borings, and Caltrans Bridge Design Specifications (BDS) 8.22 (May 2000 draft).

Project Description

The site is 1.9 km (1.18 mi.) north of the Route 5/805 Interchange in San Diego County. This project is part of the planned Route 5 Freeway improvements for the San Diego area. The site is located on a hillside in thin alluvium and underlying sandstone/mudstone formational material. The structures consist of a bridge widening and a new outer right bridge. These structures will be supported by plumb, 600mm (24 in) diameter, cast-in-drilled-hole (CIDH) piles.

Corrosion Review

Caltrans defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 2000 ppm of sulfates, has a minimum resistivity of less than 1000 ohm-cm, or a pH of 5.5 or less.

A soil sample was taken at the Carmel Mountain Road site and tested for pH, minimum resistivity, sulfate concentration, and chloride concentration as per CTM 417, CTM 422, and CTM 643. The results of the soil testing are listed below.

The pH level was 5.96, and, the minimum resistivity value was 678 ohm-cm. The sulfate concentration was 400 ppm, and, the chloride concentration was 1200 ppm. The soil on-site is corrosive based on high levels of chlorides and/or low minimum resistivity levels.

Corrosion Recommendations

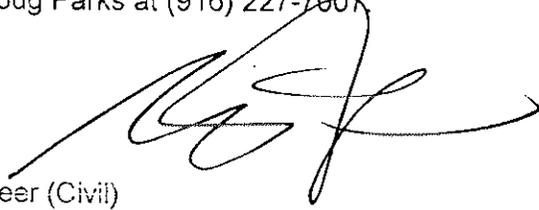
In order to maintain a 75-year design life for the structure, we recommend the following corrosion mitigation measures for the CIDH piles and the structural footings:

- The minimum concrete cover requirements for chloride environments are addressed in Table 8.22.1 of the BDS (May 2000 draft). Given chloride concentrations at the site above the groundwater level are between 500 ppm and 5000 ppm, a minimum concrete cover of 75 mm (3 inches) for reinforcing steel should be used for all cast-in-place concrete in direct contact with the soil including CIDH piles, pile caps, walls, and footings.

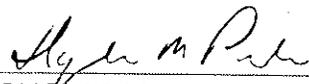
- Use of 25% mineral admixture conforming to ASTM C618 Type F on N (flyash or natural pozzolans) as a replacement for cement by weight is required for all cast-in-place concrete in direct contact with the soil including CIDH piles, pile caps, walls, and footings.
- In addition, the water-to-cementitious material ratio shall be a maximum of 0.40.

If you have any questions regarding our comments, please contact Michael Tolin at (916) 227-5297 or Doug Parks at (916) 227-7007.

MICHAEL TOLIN
Transportation Engineer (Civil)
Corrosion Technology Branch



Reviewed By:



DOUGLAS M. PARKS, Chief
Corrosion Technology Branch

c: Rob Reis, Corrosion Technology Branch
Arron Rambach, Corrosion Technology Branch