

Memorandum

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

Date: June 22, 2000
File: 11-SD-805-KP 45.41
11-0301U1

N805/N5 Truck Connector 11-0301U1
Bridge No. 57-1070G

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 N805/N5 Truck Connector**

We have completed our corrosion mitigation review of the N805/N5 Truck Connector 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 8.22 (May 2000 draft).

Project Description

The site is part of the Route 5/805 Freeway improvements in San Diego County. The proposed bridge will span over Los Penasquitos Creek. The bridge abutments will be supported by plumb, 1.2m (4 ft) diameter, Cast-in-Drilled-Hole (CIDH) Piles. The bent supports will be supported by plumb, 3m (10 ft) diameter, Cast-in-Drilled-Hole (CIDH) Piles. It is the understanding of the Corrosion Technology Branch that permanent steel casings 13mm to 25mm thick (1/2 in to 1in) will be used to avoid problems associated with caving of the holes and filling with groundwater due to aquifer conditions. The steel casings will serve as a barrier against corrosive conditions, however, the steel casings will not serve as part of the structural section of the pile.

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.

No soil samples were taken at the N805/N5 Truck Connector site. Three soil samples were taken at the nearby Retaining Wall No. 524 site and tested for sulfate and chloride concentration per CTM 417 and CTM 422. No tests were made for pH and minimum resistivity (CTM 643). The results of the soil testing are listed below.

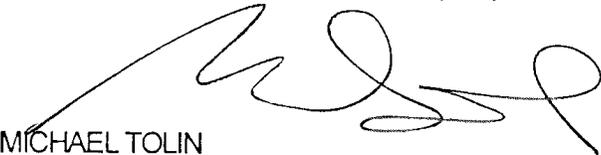
The sulfate concentration ranged from 360 ppm to 6000 ppm, and the chloride concentration ranged from 150 ppm to 760 ppm. Since there were no corrosion samples taken at the proposed site, corrosion recommendations will be based on the results of these samples. The soil is considered corrosive based on high levels of sulfates and chlorides.

Corrosion Recommendations

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

- 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 are between 500 ppm and 5000 ppm, a minimum concrete cover of 75 mm (3 inches) should be used for reinforcing steel CIDH piles (not inside a steel shell), pile caps, walls, and footings.
- The minimum requirements for protection of reinforced and unreinforced concrete against acid and sulfate exposure shall be in accordance with Table 8.22.2 of the BDS (May 2000 draft). For CIDH piles (not inside a steel shell), footings, pile caps, and walls, the concrete should contain a minimum cementitious material content of 400 kg per cubic meter. Cementitious material shall consist of 75% by mass Type II modified, or Type V portland cement and 25% by mass mineral admixture conforming to ASTM C618 Type F or N (flyash or natural pozzolans). Also, the water-to-cementitious material ratio shall be a maximum of 0.40.
- For CIDH piles inside a steel shell, no additional concrete corrosion mitigation measures are required. The minimum thickness of the steel shells (13mm) is thick enough to prevent chlorides and sulfates from penetrating the inside of the pile during the 75-year design life for the structure.

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



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Reviewed By:



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