

Memorandum

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

Date: October 10, 2000
File: 11-SD-5-KP 49.8/49.9
EA: 11-0301U1

Retaining Wall No. 531

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 Retaining Wall No. 531**

We have completed our corrosion mitigation review of the Retaining Wall No. 531 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 retaining wall will be located between the S5/S805 Truck Connector approach embankment (Br. 57-1069F, near Abutment 12) and southbound Rte. I-5. Retaining Wall No. 531 (a type I retaining wall) is approximately 93.70 m (307.4 ft) in length and varies from 3.6 to 1.8 m (11.8 to 5.9 ft) in height with an additional Type 25 Barrier (concrete) to be placed on top of the wall. Retaining Wall No. 531 will be supported by Standard Type 1 wall spread footings placed within existing embankment material or alluvial and/or Bay Point Formation sediments at elevations shown on the General Plan.

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 corrosion samples were collected of the soil and groundwater for the Retaining Wall No. 531 site. However, an extensive amount of coring was done at the adjacent S5/S805 Truck Connector site. Given the close proximity of the S5/S805 Truck Connector site to the Retaining Wall No. 531 site, it would be exceedingly likely both sites would have similar soil and/or corrosion characteristics. The soil is corrosive at the adjacent S5/S805 Truck Connector site based on high levels of sulfates, high levels of chlorides, and low minimum resistivity levels. Therefore, it would be conservative to assume the corrosion characteristics of the soil at the Retaining Wall No. 531 site would be equivalent to the adjacent S5/S805 Truck Connector site.

The soil and water samples, at the adjacent S5/S805 Truck Connector site, were tested for pH, minimum resistivity, sulfate concentration, and chloride concentration per CTM 417, CTM 422, and CTM 643. The testing results of the soil and water for the S5/S805 Truck Connector site are listed below.

The pH level of the soil ranged from 7.4 to 8.6. The minimum resistivity of the soil ranged from 250 to 2100 ohm-cm. The sulfate concentration of the soil ranged from 25 ppm to 6000 ppm and the chloride concentration of the soil ranged from less than 25 ppm to 1200 ppm.

Groundwater at the Retaining Wall No. 531 site was estimated at elevation +10.36 m (+34 ft). However, perched water layers may be encountered at shallower depths. The spread footings should be above the ground water level.

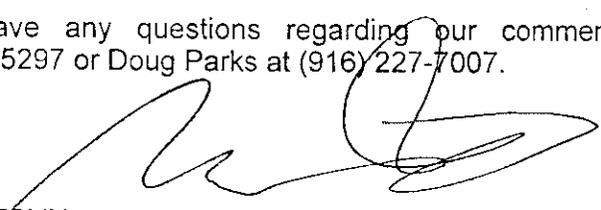
Assuming the Retaining Wall No. 531 site has equivalent soil conditions to the adjacent S5/S805 Truck Connector site, the soil is corrosive based on a high level of sulfates, a high level of chlorides, and a low minimum resistivity.

Corrosion Recommendations

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

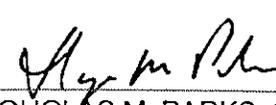
- The minimum concrete cover requirements for chloride environments are addressed in Table 8.22.1 of the BDS (May 2000 draft). Assuming chloride concentrations for soil at the site are between 500 ppm and 5000 ppm, a minimum concrete cover of 75 mm (3 inches) should be used for reinforcing steel in walls 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 footings, 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.

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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