8. MSE STRUCTURES

Most Mechanically Stabilized Embankment (MSE) structures are proprietary systems that require prior design and material use approvals. The list of pre-approved alternative Earth Retaining Systems is maintained by the Department (https://dot.ca.gov/programs/engineering-services/authorized-materials-lists). The DES Subdivision of Structure Policy & Innovation (SPI) approves the design. The Corrosion Branch of METS reviews the corrosion aspects of newly proposed systems.

Most MSE structures are equipped with inspection elements that are either galvanized steel rods or straps, depending on the form of soil reinforcement (rod or strap) used in the actual MSE structure construction. Inspection elements are included in the initial construction of MSE structures so that they may be retrieved at a later date and assessed for corrosion and remaining structural capacity. Since the inspection elements are placed at various locations and levels in the wall, and since they are exposed to the same conditions as the actual MSE soil reinforcement, they may be used to provide an estimate of the overall condition of the MSE structure. Inspection elements are typically scheduled for retrieval at 5, 10, 20, 30, 40, and 50-year intervals.

8.1 Corrosion Requirements for MSE Structure Backfill

The Department's ***Standard Specifications Section 47-2.02C Structure Backfill*** (see References), requires that the structure backfill material for an MSE structure meet the following corrosion related requirements:

1. Minimum resistivity 2000 ohm-cm, ***CT 643***
2. Chloride concentration must be less than 250 ppm, ***CT 422***
3. Sulfate concentration must be less than 500 ppm, ***CT 417***
4. pH must be between 5.50 and 10.0, ***CT 643***

MSE backfill material that meets the above criteria will be considered not corrosive to both the metallic soil reinforcement as well as the reinforced concrete retaining wall. In addition to specifying not corrosive soil, the metallic soil reinforcement must be galvanized in accordance with the Department's standard galvanizing requirements ***Standard Specifications Section 47-2*** (see References).

8.2 Corrosion Sampling and Testing for MSE Structures

The contractor is responsible for using non-corrosive soil and water for MSE wall construction. When a source of backfill material (borrow site) is being proposed

for use in constructing an MSE structure, the entire source area should be representatively sampled and tested to establish that all the material within the area to be used for structure backfill meets the minimum requirements. This may require taking many samples to properly describe the corrosivity of the proposed backfill material. If any of the material within a proposed borrow source does not meet the minimum requirements, those areas shall be clearly defined as “off limits”.

In addition to "borrow-site" sampling performed by the contractor, the Department requires backfill sampling and testing during construction for quality assurance. ***Bridge Construction Memo 145-8.0, Mechanically Stabilized Embankment Wall Construction Checklist, June 28, 2006***, (see References), advises the Structure Representative to obtain one 60 lb. sample of backfill material for each level where inspection elements are installed. The Corrosion Laboratory only requires **10 lb.** of backfill for corrosion testing.

8.3 Reporting Corrosion Test Results for MSE Structures

Corrosion test results for backfill samples, submitted to the Corrosion and Structural Concrete Field Investigation Laboratory for testing, will be reported on a Corrosion Test Summary Report and sent to the Engineer or contact submitting the sample for testing.