ITEM 08203.019901 M - IMPERVIOUS EMBANKMENT IN PLACE (SOIL-BENTONITE MIX)

DESCRIPTION:

This work shall consist of furnishing, placing and compacting impervious embankment material as shown on the plans and in accordance with Section 203 - Excavation and Embankment of the Standard Specifications, except as herein modified:

MATERIALS:

- Soil
- Bentonite
- Water

Impervious embankment material shall be a soil-bentonite mix with a minimum of 2% bentonite by weight.

The selected soil shall be a uniform natural soil, free of frozen material, debris, organic materials, or material that may adversely affect the in-place permeability or compaction when mixed, it shall produce a consistent mix without clodding of the blended material. The gradation of the soil should be such that, when mixed with bentonite, it can be compacted into a dense layer with very low permeability. Maximum particle size shall not exceed one inch.

The bentonite shall be a natural, high swelling, free flowing, sodium montmorillonite bentonite, conforming to API Standard #13A. High swelling is defined as the ability of 2 grams of bentonite, when mechanically reduced to pass a #100 sieve, to swell when added gradually to 100 ml of distilled water to a volume of 16 ml or greater. The colloid content of the bentonite shall exceed 85% as measured by evaporating the suspended portion of a 2% solution after 24 hours of sedimentation. The dry fine content of the bentonite shall be 85% minimum passing a #20 sieve, and 15% maximum passing a #200 sieve. The bentonite supplier selected for this project shall provide manufacturer or testing certification for the bentonite.

Clean water shall be used in adjusting the moisture content of the soil-bentonite mix. In general, the water shall be municipally supplied potable or shall have a pH between 5.5 and 8.0, hardness less than 70 ppm and Total Dissolved Solids less than 500 ppm.

Mixing of Impervious Embankment Material

The quantity of bentonite that is to be added shall be computed using the selected ratio (by weight) of bentonite to dry soil (dry soil being the weight of soil corrected for its moisture content). No moisture correction for bentonite is necessary provided its moisture content is less than 10%. After thorough mixing of the bentonite with the soil, the water shall be added in sufficient quantity to achieve the desired range of moisture content of the soil bentonite mixture that will provide a minimum of 95% Standard Proctor maximum density when compacted in place.

The equipment for mixing the soil-bentonite material shall be a continuous mixing, twin shaft pugmill

plant, capable of producing a well-graded uniform mix, and uniformly blending the soil particles with

water, bentonite, and any other additive(s) that may be required. The mixing plant shall have suitable controls in place to assure that the proper proportioning of the mix components (soil, bentonite, and water) is maintained during blending. The plant shall be equipped with a discharge hopper equivalent to the capacity of the one hauling vehicle to hold the blended materials for discharge to assure the blended materials do not become segregated.

The blended material shall be directly dropped from the discharge hopper to hauling vehicles, for transport to the placement area. Blended material shall not be stockpiled and then reloaded by mechanical equipment to the transportation vehicles.

CONSTRUCTION DETAILS:

All depressions, holes or keyway trenches shall be backfilled with impervious embankment material and compacted to not less than 95 percent of Standard Proctor Maximum Density. Immediately prior to placement of the impervious embankment material, the entire earth surface on or against which fill is to be placed, shall be thoroughly scarified to a depth of 150 mm and compacted to not less than 90 percent of Standard Proctor Maximum Density. Minor benching should also be performed on the side slopes of the depressions and holes to allow better compaction of the mixture.

The soil-bentonite mixture transported to the placement area shall be deposited in horizontal layers not exceeding 150 mm in thickness prior to compaction. Each layer shall be compacted to not less than 95 percent of Standard Proctor Maximum Density using a sheep foot roller or a method approved by the Engineer. The moisture content of all impervious embankment material shall be wet of the Optimum Moisture Content as determined by A.A.S.H.T.O Designation: T-99, Method C but not greater than 2 percent above the Optimum Moisture Content at the time of compaction.

The entire embankment shall be brought to not less than the prescribed cross-section at all points.

METHOD OF MEASUREMENT:

This work will be measured as the number of cubic meters of impervious embankment in place computed from the payment lines shown on the contract plans or from payment lines established by the Engineer, in writing, prior to the performance of the work. No payment will be made for work done beyond the payment lines.

BASIS OF PAYMENT:

The unit price bid per cubic meter shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work. No direct payment will be made for any losses of material which may result from compaction, foundation settlement, erosion or any other causes; the cost of such losses shall be included in the price bid for this item.