INTERPRETATION AND ENFORCEMENT OF THE EMBANKMENT SPECIFICATION

PURPOSE: The purpose of this document is to state how the embankment specification was interpreted and enforced under the WBV-14c.2 Contract. A key principle to keep in mind is that a contract must be interpreted as a whole. That is to say that in rendering an interpretation of wording in one section of a contract, all other relevant portions of the contract that have a bearing on the context and meaning of the wording in question must be considered.

RELEVANT CONTRACT SPECIFICATION PARAGRAPHS:

Materials

The embankment shall be constructed of earth materials naturally occurring or Contractor blended. Materials that are classified in accordance with ASTM D 2487 as CL or CH are suitable for use as embankment fill. Materials classified as ML are suitable if blended to produce a material that classifies as CH or CL according to ASTM D 2487. All fill materials shall be free from masses of organic matter, sticks, branches, roots, and other debris including hazardous and regulated solid wastes. As earth from the designated excavation areas may contain excessive amounts of wood, isolated pieces of wood will not be considered objectionable in the embankment provided their length does not exceed 1 foot, their cross-sectional area is less than 4 square inches, and they are distributed throughout the fill. Not more than 1 percent (by volume) of objectionable material shall be contained in the earth material placed in each cubic yard of the levee section. Pockets and/or zones of wood shall not be placed in the embankment. The Contractor shall notify the Contracting Officer whenever the in-place Plasticity Index of the material is 15 or less. Materials placed in the section must be at or above the Plasticity Index of 10. Materials placed in the section must be at or below organic content of 9 percent by weight, as determined by ASTM D 2974, Method C.

EMBANKMENT CONSTRUCTION

Compacted Fill
The location and extent of the compacted fill is shown on the drawings. Compacted fill shall not be placed in water. The materials for compacted fill shall be placed or spread in layers, the first or bottom layer and the last two layers not more than 6 inches in thickness and all layers between the first and the last two layers not more than 12 inches in thickness prior to compaction except the first layer on top of the geotextile shall be 15 inches, plus or minus 3 inches tolerance, thick as specified in Section 31 05 19.05 12 REINFORCEMENT GEOTEXTILE for details see drawings.

Compaction
The first and each successive layer of compacted fill material shall be compacted to at least 90 percent of maximum dry density as determined by ASTM D 698 (Standard Proctor Compaction Test) at a moisture content within the limits of plus 5 to minus 3 percentage points of optimum moisture content determined from ASTM D 698. For the first layer above the geotextile, a tractor having a ground pressure no greater than 4.7 plus or minus 0.2 psi shall be used to spread and then compact the layer.
BACKGROUND: During construction, it was noted that the borrow material from the River Birch Phase II Expansion Pit contained woody debris of objectionable size, as defined in the above RELEVANT CONTRACT SPECIFICATION PARAGRAPH. As such, various District elements, including the designer of record, were called upon to determine how best to enforce the contract, such that the desired end product was achieved.

Engineering Division, Project Management and Construction Division collectively visited the project site a multitude of times to witness the borrow material in various stages of the embankment construction process. This included reviewing the material as it was delivered from the trucks to the site, as it was spread, prior to disking and picking by contractor forces, after it was disked and picked by contractor forces and, lastly, as it lay in its final, compacted state.

It was obvious to all that, while the embankment material contained woody debris upon delivery from the borrow pit, through the disking and picking operations, the end product embankment material was acceptable, provided that the contractor did an adequate job of removing the objectionable wooden debris. It was apparent to all who witnessed the embankment operation, that after removal of the isolated pieces of objectionable debris in each lift, the remaining end product embankment material was a clean, fat and cohesive clay, the quantity of which far exceeded any potential, unseen remaining debris.

The question that arose after the collective visits by ED, PM and CD, was how to assure that enough of the wooden debris was removed to meet the intent of the aforementioned specification requirement. In attempting to answer this question, It was acknowledged that there is no recognized, quantitative method to make this determination. While it is desired that each cubic yard of embankment material contain no more than 1% objectionable material by volume, there is no standardized procedure for making this determination. The contract also does not specifically define the configuration of a cubic yard for this purpose. Given the contract requirement to construct the levee in lifts as previously referenced, the contract effectively causes the inspection and removal of objectionable material to be performed as each lift is constructed. Not surprisingly, this removal methodology is the predominant and generally accepted standard industry practice of very long standing. Furthermore, it is obviously not feasible nor the intent of the contract to examine or otherwise test each individual and unspecified discrete cubic yard of embankment for the presence of objectionable material, moisture, compaction or other required criteria. Likewise, on other

construction features on other USACE contracts, QC/QA testing is not required on 100 percent of materials such as fabricated steel, concrete and other construction materials, but rather on representative samples thereof.

CONCLUSIONS: It was obvious to the group of engineers representing ED, PM and CD, that thorough disking and picking of the clay embankment yielded a satisfactory levee construction material. Given that no established standard was available to quantitatively determine what level of picking represented removal of woody material to the 1% by volume level specified, it was decided that CD would administer the contract to have the contractor remove all objectionable woody debris that was seen during the picking operation.

It was realized that each individual piece of objectionable debris would not be uncovered and, therefore, would not get removed. However, by removing all objectionable debris discovered during the picking operation, it was evident that the debris remaining was less than the allowable 1% by volume.

As the application of this rationale was not possible on a per cubic yard basis, it was determined that the best way to apply this standard was per lift of material. Therefore, as each lift of material was placed for a given reach under construction, that material was adequately disked, repeatedly as necessary, and picked until there was no evidence of objectionable debris. The lift was then inspected again immediately prior to compaction. After meeting testing requirements for moisture content and density, each lift was inspected one final time during scarification and prior to allowing placement of the next lift.