

CONSTRUCTION SPECIFICATION

PA 521C - POND SEALING OR LINING – BENTONITE TREATMENT

1. SCOPE

The work shall consist of furnishing bentonite, mixing with soil, and placing the bentonite treated soil in a pond to the elevations, grades, and cross sections as shown on the drawings or as staked in the field..

2. MATERIALS

Soil material shall be obtained from the designated area(s). The selection of the material shall be as described in the drawings or in Section 10 of this specification. Soil material shall contain no frozen material, sod, brush, roots, or other objectionable materials. Rock particles larger than 4 inches in diameter shall be removed prior to treatment operations.

Water shall be clean and free from oil, acid, alkali, organic matter, or other deleterious substances in amounts that will negatively affect the bentonite treatment.

The bentonite shall be a sodium bentonite with a free swell of at least 22 milliliters as measured by ASTM Standard Test Method D5890, unless otherwise detailed in the drawings or Section 10 of this specification.

3. EQUIPMENT

All equipment necessary for the proper construction of the work shall be on the work site prior to the start of bentonite treatment operations. Unless otherwise specified, mixing equipment shall include the combined use of heavy disk plows and high speed rotary mixers. Disks shall be at least 24-inches in diameter and rotary mixers shall be capable of mixing lifts at least nine (9) inches thick traveling at a minimum speed of four (4) mph and covering a minimum width of six (6) feet.

All equipment used to convey or transport bentonite to or on the work-site shall be

covered or enclosed so as to avoid dust related pollution or exposure problems.

4. SITE PREPARATION

The Contractor shall prepare, mix, and cure the bentonite treated earth material in the area(s) shown on the drawings.

Prior to start of bentonite treatment operations, the foundation shall be stripped of topsoil and graded to a relatively smooth and uniform surface.

All sod, brush, roots larger than 2 inch diameter and 4 inches in length, rocks larger than 4 inches in diameter, and other objectionable materials shall be removed prior to bentonite treatment operations.

If required in Section 10, the foundation shall be compacted as set forth in that section. In addition to the bentonite treated soil liner, at least 2 feet of compacted fine grained soil shall be placed over fractured rock or other highly permeable material.

Immediately before placement of bentonite, the subgrade shall be scarified to allow suitable mixing and bonding of the bentonite-soil mixture. Standing water or mud shall not be present during placement operations.

The foundation shall be inspected and approved by the Engineer prior to the placement of bentonite or earth fill.

5. BENTONITE PROPORTIONING

The amount of bentonite shall be as specified in Section 10 of this specification. Adjustment in the amount of bentonite may be required as the work progresses and shall be adjusted as requested and approved by the Engineer.

6. BENTONITE APPLICATION

Bentonite shall not be applied when the temperature is below 40°F or is expected to drop below 40°F within 24-hours. Bentonite will not be applied during high wind conditions that hinder effective application or causes pollution by drift off site.

Bentonite shall be uniformly applied in dry form on the soil surface at a rate that will attain the specified proportioning.

7. MIXING

The soil and bentonite shall be mixed by disking and use of rotary mixers until a uniform mixture is obtained. Prior to mixing with dry bentonite, the soil moisture content shall be adjusted to the range specified in Section 10.

The depth of each lift shall be no greater than that specified in the drawing or Section 10. The mixing shall continue until the soil and bentonite have been thoroughly processed to a uniform mixture without lumps of soil and/or bentonite.

When mixing is complete, the water content of the mixture shall not be less than specified in the drawing or Section 10 for the soil-bentonite mixture.

8. PLACEMENT AND COMPACTION

The soil-bentonite mixture shall be placed in uniform horizontal layers. The thickness of each layer before compaction shall not exceed the maximum thickness specified in Section 10 or as shown in the drawings.

During compaction of the soil-bentonite mixture, the moisture content of the materials being placed shall be maintained within the specified range, as tested in accordance with ASTM D698.

The mixing, placement and compaction of soil-bentonite mixture shall be completed within the same workday it is started.

The soil-bentonite mixture shall be compacted in accordance with the specified class:

Class A compaction—Each layer of earthfill shall be compacted as necessary to provide the density of the earthfill matrix not less than the minimum density specified in Section 10 or identified on the drawings. The earthfill matrix is defined as the portion of the earthfill material finer than the maximum particle size used in the compaction test method specified.

Class B compaction—Each layer of earthfill shall be compacted to a mass density not less than the minimum density specified.

Class C compaction—Each layer of earthfill shall be compacted by the specified number of passes of the type and weight of roller or other equipment specified or by an approved equivalent method. Each pass shall consist of at least one passage of the roller wheel or drum over the entire surface of the layer.

Structural backfill : Earth backfill adjacent to structures shall be compacted to a density equivalent to that of the surrounding in place earth material or adjacent required earth fill or earth backfill. Compaction shall be accomplished by hand tamping or manually directed power tampers, plate vibrators, walk-behind, miniature, or self-propelled rollers. Unless otherwise specified heavy equipment including backhoe mounted power tampers or vibrating compactors and manually directed vibrating rollers shall not be operated within 2 feet of any structure. Towed or self-propelled vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist is not permitted.

The top surface of the completed soil-bentonite mixture shall be sealed by rolling with a pneumatic tired equipment or a smooth steel roller.

9. CURING AND PROTECTION

The compacted bentonite-soil mixture shall be cured a minimum of 72-hours unless otherwise specified in Section 10. The water content of the mixture shall be maintained at or above standard optimum water content during the curing period by sprinkling the sealed surface with water or by covering it with a 6 inch layer of moist soil or another approved cover.

The bentonite-soil mixture shall be protected

from damage and deterioration with a soil cover, as specified in the drawings or Section 10.

**10. ADDITIONAL CONDITIONS
WHICH APPLY TO THIS PROJECT ARE:**