

SPECIFICATIONS - DETAILED PROVISIONS
Section 02597 - Pond Lining – Treated Soil

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**SECTION 02597
POND LINING - TREATED SOIL**

PART 1 - GENERAL

1.01 DESCRIPTION

Under these specifications, the contractor shall furnish all labor, materials, and tools required for the complete installation of a chemically and cement treated clay bearing soil seepage control lining with a vertical concrete lake edge to control erosion and horizontal seepage at the upper margin of the water holding facility.

1.02 SUBMITTALS

The contractor shall submit for Eastern Municipal Water District approval clay samples and samples of any materials not specifically noted in the specifications. Laboratory tests shall accompany any clay samples indicating conformance to the specifications.

1.03 PRODUCT DELIVERY

All materials and chemicals shall be delivered to the job site. All chemicals shall be stored in their original containers, shall be plainly marked, and shall comply with the manufacturer's recommendations.

1.04 JOB CONDITIONS

The contractor shall familiarize himself and comply with all applicable state, county, and municipal rules and regulations pertaining to sanitation, fire protection and safety, and all provisions of the Contract Documents.

1.05 GUARANTEE OF WORK

The contractor shall guarantee the entire Work constructed by him under the Contract to be free of defects in materials and workmanship for a period of two (2) years following the date of acceptance of the Work by the District. The contractor shall agree to make, at his own expense, any repairs or replacements made necessary by defects in materials or workmanship in the Work which become evident within said guarantee period. The contractor shall make repairs and replacements promptly upon receipt of written order from the District. If the contractor fails to make the repairs and replacements promptly, the District may do so, and the contractor shall be liable to the District for the cost of such repairs and replacements.

1.06 EXPERIENCE OF CONTRACTOR

The contractor installing the chemically and cement treated soil liner shall have demonstrated his ability to perform this work by having previously successfully installed four (4) ponds with this type of soil treatment.

PART 2 - MATERIALS & PRODUCTS

2.01 SOILS TO BE TREATED

The soils for the treated lining shall be a blend of sands, silts and clays with a minimum clay content of 10% of two (2) micron clay as measured by ASTM standard methods. The soil to be treated may be on-site soil, an imported soil, or blends of on-site soils with high-grade imported Montmorillonite clay (bentonites).

2.02 PRODUCTS SPECIFIED BY BRAND NAME OR MANUFACTURER'S MODEL NUMBER

Specific products indicated on the plans or in the specifications signify that the product listed will perform in a satisfactory manner if installed in accordance with the plans in a good workmanship manner. Contractor shall follow all instructions furnished by the manufacturer.

Substitutions of products specified in the plans or in these specifications will be allowed if the contractor submits sufficient reasons and/or evidence to the project engineer that the alternate product will indeed perform equally, will fit in the space provided, and will not cause later maintenance problems. Alternate products shall not be installed until approved in writing by the project engineer.

2.03 SOIL STABILIZER

Soil stabilizer shall be an enzyme compaction aid, trade name WA-13 as distributed by Soil Science International, Inc., or equal.

2.04 SEEPAGE INHIBITOR

Seepage inhibitor shall be a concentrated dispersion of polymers and modifiers emulsified in water, trade name SS-13 as distributed by Soil Science International, Inc., or equal.

2.05 PORTLAND CEMENT

Portland cement shall be Type II and conform to Section 03300.

2.06 CONCRETE

Concrete for the vertical lake edge shall be Class "B" and conform to Section 03300.

PART 3 - EXECUTION

3.01 SITE CLEARING

The site shall be cleared of all vegetation, rocks, and debris and disposed of off-site in a legal manner.

3.02 EMBANKMENT

Any required embankment as shown on the plans shall be placed and shall conform to Section 02201.

3.03 CONCRETE POND EDGE

The vertical concrete lake edge shall be ten inches (10") thick and four foot (4') high or as shown on the plans.

A level bench sufficiently wide to accommodate the trencher selected shall be graded with its center line on the lake edge and elevation as shown on the plans. The normal elevation of the bench is one foot (1') above the planned high water elevation in the pond.

A trench, 10 inches (10") wide shall be excavated along the pond edge shown on the plans. The normal depth of the trench shall be four foot (4') and extend to a point three foot below the planned high water elevation in the pond.

The trench walls shall be moistened prior to placement of concrete. Care shall be taken to avoid ponding of water in the bottom of the trench. The trench shall be filled with Class "B" concrete and vibrated to eliminate voids. The top shall be brought to the grade shown on the plans and shall be float finished with a one-half inch (1/2") round edge on each side of the trench.

The concrete shall be allowed to cure for at least forty-eight (48) hours before the pond side of the trench is excavated for liner placement per the plans and specifications.

A temporary or permanent access ramp, as shown on the plans, shall be constructed for construction equipment passage over the concrete pond edge. This ramp will be necessary to remove equipment at the end of construction.

3.04 POND LINING

After constructing the concrete pond edge, the side of the pond shall be excavated and fine graded to a 4:1 side slope away from the concrete pond edge. The side slope and bottom should be at finish grade minus the thickness of the lining to be placed.

The entire bottom and side slopes of the lake shall be mixed thoroughly to a depth of at least six inches (6") with a rotary type mixer or large offset type disc capable of producing a uniform mixture to at least a twelve inch (12") depth. Deposits of sand, gravel, or rocks should be removed and replaced with approved site soil. The subgrade shall then be compacted to at least 90% relative compaction by ASTM method D-698-91 to a depth of six inches (6"). All work shall be approved by the soil engineer employed to monitor the application.

Enough stockpiled soil shall be spread on the subgrade to produce a six inch (6") thick compacted layer. This soil shall be brought to near optimum moisture content with water containing at least twenty-five (25) gallons of WA-13 and fifty (50) gallons of SS-13 per surface acre. WA-13 and SS-13 are available from Soil Science International, Phoenix, AZ, phone (602) 978-3286.

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The treated soil layer shall immediately be compacted to at least 95% relative compaction by ASTM method D-698-91 to a depth of six inches (6"). The method of compacting is at the discretion of the contractor, but usually requires both segmented foot and vibratory rollers to achieve the required compaction. All work shall be to the satisfaction of the Soils Engineer and the site representative of Soil Science International. Soil Science International shall have a representative on site during all liner construction operation to aid the contractor in proper treatment rates and procedures. The District will furnish an independent soil engineer to test the liner for compliance with compaction specifications.

The additional required six inch (6") thick layers of seepage control lining shall be spread over the previously compacted layers until the required thickness is achieved. Each layer shall be treated and compacted to 95% relative compaction as stated above. The final layer shall remain loose if soil cement slope protection is called for on the plans.

The final top layer may be used in the construction of the soil cement lining where specified. Before treatment and compaction Type II Portland Cement should be spread over the loose soil at the rate of six pounds (6 lbs) per square foot. The placement of cement, mixing and composition shall conform to Section 301-3, Standard Specifications for Public Works. The moisture content shall be near or over optimum and a relative compaction of not less than 95% as determined by ASTM D-558, shall be obtained. The soil cement layer, as detailed on the plans, shall be kept moist (watercured) for at least seven (7) days following compaction. All mixing and compaction operations must be completed in less than five (5) hours after the treated water, in the amounts as specified above is added to the mixture.

Flooding the bottom of the pond shall begin as soon as possible after compaction is completed. Three hundred (300) gallons of SS-13 shall be added to the filling water for each bottom surface acre of the pond. The filling water shall be added carefully to avoid erosion of the soil liner.

All water required for filling and/or to bring the soil to optimum moisture content for compaction will be furnished by the District as required, but the contractor is responsible for all fittings, meters, hoses, etc., required to load the water in the trucks.

END OF SECTION 02597