

**NATURAL RESOURCES CONSERVATION SERVICE  
PACIFIC ISLANDS AREA**

**CONSERVATION PRACTICE SPECIFICATION**

**POND (378)**

**SCOPE**

This specification covers the construction of farm ponds to the lines, grades, elevation, and cross-sections as shown on the drawings or as staked in the field and be in accordance with the design (construction drawings and these specifications).

**SAFETY**

Steep embankments can be very hazardous. The contractor is responsible for safe operation of equipment at all times. Any potential hazards must be addressed immediately.

Landowners or operators, sponsoring organizations, and contractors shall be liable for damage to utilities and damage resulting from disruption of service caused by construction activities. The Natural Resources Conservation Service makes no representation on the existence or non-existence of any utilities. Absence of utilities on the drawings is not assurance that no utilities are present at the site.

It is the responsibility of the landowner or operator to determine if there are buried or overhead utilities in the vicinity of the proposed work. They should take proper procedures to insure that the utilities shall not be jeopardized and that equipment operators and others will not be injured during construction operations.

**CONSTRUCTION OPERATIONS**

Construction operations shall be carried out in such a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

The owner, operator, contractor or other persons will conduct all work and operations in accordance with proper safety codes for the type of construction being performed with due regards to the safety of all persons and property.

**FOUNDATION PREPARATION**

The foundation area shall be cleared of trees, logs, stumps, roots, brush, boulders, sod, and rubbish. To establish vegetation, the topsoil and sod shall be stockpiled and spread on the completed dam and spillways. Foundation surfaces shall be sloped no steeper than 1:1. The foundation area shall be stripped of all loose material, and thoroughly scarified before placement of the first layer of fill material. The foundation surface shall have moisture added and compacted prior to fill placement.

The cutoff trench and other required excavations shall be cut to the lines and grades shown on the plans or as staked in the field. Suitable excavated materials as approved by the engineer shall be used in the permanent fill. All unsuitable material shall be stockpiled at the sites designated or disposed by the contractor.

Existing stream channels in the foundation cut slopes area shall be no steeper than 1:1 and deepened and widened as necessary to remove all stones, gravel, sand, stumps, roots, and other objectionable material. The area will be enlarged to accommodate compaction equipment.

Foundations, cutoff trenches and other parts of the construction site shall be dewatered and kept free of standing water or excessively muddy conditions as needed for proper execution of the construction

work. The Contractor shall furnish, install, operate and maintain all drains, sumps, pumps, casings, wellpoints, and other equipment needed to perform the dewatering as directed by the engineer.

The contractor shall build, maintain, and operate all temporary diversion and protective works needed to divert stream flow and other surface water through and around the construction site and away from the construction work while construction is in progress.

The Contractor shall maintain the borrow area in drainable condition or otherwise provide for timely and effective removal of surface and ground waters that accumulate within the borrow areas from any source. Approved borrow material shall be processed as necessary to achieve proper and uniform moisture content for placement.

## **EARTHFILL**

**Material.** The material placed in the fill shall be free of detrimental amounts of sod, roots, stones over 6 inches in diameter, and other objectionable material. All fill material shall be obtained from required excavations and designated borrow areas. The selection, blending, and disposition of materials in the fill shall be subject to approval of the Engineer. All suitable fill material obtained from the excavated pond can be used to construct the pond embankment.

**Placement.** Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved. Selected backfill material shall be placed around structures and pipe conduits at the same rate on all sides not to exceed 8 inch layers.

The placing and spreading of fill material shall be started at the lowest point of the foundation. The fill shall be brought up in horizontal layers of a maximum of 9 inches thickness such that adequate compaction can be obtained. The fill shall be constructed in continuous horizontal layers except where openings or sectionalized fills are required. In those cases, the slope of the bonding surfaces between the embankment in place and the embankment to be placed shall not be steeper than 3 horizontal to 1 vertical. The bonding surface shall be treated the same as that specified for the foundation so as to insure a good bond with the new fill.

If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

Dam embankments shall be constructed in continuous horizontal layers from abutment to abutment.

The distribution and gradation of materials shall be such that no lenses, pockets, streaks, or layers of material differ substantially in texture or gradation from the surrounding material. If it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the center and upstream sections of the fill. For zoned fills of substantially differing materials specified, the zones shall be placed according to lines and grades shown on the drawings.

Selected backfill material shall be placed around structures and pipe conduits at about the same rate on all sides of prevent damage from unequal loading. Fill placed around structures will be brought up at approximately uniform height on all sides of the structure.

The complete work shall conform to the lines, grades and elevations shown on the drawings or as staked in the field.

**Moisture control.** The moisture content of the fill material shall be such that the required compaction can be obtained. The moisture content shall be as uniform as practicable throughout each layer.

Material that is too wet when deposited on the fill shall either be removed or be dried to the specified moisture content prior to compaction.

If the top surface of the preceding layer of compacted fill, foundation, or abutment surface in the zone of contact with the fill becomes too dry to permit a suitable bond, it shall be scarified and moistened by sprinkling to an acceptable moisture content prior to fill layer placement.

The proper moisture for compaction will be determined by inspection during the placement operation. The material should maintain a ball shape when squeezed in the hand. When specified, the moisture shall be maintained within 2 percentage points of optimum as determined by ASTM D-698.

As far as practicable, the material shall be brought to the proper water content in the borrow pits before excavation. Supplemental water, when required, may be applied by sprinkling the materials on the fill. Uniform distribution of the moisture shall be obtained by discing, blading or other approved method prior to compaction

**Compaction.** Construction equipment shall be operated over the areas of each layer of fill to ensure the required compaction as shown in the design. Special equipment shall be used, if needed, to obtain the required compaction.

Heavy compaction equipment shall not be operated within 2 feet of any structure or pipe conduit. Fill, inaccessible by heavy compaction equipment or adjacent to structures and pipe conduits, shall be compacted to the required density by means of hand tamping, manually directed power tampers, or plate vibrators. Fills compacted in this manner shall be placed in layers not greater than 4 inches in thickness before compaction, and shall the required density.

Compacting of fill adjacent to structures shall not be started until 7 days have elapsed since the placement of the concrete.

Compaction shall meet the requirements of the method specified as described below:

- A. Sheepsfoot roller -the maximum layer thickness shall be 8 inches before compaction. The roller shall have staggered, uniformly spaced tamping feet and be equipped with suitable cleaners. The weight of the roller shall not be less than 2,500 pounds per foot of width. The maximum speed of the compaction equipment shall be 3 miles per hour. The entire surface of each layer placed should receive 6 passes of this equipment to attain the necessary compaction.
- B. Pneumatically tired equipment -The maximum layer thickness before compaction shall be 6 inches. A loaded scraper may be considered a pneumatic roller. The wheels of this equipment must pass over 90 percent of the surface of each lift before a new lift is placed.
- C. Track laying equipment (bulldozer) -The maximum layer thickness before compaction shall be 4 inches. The tracks of the equipment must pass over 90 percent of the surface of each lift before a new lift is placed.
- D. Compaction shall result in densities equal to or greater than 95 percent of the maximum obtained by laboratory compaction at optimum moisture of like soils in accordance with the procedure given in ASTM D-698, Procedure A.
- E. Compaction shall result in densities equal to or greater than 90 percent of the maximum obtained by laboratory compaction at optimum moisture of like soils in accordance with the procedure given in ASTM D-1557, Procedure A.

Compliance with this compaction requirements will be determined by the procedure given in ASTM D-1556 or D-2167 for methods D and E and by observation of performance for methods A, B, and C. Fill not meeting the specified requirements shall be reworked or removed and replaced with acceptable fill.

The passage of heavy equipment will not be allowed over:

- A. Cast-in-place conduits prior to 7 days after placement of the concrete; or

- B. Any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half the clear span width of the structure or pipe or 2 feet, whichever is greater.

### CONCRETE STRUCTURES

Concrete shall conform to the requirement of PI Construction Specification 103, Concrete.

**Steel Reinforcement.** Reinforcing steel is to be placed as indicated on the plans and held securely in place during concrete placement. Steel bars shall conform to ASTM Specification A-615 or A-617 Grade 40 or Grade 60.

Before reinforcement is placed, the surfaces of the bars and any metal supports shall be cleaned to remove any loose, flakes, rust, mill scale, oil, grease, or other coatings or foreign substances. After placement, the reinforcement shall be maintained in a clean condition until it is completely embedded in the concrete.

Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. **Tack welding of bars is not permitted.** Metal chairs, metal hangers, metal spacers, and concrete chairs may be used to support the reinforcement. Metal hangers, spacers and ties shall be spaced in such a manner that they will not be exposed in the finished concrete surface.

Reinforcement shall not be placed until the prepared site has been inspected and approved. After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved.

### FOUNDATION AND EMBANKMENT DRAINS/FILTERS

Foundation and embankment drains, shall be placed to the lines and grades shown on the drawings. Drain material shall be as shown on the drawings.

Foundation surfaces and trenches shall be clean and free of organic matter, loose soil, foreign substance, and standing water when the drainfill is placed. Drainfill shall not be placed until the subgrade has been inspected and approved by the Engineer. Drainfill shall not be placed over or around the pipe until the installation of the pipe has been inspected and approved.

Drainfill shall be placed uniformly in layers not more than 12 inches deep before compaction. The material shall be placed in a manner to avoid segregation of particle sizes and to insure the continuity and integrity of all zones. No foreign materials shall be allowed to become intermixed with or otherwise contaminate the drainfill.

All required pipes in gravel drain fill are shown on the drawings.

Trenches for the filter or filter drains shall be excavated to lines, shapes, and dimensions shown on the drawings. Over excavation disturbing the compacted foundation will not be permitted, and any disturbed material shall be removed and replaced with compacted earth fill or filter material. The filter material shall be placed and tamped in place to the dimensions shown. When drain pipes are used, they will be installed on line and grade, without displacement due to placement of filter material.

The filter material shall conform to the following gradation unless otherwise specified.

<u>U.S. Standard Sieve</u>	
Aggregate Size	Percent Passing
2 Inches	85-90
¾ Inch	50-90
#16	15-50
Less than #16	0-15

### **PRINCIPAL SPILLWAY**

Pipe materials shall be as shown in the design. The pipe shall be installed according to the manufacturer's instructions. The pipe shall be firmly and uniformly bedded throughout its length and shall be installed to the line and grade shown on the drawings.

### **PROTECTIVE COVER**

A protective cover of vegetation shall be established on all exposed surfaces of the embankment, spillway, and borrow area, if soil and climatic conditions permit. If soil or climatic conditions preclude the use of vegetation and protection needed, non-vegetative means such as mulches or gravel may be used. The embankment and spillway shall be fenced, if necessary, to protect the vegetation.

Seedbed preparation, seeding, fertilizing, and mulching shall be as shown on the plans.

### **EXCAVATED PONDS**

The completed excavation shall conform to the lines, grades, and elevations shown on the drawings or as staked in the field.

### **WORKMANSHIP**

All construction shall be performed in a workmanlike manner, and the job site shall have a neat appearance when finished.

All disturbed areas not graveled or paved will be vegetated to control erosion.

### **BASIS OF ACCEPTANCE**

The acceptability of this practice shall be determined by inspections during and following construction to ensure compliance with all provisions of this specification and the construction drawings.