NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATIONS

EMBANKMENT POND

(No.)
Code 378

SCOPE

This item shall consist of the clearing, excavation, backfill, concrete and other appurtenances required for the construction of the embankment and the disposal of all cleared and excavated materials for the water impoundment. Construction operations shall be carried out in such a manner that erosion, air, water and noise pollution will be minimized and held within legal limits as established by Federal, state, and local laws, rules, and regulations.

CLEARING AND GRUBBING

Pond Area. All trees and brush shall be cut as flush with the ground as practicable, and all such trees, brush, logs and other debris shall be removed from the pond site. Clearing shall be performed around the shoreline as specified.

Spillway and Borrow Areas. On areas from which fill materials are to be obtained, all trees, brush, logs, roots and other debris larger than 1 inch in diameter shall be removed.

The Embankment Site. All trees, brush and other debris shall be removed from the area on which fill is to be placed. All stumps and roots one inch in diameter and larger should be removed from the fill site to a depth of 12 inches.

Disposal of Cleared and Grubbed Material. All combustible material cleared and grubbed, from the site, shall be disposed of by burning, burying at approved locations or removing from the site. All burning shall conform to Florida laws and regulations. All noncombustible materials cleared and grubbed from these areas shall be removed from the site or buried with a minimum cover of 2 feet. Topsoil, when available, should be stockpiled at a convenient location for use on the embankment, auxiliary spillway and other disturbed areas to facilitate establishment of vegetative cover.

FOUNDATION PREPARATION

Surface Treatment. The foundation area shall be cleared of all trees, stumps, roots, brush, boulders, sod, and debris. All channel banks and sharp breaks shall be sloped to no steeper than one horizontal to one vertical (1:1). All material containing excessive amounts of organic matter shall be removed. The surface of the foundation area will be thoroughly scarified before placement of the embankment material.

Topsoil. Topsoil excavated from the foundation area and from the auxiliary spillway and borrow areas shall stock piled and placed on the dam, auxiliary spillway and borrow areas to facilitate establishment of vegetation.

EXCAVATION

Excavation and Backfill of Cutoff Trench. The cutoff trench shall be excavated to the depths, bottom width and side slopes (minimum one horizontal to one vertical) shown on the plans. All standing water shall be removed from the trench and it shall be backfilled using thin layers (maximum 9 inches) to the ground surface with suitable material by the same methods herein prescribed for "embankment construction."

Excavation and Backfill of Stream Channels. Existing stream channels crossing the foundation area shall be deepened and widened as necessary to remove all stones, gravel, sand, sediment, stumps, roots, organic matter and other objectionable material and to accommodate compaction equipment. Side slopes shall be constructed no steeper than one horizontal to one vertical (1:1). All water shall be removed from the channels, and they shall be backfilled in the same manner as prescribed for the cutoff trench.

Spillway and Borrow Excavation. The completed spillway excavation shall conform as nearly to the lines, grades, bottom width and side slopes shown on the plans as skillful

operation of the excavating equipment will permit. The channel bottom shall be constructed transversely level and the side slopes uniform. All borrow areas outside the pool area shall be graded and constructed in such a manner that they are well drained and protected from erosion by the use of diversions or other conservation measures. Side slopes of borrow areas shall be constructed in such condition that establishment of vegetation, mowing and maintenance operations will be facilitated.

Excavation in borrow areas within the permanent pool area shall be graded in such a manner that they are well drained and will provide the minimum specified depth of water at the normal water level. When specified, shoreline treatment shall be performed by cut or fill to develop the desired depth of flooded area around the normal pool.

EMBANKMENT CONSTRUCTION

Selecting, Placing and Spreading of Material. The fill material shall be free of all sod, roots, frozen soil, stones over 6 inches in diameter, and other objectionable material. The placing and spreading of the fill material shall be started at the lowest point of the foundation (cutoff trench) and the fill shall be brought up in approximately horizontal layers not exceeding 9 inches in uncompacted thickness. Special attention will be given to compaction in the cutoff trench where it joins the abutment slopes.

These layers shall be of approximately uniform elevation and shall extend over the entire area of the fill. Each layer shall be thoroughly compacted by at least three complete passes of the construction equipment over the entire surface area of each layer after the layer has been spread to the lift thickness. Special compaction equipment shall be used when the required compaction cannot be obtained by routing of the construction equipment.

The distribution and gradation of materials throughout the fill shall be such that there will be no lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material. Where it is necessary to use material of varying texture and gradation, the more impervious material shall be placed in the upstream and center portions of the fill.

Drainfill shall be kept from being contaminated by adjacent soil materials during placement by either placing it in a cleanly excavated trench or by keeping the drain at least 1 foot above the adjacent earthfill.

Selected drainfill and backfill material shall be placed around structures, pipe conduits, and antiseep collars at about the same rate on all sides to prevent damage from unequal loading.

Moisture Control. The moisture content of fill material shall be such that the specified compaction can be obtained with the equipment used. The moisture content of the fill shall be maintained within a range to:

1. prevent the bulking or dilatence of the material under the action of the hauling or compaction equipment
2. prevent adherence of the fill material to the equipment
3. ensure the crushing and blending of the soil clods and aggregation into a homogeneous mass
4. for fine grained soils, contain adequate moisture so that a sample can be hand molded.

The completed fill shall conform as nearly to the lines and grades, top width, and side slopes shown on the plans as skillful operation of the construction equipment will permit.

PIPE CONDUIT INSTALLATION

The pipe conduit barrel shall be placed on a firm foundation to the lines and grades shown on the plans. Selected backfill material shall be placed around the barrel and its component parts in layers not exceeding 6 inches in thickness. Each successive layer shall be thoroughly compacted by hand or power tampers. Heavy equipment shall not cross over the pipe conduit barrel until 2 feet of hand compacted material has been placed over the pipe.

Materials. All of the component parts of the principal spillway conduit including barrel, riser, trash rack or deep water release, anti-seep collars, support posts, braces and hardware for mounting shall be of the quality specified and constructed as shown on the plans.

Concrete. The work shall consist of furnishing, forming, placing, finishing and curing Portland cement concrete.

When concrete is used for footings under risers, anti-seep collars, and bedding for reinforced concrete pipe barrels, the mixture shall be not less than five bags per cubic yard. The consistency of the concrete shall be such as to allow the concrete to be worked into place without segregation or excessive laitance.

The components of the mix shall be as follows. A standard known brand, Type I Portland cement, washed sand and gravel. Clean water shall be used in the mix. (Suggested ratio in mix: 94 pounds cement (1 bag), 6 gallons. water, 170 pounds clean dry sand, 315 pounds dry gravel. Smaller batches, 1 part cement, 2 parts sand, and 3 parts gravel, and water at the rate of 1 gallon per 16 pounds of cement).

Concrete shall not be placed when the atmospheric temperature may be expected to fall below 40^{o}F at the time concrete is delivered and placed at the work site nor when it is expected to exceed 90^{o}F during placement. All exposed surfaces of concrete shall be protected from the direct rays of the sun for at least the first seven days. All concrete shall be cured by keeping it continuously moist for at least seven days after being placed or by spraying with two coats of curing compound when other concrete will not be bonded to the concrete surface. Concrete shall not be exposed to freezing temperature during the curing period.

Pre-Bedding. The strength of lightweight, flexible PVC and corrugated steel and aluminum pipe is highly dependent on the bedding and backfill. It must be carefully jointed together, bedded, and backfilled. The backfill to be used in the vicinity of the pipe should be the most impervious fine grained material available and have proper moisture content to assure good compaction around the conduit. The pipe conduit should be cambered to prevent breaking or joint separation when the dam is built. The bottom of the bedding trench will be shaped as a minimum to fit the lower one third (120^{o}) of the pipe. Flexible anti-seep collars should be used to avoid stress concentrations in the pipe as it deflects. Flexible anti-seep collars, when used, may be constructed of 6 mil or thicker plastic or rubber sheeting attached to the pipe with stainless steel clamps, waterproof tape, or closet flanges and caulk material to ensure water tightness. The flexible collars will be held in place during installation with wire or light wood framing. Proper inspection of the installation is essential, especially during the bedding of the conduit and backfilling adjacent to the conduit and anti-seep collars. All other requirements for installation of plastic pipe will be in accordance with Florida NRCS conservation practice standard Subsurface Drains, Code 606.

Principal Spillways, Trash Racks and Fittings. The pipe and pipe connecting bands shall conform with the following specifications and requirements:

Corrugated Steel Pipe. ASTM A760, 762, 885 or Federal Specification WW,P,405; helical corrugated or close riveted annular corrugated; asphalt or polymer coated; and, watertight connections as specified below:

- Rubber "O" Ring type: All types and diameters of pipe.
- Flanged Type: All pipe diameters 12 in. and under.
- Conventional Connecting Bands: All diameters annular corrugated pipe only. Twelve inch minimum band width with rods and lugs required.

Corrugated Aluminum Alloy Pipe. ASTM B745, 790 or Federal Specification WW,P,402; lock, or welded seam helical corrugated with watertight connections as specified above for corrugated steel pipe.

Steel Pipe. ASTM A53 standard weight (Schedule 40). Used pipe is satisfactory provided its wall thickness has not been reduced by corrosion.

Concrete Pipe. AWWA C300, C301, and C302, or ASTM C76 Class II with joint sealed with rubber gaskets. Requires concrete bedding (minimum 3 inches thickness) under bottom third of pipe.

Plastic Pipe. Polyvinyl chloride pipe, PVC 1120 or PVC 1220, conforming to ASTM D1785 or ASTM D2241.

High Density Polyethylene Pipe. High density polyethylene Type III, Class C, Category 4 or 5 conforming to ASTM D1248 and D3350 and AASHTO M252 or M294, Type S.

Markings. Marking on plastic (PVC) pipe verifies product specifications and includes:

- Manufacturer's name or trademark and product code.
- Nominal pipe size (e.g., 6 inches).

- Material code designation (e.g., PVC 1120, 1220).
- Standard Dimension Ratio or schedule no. (e.g.,SDR-26, SCH. 40).
- Pressure rating or pressure class (e.g., 160 psi).
- Specification designation (e.g., D1785, D2241).

Antiseep collars are to be of materials compatible with the pipe and installed so as to be watertight. The pipe shall be installed in accordance with the manufacturer's instructions and to the lines and grades shown on the drawings.

Other Materials. Other materials used in the principal spillway system that are not specified will be as noted in the plans or drawings.

Inspection of Materials. All materials used in the fabrication and installation of the principal spillway, trash rack, valves and other fittings, shall be visually inspected prior to or during their installation to assure quality and integrity of material.

POLLUTION CONTROL

Construction operations shall be carried out so that erosion and sediment are controlled during construction, and air and water pollution are minimized. Best management practices (BMP) for construction shall be installed and maintained as needed and according to NPDES permit if required. BMP's consisting of silt fences, hay bale barriers, diversions, mulching, stream crossings, temporary vegetation, fencing and others may be appropriate to adequately control erosion and sediment during construction.

VEGETATION

Vegetation will be established as specified in the vegetative plan. The embankment, spillway, borrow areas and other non-impounded areas disturbed during construction will be seeded or planted to perennial non-woody vegetation and then mulched. A perennial vegetation filter strip at least 50 feet wide will be established immediately above the normal waterline of the impoundment area, when adequate vegetation does not exist. This filter strip will be a part of the vegetation process.

Temporary vegetation or mulching will be used after construction is completed until conditions are favorable for seeding and planting permanent vegetation.

Florida NRCS conservation practice standard, Critical Area Planting, Code 342 shall be used for plant selection, seedbed preparation, liming, fertilizing, seeding and mulching for both temporary and permanent vegetation. Treated areas will be fenced when needed to protect the vegetation.