NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI CONSTRUCTION SPECIFICATION

GRADE STABILIZATION STRUCTURE

DROP INLET, BOX INLET AND CHUTE SPILLWAYS

CODE 410
410-A

GENERAL

Construction operations shall be carried out in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits. **A land disturbance permit from the Missouri Department of Natural Resources may be needed if the disturbed area is greater than one (1) acre in size.**

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used.

The contractor is responsible for having all utilities located at the site according to Missouri state laws prior to beginning work.

SITE PREPARATION

All trees, stumps, brush, and similar materials are to be removed from the construction area and disposed of in a manner consistent with environmental concerns and proper functioning of the structure. Topsoil shall be conserved if needed.

MATERIALS

Materials required and fabrication details shall be as specified on the drawings and as shown below.

Concrete and reinforcing steel shall conform to Construction Specification 750 Reinforced Concrete.

Rock riprap and bedding shall be sound, durable rock conforming to gradation shown on drawings. Geotextile may be used in lieu of riprap bedding. Timber, metal, concrete blocks, and drain materials shall be as shown on the drawings.

Geotextile fabric shall be non-woven, needle punched as specified on the drawings and shall conform to the Construction Specification 753 Geotextile.

EXCAVATION

To the extent needed, all suitable materials removed from the specified excavation shall be used in the construction of the earth fill areas of the structure. Spoil material shall be placed in the locations shown on the drawings. All spoil material deposited adjacent to the structure shall have a positive grade to drain to a stable outlet.

EARTHFILL PLACEMENT

The material placed in the fill shall be free of detrimental amounts of sod, frozen soil, stone over 6 inches in diameter (except for rock fills) and other objectionable material. To the extent they are suitable, excavated materials are to be used in the permanent fill. The distribution, moisture

content, and gradation of materials 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. Foundation areas shall be kept free of standing water when fill material is being placed on them.

The placing and spreading of the fill shall be started at the lowest point of the foundation and the fill shall be brought up in approximately horizontal layers not to exceed 9 inches in thickness. Each layer shall be spread, processed, and shall be compacted by one of the following methods, as specified on the drawings:

Dozer - Complete coverage by tread or track of hauling or spreading equipment. Each lift shall not exceed 5 inches in thickness.

Roller - two passes of standard tamping type roller over the entire area to be compacted. Complete coverage by the treads of loaded hauling equipment is considered equivalent to two (2) passes of tamping roller. Each lift shall not exceed 9 inches in thickness.

The tamping-type roller shall have tampers or feet projecting not less than six (6) inches from the surface of the drum and shall have a minimum static load on each tamper of 250 pounds per square inch of tamping area. Tamping rollers with minimum static load on each tamper of 125 pounds per square inch of tamping area may be used if the number of passes is increased to four (4) or the thickness of lifts is reduced to four (4) inches. (Sheepsfoot or wedgefoot drum rollers are considered tamping rollers.)

Embankment shall be constructed to the lines and grades shown on the drawings.

Finish shall be smooth, uniform, and ready for seedbed preparation.

MOISTURE CONTROL

The moisture content of the fill material and foundation shall be such that the required compaction can be obtained. The minimum moisture content of fill material and foundation shall be such that when kneaded in the hand, the fill material will form a ball which does not readily separate. The maximum moisture content is when conditions are too wet for efficient use of the hauling and compaction equipment.

FINISH AND CLEANUP

The disturbed area and the designated spoil areas will be finished in a relatively smooth condition ready for seeding. All rocks 3 inches in diameter or larger and roots shall be removed from the surface areas prior to seeding.

VEGETATION

Topsoil shall be added, if needed, to establish vegetation. Refer to JS-AGRON-25 for seeding and mulching recommendations or equivalent.

Additional Details: _____

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NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI OPERATION AND MAINTENANCE

GRADE STABILIZATION STRUCTURE

DROP, DROP INLET, BOX INLET AND CHUTE SPILLWAYS

CODE 410
410-A

OPERATION AND MAINTENANCE

A maintenance program shall be established by the land user to maintain capacity and vegetative cover. Items to consider are as follows:

1. Do not graze seeded areas during establishment and when soil conditions are too wet.
2. Protect structure from damage by farm equipment and vehicles.
3. Maintain structure inlet and outlet areas free of any obstructions.
4. Repair structure as soon as possible after damage is noted.
5 Reestablish vegetative cover immediately where erosion has removed established seeding.
6. Maintain effective erosion control of the contributing watershed to prevent siltation and the resulting loss of capacity.

Additional Details: _____

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NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI CONSTRUCTION SPECIFICATION

GRADE STABILIZATION STRUCTURE

LOW HEAD WATER CONTROL STRUCTURES

CODE 410
410-B

Use this construction specification for full flow structures and for surface drainage structures with fill heights of 10 ft or less.

GENERAL

Construction operations shall be carried out in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits. **A land disturbance permit from the Missouri Department of Natural Resources may be needed if the disturbed area is greater than one (1) acre in size.**

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used.

The contractor is responsible for having all utilities located at the site according to Missouri state laws prior to beginning work.

FOUNDATION PREPARATION

The foundation area shall be cleared of trees, logs, stumps, roots, brush, boulders, sod and rubbish. A minimum 3 inches of topsoil and sod shall be stripped from foundation area. Existing ditch channels crossing the foundation area shall be sloped 1 1/2:1 1:1 or flatter and made deeper and wider as necessary to remove unconsolidated sediment, stumps, roots, and other objectionable material and to accommodate compaction equipment.

EXCAVATION

To the extent needed, all suitable materials removed from the specified excavation shall be used in the construction of the earth fill areas of the structure. Spoil material shall be placed in the locations shown on the drawings. All spoil material deposited adjacent to the structure shall have a positive grade to drain to a stable outlet.

MATERIALS

Materials required and fabrication details shall be as specified on the drawings and as shown below.

Concrete and reinforcing steel shall conform to Construction Specification 750 Reinforced Concrete.

Rock riprap and bedding shall be sound, durable rock conforming to gradation shown on drawings. Geotextile may be used in lieu of riprap bedding. Metal, concrete blocks, and drain materials shall be as shown on the drawings.

Treated lumber shall be No. 2 grade or better, pressure treated with 0.4 pounds per cubic foot of Copper Chromate Arsenate (CCA) or equivalent. All other lumber shall be as shown on drawings.

Geotextile fabric shall be non-woven, needle punched as specified on the drawings and shall conform to the Construction Specification 753 Geotextile.

Corrugated metal pipe shall conform to the requirements of ASTM A760, A762, A885, B745, or B790 of a gauge as specified on the drawings. Plastic pipes through a dam shall be polyvinyl chloride pipe, PVC 1120 or 1220 conforming to ASTM D1785, ASTM D2241, AWWA C900 or equivalent of a schedule or class as specified on the drawings. The SDR or DR of PVC pipe shall be 26 or less for fill heights 10 feet or less and shall conform to the requirements of ASTM D3034. Corrugated tubing shall be polyethylene heavy duty tubing conforming to ASTM F405 or equivalent. Welded steel pipe shall be new, new reject, or high quality used pipe. Anti-seep collars shall be of materials compatible with the pipe.

INSTALLATION

Pipe conduits shall be placed on a firm foundation to the lines and grades shown on the drawings. Installation shall be conducted in a skillful and workmanlike manner.

Anti-seep collars are to be installed at locations shown on the drawings with watertight connections. The pipe foundation shall be covered with 1 inch of loose, moist, friable ML or CL soil material immediately prior to pipe placement.

Selected backfill of friable ML or CL material shall be placed around structures, pipe conduits and anti-seep collars at approximately the same rate on all sides to prevent unequal pressures. Water packing is permitted for conduits 36 inches or less in diameter. Rubber tire, hand, or manually directed power tamper will be used on backfill around all conduits or structures where water packing is not permitted or used. A maximum of 4 inches lifts shall be used for hand compaction and 6 inches lifts for rubber tired and manually directed power tampers. Extreme caution must be exercised in backfill and compaction around structures or conduits to prevent damage, movement or deflection. Compaction on the bottom half of conduits must be firm to fill all voids and supply lateral support. Light weight conduits may need to be held in place to prevent uplift during compaction.

Equipment shall not be operated over any structure or conduit until there is sufficient backfill to prevent damage. This minimum cover is 3 feet for PVC pipe.

If coated CMP is to be used, it shall be handled in such manner as to avoid damage to the coating. All damaged areas of the pipe coating shall be repaired in accordance with the manufacturer's recommendations.

EARTHFILL PLACEMENT

The material placed in the fill shall be free of detrimental amounts of sod, frozen soil, stone over 6 inches in diameter (except for rock fills) and other objectionable material. To the extent they are suitable, excavated materials are to be used in the permanent fill. The distribution, moisture content, and gradation of materials 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. Foundation areas shall be kept free of standing water when fill is being placed on them.

The placing and spreading of the fill shall be started at the lowest point of the foundation and the fill shall be brought up in approximately horizontal layers not to exceed 9 inches in thickness. Each layer shall be spread, processed, and shall be compacted by one of the following methods, as specified on the drawings:

Dozer - Complete coverage by tread or track of hauling or spreading equipment. Each lift shall not exceed 5 inches in thickness.

Roller - two passes of standard tamping type roller over the entire area to be compacted. Complete coverage by the treads of loaded hauling equipment is considered equivalent to two (2) passes of tamping roller. Each lift shall not exceed 9 inches in thickness.

The tamping-type roller shall have tampers or feet projecting not less than six (6) inches from the surface of the drum and shall have a minimum static load on each tamper of 250 pounds per square inch of tamping area. Tamping rollers with minimum static load on each tamper of 125 pounds per square inch of tamping area may be used if the number of passes is increased to four (4) or the thickness of lifts is reduced to four (4) inches. (Sheepsfoot or wedgefoot drum rollers are considered tamping rollers.)

Embankment shall be constructed to lines and grades shown on the drawings. Finish shall be smooth, uniform, and ready for seedbed preparation.

MOISTURE CONTROL

The moisture content of the fill material and foundation shall be such that the required compaction can be obtained. The minimum moisture content of fill material and foundation shall be such that when kneaded in the hand, the fill material will form a ball which does not readily separate. The maximum moisture content is when conditions are too wet for efficient use of the hauling and compaction equipment.

BORROW AREAS

All borrow areas shall be graded and left so they are well drained, protected from erosion, and may be seeded. Borrow areas inside the pool area shall have side slopes of 2:1 or flatter.

DRAINAGE GATES

Drainage gates, when specified on the drawings, shall be installed without distorting the flange or damaging the gate or seat.

The connection shall be water tight and the gate shall close tightly and operate freely in all positions.

VEGETATION

Topsoil shall be added, if needed, to establish vegetation. Refer to JS-AGRON-25 for seeding and mulching recommendations or equivalent.

Additional Details: _____

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NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI OPERATION AND MAINTENANCE

GRADE STABILIZATION STRUCTURE

LOW HEAD WATER CONTROL STRUCTURES

CODE 410
410-B

OPERATION AND MAINTENANCE

The University of Missouri Agricultural Guide 1548 "Maintaining Small Dams" provides information on the operation and maintenance of small earth dams. The Guide is available at http://extension.missouri.edu.

Operation and maintenance items addressed in the Guide include:

- An Inspection Checklist for Small Dams is included and may be used to keep a record of inspections.
- Periodic inspections, especially immediately following significant runoff events, to keeping inlets, trash guards, and spillways free of materials that can reduce flow.
- Inspection for burrowing animal damage and embankment seepage.
- Prompt repair or replacement of damaged components.
- Repair of eroded areas along the embankment and spillways.
- Control of weeds and trees and maintaining grass cover.
- Monitoring downstream development, which could change the hazard classification of the dam.

Additional Details: _____

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