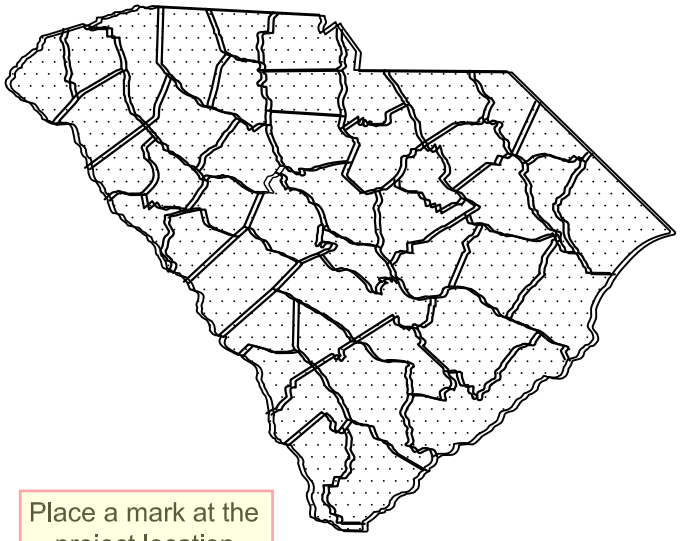
Construction Plans
For

_____ County, South Carolina

Farm/Tract/Field #:

Designed by the USDA
Natural Resources Conservation Service



Place a mark at the project location

INDEX OF SHEETS

SHEET NO.	TITLE
1	Cover Sheet
2	Site Location Map
3	Design Info & Construction Notes
4	System Layout Overview
5	Section View - System Components
6	Section View - Pipeline Trench Detail
7	Isometric View - Watering Trough
8	Isometric View - HUA & Anchor Trench Detail
9	Float Valve Details
10	Section View - Supply Line & Drainage Valve
11	Section View - Overflow Piping Detail (optional)

Operation & Maintenance requirements and the following Construction Specifications are part of this construction plan document.

CS-13, Excavation, Pipeline	(1 pg)
CS-16, Earthfill, Class U	(2 pgs)
CS-53, Valves and Meters	(1 pg)
CS-60, Well	(2 pgs)
CS-67, Construction Fabrics	(2 pg)
MS-206 Plastic Pipe	(2 pg)
MS-209, Non-Woven Fabric	(2 pg)
MS-218, Valves and Meters	(1 pg)

Palmetto Utility Protection Service_P.U.P.S.

1-888-721-7877

For safety, before doing any type of digging, call P.U.P.S. (Palmetto Utility Protection Service) at 1-888-721-7877 to have underground utilities located: P.U.P.S. hours are 7:00AM to 7:00PM Monday through Friday, excluding holidays. South Carolina law requires that utility companies be given 72 hours (excluding weekends and holidays) to mark their lines. P.U.P.S. notifies Santee Cooper and other member utilities to locate their lines. For more information on P.U.P.S. or to submit an electronic locate ticket (e-notice), visit www.SC.1PUPS.org.

GENERAL NOTES

THE CONSTRUCTION PLANS INCLUDE THESE DRAWINGS AS WELL AS THE ATTACHED SPECIFICATIONS AND O&M PLANS

ENGINEERING DISCLAIMER: THIS DESIGN IS BASED ON INFORMATION PROVIDED BY BOTH THE APPROPRIATE NRCS FIELD OFFICE AND THE PARTICIPATING COOPERATOR.

I HAVE REVIEWED THESE PLANS, DETAILS, SPECIFICATIONS, AND O&M AGREEMENTS, AND FIND THEM ACCEPABLE.

_____
COOPERATOR DATE

THESE CONSTRUCTION PLANS HAVE BEEN APPROPRIATELY REVIEWED AND MEET THE INTENT OF THE CONSERVATION PLAN.

_____
DISTRICT CONSERVATIONIST DATE

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Cover Sheet

HUA (561) _____ Job Class: III
Pipeline (516) _____ Job Class: III

Watershed: _____

Date
Designed _____
Drawn YCB (original_revised) 8/08_2/16
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Drawing Name
Number
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Sheet 1 of 10

Insert GIS Highway map showing project location at large enough scale to show two closest towns/citys and street names

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Site Location Map

Client: _____

Program:_____

Watershed: _____ _____ County, SC

Date

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Number

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Sheet 2 of 10

Is a Flow Restrictor required by the design? Flow rate: _____ gpm

Pipeline design Flow Rate: _____ gpm

Main pipeline shall be ~ _____ ft of _____

Lateral pipeline shall be ~ ft of

Will a Float Vave be used:

Type of Water Control Device: _____ Pressure Range for all Troughs: _____ psi

Trough Capacity: _____ gallons

Number of Troughs per HUA:

Total Aggregate HUA's under this construction plan: _____

Total Concrete/Asphalt HUA's under this construction plan: _____

	Length (ft)	Width (ft)	Thickness (in)	
HUA Dimensions:				(for Commercial Troughs)
HUA Dimensions:				(for Rubber Tire Troughs)

Commercial Trough HUA Construction material: _____ tons (Total Volume)

Rubber Tire Trough HUA Construction material: _____ tons (Total Volume)

Commercial Trough Geotextile: _____ pieces @ _____ ft wide each & _____ ft long each

Rubber Tire Trough Geotextile: _____ pieces @ _____ ft wide each & _____ ft long each

GENERAL CONSTRUCTION NOTES

1. All areas disturbed by construction shall be seeded and mulch unless otherwise indicated on the drawings or in the construction specifications.
2. In areas with the potential of erosion, sediment and erosion control measures shall be in place prior to the beginning of any construction.
3. In the event of a conflict with water, sewer, drainage, or other utility lines or service, the contractor shall coordinate with the affected utility.
4. Location, existence or non-existence of any utility does not constitute responsibility of NRCS.
5. Should the participant/contractor find any discrepancies in the drawings or in the field prior to beginning work or during construction, the participant/contractor shall immediately notify NRCS.
6. All work performed in the public right-of-way shall comply with the requirements of authorities having jurisdiction.
7. **NRCS shall be notified 72 hours prior to construction.**
8. It shall be the responsibility of the participant to obtain all necessary clearances, permits, rights of ways, and to comply with all ordinances and laws pertaining to construction of this project.
9. It shall be the responsibility of the participant to assure that the project is constructed according to the attached drawings and specifications. **Any changes shall be submitted in writing to the NRCS 48 hours prior to implementation for approval.**
10. The contractor must obtain the exact location and depth of all utilities from the utility companies prior to excavation or construction activities.

Insert GIS map showing final design layout

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System Layout Overview

Client: _____

Program:_____

Watershed: _____ _____ County, SC

Date

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Drawn YCB (original revised) 8/08 2/16

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File Name

Drawing Name

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Section View - System Components (General)

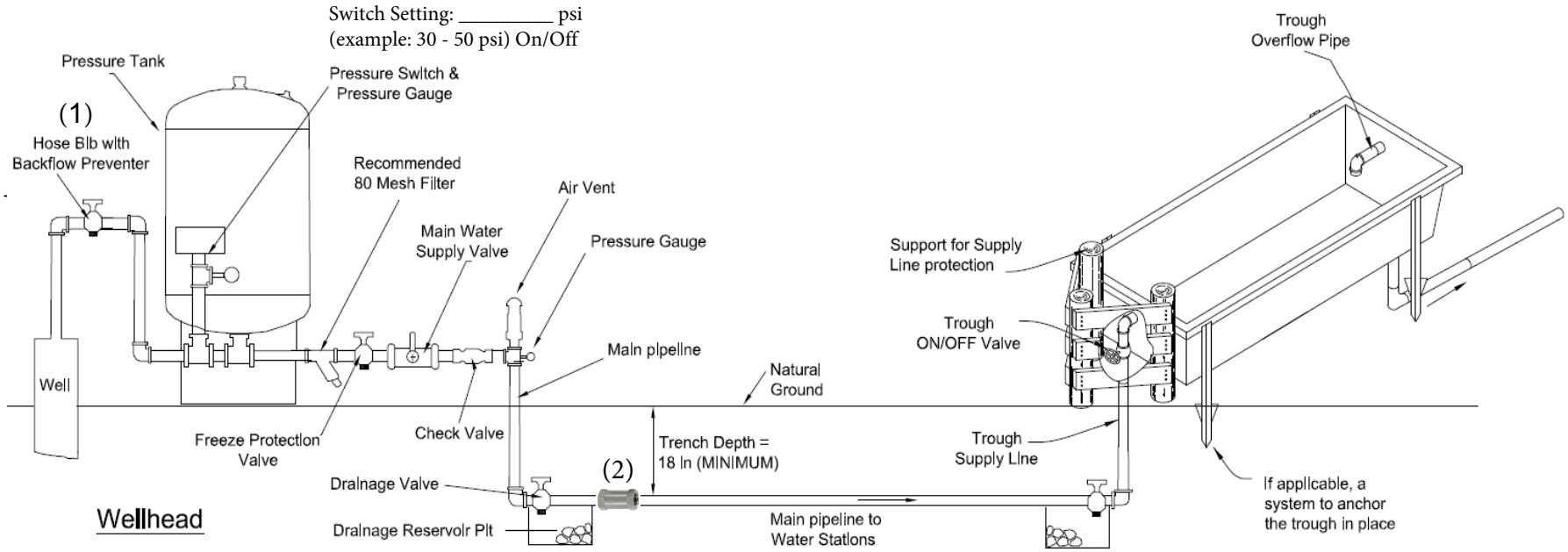
Client: _____

Watershed: _____ Program: _____ County, SC

Provide all necessary pipe support to prevent sagging

Manual Drains are required at low points in the pipeline and are recommendedat each trough

Trench bottom shall have positive grade to one or multiple manual drains



Single Trough at Watering Station

(1) A vacuum breaker device is required on any hose bibb (spigot) located upstream of the check valve

(2) If applicable, a flow restrictor shall be installed on the mainline, no more than 20 feet from the well, to ensure the design flow rate through the pipe is NOT exceeded.

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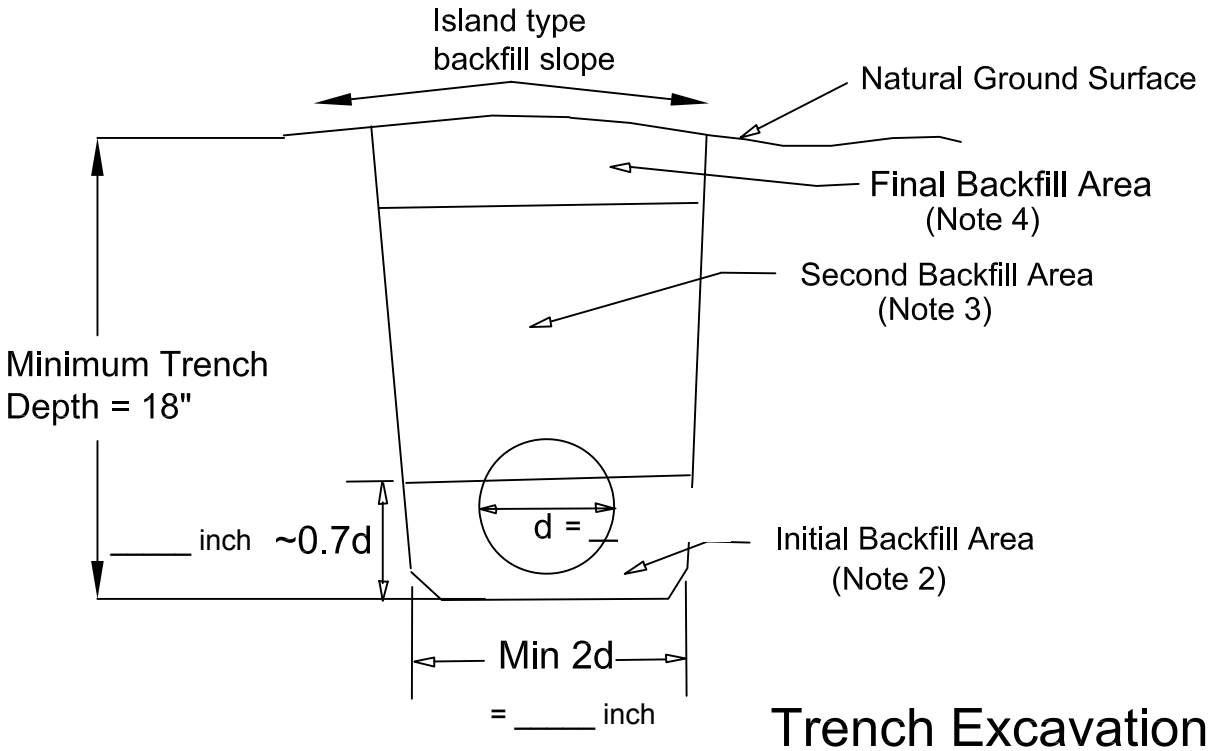

Trench Excavation
Cross Section

Notes:

1. This applies to all NRCS trench excavation.
2. The initial backfill area shall be compacted with the edge of 2" x 4" or similar tool.
3. The second backfill area shall be compacted with a flat surfaced object with a surface area of 3" x 3" or larger in 4" thick loose lifts.
4. The final backfill area may be compacted with track/rubber tire equipment, ONLY if 2 ft of compacted material is already over the pipe.
5. For description of the materials in each backfill area, see construction specification CS-16.

Pipe Size (in)	Trench Width (in)	Initial Backfill Depth (in)
1	2	1
1.5	3	1
2	4	1.5
3	6	2.1
4	8	3

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Pipeline Trench Detail

Client: _____

Program:_____

Watershed: _____ _____ County, SC

Date

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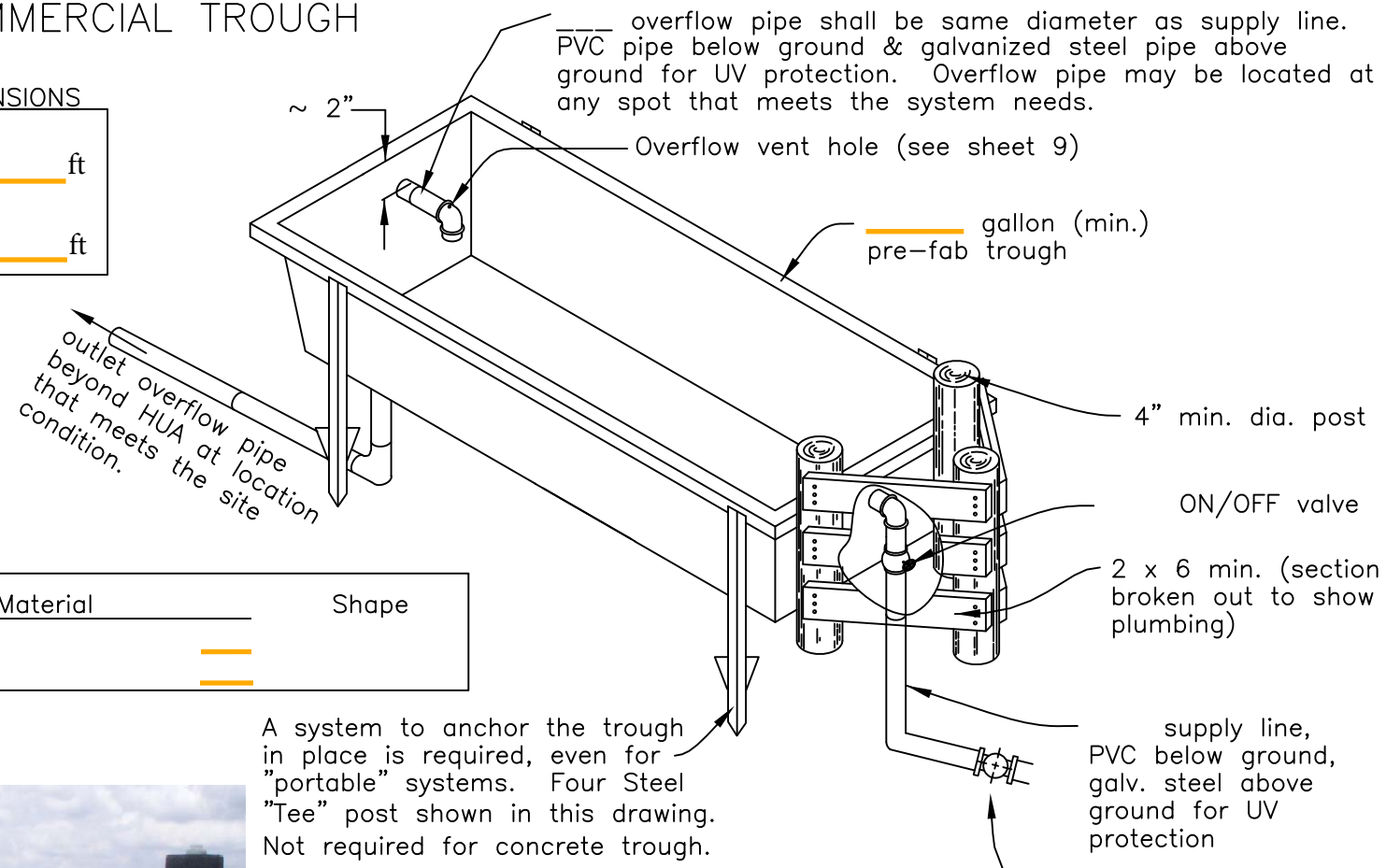
ISOMETRIC VIEW
COMMERCIAL TROUGH

TROUGH DIMENSIONS

Width = _____ ft

Length = _____ ft



Trough Overflow protection – Strongly Recommended

___ overflow pipe shall be same diameter as supply line. PVC pipe below ground & galvanized steel pipe above ground for UV protection. Overflow pipe may be located at any spot that meets the system needs.

Trough#	Material		Shape

A system to anchor the trough in place is required, even for "portable" systems. Four Steel "Tee" post shown in this drawing. Not required for concrete trough.

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Commercial Trough

Client: _____

Program: _____

Watershed: _____ County, SC

Designed _____ Date _____

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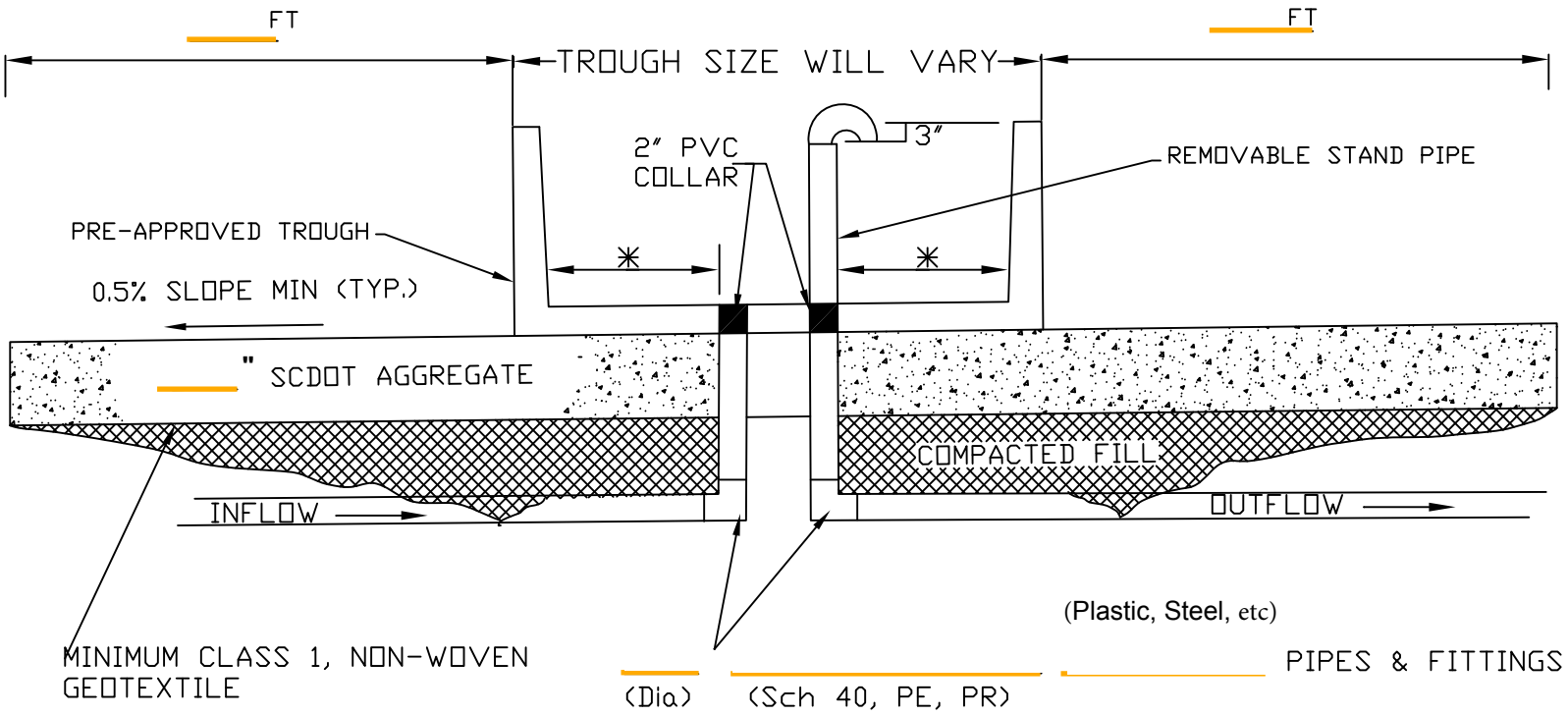

NOTE:

* Both pipes shall be flush fit female threads on both top and bottom approximately 12 inches from inside of tank wall, so pipes can be plumbed from bottom and a wrench has room to work.

COMMERCIAL TROUGH - BOTTOM SUPPLY ON AGGREGATE PAD

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Bottom Supply Trough - Aggregate Pad

Client: _____

Watershed: _____ Program: _____

_____ County, SC

Designed _____ Date

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File Name Final_LWS Construction Plan.dwg

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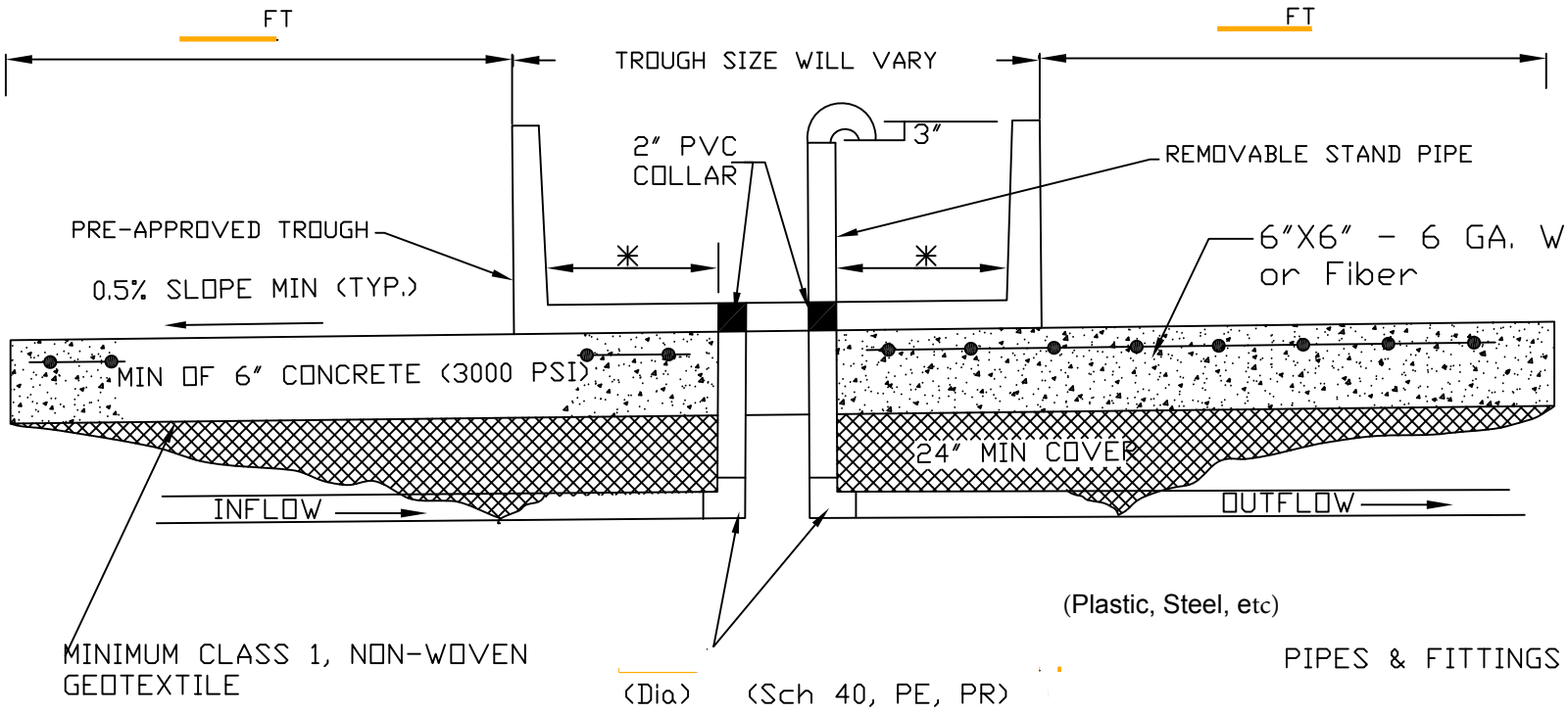
Sheet 7 of 10



NOTE:

* Both pipes shall be flush fit female threads on both top and bottom approximately 12 inches from inside of tank wall, so pipes can be plumbed from bottom and wrench has room to work.

COMMERCIAL TROUGH - BOTTOM SUPPLY ON CONCRETE PAD

N.T.S.

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Bottom Supply Trough - Concrete Pad

Client: _____

Watershed: _____ Program: _____ County, SC

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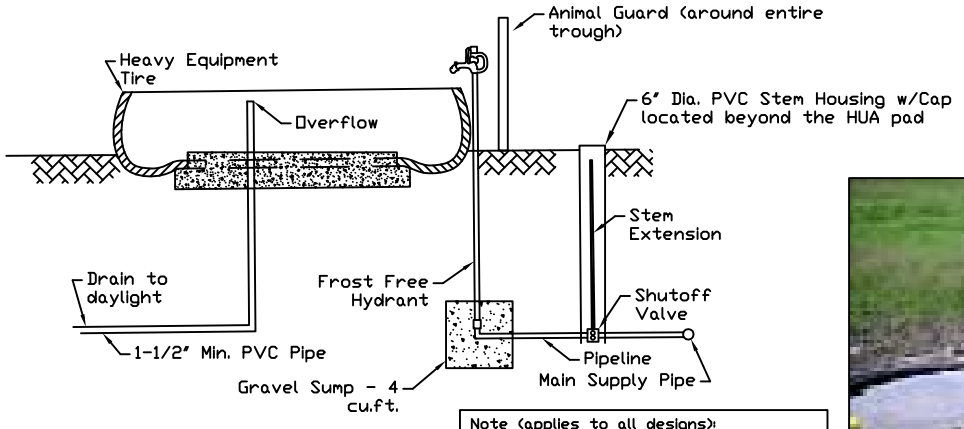
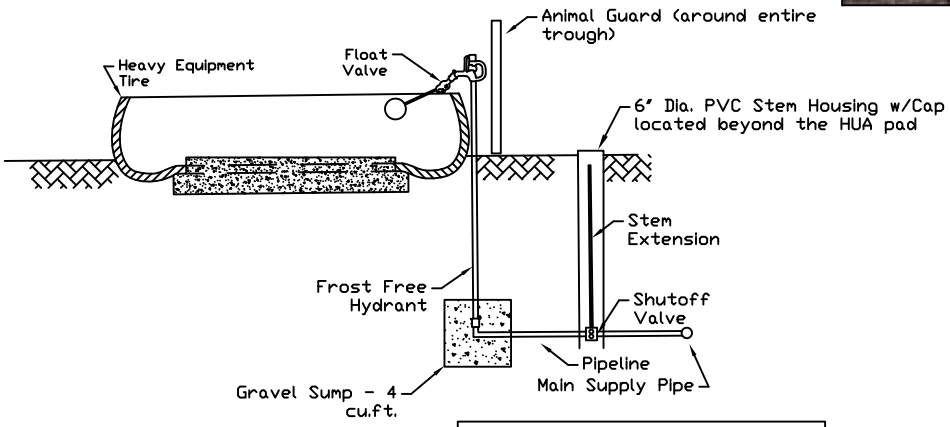


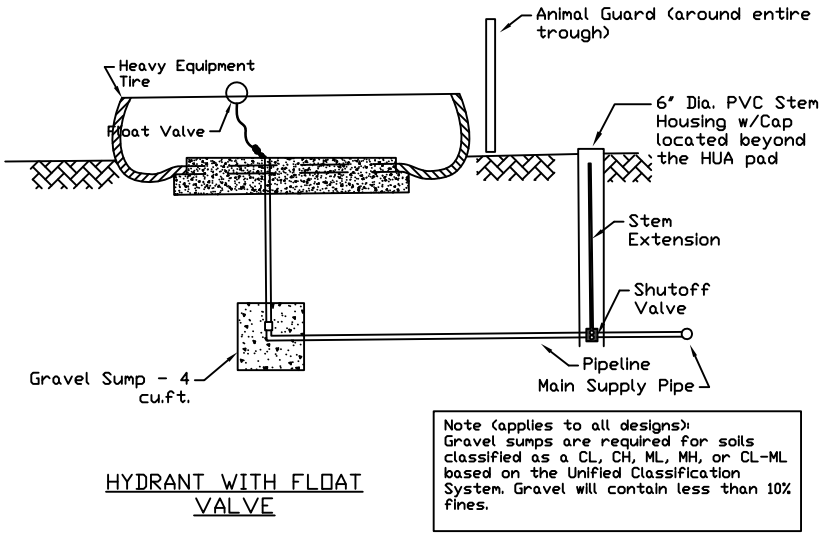
Note (applies to all designs):
Gravel sumps are required for soils classified as a CL, CH, ML, MH, or CL-ML based on the Unified Classification System. Gravel will contain less than 10% fines.

HYDRANT WITH OVERFLOW PIPE



Note (applies to all designs):
Gravel sumps are required for soils classified as a CL, CH, ML, MH, or CL-ML based on the Unified Classification System. Gravel will contain less than 10% fines.

HYDRANT WITH FLOAT VALVE



Note (applies to all designs):
Gravel sumps are required for soils classified as a CL, CH, ML, MH, or CL-ML based on the Unified Classification System. Gravel will contain less than 10% fines.

HYDRANT WITH FLOAT VALVE

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Rubber Tire Trough

Client: _____

Program:_____

Watershed: _____ _____ County, SC

	Date
Designed	
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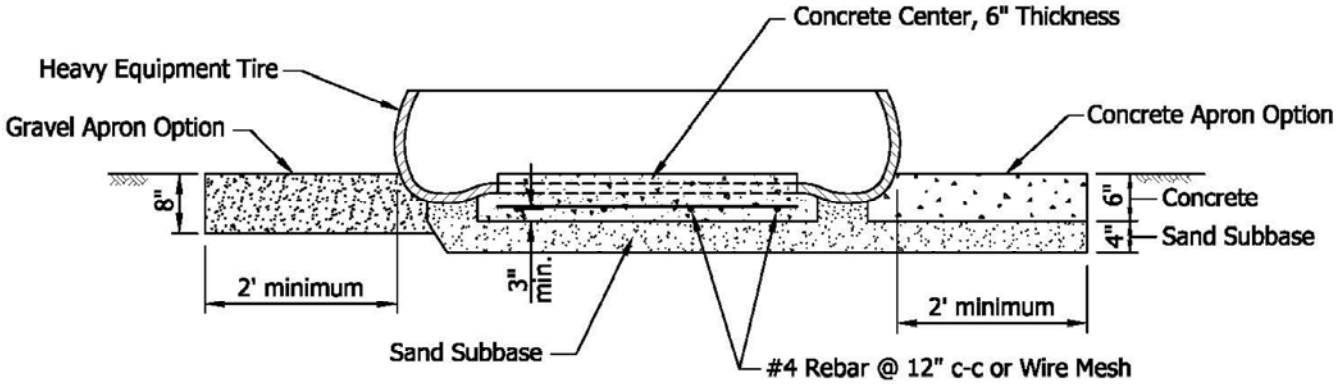

LIVESTOCK TANK ELEVATION

CONSTRUCTION NOTES

1. Used tire casing shall be free of cuts, rips and holes. The tire shall not be worn beyond the tread depth. Minimum casing thickness shall be 2.5 inches.

2. The concrete center plug and concrete apron (if applicable) must be constructed on a firm, well compacted foundation. A minimum 4 inch thick layer of sand subbase for the concrete will be used for soils classified as a CL, CH, ML, MH or CL-ML based on the Unified Classification System.

3. It is recommended that immediately after placing concrete for the center plug the tire is filled with water to a 1.5 inch depth above the concrete. Care should be taken to not disturb the concrete while water is being added to the tire.

4. All concrete shall have a minimum compressive strength of 3000 psi at 28 days.

5. Rebar will be cut to a length which will not extend past the rim bead or 3 inches from the outside edge of the concrete center plug, whichever is less.

6. W5x3, W7x4 or W10x6 wire mesh can be substituted for #4 rebar.

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Rubber Tire Trough - Concrete Base

Client: _____

Program:_____

Watershed: _____ _____ County, SC

Date

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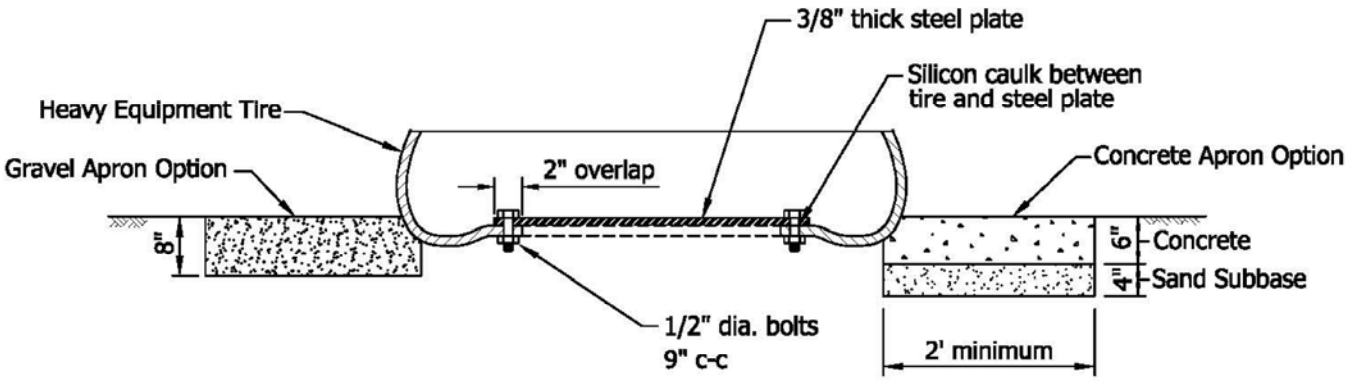

LIVESTOCK TANK ELEVATION

CONSTRUCTION NOTES

1. Used tire casing shall be free of cuts, rips and holes. The tire shall not be worn beyond the tread depth. Minimum casing thickness shall be 2.5 inches.

2. The 3/8" thick steel plate will extend past the inside edge of the rim bead a minimum of 2 inches. The plate will be bolted to the tire with 1/2" dia. galvanized bolts on 9" centers.

3. Silicon caulk (ASTM C920) will be applied to the tire bead prior to bolting the plate to the tire.

4. The concrete apron (if applicable) must be constructed on a firm, well compacted foundation. A minimum 4 inch thick layer of sand subbase for the concrete will be used for soils classified as a CL, CH, ML, MH or CL-ML based on the Unified Classification System. All concrete shall have a minimum compressive strength of 3000 psi. at 28 days.

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Rubber Tire Trough - Steel Base

Client: _____

Program:_____

Watershed: _____ _____ County, SC

Date

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Sheet 7b of 10

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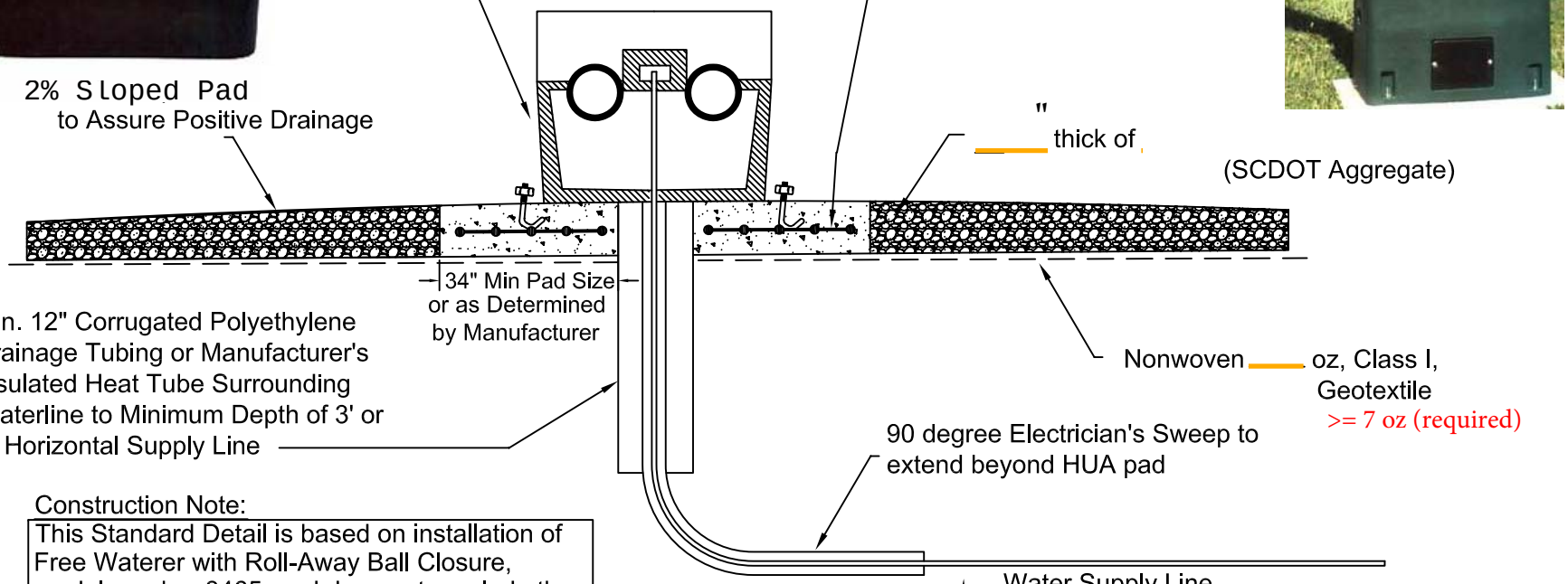
Watershed: _____ County, SC

Client: _____

Program: _____

Ball Waterer



Construction Note:

This Standard Detail is based on installation of Free Waterer with Roll-Away Ball Closure, model number 3465, and does not preclude the use of other models or troughs by other manufacturers. All troughs eligible for use must meet or exceed NRCS Practice Standard and Specifications for 614 Trough or Tank. All manufacturer's recommendations and specifications shall be followed during installation, regardless of the specific trough purchased.

NOTES:

1. Exact location of supply line to be determined during construction by the landowner and NRCS.
2. All lines to have a min 24" cover
3. All concrete apron must have 6 gauge 6"X6" wwm or FIBER
4. All concrete to be 3000 psi, 5% air entrainment and slump of 3-5 inches.

INSTALLATION NOTES:

1. Grade pad for trough and install inlet pipe, including elbows
2. Backfill with appropriate SCDOT aggregate around trough location and grade stone
3. Pour concrete
4. Set trough
5. Complete installation
6. Grade around all facilities as necessary to maintain positive drainage and spread spoil as directed by landowners

Designed _____ Date

Drawn YCB (origin _revised) 8/08_2/

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Spring Fed Trough System

Client: _____

Program: _____

Watershed: _____ County, SC

Designed _____ Date _____

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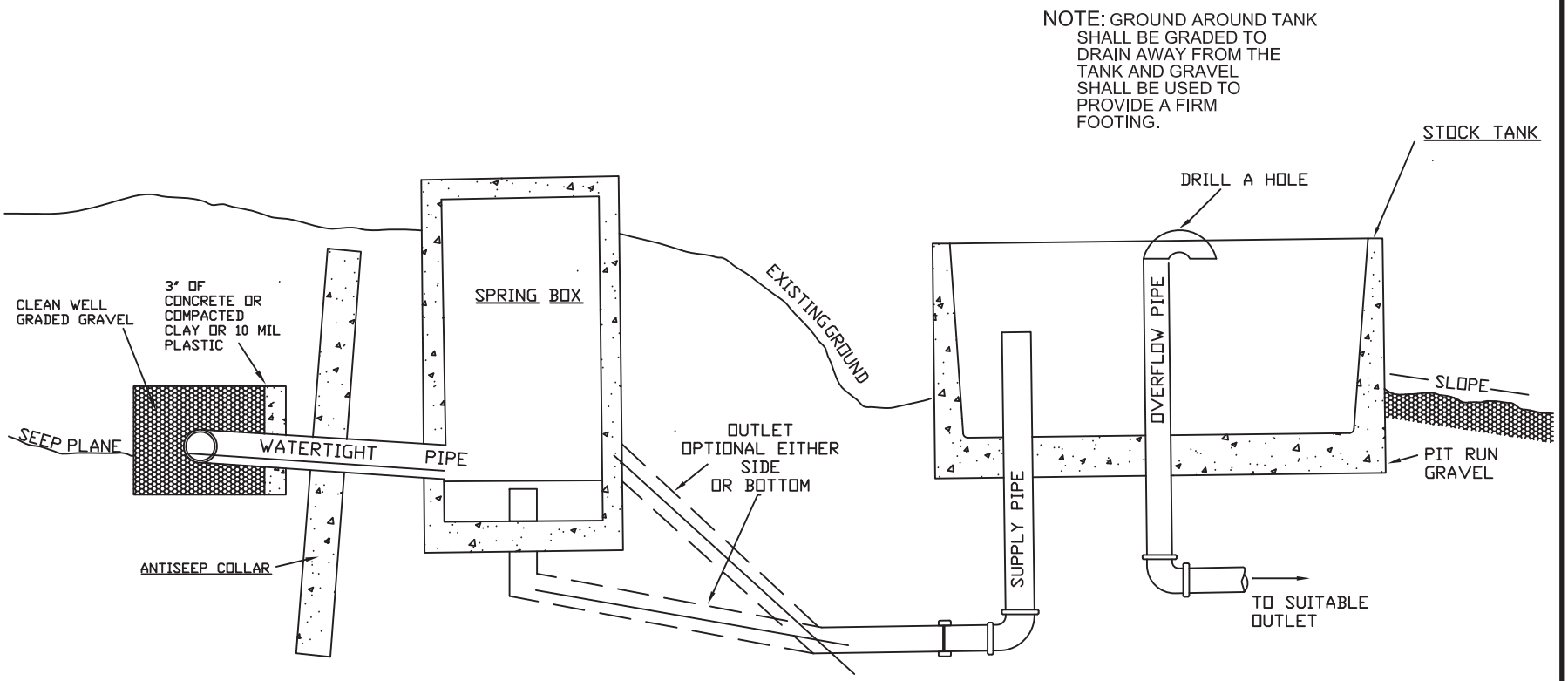

TYPICAL COMPONENTS SPRING DEVELOPMENT & WATERING SYSTEM

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Isometric View - HUA & Anchor Trench

Client: _____

Watershed: _____ Program: _____ County, SC

Designed _____ Date

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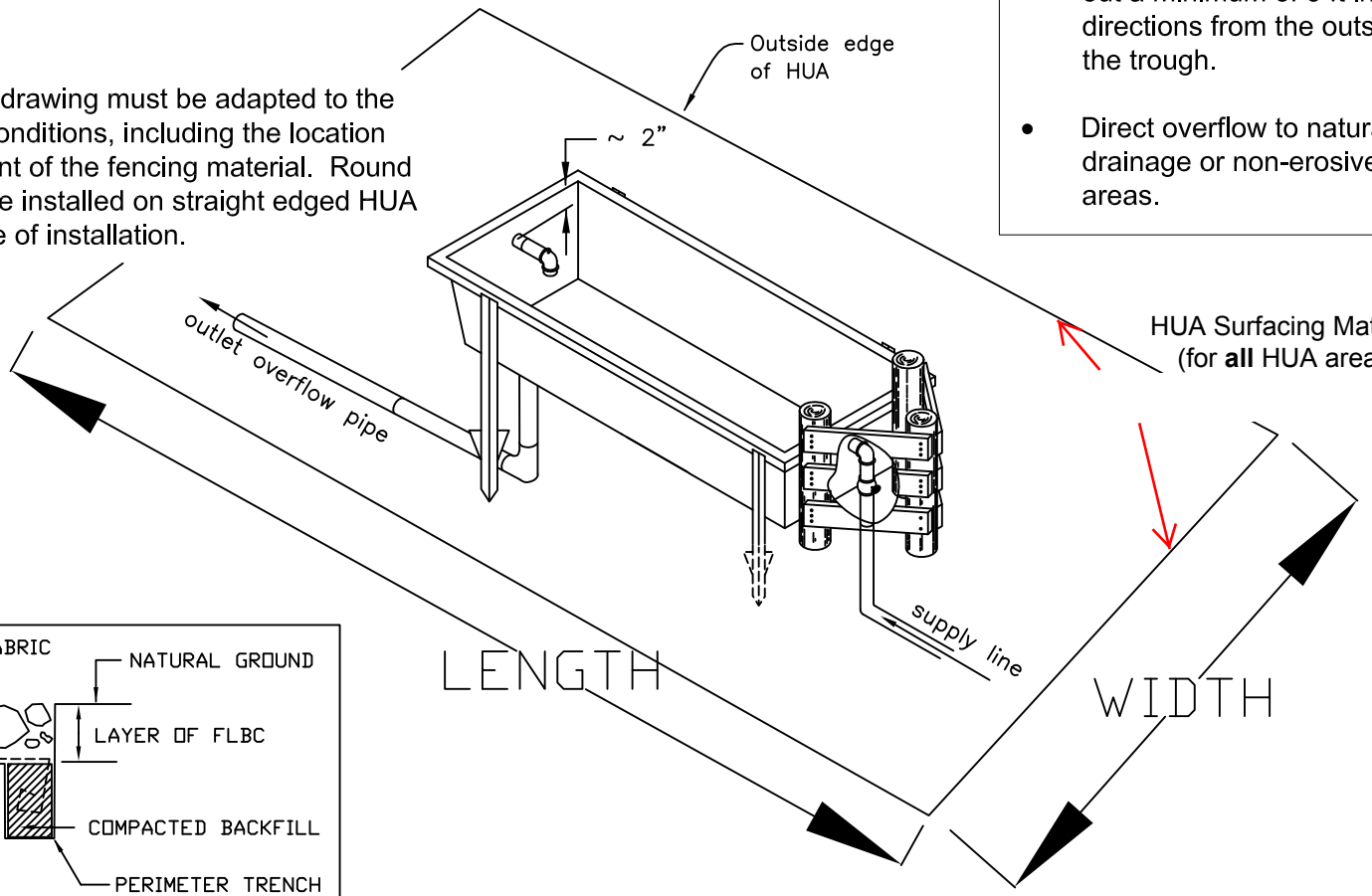
HUA Dimensions:

Field #	Length (ft)	Width (ft)	Thickness (in)	Volume (tons)
1				for Commercial troughs
				for Rubber Tire troughs

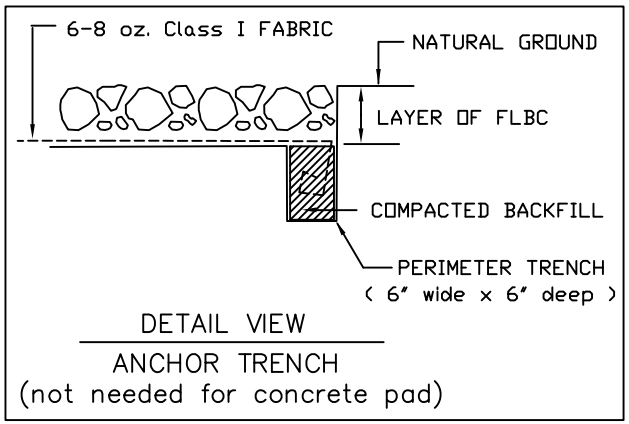
NOTE:

- Large animal HUA will extend out a minimum of 8 ft in all directions from the outside of the trough.
- Small animal HUA will extend out a minimum of 3 ft in all directions from the outside of the trough.
- Direct overflow to natural drainage or non-erosive areas.

Standardized drawing must be adapted to the specific site conditions, including the location and attachment of the fencing material. Round troughs can be installed on straight edged HUA areas for ease of installation.



ISOMETRIC VIEW
Typical HUA



DETAIL VIEW
ANCHOR TRENCH
(not needed for concrete pad)

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Watershed: _____

Client: _____

Program: _____

_____ County, SC

Float Valve Detail

Designed _____ Date _____

Drawn YCB (original, revised) 8/08, 2/16

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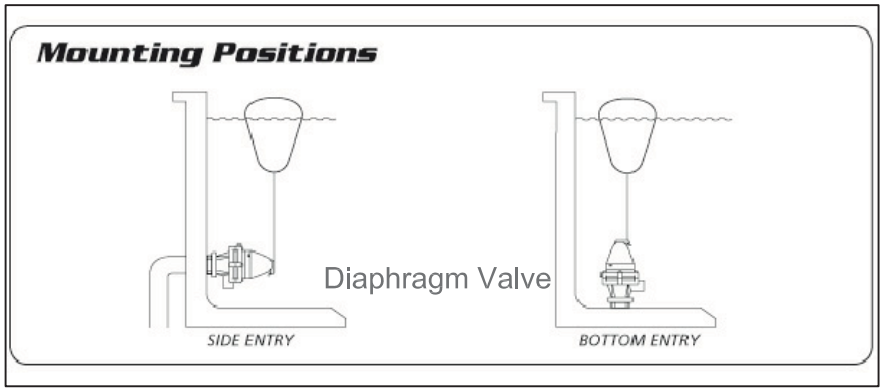
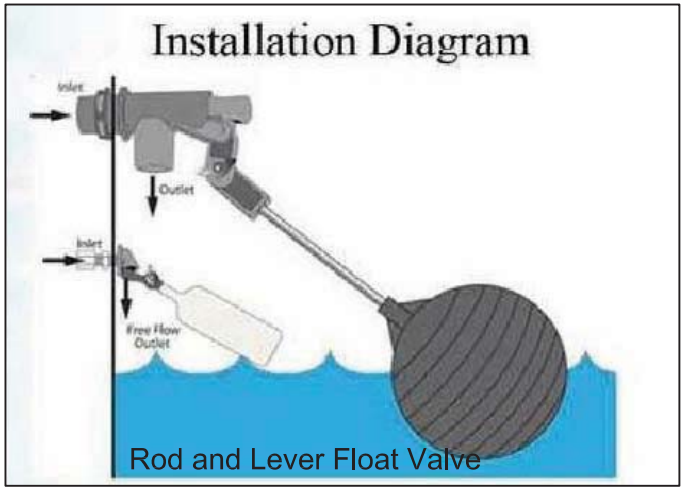


Planned Float Valve: _____

Pressure Range for all Troughs: _____ psi

Megaflow trough valves are float operated valves for use in automatic filling of water troughs. The valve is configured for underwater mounting only. The float is connected to the valve with a nylon cord, this operates a pilot valve, when the water level drops, the pilot valve is opened and the main diaphragm valve is activated. This system works between 5 - 75 PSI and can deliver a flow rate between 10 - 75 GPM depending on the orifice size.



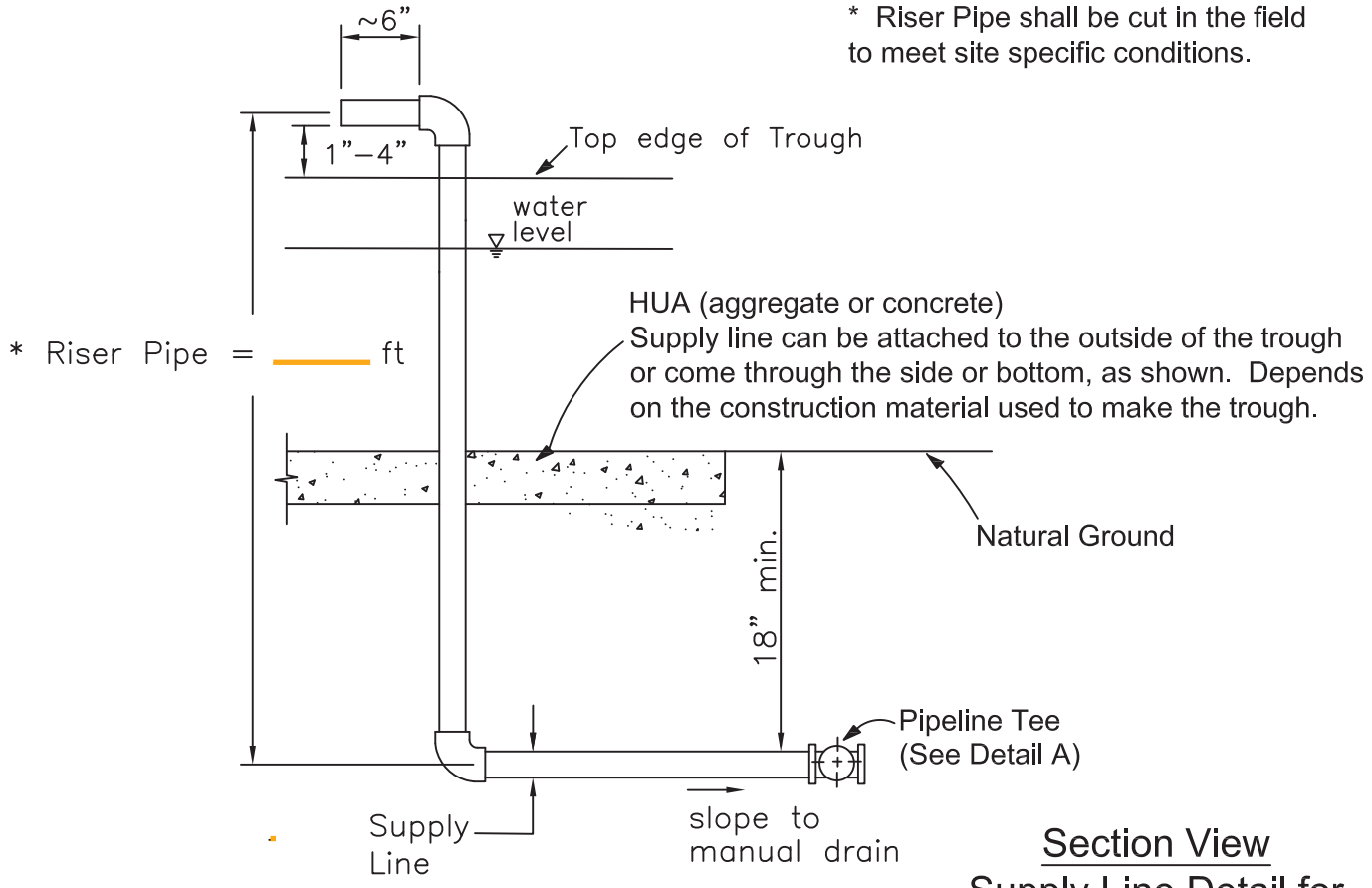
Kerick's 3/8" & 1/2" valves are available in the following orifice sizes in order to match your flow range.

- 0.187" orifice has an estimated flow rate of 4.4 GPM @ 20 PSI and 7.2 GPM @ 60 PSI
- 0.25" orifice has an estimated flow rate of 7.7 GPM @ 20 PSI and 12.5 GPM @ 60 PSI
- 0.312" orifice has an estimated flow rate of 8 GPM @ 20 PSI and 15 GPM @ 60 PSI
- Use with 3" or 6" rod and 4x5" or 2x2x4" float (see product manual for float options)
- Hardware made with 18-8 stainless steel

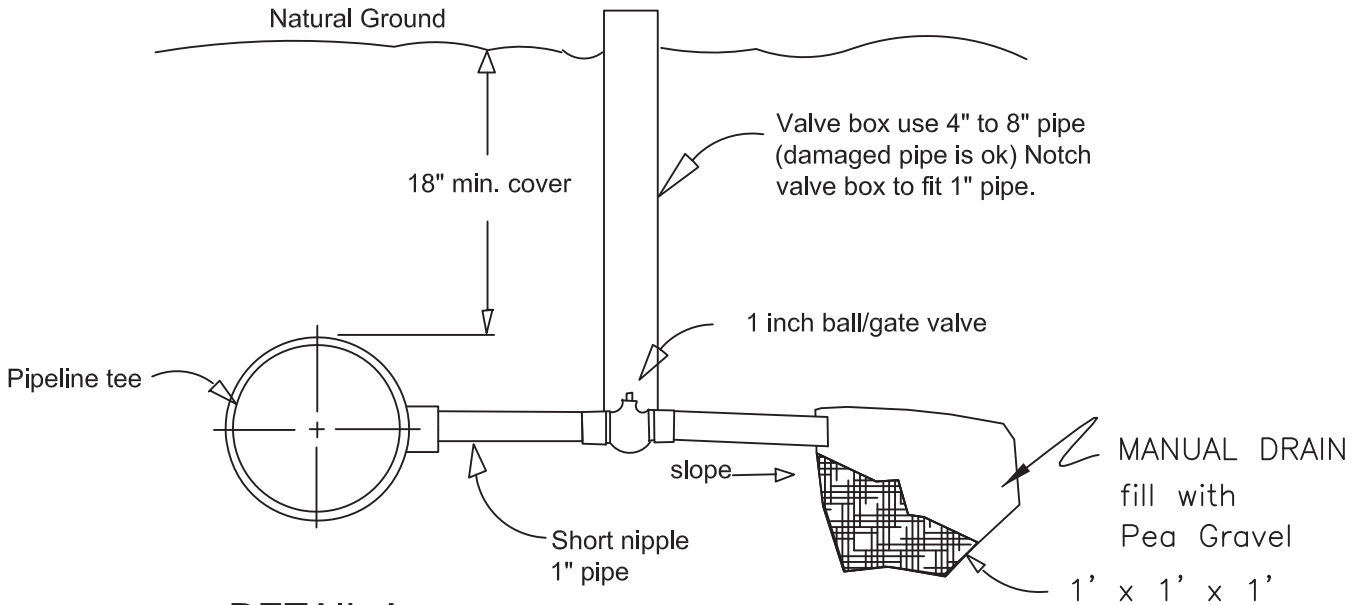
Little Giant Metal Float Valve

Trough-o-matic (metal, anti-siphon) all metal float valves flow up to 245 gallons-per-hour (4 gpm) and operates between 10-70 PSI. Aluminum model complies with basic back-siphoning regulations.

* Riser Pipe shall be cut in the field to meet site specific conditions.



Section View
Supply Line Detail for over the Top Inflow



DETAIL A
Drainage valve & Reservoir Pit

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Section View - Supply Line & Drainage Valve Detail

Client: _____

Program:_____

Watershed: _____ _____ County, SC

	Date
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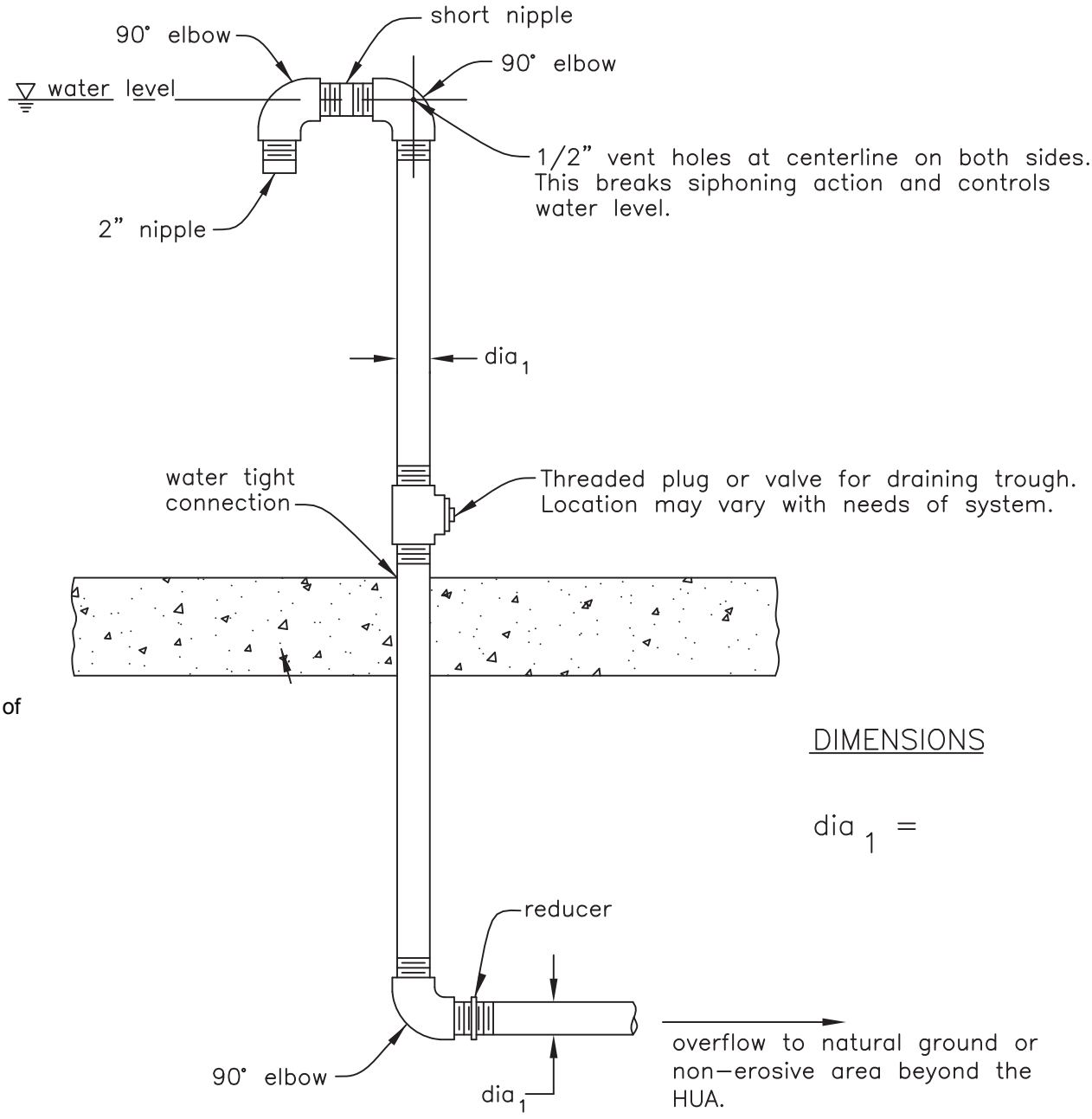

NOTE:

- An overflow system is HIGHLY recommended for all types of troughs.
- A know release point for excess water will decrease HUA maintenance and increase the life of the structure.
- The overflow pipe can exit through a side wall or bottom of the trough, as shown. It depends on your specific needs and the construction material of the trough.
- All holes MUST be sealed to make a water tight connection.

Section View
Overflow Piping Detail
(recommended)

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Section View - Overflow Piping Detail

Client: _____

Program:_____

Watershed: _____ _____ County, SC

Date

Designed _____

Drawn YCB (original revised) 8/08 2/16

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Sheet 11 of

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATIONS
CS-13 EXCAVATION AND BACKFILL OF TRENCHES FOR CONDUITS AND PIPELINES

13.1 SCOPE

This specification applies when trench excavation is necessary for installation of a conduit and/or pipeline for spillways, irrigation systems, drainage systems, animal waste systems and other installations where liquid is conveyed and discharged in an underground conduit or pipeline.

13.2 EXCAVATION

The bottom width, side slopes, and gradeline of the trench excavation shall be to the dimensions and lines shown on the drawings.

Excavated trenches shall conform to state and local laws and regulations for trenching. Trenches shall be supported as necessary to safeguard the work and workers. Trench supports shall prevent sliding or settling of the adjacent ground. The width of the excavation shall be increased, if necessary, to provide space for sheeting, bracing, shoring, and other supporting installations.

13.3 FINAL GRADING

All disturbed areas shall be graded without surface depressions to blend with the surrounding area.

13.4 ITEMS OF WORK AND CONSTRUCTION DETAILS FOR THIS PROJECT

Items of work to be performed in conformance with this specification and the construction details therefore are:

A. Construction Item, Excavation, Common

1. This item shall consist of all common excavation to the neat lines and grades, as shown on the drawings, required to construct a trench for the purpose of conduit installation.

2. The trench depth shall be a minimum of 18 inches and must accommodate site specific agronomic practices or other activities that could damage the conduit pipe.

3. Excavated soil materials may be utilized as backfill for the trench, as per Section 16.3.

4. The trench bottom shall be excavated to include positive grade towards manual drain locations within the conduit system.

5. Self trenching machines may be utilized, but care must be taken to vary the depth of the trenching bar to insure the trench bottom does not contain “waves” or “humps”.

- END CONSTRUCTION SPECIFICATION 13 -

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATION
CS-16 EARTH FILL, CLASS U

16.1 SCOPE

The work shall consist of placing of earth fills where compaction other than which results from hauling and placing is not required.

16.2 GENERAL

The fill may contain rocks, woody and vegetative materials, provided they do not cause voids or excessive settlement. Hard objects such as roots, stumps, brush, and rocks shall be buried to a minimum depth of 2 feet below the finished grade. Adequate moisture to control dust on haul roads and fill areas shall be maintained.

16.3 BACKFILL

a. The initial backfill shall be select material that is ¾ inch or finer, placed and compacted around and above the conduit to the specified depth and density, the minimum thickness of this layer will be 4 inches above and below the pipe. Care will be taken not to displace or damage the conduit or its protective coating.

b. The final backfill shall be the material from the trench excavation and shall be compacted to the density of the surrounding material.

c. Backfill material shall contain no frozen soil, sod, brush, roots, or other perishable material.

d. Rock fragments greater than 3 inches shall not be placed within 2 feet of the pipe.

e. For pipe diameters up to and including 2.5" the minimum depth of cover shall be 18". For pipe diameters greater than 2.5" and less than 36" the minimum depth of cover shall be 24". For pipe diameters 36" and greater the minimum depth of cover over the pipe shall be 30". All depths of cover need to provide enough depth for agronomic practices to occur without damaging the pipeline. Any installations requiring less cover shall require a variance.

16.4 FINAL GRADING

The earth fill surface shall be graded, sloped to drain, without surface depressions and blended with the surrounding area.

16.5 ITEMS OF WORK AND CONSTRUCTION DETAILS FOR THIS PROJECT

Items of work to be performed in conformance with this specification and the construction details therefore are:

A. Construction Item, Earth Backfill, Class U

1. This item shall consist of the earth backfill required for proper installation of all necessary structures utilized in a livestock watering system, including but not limited to pipeline and heavy use areas (HUA), to the neat lines and grades as shown on the drawing.

2. For Aggregate HUA, prepare the area by removing all debris and soft soils. Then place earth backfill in loose layers not greater than 4-inches thick prior to compaction. After a minimum of 3 blows with a flat surfaced object, the next loose layer of backfill may be placed. Use this process to construct an HUA that is slightly higher than the surrounding natural ground, which also has a grade of 1"/10' from the center out towards the edges. The area under the trough may be level.

3. For Concrete HUA, prepare the area by removing all debris and soft soils down to a minimum of 1.0 ft below natural ground. Then place earth backfill in loose layers not greater than 4-inches thick prior to compaction. After a minimum of 3 blows over the entire subgrade with powered hamp tamp equipment, which should create a 2 inch thick layer, the next loose layer of backfill may be placed. Use this process to compact a minimum 1.0 ft thick subgrade foundation prior to forming and pouring a 3,000 psi concrete mix. Construct an HUA that is slightly higher than the surrounding natural ground, which also has a grade of 1"/10' from the center out towards the edges. The area under the trough may be level.

4. For Pipeline, earth backfill shall be placed around the conduit in loose layers not greater than 4-inches thick prior to compaction. After a minimum of 3 blows with a flat surfaced object, the next loose layer of backfill may be placed. This process must be repeated until 2.0 ft of compacted backfill covers the conduit. See sheet 4 for more details.

5. The moisture content of the earth backfill material shall be maintained as high as practicable within the limits available to the program participant.

   Fill shall not be placed which is so dry that a sample will not remain formed after squeezing in the hand or so wet that water is released from the sample after squeezing in the hand.

6. The earth backfill material shall be classified as an SC material (clayey sand).

7. Fill materials shall contain no sod, roots or other perishable materials.

- END CONSTRUCTION SPECIFICATION 16 -

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATION
CS-53 VALVES AND METERS

53.1 SCOPE

The work shall consist of furnishing and installing valves and/or meters at the location as shown on the drawings.

53.2 MATERIALS

The valves and/or meters shall conform to applicable material requirements of MS-218 for the type, capacity and the pressure rating as specified.

53.3 INSTALLATION

Valves and/or meters shall be installed according to the manufacturer's recommendations with no leakage at the maximum operating pressure. Align the valve or meter to the adjoining pipe to prevent damage to the threads or flanges during installation. All sealing materials or gaskets shall be in accordance with the manufacturer's recommendations.

Care shall be taken to prevent damage to factory coatings during storage, handling and/or installation.

Anchor bolts and other items embedded in concrete shall be held in alignment and secured in true position during concrete placement.

53.4 OPERATIONAL TESTS

Valves, meters, and appurtenances that have been installed shall be cleaned, lubricated, and serviced in accordance with the manufacturer's instructions. The equipment shall be tested throughout its full range of operation and adjusted as necessary for pressure and flow prior to use.

53.5 ITEMS OF WORK AND CONSTRUCTION DETAILS FOR THIS PROJECT

Items of work to be performed in conformance with this specification and the construction details therefore are:

A. Construction Item, Valves and Meters

1. This item shall consist of installing the designed valves and other system components at the locations, as shown on the drawings.

2. All above ground components shall be insulated or otherwise protected against freeze and UV radiation.

- END CONSTRUCTION SPECIFICATION 53 -

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATION
CS-60 WELL

60.1 SCOPE

The work shall consist of furnishing and installing materials to construct and test a water supply well.

60.2 DRILLER'S LOG

A well log shall be maintained to accurately record the location of the top and bottom of each stratum, the fluids encountered, the encasement and the completion record for each well. A copy of the log shall be submitted to the State of South Carolina according to state drilling regulations.

60.3 MATERIALS

Steel pipe, copper, reinforced plastic mortar, fiberglass or plastic may be used for well casings in drilled wells. Steel pipe casing shall be used for driven wells. The well casing pipe shall be marked according to the applicable ASTM specification for the material used.

a. Plastic Pipe Casing - Plastic casing shall be acrylonitrile-butadiene-styrene (ABS), polyvinyl chloride (PVC), or styrene-rubber (SR) and shall conform to ASTM Specification F-480.

Plastic well casing shall be no larger than 12 inches nominal diameter, or smaller than 2 inches nominal diameter.

Where water is to be used for human consumption the requirements of the National Sanitation Foundation (NSF) shall be met. Plastic pipe will be suitably marked.

Polyvinyl chloride (PVC) pipe will be schedule 40, 80, or 120 and shall meet ASTM Specification D-1785.

Threaded or solvent-welded couplings for plastic pipe shall have a strength equal to or greater than the pipe to which they are attached.

b. Fiberglass - Fiberglass well casing shall meet the requirements of ASTM Specification D-2996. The joints shall meet ASTM Specification F-480. The modulus of elasticity shall be certified.

c. Concrete - Concrete well casings shall be reinforced and shall meet or exceed the requirements of ASTM Specification C-76 Class II for reinforced concrete culvert pipe.

d. Reinforced Plastic Mortar - Reinforced plastic mortar, RPM, well casings shall equal or exceed the requirements of ASTM Specification D-3517.

e. Steel Casing - Steel casing used in driven wells shall be provided with a drive shoe of approved type where necessary. Casing shall have welded or threaded joints.

Welding of steel casings shall be done in accordance with the standards of the American Welding Society. Sufficient passes of continuous weld shall be applied so that the finished surface at the area of fusion is built up to the surface of the adjoining pipe.

60.4 WELL SCREENS OR INTAKE SECTIONS

All wells finished in unconsolidated aquifers (sand, gravel, etc.) shall be equipped with manufactured screen sections, well points, or field perforated sections. The screen or slotted casing section shall be protected with a device immediately above the intake section, if necessary, to prevent well stabilizer materials from entering the intake section. Where practical, the top elevation of the intake section should be below the lowest drawdown.

60.5 GRAVEL PACK

Artificial filters (gravel pack) are specified around the well intake when conditions exist that will allow sand to enter the well. The need and gradation of the filter will be specified based on an analysis of the water bearing sands, and approved by the technician. The filter material shall extend a minimum of 10 feet above the top of the perforated or screened section and shall extend through the length of the water bearing formation.

60.6 ALIGNMENT

Drilled vertical wells shall be round, plumb, and aligned to permit satisfactory installation and operation of a pump.

60.7 DEVELOPING

The well shall be developed until it stops producing detrimental quantities of solid particles when the continuous discharge rate is approximately 20 percent greater than the anticipated normal production rate.

60.8 WORKMANSHIP

The well casing pipe, couplings, and screens shall be homogeneous throughout and shall be free of visible cracks, holes, foreign materials, or other injurious defects. The well casing pipe, couplings, and screens shall be as uniform in color, density, and other physical properties as is commercially possible.

60.9 ITEMS OF WORK AND CONSTRUCTION DETAILS FOR THIS PROJECT

Items of work to be performed in conformance with this specification and the construction details therefore are:

A. Construction Item, Well

1. This item shall consist of the installation of a water well by a certified South Carolina driller. A fully completed SCDHEC form 1903, including item 18, “Pump Capacity”, shall be submitted to NRCS.

2. All above ground components, including all pipelines, shall be insulated or otherwise protected against freeze and UV radiation.

3. A ½” ball or gate valve shall be installed on the pressure tank outflow pipe as a manual drain outlet.

- END CONSTRUCTION SPECIFICATION 60 -

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATION
CS-67 CONSTRUCTION FABRICS

67.1 SCOPE

This construction specification is applicable for furnishing and installation of woven and non-woven construction fabrics to the lines and grades as shown in the drawings.

67.2 MATERIALS

The materials will conform to the type specified on the drawings and shall meet or exceed material specification, MS-209, for the type of fabric to be installed. The bedding and covering shall be of the material quality and depth as shown on the drawing.

67.3 SITE PREPARATION

The final grading of the earthwork shall be completed before installation. The site shall be free from depressions, ridges and rocks greater than 1 inch. The area shall be free from all sharp objects and foreign material such as wood, wire and metal. Bedding shall be in place prior to the installation of fabric material.

67.4 INSTALLATION

If bedding is shown on the drawing, it shall be installed prior to placement of the fabric. In channels, the fabric shall be installed in the direction of flow. On slopes, the fabric may be installed across the slope or perpendicular to the slope. The ends and edges shall be overlapped or shingled a minimum of 4 inches in the direction of flow and anchored. The fabric shall be covered, seeded and/or fertilized as shown on the drawings.

67.5 ANCHORING

Unless otherwise shown on the drawings, the upper and lower ends of fabric on slopes that exceed 5:1 shall be anchored by burial in a twelve-inch deep trench and covered and/or stapled. If the fabric is not covered, it shall be secured by stapling in a diamond pattern with a minimum of two staples per square yard which includes all edges and ends stapled at a maximum spacing of four foot on center.

67.6 ITEMS OF WORK AND CONSTRUCTION DETAILS FOR THIS PROJECT

Items of work to be performed in conformance with this specification and the construction details therefore are:

A. Construction Item, Woven and Non-Woven Fabrics

1. This item shall consist of installing the specified product to the neat lines and grades at the locations shown on the drawings. The fabric shall be between Type 3NW (6.8 oz/sy) and Type 4NW (8.5 oz/sy), non-woven, needle punched geotextile fabric.

2. Install the specified fabric over the graded aggregate HUA area, overlapping each piece a minimum of 18 inches if more than one piece. Geotextile fabric not required under a concrete HUA.

3. Tuck fabric into a perimeter trench that is at least 6 inches deep by 6 inches wide. Then backfill and compact to prevent movement of fabric.

4. The fabric must extend beyond all sides of the trough by a minimum of 8 ft for large animals and 3 ft for small animals.

5. The fabric may be manipulated to accommodate fence installation.

- END CONSTRUCTION SPECIFICATION 67 -

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MATERIAL SPECIFICATION
MS-206 PLASTIC PIPE

1. SCOPE

This specification governs the quality of plastic pipe and fittings.

2. QUALITY

The pipe shall conform to American Society of Testing Material Specification, ASTM or Natural Resources Conservation Service (NRCS) standard applicable for the manufacture of this pipe.

Material	SDR[1] NRCS or ASTM	SCH 40 & 80 ASTM	PIP[2] NRCS
Acrylonitrile-Butadiene-Styrene, ABS	D-2282 430-DD 430-EE	D-1527	430-DD 430-EE
Polyethylene, PE	D-2239 D-3035 430-DD 430-EE	D-2104 D-2247	
Polyvinyl Chloride, PVC	D-2241 430-DD 430-EE	D-1785	430-DD 430-EE

*For pipelines conveying potable water, the material also requires approval of the National Sanitary Foundation, NSF.
[1] SDR, Standard Dimension Ratio
[2] PIP, Plastic Irrigation Pipe

3. FITTINGS

The fittings shall be of a material, size and pressure rating compatible with the pipe materials and withstand a working pressure equal to or greater than the pipe.

4. JOINTS

a. Solvent welding of joints shall be in accordance with the recommendation of the pipe manufacturer.

b. Rubber gasket joints and the gasket material shall conform to ASTM D-3139.

c. All joints and connections shall withstand a working pressure equal to or greater than the pipe.

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MATERIAL SPECIFICATION
MS-209 WOVEN AND NON-WOVEN FABRICS

1. SCOPE

This specification governs the quality of structural woven and non-woven fabrics.

2. FABRIC

The fabric material shall be polypropylene material with long chain polymeric filaments or fibers.. The material properties are defined in the following tables and the type of material selected is shown on the drawings

a. Table 1, Non-Woven Fabric Material

Type	Weight OZ/SY	Grab Strength Lb.	Grab Elongation %	Mullen Burst PSI	Puncture PSI	Ultra-Violet Resistance %	Apparent Opening Size US Sieve
1NW	4.2	80	50	175	40	70	40
2NW	4.8	90	50	225	65	70	60
3NW	6.5	150	50	315	90	70	100
4NW	8.5	200	50	400	130	70	100
5NW	12.5	275	50	600	175	70	100

b. Table 2, Woven Fabric Material

Type	Weight OZ/SY	Grab Strength Lb.	Grab Elongation %	Mullen Burst PSI	Puncture PSI	Ultra-Violet Resistance %	Apparent Opening Size US Sieve
1W	3.2	120	30	400	80	80	30
2W	7.4	300	30	450	120	90	40
3W	7.4	350	30	500	140	90	70
4W	8.0	300	15	800	120	80	40
5W	12.5	600	20	1350	140	80	50

3. ENVIROMENTAL RESISTANCE

The fabric shall be inert to commonly encountered chemicals within a pH range of 4 to 10. The ultra-violet light resistance shall not be less than the percentage shown for the specified fabric. The fabric shall also be resistant to mildew, rot and damage caused by rodents.

4. REFERENCES

The following standard specifications shall apply for determining the properties of the fabric material listed 1n Table 1 and Table 2:

a. Grab Strength: ASTM D-1682, Breaking Load and Elongation of Textile Fabrics and ASTM D-4632, Grab Breaking Load and Elongation of Geotextiles.

b. Mullen Burst: ASTM D-3782, Bursting Strength of Knotted Goods Constant-Rate-of-Traverse Ball Burst Test.

c. Puncture: ASTM D-4833, Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

d. Ultra-Violet Light: ASTM D-4355, Deterioration of Geotextiles From Exposure to Ultra-Violet Light and Water (Xenon-Arc Type Apparatus).

e. Apparent Opening Size: ASTM D-4751, Determining Apparent Opening Size of a Geotextile.

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MATERIAL SPECIFICATION
MS-218 VALVES AND METERS

1. SCOPE

This specification governs the quality of valves and meters for use in water distribution systems.

2. MATERIALS

The material used in manufacturing valves and meters shall conform to the following requirements:

a. Gate Valves: AWWA Standard C500 or Federal Specification WW-V-58.

b. Butterfly Valves, Air-Release Valves, Air-Vacuum Relief Valves, Combination Air and Vacuum Relief Valves, Pressure Reducing Valves, and Pressure Relief Valves:

Material	Specification
Cast Iron	ASTM A-48, Class 30, or ASTM A-126, Class B
Bronze	ASTM-B-61, or ASTM B-62, Grade I
Brass	Federal Specification QQ-B-626
Stainless Steel	ASTM A-167, A-276, A-582 Type 302, 303, 304 or 304L
Cast Aluminum	ASTM B-179, C-355 or C-356

d. Meters: AWWA Standard C-704.

3. CONNECTIONS

The connections may have internal or external ANSI threads or flanges conforming to AWWA C-207, ANSI 125/150 or plain ends.

Bolts for flanged connections may be either steel, stainless steel, or galvanized.

4. MANUFACTURER'S IDENTIFICATION

The manufacturer's identification and model shall be clearly identifiable. The performance rating shall be in the manufacturer's literature and may be stamped or painted on the valve or meter.

NATURAL RESOURCES CONSERVATION SERVICE

SOUTH CAROLINA

OPERATION AND MAINTENANCE REQUIREMENTS

WATER WELL

CODE 642

Land Owner/Operator_____ Farm/ Tract/ Field:_____

County_____

Prepared By_____ Date_____ Watershed _____

OPERATION AND MAINTENANCE ITEMS

A properly operated and maintained well is an asset to the farm. This well was installed to provide beneficial use of subsurface water. Estimated life span of this installation is at least 10 years. The life of this system can be assured and usually increased by developing and carrying out a systematic operation and maintenance program.

This practice will require periodic maintenance and may also require operational items to maintain satisfactory performance. Your operation and maintenance program includes:

- A Water Well Record (SCDHEC Form 1903) must be completed by the well driller at the time of installation. This record should be filed for reference.
- If a written variance is required for the well, the variance as issued by SCDHEC should be filed for reference.
- Maintain a sanitary seal on top of the well casing.
- Protect the area from being damaged by agriculture machinery, vehicles, or livestock. Locks on the well cover and fencing around the well head are strongly recommended.
- All fences, railings, and/or warning signs shall be maintained to provide warning and/or prevent unauthorized human or livestock entry.
- Do not allow any foreign debris to accumulate in the immediate vicinity of the well head.
- Maintain soil and vegetative covering around the well. Keep all surface water from entering or accumulating at the immediate vicinity of the well site.
- Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.
- Check metal surfaces for rust and other damage especially sections in contact with earth and with other materials. Repair or replace any damaged sections and apply paint as a protective covering.
- Immediately repair any vandalism, vehicular, or livestock damage.
- The well owner is responsible for routine maintenance and operation of the well.
- A sampling spigot shall be installed on the wellhead.

- Approved backflow prevention devices are required on all wells that utilize a chemical feed system for any purpose other than water treatment. The backflow prevention device shall be installed so as to preclude any direct pathway for any contaminant to enter an underground source of drinking water.

- All individual residential wells and irrigation wells shall be disinfected upon well completion. The well shall also be disinfected upon any well maintenance, repair, pump repair, pump installation, or testing. Disinfectants shall be placed in the well in order to provide a chlorine residual from 50 ppm (milligrams per liter) to 250 ppm for a minimum of four hours before being flushed from the well. The method of chlorination shall be one that insures that the chlorine is uniformly distributed in the well. The well shall be flushed sufficiently after disinfection to remove the disinfectant and to condition the well for use.

- These wells shall be properly labeled with an identification plate immediately upon well completion. The identification plate shall be constructed of a durable, weatherproof, rustproof, material. The identification plate shall be permanently secured to the well casing or enclosure floor around the casing where it is readily visible. The identification plate shall be permanently marked to show:
    - Company name and certification number of the driller who installed the well;
    - Date well was completed;
    - Total depth (feet); and,
    - Casing depth (feet).

Irrigation wells shall not be permitted at a residence unless another source of potable water serving the residence is proposed or exists.

PROCEDURES FOR COLLECTION OF WATER QUALITY SAMPLES

Note for all samples: A laboratory analysis is no better than the sample submitted for analysis. The sample should represent the conditions of use as much as possible.

Bacterial Sampling

Sampling of community water supply wells is covered by requirements of the South Carolina Department of Health and Environmental Control (SCDHEC) and the local water authoriity. For individual domestic wells, technical assistance or advice regarding the collection of bacteriological samples may be obtained from local health department, SCDHEC, or from the laboratory that will examine the sample.

If no technical assistance is available, the following procedure will suffice: A sterile sample bottle, preferably one provided by the laboratory that will make the determination, must be used. Allow the water to run at least 10 minutes before collecting the sample. It is extremely important that nothing except the water to be analyzed come in contact with the inside of the bottle or the cap; the water must not be allowed to flow over an object or over the hands while the bottle is being filled. Do not rinse the sample bottle. The sample should be delivered to the laboratory as soon as possible and in no case more than 24 hours after its collection. During delivery, the sample should be kept as cool as possible (but not frozen).

Irrigation Water / Chemical (Mineral) Sampling

Irrigation water analysis can be analyzed by the Clemson University Agricultural Services Laboratory. Information on sample collection and analysis can be obtained from http://www.clemson.edu/agsrvlb/feedback3.htm.

NRCS, SC
September 2010

In most cases, a routine mineral analysis (determination of the concentrations of the common minerals) will suffice, particularly where there is no prior knowledge of the chemical quality of the water in the area where the well is located.

The sample should be collected after the well has been pumped long enough to remove standing water and disinfectant chemicals, and to insure that water from the producing formation(s) has entered the well. Generally, this pumping time should be a minimum of 30 minutes. If the well is new, a sample taken after several hours' delivery should be more representative than the samples taken earlier.The water sample should be obtained in a chemically clean container preferably one obtained from the laboratory which has been selected to perform the analysis. The container should be rinsed several times with the water to be sampled prior to collecting the sample. The laboratory performing the analysis should issue instructions regarding the quantity of sample required. However, a minimum of one pint is required. More may be needed if more than the routine analysis is needed.

Avoid sample agitation and prolonged exposure to air. Identify each bottle by attaching an appropriate label. Submit the samples for analysis as soon as possible. (Ideally the samples should be analyzed within 24 hours after sampling.) Keeping the samples cool (preferably refrigerated) and covered from light will reduce changes in sample composition between sampling time and analysis by the lab.

Additional Operation and Maintenance Requirements Specific to this Plan:_____

U.S DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
SOUTH CAROLINA

OPERATION AND MAINTENANCE WORKSHEET
PIPELINE - CODE 516

Landowner/Operator_____ Farm/ Tract/ Field_____

Job Location _@ miles east of nowhere_____ Watershed _____

County_____

Prepared by_____ Date

OPERATION AND MAINTENANCE ITEMS

A properly operated and maintained irrigation water conveyance pipeline system is an asset to the farm. This system was designed and installed to convey water in an irrigation system. Estimated life span of this installation is at least 10 years. The life of this system can be assured and usually increased by developing and carrying out a systematic operation and maintenance program. This practice will require periodic maintenance and may also require operational items to maintain satisfactory performance. Your operation and maintenance program includes:

- All pipelines, check, pressure-relief, air-release, gate, and other valves and thrust blocks shall be maintained at their post-construction condition. Repairs must be made immediately.
- Maintain the design depth of cover over the pipe system. All settlement or cracks in the soil should be investigated to determine their cause and immediately repaired. Excessive settlement or voids in the line present a hazard to livestock and should be backfilled and compacted immediately.
- Avoid travel by heavy equipment over pipelines when the soil is saturated except at designed crossings. Limit traffic to sections that were designed for traffic loads. Avoid any sub-soiling operation that may disturb or destroy the pipeline.
- Inspect and test valves, pressure regulators, pumps, switches and other appurtenances regularly to ensure proper operation. Open and close valves slowly to prevent excessive water hammer.
- Check operating pressures often; a pressure drop (or rise) may indicate problems. Repair or replace damaged gauges.
- Plastic pipe should be protected from UV radiation and freeze damage.
- Conduct routine maintenance of all mechanical components in accordance with manufacturer recommendations. Repair or replace components as necessary.
- Maintain erosion protection at outlets.

- Drain and/or provide for cold weather operation of the system.
- Remove all foreign debris, minerals, algae and other materials that may hinder system operation.
- Maintain all outlets, rodent guards, inlets and access man-holes in good operating condition.
- Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization, and application of herbicides when necessary. Fertilize as needed to maintain a uniform vigorous stand. Periodic mowing may also be needed to control height.
- Eradicate or otherwise remove all rodents and/or burrowing animals that have damaged or can potentially damage any part of the system. Immediately repair any damage caused by their activity.
- Immediately repair any vandalism, vehicular or livestock damage to any outlets and appurtenances.

Additional Operation and Maintenance Requirements Specific to this Plan:_____

NATURAL RESOURCES CONSERVATION SERVICE

SOUTH CAROLINA

OPERATION AND MAINTENANCE REQUIREMENTS

HEAVY USE AREA PROTECTION

CODE 561

Land Owner/Operator_____ Farm/ Tract/ Field_____

County_____

Prepared By_____ Date_____ Watershed _____

OPERATION AND MAINTENANCE ITEMS

Properly protected, operated, and maintained heavy use area(s) can be an asset to the property. This practice was designed and installed to stabilize the area identified in the plan. Estimated life span of this installation is at least 10 years. The life of the practices can be assured and usually increased by developing and carrying out a systematic operation and maintenance program.

This practice will require periodic maintenance and may also require operational items to maintain satisfactory performance. Your operation and maintenance program requirements include:

- Treatment areas and associated practices shall be inspected annually and after significant storm events to identify repair and maintenance needs. All surfaces, structures, pipes, drains, and associated appurtenances will be repaired promptly.

- Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization and application of herbicides when necessary. Apply supplemental nutrients as needed to maintain the desired species composition and stand density. Control undesired weed species, especially state-listed noxious weeds.

- Maintain hardened surfaces in good condition, which includes periodic grading and addition of surface material when necessary. Prevent surface ponding by localized grading or addition of surface materials to remove depressions. Repair of surfaces shall be made with material compatible with original construction materials.

- Remove debris or blockages from associated roads, lots, drainage ditches, drop inlets, culverts, waterways and/or storm water outlets. Maintain pathway drainage capacities.

- Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

- Immediately repair any vandalism, vehicular, or livestock damage to surfaces, structures, earthfills, side slopes, drainage facilities, water ways, storm water outlets, or other appurtenances.

- This O&M plan shall be provided to, and discussed with the operator. For practices that address animal waste concerns, this O&M plan must complement the Animal Waste Management System Plan.

- For practices that address animal waste concerns, the operational requirements for managing the heavy use area and associated practices including planned scraping intervals, storage, treatment, and/or disposal methods are described below.

Additional Operation and Maintenance Requirements Specific to this Plan:_____

U.S DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
SOUTH CAROLINA

OPERATION AND MAINTENANCE WORKSHEET
WATERING FACILITY
CODE 614

Landowner/Operator _____ Farm/ Tract/ Field _____

Job Location @ miles east of nowhere _____ Watershed _____

County _____

Referral No. n/a Prepared By _____ Date _____

OPERATION AND MAINTENANCE ITEMS

A properly operated and maintained livestock water facility is an asset to the farm or ranch. This facility includes a delivery pipeline and a trough and was designed and installed to provide water for livestock. Estimated life span for this installation is at least 10 years. Life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

Failure to Operate and Maintain this system could result in actions to reclaim cost share and/or loss of any future financial or technical assistance.

This practice will require performance of periodic maintenance and may also require operational items to maintain satisfactory performance. A good operation and maintenance program includes:

⇒ Check all above ground connections, valves, gates, rodent guards, inlets and outlets to make sure they are functioning properly. Check troughs and pipelines for leaks or cracks and repair or replace immediately, if necessary

⇒ Make certain the area adjacent to the trough is well protected with gravel, paving, or good cover. Be sure that the outlet pipe has a free outlet and is not causing any serious erosion problems.

⇒ Check periodically to see if debris has fallen into the trough which may restrict inflow or planned functions of the outflow system.

⇒ Clean the entire system periodically and remove moss, algae growth, and/or sludge. Chemicals such as copper sulfate and chlorine can be used to prevent moss and algae growth. Local rules and regulations are to be followed when recommending chemicals making sure, any used are safe for animals.

⇒ Maintain, where necessary, coverings and insulation to prevent damage by freezing.

⇒ Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing may also be needed to control growth.

⇒ Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

⇒ Immediately repair any vandalism, vehicular or livestock damage.

Special operation and maintenance requirements _____