

## **Board of Water and Sewer Commissioners**

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### ***Construction Specifications***

#### ***Potable Water Utilities & Infrastructure***

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## **SECTION 1 EROSION CONTROL**

### **1.01 SCOPE**

This section, in addition to applicable regulatory requirements, shall govern the erosion control requirements for water mains and appurtenances.

### **1.02 GENERAL**

The Contractor shall adhere to the following provisions at all times for the related construction and maintenance activities:

#### **A. FLOW OF DRAINS AND SEWERS MAINTAINED**

Adequate provisions shall be made for the flow of sewers, drains and watercourses encountered during construction. Lines and structures disturbed during construction shall be immediately restored to their original condition.

#### **B. PROPERTY PROTECTION**

Trees, grass, fences, signboards, poles and all other property shall be protected unless their removal is authorized. Any property damage shall be satisfactorily restored by the Contractor.

#### **C. MAINTENANCE OF EROSION CONTROL MEASURES**

The Contractor shall at all times take necessary precautions to prevent erosion or transportation of soil due to natural or induced water flows. Spoil banks and soil stockpiles shall be contained to prevent transportation of soil by run-off waters. All temporary erosion control measures installed shall be properly maintained for the entire duration of construction. Failing to maintain these structures will be grounds for halting of construction until the measures are properly restored. This does not provide an allowance for an extension in contract time.

#### **D. TOPSOIL**

The Contractor shall remove a minimum of 4 inches of existing grass and topsoil from within the limits of construction. Topsoil obtained from this stripping operation that meets or exceeds topsoil requirements per these specifications shall be stockpiled on-site. Stripped material not suitable for use as topsoil or embankment material shall be disposed of properly.

The stockpiled topsoil from the stripping operation shall be used to cover disturbed areas of construction to a minimum thickness of 2 inches, prior to temporary and permanent grassing.

**E. GRADING**

The Contractor shall perform grading of every description regardless of the character of material encountered, within the limits and to the lines and grades shown on the Plans. Minor changes in grades shown on the Plans may be required to allow for final grassing, soil stabilization and drainage as the work progresses.

**F. PERMITS**

Construction shall not begin until all applicable environmental permits have been obtained. The Contractor shall comply with all provisions of construction permits throughout the duration of construction. Failure to comply with all provision may result in penalty.

**1.03 EROSION CONTROL PLAN**

Prior to commencement of construction, an erosion control plan must be on file with the Utility. The following outlines some of the key elements required:

- Identify all points where construction limits cross streams, creeks, etc.
- Identify locations where materials for construction will be stockpiled (including soils, aggregate, piping, manholes, etc.)
- Proposed erosion control measures to be employed at the locations identified above.
- Proposed maintenance schedule of erosion control devices for the entirety of the project.

**1.04 BEST MANAGEMENT PRACTICES**

**A. TOPSOIL**

As indicated on the Plans or specifically required in the Specifications, additional good quality topsoil shall be provided by the Contractor within the construction limits. The required topsoil for this item shall be material obtained from an offsite source. Topsoil shall be workable, friable, loamy soil free from hard lumps, stiff clay, gravel, noxious weeds, brush and other deleterious materials.

Lime shall be added to reduce the possibility of odor. Topsoil shall be placed in all areas disturbed by construction, prior to grassing. The topsoil shall be placed to the compacted depth specified on the plans, but shall not, in any case, be placed at a compacted thickness of less than 2 inches.

It is intended that the grassing operation shall follow immediately after the placing of topsoil in which case such grassing operation would require satisfactory

compaction in order to prevent erosion. In the event that grassing operations are delayed, the layer of topsoil shall be compacted until satisfactory.

## **B. TEMPORARY GRASSING**

Temporary seeding is the establishment of fast-growing annual vegetation from seed on disturbed areas. Temporary vegetation provides economical erosion control for up to a year and reduces the amount of sediment moving off the site.

This practice applies where short-lived vegetation can be established before final grading or in a season not suitable for planting the desired permanent species. It helps prevent costly maintenance operations on other practices such as sediment basins and sediment barriers. In addition, it reduces problems of mud and dust production from bare soil surfaces during construction.

### **1. PLANT SELECTION**

Select plants that can be expected to meet planting objectives. To simplify plant selection, use Table 1-1, Commonly Used Plants for Temporary Cover. Seeding mixtures commonly specified by the Alabama Department of Transportation are an appropriate alternative for plantings on rights-of-ways.

**Table 1-1, Commonly Used Plants for Temporary Cover**

<b>Species</b>	<b>Seeding rate/acre (PLS)</b>	<b>Planting Dates</b>
Millet, Browntop or German	40 lbs	Apr 1-Aug 15
Rye	3 bu	Sep 15-Nov 15
Ryegrass	30 lbs	Sep 1-Oct 15
Sorghum-Sudan Hybrids	40 lbs	Apr 1-Aug 15
Sudangrass	40 lbs	Apr 1-Aug 15
Wheat	3 bu	Sep 15-Nov 15
Common Bermudagrass	10 lbs	Mar 1-July 15
Crimson Clover	10 lbs	Sept 1-Nov 1

*PLS means pure live seed and is used to adjust seeding rates. For example, to plant 10 lbs PLS of a species with germination of 80% and purity of 90%,  $PLS = 0.8 \times 0.9 = 72\%$ . 10 lbs PLS =  $10 / 0.72 = 13.9$  lbs of the species to be planted*

### **2. SITE PREPARATION & SOIL AMENDMENTS**

Complete grading and shaping before applying soil amendments if needed to provide a surface on which equipment can safely and efficiently be used to apply soil amendments and accomplish seedbed preparation and seeding.

*Lime:* Apply lime according to soil test recommendations. If a soil test is not available, use 1 ton of agricultural limestone or equivalent per acre on coarse textured soils and 2 tons per acre on fine textured soils. Do not apply lime to alkaline soils or to areas which have been limed during the preceding 2 years. Other liming materials that may be selected should be provided in amounts that provide equal value to the criteria listed for agricultural lime or be used in combination with agricultural limestone or Selma chalk to provide equivalent values to agricultural limestone.

*Fertilizer:* Apply fertilizer according to soil test results. If a soil test is not available, apply 8- 24-24 fertilizer. When vegetation has emerged to a stand and is growing, 30 to 40 lbs/acre (approximately 0.8 lbs/1000sq.ft.) of additional nitrogen fertilizer should be applied. Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

*Application of Soil Amendments:* Incorporate lime and fertilizer into the top 6" of soil during seedbed preparation.

### **3. PLANTING METHODS**

*Seeding:* Evenly apply seed using a cyclone seeder (broadcast), drill seeder, cultipacker seeder, or hydroseeder. Broadcast seeding and hydroseeding are appropriate for steep slopes where equipment cannot operate safely. Small grains should be planted no more than 1" deep, and grasses and legumes no more than ½" deep. Seed that are broadcast must be covered by raking or chain dragging, and then lightly firmed with a roller or cultipacker.

*Hydroseeding:* Surface roughening is particularly important when hydroseeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge. Mix seed, inoculant if required, and a seed carrier with water and apply as slurry uniformly over the area to be treated. The seed carrier should be a cellulose fiber, natural wood fiber or other approved fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. Use the correct legume inoculant at 4 times the recommended rate when adding inoculant to hydroseeder slurry. The mixture should be applied within one hour after mixing to reduce damage to seed. Fertilizer should not be mixed with the seed-inoculant mixture because fertilizer salts may damage seed and reduce germination and seedling vigor. Fertilizer may be applied with a hydro seeder as a separate operation after seedlings are established.

### **C. PERMANENT SEEDING**

Permanent seeding is the establishment of perennial vegetation on disturbed areas from seed. Permanent vegetation provides economical long-term erosion

control and helps prevent sediment from leaving the site. This practice is used when vegetation is desired and appropriate to permanently stabilize the soil.

## **1. PLANT SELECTION**

Select plants that can be expected to meet planting objectives. To simplify plant selection, see Table 1-2, Commonly Used Plants for Permanent Cover. Mixtures commonly specified by the Alabama Department of Transportation are an appropriate alternative for plantings on rights-of-ways.

The plants used for temporary vegetation may be used for companion plants provided the seeding rate of the annual species is reduced by one half. See the Temporary Seeding practice for additional information on establishing temporary Vegetation. Ryegrass or other highly competitive plants should not be used as a companion plant.

**Table 1-2, Commonly Used Plants for Permanent Cover**

<b>Species</b>	<b>Seeding rate/acre (PLS)</b>	<b>Planting Dates</b>
Bahiagrass, Pensacola	40 lbs	Feb 1-Nov 1
Bermudagrass, Common	10 lbs	Mar 1-July 15
Bahiagrass, Pensacola Bermudagrass, Common	30 lbs 5 lbs	Mar 1-July 15
Bermudagrass, Hybrid (Lawn Types)	Solid Sod	Anytime
Bermudagrass, Hybrid (Lawn Types)	Sprigs 1/sq ft	Feb 15-Sep 1
Sericea	40-60 lbs	Feb 15-July 15
Sericea & Common Bermudagrass	40lbs 10 lbs	Feb 15-July 15
Switchgrass, Alamo	4 lbs	Mar 15-Jun15

*PLS means pure live seed and is used to adjust seeding rates. For example, to plant 10 lbs PLS of a species with germination of 80% and purity of 90%,  $PLS = 0.8 \times 0.9 = 72\%$ . 10 lbs PLS =  $10 / 0.72 = 13.9$  lbs of the species to be planted*

## **2. SEEDBED REQUIREMENTS**

Establishment of vegetation should not be attempted on sites that are unsuitable due to compaction or inappropriate soil texture, poor drainage, concentrated overland flow, or steepness of slope until measures have been completed to correct these problems. To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. A good growth medium should have these attributes:

- Sufficient pore space to permit root penetration.

- Enough fine-grained soil material (silt and clay) to maintain adequate moisture and nutrient supply.
- Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans should be 12" or more, except on slopes steeper than 2:1 where topsoiling is not feasible.
- A favorable pH range for plant growth, usually 6.0-6.5.
- Sufficient nutrients (nitrogen, phosphorus and potassium) for initial plant establishment.
- Freedom from large roots, branches, stones, or large clods. Clods and stones may be left on slopes steeper than 3:1 if they are to be hydroseeded.

If any of the above attributes are not met (i.e., if the existing soil is too dense, coarse, shallow or acidic to foster vegetation) chiseling, topsoil, or special amendments should be used to improve soil conditions. The soil conditioners described below may be beneficial or topsoil may be applied. These amendments should only be necessary where soils have limitations that make them poor for plant growth or for turf establishment.

- Peat: Appropriate types are sphagnum moss peat, reed-sedge peat, or peat humus, all from fresh-water sources. Peat should be shredded and conditioned in storage piles for at least 6 months after excavation.
- Sand: Should be clean and free of toxic materials.
- Vermiculite: Use horticultural grade.
- Rotted manure: Use stable or cattle manure not containing undue amounts of straw or other bedding materials.
- Thoroughly rotted sawdust: Should be free of stones and debris. Add 6 lbs of nitrogen to each cubic yard.

### **3. SOIL AMENDMENTS**

*Liming Materials:* Lime (Agricultural limestone) should have a neutralizing value of not less than 90 percent calcium carbonate equivalent and 90 percent will pass through a 10 mesh sieve and 50 percent will pass through a 60 mesh sieve.

Selma chalk should have a neutralizing value of not less than 80 percent calcium carbonate equivalent and 90 percent will pass through a 10 mesh sieve.



Other liming materials that may be selected should be provided in amounts that provide equal value to the criteria listed for agricultural lime or be used in combination with agricultural limestone or Selma chalk to provide equivalent values to agricultural limestone.

*Plant Nutrients:* Commercial grade fertilizers that comply with current Alabama Fertilizer Laws should be used to supply nutrients required to establish vegetation.

Lime and fertilizer needs should be determined by soil tests. Soil testing is performed by the Auburn University Soil Testing Laboratory and provides recommendations based on field tests on Alabama soils. The local county Cooperative Extension Service can provide information on obtaining soil tests. Commercial laboratories that make recommendations based on soil analysis may be used.

When soil tests are not available, use the following rates for application of soil amendments.

Sandy soils: Use 1 ton/acre (exception on sandy soils – if the cover will be tall fescue and clover) use 2 tons/acre.

Clayey soils: 2 tons/acre. (Do not apply lime to alkaline soils).

Grasses alone: Use 400 lbs/acre of 8-24-24 or the equivalent. Apply 30 lbs of additional nitrogen when grass has emerged and begun growth (approximately 0.8lbs/1000 sq.ft.).

Grass-legume mixtures: Use 800 to 1200 lbs/acre of 5-10-10 or the equivalent.

Legumes Alone: Use 400 to 600 lbs/acre of 0-20-20 or the equivalent.

*Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.*

*Application of Soil Amendments:* Apply lime and fertilizer evenly and incorporate into the top 6" of soil by disking, chiseling or other suitable means during seedbed preparation. Operate machinery on the contour. On sites too steep for seedbed preparation, fertilizer and lime can be applied with a hydroseeder.

*Seedbed Preparation:* If needed, grade and shape to provide a surface on which equipment can safely and efficiently be used for seedbed preparation and seeding. Install necessary sediment control practices before seedbed preparation and complete grading according to the approved plan. Prepare a friable seedbed with tillage to a depth of at least 6". Break up large clods, alleviate compaction, and smooth and firm the soil into a uniform surface. Fill in or level depressions that can collect water.

#### **4. PLANTING METHODS**

*Seeding:* Use certified seed for permanent seeding whenever possible. Certified seed is inspected by the Alabama Crop Improvement Association to meet high quality standards and will be tagged with a "Certified Seed" tag. (Note: all seed sold in Alabama is required by law to be tagged to identify seed purity, germination, and presence of weed seeds. Seed must meet state standards for content of noxious weeds.)

Inoculate legume seed with the Rhizobium bacteria appropriate to the species of legume.

Plant seed uniformly with a cyclone seeder, a drill seeder, a cultipacker seeder, or by hand on a fresh, firm, friable seedbed. If the seedbed has been sealed by rainfall, it should be disked so the seed will be sown into a freshly prepared seedbed.

When using broadcast-seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one-half the seed while moving back and forth across the area, making a uniform pattern; then apply the second half in the same way, but moving at right angles to the first pass.

Cover broadcast seed by raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact. Small grains should be planted no more than 1" deep and grasses and legume seed no more than ½" deep.

*Hydroseeding:* Surface roughening is particularly important when hydroseeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge.

Mix seed, inoculant if required, and a seed carrier with water and apply as a slurry uniformly over the area to be treated. The seed carrier should be a cellulose fiber, natural wood fiber or other approved fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. Use the correct legume inoculant at 4 times the recommended rate when adding inoculant to a hydroseeder slurry. The mixture should be applied within one hour after mixing to reduce damage to seed.

Fertilizer should not be mixed with the seed-inoculant mixture because fertilizer salts may damage seed and reduce germination and seedling vigor.

Fertilizer may be applied with a hydroseeder as a separate operation after seedlings are established.

Lime is not normally applied with a hydraulic seeder because it is abrasive but if necessary it can be added to the seed slurry and applied at seeding or it may be applied with the fertilizer mixture. Also lime can be blown onto steeper slopes in dry form.

*Sprigging:* Hybrid bermudagrass cannot be grown from seed and must be planted vegetatively. Vegetative methods of establishing common and hybrid bermudagrass, centipedegrass and zoysia include sodding, plugging and sprigging.

When sprigs are planted with a sprigging machine, furrows should be 4-6" deep and 2 feet apart. Place sprigs no farther than 2 feet apart in the row and so that at least one rooting node is in the furrow.

When broadcasting is used for sprig planting, broadcast sprigs at the specified rate. Press into the top ½" to 2" of soil with a cultipacker or with a disk set nearly straight so that the sprigs are not brought back to the surface. A mulch tacking machine may be used to press sprigs into the soil.

#### **D. SOLID SOD**

##### **1. MATERIALS**

Solid sod may be obtained from any sod producer specializing in sod production harvesting with a minimum of three years experience. The sod shall be St. Augustine or Centipede and shall be placed as suitable growing conditions may require. The sod shall be live, fresh growing grass, free of weeds and rocks. Solid sod removed from construction site and preserved during construction may be used with the Engineer's approval.

##### **2. PREPARATION**

The Contractor shall prepare the subsoil to a sufficiently loose or pulverized condition and all uneven areas and low spots shall be eliminated prior to planting. All foreign materials and undesirable plants and their roots must be removed from the area. Topsoil shall be spread to a minimum depth of 2 inches over the area to be sodded. Areas to be sodded must be fertilized initially with agricultural limestone and with the type of fertilizer recommended by the sod provider for either Centipede or St. Augustine grass. The fertilizer shall be distributed into the planting areas by approved methods to a depth of at least 2 inches. If the soil is dry, water shall be applied until it is in a workable condition. Immediately following this, the sod shall be placed.

##### **3. LAYING SOD**

Moisten prepared surface immediately prior to laying sod. To prevent deterioration the sod shall be planted within three days from the time of harvesting. However, should inclement weather alter this procedure, the

grass may be kept in temporary storage if the sod is spread out in a shaded area with the grass side up and kept moist. Any sod allowed by the Contractor to dry out shall be rejected and no payment for such sod will be made. The sod shall be placed on the prepared surface tightly with no open joints visible and no overlapping. The sod shall be smooth and align with adjoining grassed areas. After installation is complete, the newly sodded areas shall be tamped in place in a satisfactory manner and watered as necessary to enhance growth.

#### **4. MAINTENANCE**

The Contractor shall mow grass at regular intervals to maintain a maximum height of 2-1/2 inches. The edges will be neatly trimmed and clipped where necessary. Immediately after mowing and trimming all clippings shall be removed. Watering of the sodded areas shall be applied in the form of a spray or sprinkle, without erosive force in sufficient amounts that will keep the sod in a living and growing condition. The application of herbicides in accordance with manufacturer's instructions shall be applied for weed control. All sod showing deterioration or bare spots shall be replaced. Additional fertilizer may be required

#### **E. SILT FENCE**

Silt fences shall be constructed at locations approved by the Engineer and installed in accordance with the State of Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition Type A or Type B, as specified on the plans.

#### **F. EROSION CONTROL NETTING**

Erosion control netting shall be utilized in locations where specifically required by the Engineer and installed in accordance with the Manufacturer's recommendations using 3/4 inch X 2-1/2 inch X 12 inch wedge shaped wooden stakes and/or staples.

##### **1. MATERIALS**

The netting material shall be one of the following: Curlex Excelsior Blanket (American Excelsior Company), Excelsior Blanket (Erosion Control Systems), Enkamat 7220 (AKZO), or approved equal.

##### **2. INSTALLATION**

All surfaces to be protected shall be graded, fertilized, limed, and seeded or sodded, as specified and where shown on the plans, so as to be stable and firm.

Erosion Control netting used as a ditch liner shall be applied with the length of roll laid parallel to the flow of the water. Where a synthetic mat is used and where more than one width is required, a multi-width welded mat shall be supplied in multiples of 3 feet. All lap joints and upslope

edges shall be staked at intervals of 3 feet or less. Where three-wide mat is required, lap joints to be limited to one every nine feet of width.

All wood stakes shall be driven 2 inches into the ground surface.

An anchor slot shall be placed at the upslope and downslope ends of the mat placement. At least 12 inches of the end of the mat shall be buried vertically in a slot dug in the soil. The mat shall be secured in the anchor slot by staples or stakes at intervals of 3 feet or less prior to burying, except when the ditch is located above the erosion control netting, in which case no stakes or staples shall be used in the anchor slot unless 6 inches separation is maintained between the point of the installed stake or staple, and the netting. The soil shall be firmly tamped against the mat in the slot.

Successive lengths of netting shall be overlapped at least 3 feet, with the upstream length on top. Stake or staple the overlap in 3 places evenly spaced across the end of each of the overlapping lengths and in 3 places across the width of the center of overlap area. Check slots shall be spaced so that a check slot occurs within each 30 feet.

Stake or staple the netting in the check slot at each edge overlap and in the center of the mat, except when the ditch is located above the netting, in which case no stakes or staples shall be used in the check slot, unless 6 inches separation is maintained between the point of the installed stake or staple and the synthetic liner. Beginning and terminal ends to be staked in accordance with installation manual.

Upslope edges of netting used as ditch lining shall terminate on 4-inch wide horizontal shelves running parallel to the axis of the ditch for the full length of the ditch. Edges of the netting shall be staked at 3-foot intervals, backfilled with soil, and tamped to original slope.

Erosion control netting damaged by the contractor during installation shall be repaired immediately.

The Contractor shall maintain the netting until all work on the contract has been completed and accepted. Maintenance shall consist of the repair of areas where damaged by any cause.

#### **G. RIPRAP**

All stone for riprap shall consist of rough unhewn quarry stone as nearly rectangular in section as practicable. The stone shall be resistant to the action of air, temperature changes, and water. The stone shall be sound and dense, and suitable in all other respects for the purpose intended. The stone shall be a well-graded mixture with individual classified stones ranging in weight in accordance with Section 814 of the Alabama Department of Transportation Standard Specifications, latest edition.

Riprap shall be placed in a manner as to ensure that the larger pieces are

distributed uniformly and that the smaller pieces will fill the spaces between the larger pieces. After placing, the riprap shall present a reasonably smooth surface to the thickness shown on the Plans.

#### **H. FILTER BLANKET FOR RIPRAP**

Where indicated on the Plans or directed by the Engineer, a filter blanket of crushed stone or geotextile filter fabric shall be placed as a bed for riprap. Crushed stone and geotextile filter fabric shall be as specified in this Section.

##### **1. CRUSHED SLAG OR CRUSHED STONE**

Crushed slag or crushed stone shall be screened, washed and shall be 100 percent retained by a 1/4 inch screen. One hundred percent shall pass a 1-1/2 inch opening and shall be uniformly graded from maximum size to minimum size. Foreign matter shall not exceed 3 percent by weight when dry.

##### **2. GEOTEXTILE**

Geotextile filter blanket shall be Terratex GS or approved equal and shall be installed in accordance with the State of Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 2 REMOVING AND REPLACING PAVEMENT**

### **2.01 SCOPE**

These specifications govern pavement replacement above water mains. Reference for this section has been made to the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest edition.

### **2.02 MATERIALS**

Materials of this Section shall be as specified herein.

### **2.03 ASPHALT PAVEMENT**

After the trench has been backfilled in accordance with Section 3, Backfilling, the following procedures shall commence:

#### **1. PREPARATION**

Jagged edges of the pavement shall be saw-cut to form a straight line. Final inspection of the pipe backfill shall be made, and then the trench shall receive the base and bituminous wearing surface layers, as specified herein.

#### **2. BASE**

The authority having jurisdiction shall determine which type of base material is permissible. After the pipe trench has been backfilled and compacted in accordance with Section 3, Backfilling, a 6-inch minimum compacted thickness layer (in accordance with ALDOT Standard Specifications for Highway Construction, latest edition) shall be installed.

Base coarse shall be installed the full width of trench and shall be compacted to 100 percent maximum density. Base shall be finished off 1½ inches below the surface of the existing pavement and to the shape of the existing pavement. If after a one-month period no settlement problems occur, Contractor may install bituminous wearing surface layer. Base coarse shall be kept clean and maintained until wearing surface is applied.

#### **3. WEARING SURFACE LAYER**

Wearing surface layer shall be in accordance with ALDOT Standard Specifications for Highway Construction, latest edition.

**4. TESTING**

All testing procedures and requirements shall be in accordance with ASTM and ALDOT Standard Specifications.

**2.04 CONCRETE PAVEMENT**

After the trench has been backfilled in accordance with Section 3, Backfilling, the following procedures shall commence:

**1. PREPARATION**

Existing pavement shall be cut back a minimum of 12 inches from the edge of the trench with an appropriate saw. The edges of the pavement shall be sawed along straight lines parallel to the center of the pavement cut. In the event that a crack exists in the pavement within 2 feet to the saw cut, the width of pavement to be removed shall be widened to include the crack in the removal and replacement, and the saw cut shall be made parallel to the centerline of the street behind the crack between existing transverse pavement joints.

**2. BASE**

The authority having jurisdiction shall determine which type of base material is permissible. After the pipe trench has been backfilled and compacted in accordance with Section 3, Backfilling, an 8-inch minimum compacted thickness base layer shall be installed, compacted at 2 to 4-inch lifts in accordance with ALDOT Standard Specifications for Highway Construction, latest edition.

**3. WEARING SURFACE LAYER**

Concrete used shall comply with “Portland Cement Concrete Pavement” of the ALDOT Standard Specifications. All steel reinforcements shall be spliced according to acceptable standards. Concrete finish shall match the finish of the existing concrete pavement.

**4. TESTING**

All testing procedures and requirements shall be in accordance with ASTM and ALDOT Standard Specifications.



**2.05 CONCRETE SIDEWALKS, CURB & GUTTER, DRIVEWAYS & DITCH PAVING**

Where concrete is removed it shall be replaced with same type and thickness as that removed. Expansion & control joints shall be installed. Concrete shall have a minimum strength of 3,000-psi. Concrete driveways shall replace the entire disturbed panel (joint to joint) unless written approval from the Utility is provided. All replacement applications shall abide by the requirements of the governing jurisdiction.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 3 BACKFILLING**

### **3.01 SCOPE**

These Specifications shall govern the backfilling requirements for water mains.

### **3.02 MATERIALS**

Materials of this Section shall be as specified herein.

### **3.03 BACKFILLING**

#### **A. EXAMINATION PRIOR TO BACKFILLING**

Before backfilling any trench, the Contractor's foreman shall examine the completed water line and all joints and shall correct any deficiencies that exist.

#### **B. CURING OF CONCRETE**

No trenches or excavations shall be backfilled until concrete in the structures placed therein has acquired a suitable degree of hardness.

#### **C. OVERCUTTING**

Overcutting of trench bottom shall be backfilled at the Contractor's expense with select material from the excavations and compacted to not less than 95 percent maximum density as determined by AASHTO T99 prior to placing of pipe. Select material shall be granular soil free from rock, grass, wood or other deleterious material. If material from the excavation is not considered to be satisfactory for backfill, the overcut shall be backfilled with crushed slag, crushed stone, or approved equal.

#### **D. INITIAL BACKFILL**

After the pipe has been installed, select material from the excavation shall be placed alongside the pipe in layers not exceeding 4 inches in depth, to a depth of at least 2 feet above the top of the pipe. Select material shall be as specified above for filling overcut. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall be thoroughly compacted by hand tamping with iron tampers, the tamping face area of which shall not exceed 50 square inches, to not less than 90 percent maximum density as determined by AASHTO T99. All material shall be deposited carefully in the trench to avoid damaging the pipeline. The operation of heavy equipment shall be conducted so that no damage to water lines will result.

**E. FINAL BACKFILL**

The remainder of the trench above an elevation of 2 feet higher than the top of pipe shall be backfilled with select material from the excavation. Mechanical backfilling will be permitted providing material being placed with dragline or crane has a free fall of not greater than one foot from the bucket. The manner of placing and the degree of compaction shall be as specified hereinafter.

**1. FIELDS AND OPEN COUNTRY**

The backfill above a point 2 feet above the top of the pipe shall be placed in the trench until full. The remaining earth shall be placed on the top of the trench and dressed by the Contractor until it settles. At the completion of the job, all excess dirt shall be leveled and disposed of by the Contractor.

**2. STATE & COUNTY RIGHT-OF-WAY**

Backfilling procedures and degree of compaction shall be in accordance with the latest edition of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction.

**3. CITY RIGHT-OF-WAY**

All trenches shall be backfilled with select, stable material. The backfill material shall be compacted at near optimum moisture content, in layers not exceeding 24-inches compacted thickness, to a density of not less than 95 percent maximum density as determined by AASHTO T99. Mechanical tampers (or approved equal) shall be used. Flooding or jetting will not be permitted. The backfill shall be brought up evenly on both sides of the pipe to the top of the subgrade elevation. A crusher run stone or sand-shell base course, 6 inches minimum compacted thickness, in accordance with "Soil, Soil Aggregate, and Aggregate, Base and Subbases" of the ALDOT Standard Specifications for Highway Construction, latest edition, shall then be constructed. The top of the trench shall then be filled with bituminous wearing surface mixed flush with the road surface, and maintained continuously until the applicable pavement replacement procedure has begun. Compaction tests will be required by a certified testing lab at 2 foot increments vertically and at sufficient intervals along the trench to verify that density requirements have been met. A copy of the laboratory reports and compaction test shall be given to the Utility & Engineer.

**F. FLOWABLE BACKFILL**

This shall be used as a backfill material in cases where traffic can only be closed for a short period of time. It will only be used when directed by the Engineer. Flowable backfill shall be made from a mixture of cement (ASTM C150, Type II), fly ash (ASTM C618, Class C), sand (ASTM C33) and water having a compressive strength of not more than 500 psi. The strength of the material shall be tested by following the procedures given

in ASTM D4832-88. A penetration resistance test (ASTM C403) can assess the setting and early strength development of the backfill. This test will be used to determine if the fill is ready to be covered with a patch or strong enough to support equipment, traffic or construction loads. Tests will be required by a certified testing lab at sufficient intervals along the trench to verify that all requirements have been met. Copies of the lab reports and tests shall be given to the Utility & Engineer.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 4 WATER MAINS**

### **4.01 SCOPE**

This Section shall cover the following work:

- Furnishing and installing new water pipe, water mains, water service lines, water meters and boxes, valves and valve boxes, fire hydrants, and appurtenances
- Removing, abandoning, and/or relaying existing water pipe, water mains, water service lines, water meters and boxes, valves and valve boxes, fire hydrants, and appurtenances
- Constructing connections to existing water mains
- Constructing concrete thrust blocks and support pads

A water service line shall be defined as a lateral line leading from a water main to a water meter or approved service connection point. A water main shall be defined as the carrier pipe through which water is transmitted from the water source to the water service lines.

All work performed and materials used shall be in accordance with the Authoritative Jurisdiction's specifications and the Utility's requirements. In the event that there is a conflict between the authoritative jurisdiction's specifications and the Utility's requirements, the more stringent requirements shall govern.

### **4.02 MATERIALS**

Materials furnished for use shall conform to the requirements of this section. All materials used for installation of potable water utility pipe and infrastructure shall be domestically manufactured and selected from the Utility's Approved Manufacturer List (See Appendix I).

#### **A. DUCTILE IRON WATER PIPE**

Ductile Iron pipe shall meet the requirements of AWWA C151 with a minimum working pressure of 150 psi. The pipe shall have an inner cement mortar lining meeting AWWA C104 and an outer bituminous coating. The push-on joints shall meet the requirements of AWWA C111. Restrained joints shall meet the requirements of AWWA C110. Lock joint pipe shall meet the requirements of AWWA C151.

The pipe length shall be a minimum of 18 feet.

No water mains smaller than 6" diameter shall be installed.

Tracer wire and marking tape shall be provided in accordance with PVC pipe Section 4.02 E.

The Contractor shall furnish written certification, accompanied by a copy of the test results, to the Utility that the pipe and pipe material have been sampled, tested, and inspected as required by AWWA. Tests and certifications shall be of such frequency to be representative of the entire project.

**B. DUCTILE IRON FITTINGS**

Ductile Iron fittings shall meet the requirements of AWWA C110, AWWA C153, or AWWA C151. Fittings shall be compact type with an inner cement mortar lining meeting AWWA C104 and an outer bituminous coating. Fittings shall have a minimum pressure rating equal to the adjoining pipe installed. For fittings sizes 4 inch through 12 inch, the minimum pressure rating shall be 250 psi.

All joints shall be secured using ductile iron friction restraining glands. The proper restraining gland shall be used based on the type of pipe. The use of restraining glands does not eliminate the requirement for thrust block restraint. Restraining glands shall be selected from the Utility's list of approved manufacturers.

All tees shall be anchor tees and approved by the Engineer when used. All fittings shall be supported on undisturbed soil and thrust blocking. For minimum concrete pad dimensions, refer to Appendix III, standard detail drawing number 2.

Fittings shall be moved using non-metallic straps. All fittings shall be inspected prior to use to insure interior coatings have not been damaged.

Fittings shall be selected from the Utility's approved manufacturer list.

**C. POLYETHYLENE SHEATHING**

Polyethylene sheathing shall be installed on all ductile iron pipe and appurtenances at all locations and shall conform to AWWA C105, "Standard for Polyethylene Encasement for Ductile Iron Piping for Water and other Liquids". This applies with the following stipulation: Class A polyethylene encasement shall not be exposed to sunlight longer than 7 days. In situations where the polyethylene is expected to be exposed to sunlight longer than 7 days, Class C polyethylene shall be required.

Care shall be taken not to damage the polyethylene sheath during the backfill operations. Any polyethylene sheath damaged shall be replaced or repaired by the Contractor at no additional expense to the Owner.

**D. COPPER WATER SERVICE PIPE**

All water service lines shall be  $\frac{3}{4}$ ", 1", 2" copper type K pipe. Pipe shall meet the requirements of ASTM B88, Type K. All service lines for any type of development shall be installed prior to acceptance.

**E. POLYVINYL CHLORIDE (PVC) PLASTIC PIPE**

Pipe sizes 6 inch to 12 inch shall meet the requirements of AWWA C900 Class 150, SDR 18 or heavier.

Pipe sizes 14 inch to 48 inch shall meet the requirements of AWWA C905, SDR 18 or heavier.

Pipe joints shall be integral bell and spigot type with rubber ring sealing gasket. Where restrained joint fittings are used, proper restraint for the type of pipe shall be used. Ductile iron fittings in accordance with these specifications shall be used with PVC pipe. Joints and gasket material shall be as recommended by the pipe manufacturer.

Fully insulated 10 gauge, blue, solid tracer wire shall be buried with PVC pipe (on curb side of pipe) to allow for identification of pipe with electronic location devices. All tracer wire shall run inside all valve boxes and extend a minimum of 18" above top of the valve box. Non-metallic, blue caution tape shall be buried 12"-18" above top of pipe.

For all pipe, the Contractor shall furnish written certification, accompanied by a copy of the manufacturer's pressure test results, to the Utility that the pipe and pipe material have been sampled, tested, and inspected as required in AWWA C900/C905. Tests and certifications shall be of such frequency to be representative of the entire project.

**F. HIGH DENSITY POLYETHYLENE (HDPE) PIPE**

HDPE pipe and bends shall meet the requirements of ASTM D1248, ASTM D3350 (PE 3408), and ASTM F714. The HDPE pipe shall have a minimum SDR 11 with a pressure rating of 160 psi. HDPE pipe shall be in ductile iron pipe (DIP) sizes for 6" and larger pipe. All HDPE pipe shall be joined by means of thermal butt fusion with mechanical joint (MJ) adaptors at ends. Joining of pipe shall be in accordance with the pipe manufacturer's recommendations. Thermal butt fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer. The Contractor shall be responsible to verify the fusion equipment is in good operating condition and that the operator has been trained and certified within the past 12 months. All welds shall be made using a data logger to record temperature & pressure. These measurements along with graphical representation of the fusion cycle shall be part of the quality control records.

HDPE pipe shall be manufactured with blue striping to indicate that the pipe is a water utility pipe.

Tracer wire and marking tape shall be provided in accordance with the PVC pipe section.

For connecting HDPE pipe to pipe of a different material, MJ adaptors shall be used. MJ adaptors shall be attached to the pipe fittings using thermal butt fusion and shall be aligned and centered relative to the pipe. MJ adaptors shall be square with the valve or other flange before tightening bolts. Bolts should not be used to draw flanges into alignment. Bolt threads shall be lubricated and flat washers shall be used under flange nuts. Bolts shall be tightened using manufacturer's recommendations. Twenty-four hours after the first tightening the flange bolts, they must be re-tightened. The final torque shall be as indicated by the manufacturer.

Pipe stiffeners shall be used where stiffening of the pipe is necessary for proper gasket seal. Pipe stiffeners shall be ASTM-240-TP-304 Stainless Steel.

#### **G. GATE VALVE**

Gate valves shall meet the requirements of AWWA C509 and/or AWWA C515. Gate valves shall be resilient seated gate valves and have o-ring seals. Gate valves shall have a non-rising stem that opens counterclockwise (left hand opening) with a 2 inch square nut. Gate valves shall be installed to the proper orientation. Gate valves shall have mechanical joints meeting the requirements of AWWA C-111. The disc shall be SBR coated and the valve body shall be fusion bonded epoxy inside and out. Valves shall be furnished complete with necessary gaskets, bolts, and nuts as needed for mechanical joint ends. All valves shall require pre-cast concrete support pads, as per standard detail drawings. Gate valves shall be selected using the Utility's approved manufacturer list.

#### **H. BUTTERFLY VALVE**

All buried service butterfly valves shall be manufactured in accordance with the latest revision of AWWA C504 for the Specifications for Rubber Seated Butterfly Valves for Class 150B service. Butterfly valves shall be rubber seated with valve seat located on the valve body. For line sizes 20" or smaller, valves shall have bonded seats that meet test procedures outlined in ASTM D-429 Method B.

The valve body shall be constructed of cast iron ASTM A-126 Class B and conform to AWWA C504 in terms of laying lengths and minimum body shell thickness. End connections shall be MJ in accordance with AWWA C111, unless otherwise specified on the plans. The disc shall also be made from cast iron ASTM A-126 Class B in sizes 20" and smaller. Disc shall be furnished with Type 316 stainless steel seating edge to mate with the rubber seat on the body. The valve shaft shall be Type 304 stainless steel conforming to ASTM A-276. Shaft seals shall be standard self-adjusting split V packing. Shaft seals shall be of a design allowing replacement without removing the valve shaft. Bearings shall be sleeve type that is corrosion resistant and self-lubricating. Butterfly valves shall have a fully grease packed actuator and have stops in the open/close position. The actuator shall have a mechanical stop which will withstand an input torque of 450 ft.-lbs. against the stop. The valve shall be opened on a counterclockwise rotation of the wrench nut which shall be 2-inch square cast iron, unless specified otherwise on the plans. The traveling nut shall engage alignment grooves in the housing. The actuators shall have a built in packing leak bypass to eliminate



possible packing leakage into the actuator housing. Butterfly valves shall be selected from the Utility's approved manufacturer list.

**I. VALVE BOXES AND STEM EXTENSIONS**

Valve boxes shall be cast iron, consist of a base covering the operating nut and head of the valve, and shall be provided with all valves that are installed below grade. Valve box aligners shall be used for assuring placement over the center of the operating nut. Valve boxes shall have screw type adjustable riser and shall have a minimum diameter of 5 ¼ inches.

If not located in traffic area, the box shall extend above finished grade and be completed by adding a round pre-cast collar around the top of valve.

If located in a traffic area, the box shall be heavy duty traffic rated and installed such that the top of the box is flush with the adjacent surface.

Tracer wire shall be provided in accordance with the PVC pipe section.

For identification of mainline valves, valve boxes shall have a BLUE non-pop lid with "water" molded in the top. For identification of valves on fire hydrants and fire lines, valve boxes shall have a RED non-pop lid. The lid body shall be designated as heavy duty for H-20 traffic load applications (AASHTO M-306). Lids shall be designed of premium quality materials, capable of operating at temperatures in excess of 250 °F. Lids shall be resistant to UV sunlight, ozone, hydrocarbon fluids, and other chemicals associated with the roadway environment. A rubber seal shall be provided to absorb the direct shock and vibration from traffic impact insuring the lid to stay in place. The rubber retention seal shall be an ozone and chemical resistant thermoplastic elastomer composite. The non-pop lid shall fit snug in the box. A "debris skirt", for prevention of debris from getting into the valve box and to insure a snug fit, shall be factory attached around the top. Additional features shall include an identification disk and locator coil fixed in the underside of the cap for pertinent information and location.

Valve stem extensions shall be provided with all valves with an operating nut greater than 3 feet below the adjacent ground surface. The extension stem shall be of the same size as the valve stem and shall be provided with a stem guide. Use of any type pipe in the placement of the valve box shall not be permitted. Valve boxes shall be selected from the Utility's approved manufacturer list.

**J. TAPPING SLEEVES**

Tapping sleeves shall be the high strength type having a wide body made of steel with a minimum material strength of ASTM 285 Grade C, ASTM A-36 steel or equal. The sleeve shall be fusion epoxy coated to a minimum 12 mils thickness per ANSI/AWWA C-213 and furnished with a type 304 stainless steel plug in the test outlet. Sleeves shall fit the pipe diameter and shall ensure a leak proof joint. Branch connections shall be flanged and gaskets shall be a full circumferential gasket molded of synthetic rubber.

Sleeves 12"x12" and smaller shall have a minimum working pressure of 200 psi and larger sleeves shall have a minimum working pressure of 150 psi. Stainless steel tapping sleeves are NOT ALLOWED by the Utility. Tapping sleeves are inclusive in a water service tap assembly. Tapping sleeves shall be selected from the Utility's approved manufacturer list.

**K. TAPPING VALVES**

Tapping valves shall be resilient seat type with bodies and bonnets made of ductile iron for 250 psi working pressure. Tapping valves shall meet the same requirements and specifications for Gate Valves.

**L. AIR RELEASE LINES**

Air release lines shall be as detailed by project plans and air release service connection, as required by the Engineer. Air release lines shall be as detailed in the standard detail drawings.

**M. CORPORATION STOP AND CURB STOP**

Corporation stops shall meet the requirements of AWWA C800 and shall be self restraining. Curb stops shall be angled for new services. Corporation stops and curb stops shall have grip joint type compression fittings, shall have full port openings, and are included in a water service tap assembly. Corporation stops and curb stops shall be rated for 300 psi and shall be selected from the Utility's approved manufacturer list.

**N. FIRE HYDRANT ASSEMBLY**

Fire hydrants shall meet the requirements of AWWA C502 and shall be of the traffic model design. Locations shall meet the requirements of the 2012 International Fire Code, Appendix C, "Fire Hydrant Locations and Distribution".

Fire hydrants shall have a minimum working pressure of 250 psig and a minimum test pressure of 500 psig. Fire hydrants shall have a 5 ¼ inch valve opening and three-way nozzle section (two 2 ½ inch hose nozzles and one 5 ¼ inch pumper nozzle). Nozzle caps shall be cast or ductile iron and shall be provided with gaskets and chains. Fire hydrants shall have a 1.5 inch pentagon, one-piece operating nut that opens left. The fire hydrant main valve shall close with pressure. Fire hydrants shall have a 6 inch ductile iron mechanical joint inlet. All operating parts, including the drain ring, operating nut, hold-down nut, upper valve plate, seat ring, drain lever, and nozzles shall be made of bronze. The bonnet assembly shall provide for a grease reservoir and lubricating system that lubricates all stem threads and bearing surfaces each time the hydrant is operated. The reservoir shall be completely sealed from the waterway and all external contaminants by two each o-ring stem seals. Fire hydrants shall be factory pre-filled with a lubricant suitable for a working temperature range of -60 °F to +150 °F.

All hydrants shall have pea gravel placed 6" above, below, and around weep holes for draining of barrel. All hydrants shall require concrete thrust blocks.

Gradelok® hydrant adaptor or other approved device may be used for height extensions to existing hydrants.

Fire hydrant shall be epoxy coated and the body of the hydrants shall be painted yellow. Painting of hydrants shall conform to AWWA C502. Bonnets shall be painted the color which is coded to the hydrant's capacity rating determined from fire flow tests conducted by the Utility in accordance with NFPA 291 regulations. After hydrant installation, the Contractor shall test accordingly and provide the Utility all required hydrant test results, as described in the construction requirements of this section. The cost of hydrant testing shall not be the responsibility of the Utility, but instead the Owner or Developer.

At each fire hydrant location, a blue reflector shall be installed in the street to mark the location of the fire hydrant. The reflector shall be blue bi-directional reflective type. The placement of the reflector shall be located in the traffic lane closest to the hydrant in accordance with ALDOT requirements. At intersections, a reflector shall be placed in each of the two streets forming the intersection in accordance with ALDOT requirements.

**O. CONCRETE FOR THRUST BLOCKS AND SUPPORT PADS**

Concrete thrust blocks and support pads shall be required at all fire hydrants and at all fittings. Concrete shall have a 28-day compressive strength of 3000 psi and shall be confirmed with ASTM field specimens and lab testing. The bearing surface shall be as shown or as directed by the Utility. Placement of blocks shall be on undisturbed soil and shall be as such that the pipe and fitting joints will be accessible to repairs. Refer to standard detail drawings.

**P. SERVICE SADDLES**

Service saddles shall be installed only after the main line has been pressurized (hot tapped) and pressure is to be maintained. No taps shall be made on main lines while they are empty or non-pressurized. Service saddles shall be specific for the material being tapped and designed to prevent deformation of pipe. The rubber gasket shall be confined and provide a full life seal against leakage. Saddles shall be heavy duty double strapped and shall be fusion epoxy coated. Service saddle is included in a water service tap assembly and saddles shall be selected from the Utility's approved manufacturer list.

**Q. WATER METER AND BOX**

For meters 1 ½" and 2", concrete meter and boxes with ICI readers shall be Type 36-H by manufactured by Goddard only and jumbo PVC meter box with CI reader shall be Model 1220 manufactured by Carson only. (See Appendix IV: Product Data Sheets for Acceptable Water Meters)

**R. PIPE CONNECTIONS FOR CAST-IN-PLACE CONCRETE**

Where smooth exterior pipes (steel, ductile iron, or PVC) are connected to cast-in-place concrete vault wall or manhole barrel, the space between the pipe and

concrete wall shall be sealed with a wall sleeve, or an assembly consisting of rubber gasket or links mechanically compressed to form a watertight barrier.

When connecting concrete or cement mortar coated steel pipes, or as an option for connecting smooth exterior pipes to concrete vault wall, the space between the pipe and concrete wall may be sealed with an assembly consisting of a stainless steel power sleeve, stainless steel take up clamp and a rubber gasket. The take up clamp shall be a minimum of 9/16-inch wide. The gasket shall provide a positive seal.

#### **4.03 CONSTRUCTION REQUIREMENTS**

##### **A. GENERAL**

##### **1. WATER PIPE**

Pipe shall be laid in the presence of the Utility and/or Engineer. Pipe shall not be covered until allowed by the Utility or designated representative. Pipe designated to be re-laid that is damaged or rendered unfit for use through negligence or improper handling by the Contractor shall be replaced by the Contractor without additional compensation.

All new pipes shall be handled in such a manner as to prevent damage to the pipe and pipe lining. The interior of all pipes, valves, and fittings shall be free from dirt and debris. All material shall be stored in the appropriate manner to protect the materials from damage by freezing and subsequent handling.

The construction methods employed in the adjustment, relocation, abandonment, and placement of the water pipe shall be in accordance with the current codes and practices of the Utility.

Work required on the water main and service lines shall be performed by the Contractor in such a manner that shall limit interruption of the service for a minimum period of time. Notice shall be made by the Contractor to the Customers affected by the service interruption at least 24 hours but not more than 72 hours prior to service interruption. The Owner shall be notified in advance of interruption for coordination.

No valve or other control on the existing system shall be operated for any purpose without the approval of the Utility. When water service interruption is required, all consumers affected by such operation shall be notified at least 24 hours prior to the operation and be advised of the probable time when the service will be restored, unless authorized by the Utility.

Ductile iron pipe shall be wrapped in polyethylene sheath meeting AWWA C105.

When installing water pipe, the Contractor shall install with the pipe a fully

insulated 12 gauge solid wire, blue in color, on the curb side of the pipe to allow for location by electronic detection devices. Locating wire shall be ran through all valve boxes and shall extend 18" minimum above top of valve box. Blue, non-metallic caution tape shall also be buried 12" to 18" above top of the pipe.

Valves and other controls on the existing water system shall not be operated for any purpose by the Contractor without approval and representation by the Utility.

Water mains shall be laid below existing drainage pipes, existing water lines, gas lines, and other utility lines except for sanitary sewer by deflecting pipe downward unless otherwise shown on the plans or approved by the Engineer. Any deflection shall be approved by the Engineer and in accordance with the pipe manufacturer's recommendations.

In subdivisions, mains shall be laid at a minimum of 2 feet from back of curb. For other locations, mains are to be laid so that a minimum of 2 feet from back of right of way is provided, or as shown on plans.

## **2. SEPARATION REQUIREMENTS**

Separation distances shall meet the requirements set forth in the "Ten States Standards – Recommended Standards for Water Works".

Where practical, water mains shall be laid at least 10 feet horizontally (measured inside edge to inside edge) from any force main or gravity sanitary sewer. If maintaining this separation is not practical, then the reviewing authority may allow deviation on a case by case basis, if supported by data from the Engineer.

As shown in the standard detail drawings, water mains crossing sewers shall be laid to provide a minimum vertical distance of 18" between the outside of the water main and outside of the sewer with the water main located above the sewer. On both sides of crossing, the water and sewer mains shall be one full length of pipe encased with HDPE (including casing spacers and end seals).

Water service lines shall not be laid in the same trench as the sanitary sewer laterals and should be placed opposite of the property line from sewer laterals.

PVC pipe installation shall meet the requirements of ASTM D 2321.

HDPE pipe used for the open cut method shall meet the manufacturer's requirement for the pressure rating required for use.

### **3. FIRE HYDRANT ASSEMBLY**

All hydrants shall meet the requirements of AWWA C502 and be of the traffic model design. All hydrants shall be visually inspected by the Utility for compliance with specifications. If the hydrant is not in compliance, the Utility will not accept and will require that the hydrant be returned at the Contractor's expense.

All hydrants shall be thoroughly cleaned of dirt or foreign matter before setting. Hydrants and valves shall be installed in accordance with the manufacturer's recommendations. Locations of hydrants will be determined by the Utility and/or Engineer and shall be in accordance with the spacing requirements per the latest fire code.

Hydrants shall be located for complete accessibility and to avoid damage from vehicles and injury to pedestrians. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb. Hydrants shall not be buried below the manufacturer's bury line, nor shall bury line exceed 3" above finished grade. Hydrant of correct bury length shall be used. Any grade adjustments shall be accomplished with approved hydrant adaptor device. No hydrant extensions are allowed for new hydrant sets.

Existing hydrants shall be adjusted with hydrant extension kits of 6", 12", and 18" extension heights, or as designated on the plans. Extension kits shall be of the same manufacturer as the fire hydrant. Installation of the extension shall be in accordance with the manufacturer's recommendations, unless otherwise specified by the Engineer.

Each hydrant shall be controlled by an independent gate valve. A drainage pit 2 feet x 2 feet x 2 feet shall be excavated below each hydrant and filled with pea gravel or crushed stone to a depth of 6 inches above the hydrant weep holes. The drainage pit shall not be connected to a sewer system. The bowl of each hydrant shall be anchored as shown in the detail drawings.

Concrete support pad shall be provided for restraint support at the hydrant and valve. Refer to the standard detail drawings.

After complete installation of hydrant to the mainline, the Contractor shall coordinate with the Utility and Engineer fire flow testing in accordance with NFPA 291. Fire flow test results shall be provided to the Utility & Engineer for review and determination of the hydrant's capacity rating. The color of the hydrant's bonnet will be based upon the hydrant's capacity rating.

New hydrants shall come epoxy coated and painted yellow in accordance with the requirements set forth in these specifications. The bonnets shall be color coded to the hydrant's capacity rating and painted by the Contractor. The Contractor shall paint the bonnets in accordance with the

following table according to flow test results:

<b>Class</b>	<b>Bonnet Color</b>	<b>Capacity Rating</b>
AA	Safety Blue	1500 gpm or greater
A	Safety Green	1000 gpm- 1499 gpm
B	Safety Orange	500 gpm – 999 gpm
C	Safety Red	Less than 500 gpm

Painting shall be in accordance with the requirements of AWWA C-502. The outside of the hydrant top shall receive one coat of shop-applied primer. After hydrant is installed, it shall be cleaned and primer applied to scraped/abraded areas. Hydrants shall receive an intermediate coat and final coat meeting Federal Specifications TT-E-489 applied at a dry thickness of 2 mils per coat.

Hydrants shall be installed using approved hydrant lifters.

After complete and proper installation of the hydrant, the information listed below shall be provided for each hydrant to the Utility for inclusion in the Utility's hydrant database and system mapping:

- Brass tag number (located on the bonnet and provided by the Utility)
- Address/Primary Street Number
- Nearest Cross Street
- Latitude and Longitude Coordinates
- Northing and Easting Coordinates (State Plane)
- Elevation of Nozzle
- Water Main Size
- Hydrant Barrel Size (inches)
- Hydrant Make
- Hydrant Model
- Hydrant Manufacture Year
- Number of Discharge Openings
- Discharge Coefficient
- Number of Bonnet Bolts
- Location of the Lube Fill Plug
- Turn Opening (Shall be left)
- Comments/pertinent information about the hydrant

#### **4. VALVES AND VALVE BOXES**

All valves shall be resilient seated gate valves and shall meet the requirements of AWWA C509/C515. All valves shall be "Open-Left" (counterclockwise only) and closed when the nut is turned clockwise. All valves shall have a non-rising stem.

Any gate valve with operating nut greater than 36" below the top of the valve box shall be fitted with a stem extension which shall bring the

operating nut no less than 36" from the top of the valve box.

Gate valves shall be plumb and shall be set and jointed to the new pipe as specified for laying pipe. All lateral lines shall be connected to new mains using an anchoring tee. Cast Iron valve boxes shall have the screw type adjustable riser, shall be at least 5 1/4" in diameter, plumb, and centered over the wrench nut of the valve with the box cover flush with the finished pavement or unpaved area. Boxes shall be placed concentrically over the center of the operating nut by use of an approved valve box aligner. Valve box lids shall be non-pop, as described in subsection 6.02.

Boxes shall extend above finished grade and completed by adding 24" round pre-cast collar around top of valve. Collars shall rest on finished grade with top of valve box even with top collar. Valve boxes shall be flush with finished grade, with no collar, if placed in asphalt or concrete. No pipe of any type shall be used in the placement of the valve box.

All valves shall be provided with a pre-cast concrete support pad. Valves shall be installed using approved lifting equipment, such as valve lifters. Air release valves shall not be allowed; air service lines, sized by the Engineer, shall be installed where shown on the plans, or as directed.

#### **5. MECHANICAL JOINT (M.J.) FRICTION RESTRAINING GLAND**

All joints shall be secured friction restraining glands manufactured from ductile iron. The proper friction restraining gland shall be used based on the type of pipe. The use of friction restraining glands does not eliminate the requirement for thrust block restraint. Refer to the standard detail drawings. Friction restraining glands shall be selected from the Utility's list of approved manufacturers.

#### **6. WATER METER AND BOX RESET**

The water meter box shall be adjusted carefully to the designated location and elevation shown on plans. Backfill shall be tamped around each box to the required density of the adjacent material. Any meter, box or accessories lost or rendered unfit for re-use due to negligence or improper handling by the Contractor shall be replaced in kind without additional compensation.

Meter boxes shall be as prescribed in these specifications.

The Utility requires that all meters and backflow preventers larger than 1" be installed by the Contractor. The meter shall be purchased by the Contractor from The Board of Water and Sewer (BW&S) and the backflow preventer shall be provided by the Contractor or Developer. Backflow preventers must be approved prior to purchasing.

All meters and backflow preventers 2-inch or smaller shall be set by the BW&S personnel. 2-inch backflow preventers not installed directly



downstream of the meter will require prior written approval by the BW&S, and installation will be by personnel other than the BW&S.

#### **7. VALVE BOX RESET**

A valve box shall not be reset unless approved by the Utility, Engineer, or as shown on plans. The box shall be adjusted carefully to make sure that the top is at the designated location and elevation. Backfill shall be tamped around each box located in the pavement area to the required density of the adjacent material. Any box or accessories lost or rendered unfit for re-use due to negligence or improper handling by the Contractor shall be replaced in kind without additional compensation.

### **B. TRENCH EXCAVATION AND FOUNDATION**

The trench shall be excavated to the alignment and depth required and for a minimum distance in advance of pipe laying. The trench, unless otherwise specified and when in good soil, shall have a flat bottom, conforming to the grade to which the pipe is to be laid. The pipe shall be laid in the bottom of the trench such that the barrel of the pipe will have bearing for its full length. Any part of the trench excavated below grade shall be corrected with approved material and thoroughly compacted at the Contractors expense.

Excavations for pipe laying shall be done in a manner to cause the least interruption to traffic. All pipe crossings under State roadways shall be installed by jack and bore or directional bore method. No open trenches shall be allowed across State roadways, unless otherwise directed.

The trench shall be dewatered to prevent standing or running water and to allow workmen to work therein efficiently. The discharge of water pumped from the trench shall be led to natural drainage channels or storm drains and not be discharged to sanitary sewers, unless otherwise approved by the Utility. Dewatering shall be done at no extra payment.

The trench width shall be sufficient to permit work on the pipe and inspection of the work. The trench width may vary with and depend on the depth of trench and the nature of the excavated material encountered, but in any case shall be of ample width to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted properly. The minimum trench width shall be 18 inches plus the outside pipe diameter. The trench shall be of a depth sufficient to provide for foundation preparation and proper cover. For pipes 16" and larger, a minimum cover of 48" shall be provided. For pipes smaller than 16", a minimum cover of 36" shall be provided, unless otherwise noted on plans. For pipes crossing under existing or proposed ditches, a minimum cover of 36" shall be provided.

Trenches shall be properly sheeted or braced wherever needed to prevent cave-in or loose soil from falling into the trench. Sides of the trenches shall be kept as near vertical as possible. Bell holes shall be excavated at each joint to permit proper joining and to insure that the pipe rests upon the bottom of the trench for its full length.

In the event that the bottom of the trench is unsuitable material, the trench shall be excavated at a minimum of 6 inches below grade or as directed by the Engineer. The trench shall then be backfilled with Class II sand backfill material (as specified in ALDOT Section 853), or Engineer approved material up to the proper grade elevation.

All excavated material that is not suitable for use as backfill shall be removed from the project site or otherwise properly stockpiled at locations that will not obstruct travelled ways, sidewalks and driveways.

Trees, fences, poles, drives and other property shall be protected unless their removal is authorized. Damages to property shall be restored to its original condition at the Contractor's expense.

### **C. PIPE LAYING**

The pipe shall be laid to the line and grade shown on the project plans with fittings, valves, and hydrants at required locations and with valve and hydrant stems plumb. Pipe shall be fitted and matched to form a smooth, uniform invert. The pipe shall be installed in accordance with the pipe manufacturer's recommendations and as directed by the Engineer.

Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient execution of the work.

Pipes, fittings, valves, and accessories shall be carefully lowered piece by piece in such a manner as to avoid damage and unnecessary handling in the trench. Under no circumstances shall the pipe or accessories be dropped or dumped into the trench.

The pipe shall be examined to make sure that it is free of defects prior to lowering into the trench. All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench. The hubs and bells shall be clean when laid. The pipe shall be kept clean by the use of a non-pressure plug during and after laying. The pipe shall be cleaned of debris and dirt when jointing the pipe. The non-pressure plug shall be used to securely close the ends of the pipes when operations stop to prevent animals, debris, etc. from entering the pipe.

The laying of pipe in finished trenches shall be started at the outlet end and shall be installed up grade with the spigot end pointing in the direction of flow.

Whenever necessary to determine the location of existing pipes, valves, or other underground structures, the Contractor shall examine all available records and shall make all explorations and excavations for such purpose. This investigation shall be made in advance of pipe laying.

Water mains shall have a minimum cover of 48 inches under pavement and 36 inches under ditches. Water service lines shall have a minimum of 36 inches of cover.

Concrete thrust blocking or other approved anchorage restraint shall be provided on all mains 6 inches in diameter or larger at all wyes and tees, plugs, caps and at bends with a deflection angle equal to or greater than 22.5 degrees. Concrete for thrust blocks shall be placed against undisturbed earth.

Walking and working on or over the completed water line, except as necessary for backfilling and tamping, shall not be permitted until at least 1 foot of backfill is in place over the top of the pipe.

#### **D. JOINTS**

All joints shall be sealed for the entire circumference of the pipe providing an acceptable watertight joint. Joints of pipe to pipe (i.e. bell and spigot) shall be installed according to the Manufacturer's specifications. Joints of pipe joined at D.I. fittings shall use friction restraining glands and installed to the Manufacturer's specifications. When transitioning to other pipe material, HDPE pipe shall be joined by means of a butt-fused MJ adaptor.

The installation of rubber gasket joints shall be in accordance with the pipe manufacturer's recommendations or otherwise, as directed by the Engineer. Any joint that is disturbed after joining shall be removed, cleaned, and re-laid at no extra cost.

At restrained joint locations, locked mechanical joint retainer glands or restrained joint gaskets of adequate strength shall be used to prevent movement of the water main in addition to the concrete thrust block.

#### **E. BACKFILLING**

Backfilling shall be performed immediately after inspection as directed by the Engineer to secure the pipe position prior to proceeding to the next section. The backfill material shall be in accordance with the "Backfilling" Section of these Specifications.

Where roadways and other crossings are disturbed, the Contractor shall restore them to their original condition and shall replace all surface material and all paving, sidewalks, sod, or other disturbed surfaces, by furnishing all necessary new materials to restore to original condition.

All trenches and excavations shall be backfilled with approved natural soil or, when directed by the Engineer, with select foundation backfill material.

Sand backfill shall be provided from bottom of trench to a minimum of 3" above piping around all valves, tees, hydrants, fittings, etc as per the standard detail drawings.

After completing the backfill, the Contractor shall promptly remove all surplus material, rubbish, and all equipment, leaving the site and adjacent areas in a neat and presentable condition. ALL trash shall be disposed of properly, during and after construction.

**F. CONNECTION TO EXISTING WATER SYSTEM**

Connection to the existing water system shall be made as shown on the plans, as directed by the Utility and/or Engineer, as well as in the presence of the Utility and/or Engineer. The connection shall be made to minimize interruption of service. The Contractor shall notify the Utility at least 48 hours prior to connecting to the existing system.

**G. STERILIZATION / DISINFECTION**

Pipe lines and appurtenances, both existing and new, which are the responsibility of the Contractor by being within the overall limits of construction, shall be sterilized before being placed in service. The sterilization process shall be performed and accepted before all pressure tests have been performed to prevent contamination of the existing system.

The sterilization process shall, at a minimum, shall meet AWWA Standard for Disinfecting Water mains (ANSI/AWWA C651, latest edition). Prior to disinfection, all dirt and foreign matter shall be removed by thoroughly flushing the hydrants or other approved means. Each valved section of newly laid pipe shall be flushed independently. The Contractor shall contact the Utility to discuss and determine the acceptable sterilization treatment process to implement.

Bacteriological samples shall be taken after final flushing has been completed and shall be tested by a state certified laboratory for bacteriological quality.

Samples shall be taken at locations selected by the Utility and/or Engineer but shall be no less than 1 sample per 3000 feet of pipe or 1 sample from each dead end line, whichever is greater. If the initial disinfection fails to produce satisfactory bacteriological samples, the main shall be re-flushed and re-sampled. Samples shall not show the presence of coliforms. Copies of all bacteriological test results shall be provided to the Utility for approval.

Following the chlorination, the treated water shall be thoroughly flushed from the newly laid pipeline. Discharge of chlorinated water shall conform to all local, state, and federal regulations. The Utility shall be notified at least 48 hours prior to disinfection. Test results shall be submitted to the Utility for approval. The Utility shall receive all original copies of test results.

**H. PRESSURE TESTING OF INSTALLED LINES**

**1. GENERAL**

Water lines shall be pressure tested in accordance with AWWA C600. The Contractor shall test the mains and service lines after specified backfill has been in place.

The Utility shall be present at the start, finish and anytime of a change during the testing and shall be notified 48 hours in advance of testing.

## **2. TESTING**

**MAINS:** When a section of pipe is approved by the Utility for testing, the Contractor shall furnish all materials, equipment, and labor to properly carry out the testing operation. This shall include, as a minimum, a test pump and a means of accurately measuring the volume of water necessary to maintain the required pressure during the prescribed time of testing. A recording pressure gauge shall be used during the pressure test and the charts shall be provided to the Utility and Engineer.

The Contractor shall furnish, install, and remove any temporary bulkheads, flanges, and plugs, as well as corporation stops at high points in the pipe line and at the test pump, when such are necessary for the testing operation.

All water mains, including corporation stops, service lines, hydrants, and other appurtenances connected to the mainline shall be tested as a complete system.

After necessary joints, corporation stops, bulkheads, etc. have been installed, temporary corporation stops, if no other means can be provided, shall be placed in the high points of the pipe line and at the pumps as required, to remove air from the water system.

The test pressure shall be a minimum of 150 psi or more than the pressure class of the pipe being tested. The minimum test period shall be six hours. However, the testing period shall be extended if the Engineer deems additional testing is necessary with no additional compensation given for the additional testing. The maximum leakage allowed shall be determined by the following formula:

$$L = S D P^{1/2} / 148,000$$

*where, L = allowable leakage in gallons/hour*

*S = length of pipe tested in feet*

*P = test pressure in psi*

*D = nominal diameter of the pipe in inches*

The Contractor shall provide suitable means for determining the quantity of water lost by leakage under the test pressure.

All test results shall be submitted to Utility and Engineer for approval. The Utility shall receive all original copies of test results.

The Contractor, at his expense, shall locate and repair defective joints, sections, or valves until the leakage is within the noted allowances. All observed leaks shall be repaired whether or not the leakage test results are within the requirements specified above. After the Contractor has made the necessary corrections, the main shall be retested as described above until the line passes the necessary requirements. All tests, and

retests, shall be at the Contractor's expense.

WATER SERVICE LINES: These lines shall be checked under normal operating pressures for at least six hours and the line completely inspected for visible leaks unless checked along with the main. The Contractor, at his expense, shall locate and repair or replace any connection or joint until leakage has been stopped.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 5 ENCASEMENT PIPE**

### **5.01 SCOPE**

This section shall include the work of furnishing and installing an encasement pipe for a utility carrier pipe. The type of installation will be based on the location of the encasement pipe. The three types of installation are designated as follows:

- Type 1 - Open cut
- Type 2 - Jack and bore
- Type 3 - Directional drilling

Type 2 and Type 3 installations are intended for use under existing facilities and where traffic is not to be disturbed.

### **5.02 MATERIALS**

#### **A. WELDED STEEL ENCASEMENT PIPE**

Welded steel encasement pipe shall comply with the appropriate requirements for the size shown in the following table unless local codes or ordinances are more stringent:

Pipe Diameter (Inches)	Minimum Wall Thickness (Inches)	Pipe Requirements
<4	Sch. 40	ASTM A 53, Grade B
4-12	0.188"	ASTM A 252, Grade 2
>12-24	0.250"	ASTM A 252, Grade 2
>24	0.375"	ASTM A 252, Grade 2

All pipe shall be coated inside and out with at least one shop coat of an approved primer paint. In addition, the external surface shall be treated with one coat of asphaltum paint, meeting the requirements of Federal Specification TT-C-454B Type II, Composition G. Fusion-Bonded Epoxy Coating, meeting the requirements of AWWA C213, may be used as an alternative to the shop coat primer and asphaltum paint. Other approved protection material may be used with prior approval by the Utility.

#### **B. ENCASEMENT SPACERS**

Spacers shall be stainless steel or as approved by the Utility. The spacer shall be sized for the carrier pipe and encasement pipe used.

**C. ENCASEMENT END SEALS**

Encasement end seals shall be synthetic rubber with a stainless steel zipper or closer. The seal shall be secured to the encasement with a stainless steel band clip or thumbscrew clip with a polyethylene strip placed under each clip. Proper flexibility between the carrier pipe and the encasement pipe shall be provided.

**D. HIGH DENSITY POLYETHYLENE (HDPE) PIPE**

HDPE pipe and bends 4 inches and smaller shall meet the requirements of ASTM D1248, ASTM D 3350 (PE 3408 cell classification 335434C), and ASTM F 714. The HDPE pipe shall have a minimum wall thickness of SDR 11.

**5.03 CONSTRUCTION METHODS**

**A. OPEN CUT METHOD**

The trench shall be excavated true to established lines and grades as shown on the project plans. Tunneling will not be permitted unless authorized in writing. Trenches shall be excavated at least 9 inches on each side of the pipe. Trenches shall be properly sheeted or braced wherever needed to prevent cave-in or loose soil from falling into the trench. Sides of the trenches shall be kept as near vertical as possible. Bell holes shall be excavated to insure that the pipe rests upon the bottom of the trench for its full length.

In the event that the bottom of the trench is in rock or is unsuitable material, the trench shall be excavated at a minimum of 6 inches below grade or as directed. The trench shall then be backfilled with crushed stone up to the proper grade elevation.

All excavated material that is not suitable for use as backfill shall be removed from the project site or otherwise satisfactorily disposed.

The trench shall be dewatered to prevent standing or running water, and to allow for proper installation.

**B. JACK AND BORE METHOD**

The Contractor shall submit the procedure proposed for the Type 2 installation (jack and bore) to the Utility at least 7 calendar days prior to the beginning of installation. The submittal will not be approved but will be reviewed for completeness. Work shall not begin until the Utility is satisfied that the submittal is complete. The submittal shall contain a list of all equipment proposed for use and a description of the procedure proposed for installation.

The encasement pipe shall be installed simultaneously with the boring action. The results of this procedure shall produce a neatly installed encasement pipe without damage to the existing facilities (roadbed, slopes, etc.) and without excessive voids in the earth surrounding the encasement pipe. If there are indications that voids exist around the encasement, the Contractor shall pump a



concrete grout under pressure to seal the voids. Any damage to facilities caused by the installation operation shall be restored by the Contractor.

**C. DIRECTIONAL DRILL METHOD**

The Contractor shall submit to the Utility the details of the procedure and equipment proposed for the directional drilling at least 7 calendar days prior to beginning the drilling. The directional drilling procedure shall produce a neatly installed carrier pipe without damage to existing facilities (roadbed, slopes, etc.) and without excessive voids in the earth surrounding the pipe. If there are indications that voids exist around the pipe, Contractor shall pump under pressure a concrete grout to seal the voids. Any damage to facilities caused by the installation operation shall be restored by the Contractor to the satisfaction of the Utility.

Installation of the pipe shall meet the requirements of ASTM F 714. Joining of the HDPE pipe shall be performed by thermal butt-fusion in accordance with the pipe manufacturer's recommendations. The piping shall be assembled in a manner that does not obstruct adjacent roadways or public activities.

The pipe installed by the directional drill method shall be to the alignment and grade shown on the project plans. The Contractor shall provide a record drawing showing the constructed horizontal and vertical alignment shown for intervals not exceeding 30 feet.

The Contractor shall perform the construction in a manner so that the drilling fluids and cuttings are contained and not released into waterways or their tributaries. The Contractor shall handle the HDPE and steel pipe in a manner that will not over stress the pipe at any time before, during, and after construction. A sizing pig shall be used to determine the presence of buckles, dents, out of roundness, and any other deformations. Anomalies shall not exceed 2% of the nominal pipe diameter or excessive ovality greater than 5% of the nominal pipe diameter.

**\*\*\*END OF SECTION\*\*\***



## ***Appendices - Table of Contents***

### Appendices:

- Appendix I: Approved Manufacturer List
- Appendix II: Backflow Prevention Policy and Cross Connection Control
- Appendix III: Standard Detail Drawings



***Appendix I: Approved Manufacturer List***

### APPROVED MANUFACTURERS LIST

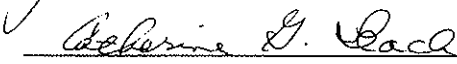
<u>ITEM</u>	<u>APPROVED MANUFACTURERS</u>
PIPE (CU)	MUELLER
PIPE (DI)	AMERICAN, U.S. PIPE, MCWANE
PIPE (PVC)	JM MANUF., VULCAN PLASTICS, NORTH AMERICAN, ETI
PIPE (HDPE)	JM MANUF., POLYPIPE, PERFORMANCE PIPE, INDEPENDENT PIPE PRODUCTS
GATE VALVE (DBL. DISC)	KENNEDY, MUELLER, CLOW
GATE VALVE (SEATED)	MUELLER, AMERICAN, KENNEDY, CLOW, M&H
BUTTERFLY VALVE	CENTERLINE 504, PRATT, CLOW, KENNEDY
GLOBE VALVE	NIBCO, WATTS
CHECK VALVE	MUELLER, AMERICAN, KENNEDY, CLOW, M&H
JOINT RESTRAINT (DI)	EBAA
FITTINGS (CI OR DI)	AMERICAN, STAR, TYLER, U.S. PIPE, MCWANE
VALVE BOXES	TYLER UNION
VALVE BOX TOPS	S W SERVICES
TAPPING VALVES	AMERICAN, KENNEDY, CLOW, MUELLER
TAPPING SLEEVES (M.J.)	AMERICAN, U.S. PIPE, MCWANE
CORPORATION STOPS	FORD, AY MCDONALD
CURB STOPS	FORD, AY MCDONALD
FIRE HYDRANTS	AMERICAN, KENNEDY, M&H, MUELLER, CLOW
SERVICE SADDLES	ROMAC, FORD, SMITH AND BLAIR, JCM
WATER METER & BOX	BADGER
AIR RELEASE VALVE	APCO, VAL-MATIC



***Appendix II - Backflow Prevention Policy & Cross Connection Control***

**CROSS-CONNECTION CONTROL PROGRAM**  
**FOR**  
**SARALAND WATER SERVICE**  
**IN ACCORDANCE WITH PUBLIC LAW 805**  
**AND**  
**22-23-30 CODE OF ALABAMA 1975**  
**AND SAFE DRINKING WATER ACT OF 1977**  
**AS AMENDED**  
**AND THE SBCCI STANDARD CODES, 1985 EDITION**  
**REVISED PROCEDURES ADOPTED THE**  
**19<sup>TH</sup> DAY OF JUNE, 2003**

  
Chairman

  
Attestee

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## 1. INTRODUCTION

Saraland Water Service in its operation of a public potable water supply system is required to ensure protection of public health through the provision of minimum requirements and standards for design, construction, operation, and maintenance of the system. It is essential that physical cross-connections, which create or have the potential to create an imminent and substantial danger to public health be eliminated from the distribution system and plumbing systems of customers. Backflow can result in the potable water system becoming a transmitter of disease, toxic materials and other hazardous liquids. Therefore, it is necessary to establish and maintain a Cross-Connection Control Program to protect the health of water customers by the control of actual and/or potential cross connections through the methods of containment and/or isolation.

## 2. AUTHORITY

The Alabama Department of Environmental Management requires public water supply systems to establish a routine Cross-Connection Control Program for the purpose of detecting and preventing cross-connections that create or have the potential to create an imminent and substantial danger to public health by and from contamination due to the cross-connection. Upon detection of a prohibited cross-connection both community and non-community water systems shall either eliminate the cross connection by installation of an appropriate backflow prevention device acceptable to the Board or discontinue service until the contaminant source is eliminated. Such program shall be developed utilizing accepted practices of the American Water Works Association guidelines as set forth in AWWA manuals M14,



“Backflow Prevention and Cross Connection Control” and “Cross Connections and Backflow Prevention”, 2<sup>nd</sup> edition.

### 3. DEFINITIONS

Air Gap Separation – An unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood rim of the receptacle, and shall be at least double the diameter of the supply pipe measured vertically above the flood level rim of the vessel. In no case shall the gap be less than one (1) inch. This gap shall also be above the established 100-year flood level.

Atmospheric Vacuum Breaker – A backflow prevention device, which is operated by atmospheric pressure in combination with the force of gravity. The unit is designed to work in a vertical plane only. The moving part consists of a poppet valve, which must be carefully sized to slide in a guided chamber and effectively shut-off the reverse flow of water when a negative pressure exists.

Auxiliary Water Supply – Any water supply on or available to the premises other than the purveyor’s approved public potable water supply. These auxiliary water supplies may include water from another purveyor’s public water supply or any natural source(s) such as a well, spring, river, stream, harbor, etc., or “used waters” or “industrial fluids”. These waters may be polluted, contaminated, or may be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

Backflow – The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable supply of water from any source or sources other than its intended source.

Back Pressure – Backflow caused by a pump, elevated tank, boiler or other means that could create pressure greater than the supply pressure.

Back Siphonage – Backflow due to a negative or sub-atmospheric pressure within a water system.

Backflow Prevention Device – A device to counteract back pressure or prevent back siphonage.

Backflow Prevention Device – Approved – The term approved backflow prevention device shall mean a device that has met the requirements of one or more of the following standards:

AWWA – C-505	Standard for backflow prevention devices, reduced pressure principle and Double Check valve types.
ASSE – 1001	Atmospheric type vacuum breakers.
ASSE – 1011	Hose connection vacuum breakers.
ASSE – 1020	Pressure type vacuum breakers.
ASSE – 1024	Dual Check Type backflow preventer (Residential use only).
ASSE – 1013	Reduced pressure principle back pressure backflow preventers.
ASSE – 1015	Double check valve type back pressure backflow preventers.

USC-FCCC

University of Southern California Foundation for Cross-  
Connect Control and Hydraulic Research.

Containment - A method of controlling potential and/or confirmed cross-connection by installation of a double check assembly or a reduced pressure principle backflow prevention device.

Cross-Connection – Any physical arrangement whereby a public water supply system is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture or other device which contains or may contain contaminated water, sewage, or other waste or liquid of unknown or unsafe quality, which may be capable of imparting contamination to the public water supply system as a result of backflow. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or any other temporary or permanent devices through which or because of which backflow could occur are considered to be cross-connections.

Double Check Valve Assembly – An assembly composed of two single, independently acting check valves, including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve.

Health Hazard – Any conditions, devices, or practices in any water supply system or in its operation, which create or may create a danger to the health and well being of the water consumer.

Isolation – A method of controlling potential and/or confirmed cross-connections by installation of an air gap separation or a vacuum breaker.

Pressure Vacuum Breaker – A pressure vacuum breaker is similar to an atmospheric vacuum breaker except that the checking unit “poppet valve” is activated by a spring. This type of vacuum breaker does not required a negative pressure to react and can be used on the pressure side of a valve.

Public Water Supply – Any system or water supply intended or used for human consumption or other domestic use, including source, treatment, storage, and distribution where water is furnished to any community, collection or number of individuals, or is made available to the public for human consumption or domestic use, but excluding supplies serving one single-family residence.

Reduced Pressure Principle Backflow Prevention Device – A device incorporating two or more check valves and an automatically operating differential relief valve located between the two check valves, two shutoff valves and equipped with necessary appurtenances for testing. The device shall operate to maintain the pressure in the zone between the two check valves, less than the pressure of the public water supply side of the device even at cessation of normal flow. In the case of leakage of either check valve, the differential relief valve shall operate to maintain this reduced pressure by discharging to the atmosphere. When the inlet pressure is two pounds per square inch or less, the relief valve shall open to the atmosphere, thereby providing an air gap in the device. This air gap shall also be above the 100-year flood level.

#### 4. RESPONSIBILITY

- (a) Saraland Water Service is responsible for the protection of its public potable water distribution system from backflow of contaminants or

pollutants through any water service connection. If, in the judgment of the Board, an approved backflow prevention device is required at the water service connection to any of its customer's premises for the safety of the users of the water system, the Board shall give notice in writing to the customer that an approved backflow prevention device shall be installed at the customer's expense.

- (b) Failure, refusal or inability on the part of the customer to meet the Board's time schedule for installation of this device or devices shall constitute grounds for discontinuance of water service until such device or devices have been properly installed. Any licensed plumber may install the proper device in the correct manner.
- (c) Compliance testing after initial installation of a backflow prevention device shall be performed by the Board.
- (d) In the event of any known or suspected accidental pollution or contamination of the consumer's or the Board's potable water, the consumer shall promptly take steps to confine any further spread of pollution or contamination and shall immediately notify the Board of the situation.

## 5. POLICY

- (a) All premises having an auxiliary water supply which is not or may not be of safe bacteriological or chemical quality and which is not acceptable as an additional source to the Board shall have an approved air gap separation or an approved reduced pressure principle backflow

prevention device installed in order to protect the public water supply against backflow.

- (b) For all premises where there is water or substances that could be objectionable but not hazardous to health, if introduced into the public water system, the public water system shall be protected by an approved air gap separation, or an approved double check valve assembly, or an approved vacuum breaker.
- (c) For all premises where there is any material dangerous to health, which is handled in such a fashion as to create an actual or potential hazard to the public water system, the public water system shall be protected by an approved reduced pressure principle backflow prevention device. Examples of premises where these conditions have been found to exist include sewage treatment plants, sewage pumping stations, chemical manufacturing plants, hospitals, mortuaries, and planting plants.

#### **FACILITIES REQUIRING BACKFLOW PREVENTION DEVICES:**

(AG=Air Gap Separation, DC=Double Check Valve Assembly, RP=Reduced Pressure Principle Backflow Prevention Device, VB=Vacuum Breaker (type to be designated))

##### Type of Facility & Type of Protection

Ice Cream & Dairy Products – AG or DC

Car Wash – AG or RP

Chemical Plant – AG or RP

Film Lab or Development – AG or RP

Food or Beverage Processing Plant – DC

Hospitals, Clinics and Medical Buildings – AG or RP

Laboratories – AG or RP

Laundries or Dry Cleaners – DC

Machine Tool Plants (health hazard) – AG or RP

Machine Tool Plants (no health hazard) – DC  
Metal Plating Plants – AG or RP  
Morgues, Mortuaries or Autopsy Facilities – AG or RP  
Multistoried Buildings – AG or DC  
Packing Houses – AG or RP  
Paper Product Plants – AG or RP  
Pesticides & Herbicides Exterminators – AG or RP  
Petroleum Processing Plants – AG or RP  
Petroleum Storage Plant or Yard (health hazard) – AG or RP  
Petroleum Storage Plant or Yard (no health hazard) – DC  
Pharmaceutical 1 or Cosmetic Plants – AG or RP  
Piers, Docks or Water Front Facilities – AG or RP  
Power Plants – AG or RP  
Radioactive Material Plants – AG or RP  
Sand and Gravel Plants – DC  
Schools with Laboratories – DC  
Irrigation Systems – DC  
Irrigation Systems (with Chemical Feed) – AG or RP  
Swimming Pools – AG or RP  
Sewage Treatment Plants – AG or RP  
Sewage Pumping Stations (health hazard) – AG or RP  
Sewage Pumping Stations (no health hazard) – DC  
Sewage Pumping Stations (outside hose bibs only) – VB  
Premises having water re-circulating systems and pumps (health hazard) – AG or RP  
Premises having water re-circulating systems and pumps (no health hazard) – RP or DC  
Premises having boiler, cooling systems, or hot water heating systems where chemical water conditioners are used – AG or RP  
Premises having storage tanks, reservoirs, ponds, etc. – AG or RP  
Veterinary Establishments – AG or RP

## 6. INSPECTION

- (a) Saraland Water Service shall conduct inspections of customer's premises where suspected cross-connections or potential cross-connections may exist. Customers shall be notified in advance of the inspections and the reason for the inspections. Should any cross-connections or potential cross-connections be detected, the customers shall be notified in writing of the appropriate type of backflow prevention device to be installed.

Refusal by a customer to allow an inspection shall be considered prima facia evidence of the existence of cross-connections, thereby requiring the installation of an approved reduced pressure principle backflow prevention device or the disconnection of service.

- (b) For existing facilities, customers will be asked to complete a questionnaire on their water usage in order to make a preliminary determination of the potential health hazard to the Board's water distribution system. When such information or other knowledge indicates a potential health hazard, a survey of the customer's water system shall be conducted. Such surveys need not be a detailed inspection of the location or disposition of water lines, but can be confined to establishing the water use on premises; the existence of any cross-connections; the availability of auxiliary water supplies; the use or availability of pollutants, contaminants, or other liquids, solid or gaseous substances that may be used industrially for stabilization of water supplies and other procedures for determining the degree of health hazard.
- (c) All new services shall be classified at the time of application to indicate the degree of hazard anticipated and hence, the type of device required. This information shall be given to the applicant in writing. Any later change in water usage may require a change in the type of device. If no realistic evaluation of the proposed water uses can be determined, the customer, architect, engineer or other appropriate individual should be



advised in writing that eventually circumstances may require the installation of additional backflow protection of the water supply serving the premises.

- (d) All water customers of the Saraland Water Service shall be required to notify the Board in writing, of any changes in their water usage. These changes will be evaluated to determine if there is an increase in the potential health hazard and if such increase requires the installation of a device. If a device is already in place, it will be determined if this device is adequate or if a different type of device is required.

## 7. RECORDS

Appropriate records shall be maintained by the Board of all potential and confirmed cross-connections. Installations and tests of backflow prevention devices shall be recorded and filed for future reference.

## 8. MAINTENANCE

- (a) Routine testing of backflow prevention device(s) shall be performed by the Board. The frequency of testing will be dependent upon the type of device installed and the potential health hazard involved.
- (b) Customers will be notified in advance of the date and approximate time any testing will be performed. It will be necessary to shut off the water service for a period not exceeding fifteen (15) minutes and every effort will be made to schedule tests to suit the customer's convenience. If the customer's operations cannot permit any interruption of service, it will be the customer's responsibility to have two approved backflow prevention

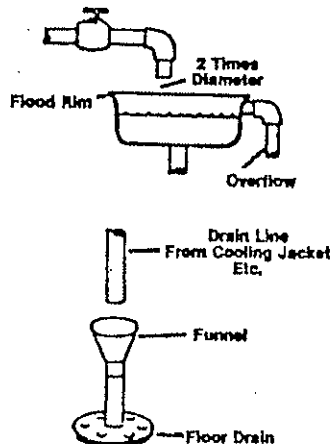
devices installed in parallel so that one may be used while the other is being tested. Bypasses around backflow prevention devices are expressly forbidden.

- (c) If any devices are found to be faulty, the customer will immediately be notified and will be required to have the device promptly repaired or replaced at his expense. In high hazard situations, it may be necessary to terminate service until a properly operating device is in place. The customer shall notify the Board as soon as any faulty device has been corrected so that it may be re-tested.

## 5.04 Backflow Prevention Devices (Illustrated)

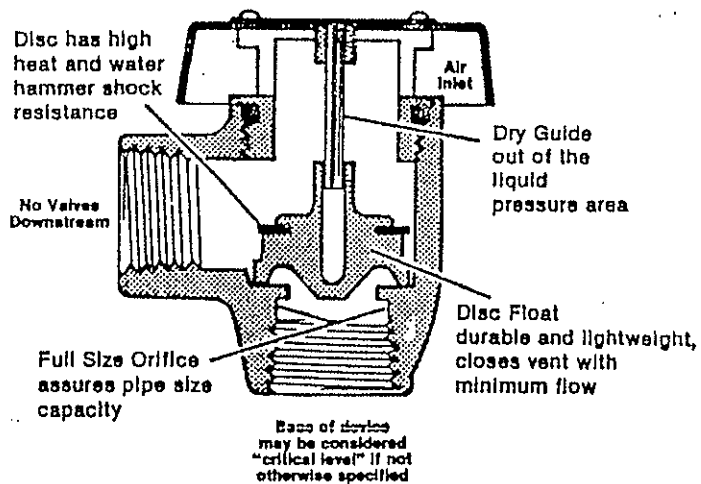
### AG — Approved Air-gap

- good for toxic and non-toxic substances
- good against backpressure and backphoning
- a distance of 2-times the diameter of supply pipe, never less than a 1" gap
- best protection against backflow provided it is installed properly and not circumvented
- ANSI Standard No. A112.1.2



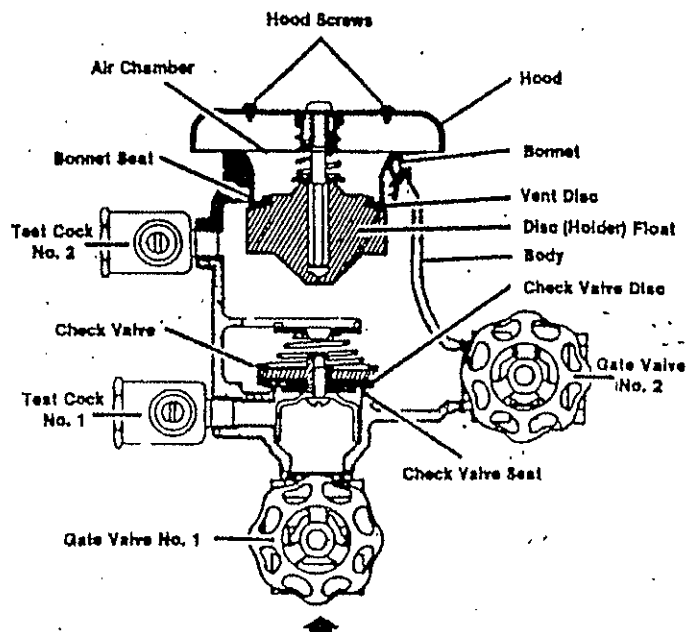
### AVB — Approved Atmospheric Vacuum Breaker

- good for most toxic and all non-toxic substances
- good for backphoning ONLY
- no control valves on discharge side of device
- minimum of 6" between base of device and highest outlet
- no more than 12 hours continuous service in a day
- sizes available: 1/4" - 3"
- ASSE Standard No. 1001



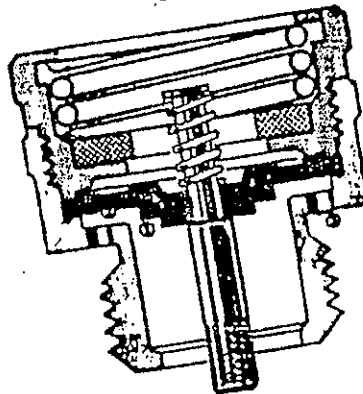
### PVB — Approved Pressure Vacuum Breaker

- good for toxic and non-toxic substances
- good for back-siphonage ONLY
- can be installed under continuous pressure (valves downstream)
- Minimum of 12" between base of device and highest outlet
- must be tested annually
- sizes available: 1/4" - 2" (2 1/2" - 10" not normally used)
- ASSE Standard No. 1020



### HBVB — Approved Hose Bibb Vacuum Breaker

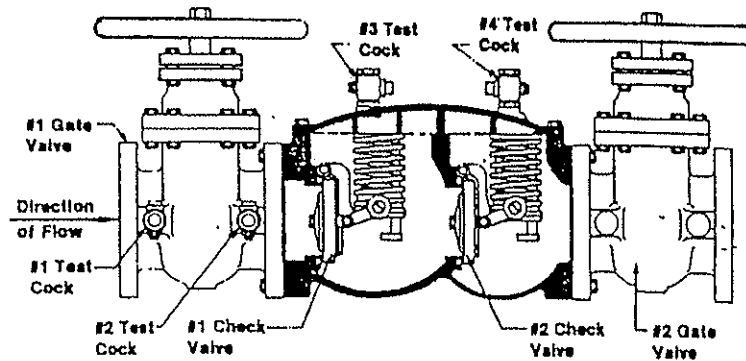
- to be installed on all hose threaded faucets
- good against back-siphonage and VERY LOW backpressure
- not to be subject continuous pressure
- no more than 12 hours continuous service in a day
- sizes: 1/4"
- ASSE Standard No. 1011



With loss of water supply, disc (1) seals tightly against diaphragm (2) preventing back-siphonage or backflow of water and opens atmospheric vents (3)

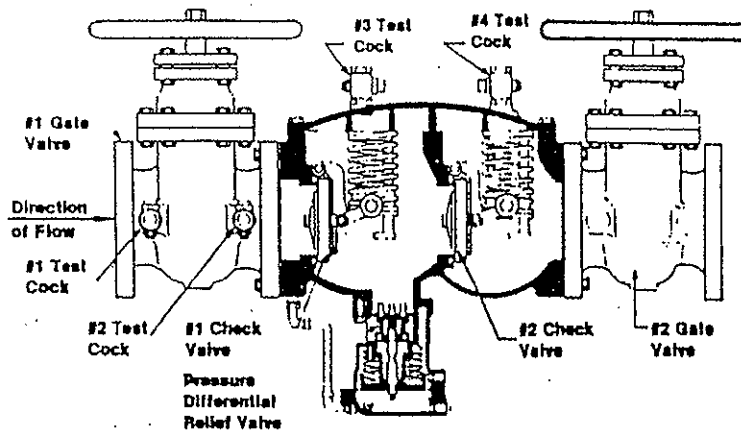
### DCVA — Approved Double Check Valve Assembly

- good for non-toxic substances such as steam, air, food, beverages
- good against backslphonage and backpressure
- Installed minimum of 12" above ground or flood level
- must be tested annually
- sizes available:  $\frac{1}{4}$ " - 10"
- ASSE Standard No. 1015 or AWWA Standard C508-78



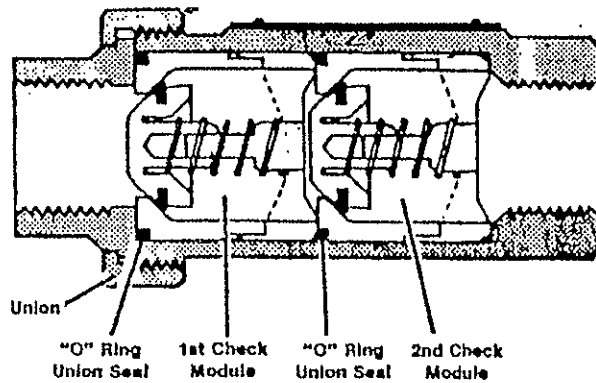
### RP — Approved Reduced Pressure Principle Backflow Preventer

- good for toxic and non-toxic substances
- good against backslphonage and backpressure
- Installed minimum of 12" above ground or flood level
- must be tested annually
- sizes available:  $\frac{1}{4}$ " - 10"
- ASSE Standard No. 1013 or AWWA Standard C508-78



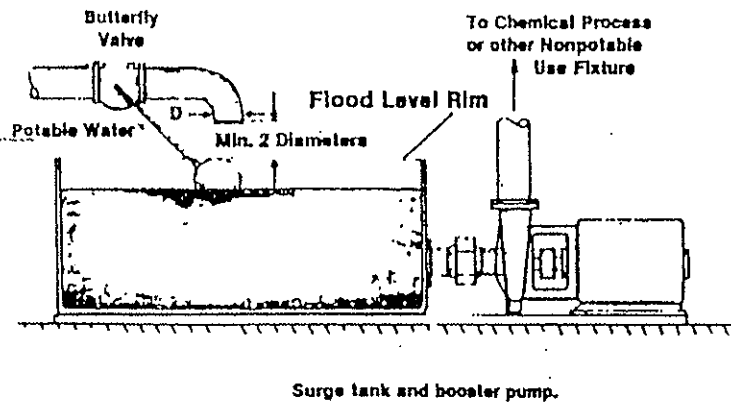
### Dual Check Valves

• ASSE Standard No. 1024 suited particularly for installations immediately downstream from residential water meters where potential pollutants from residences could enter the water mains.



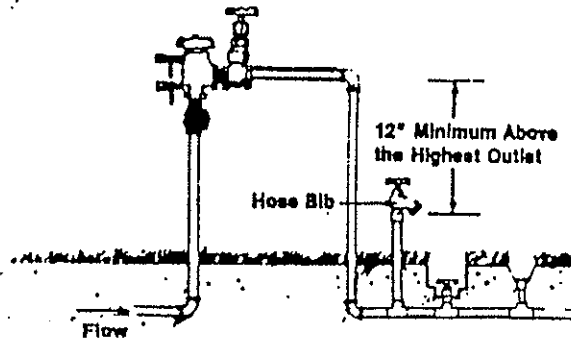
### 5.05 TYPICAL INSTALLATIONS (ILLUSTRATED)

#### Airgap Separation



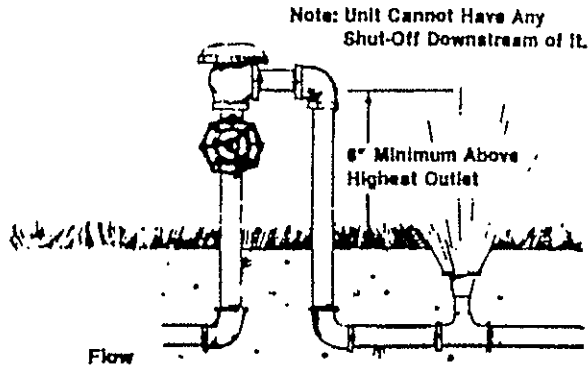
### Pressure Vacuum Breaker

The pressure vacuum breaker cannot be installed where there can be backpressure only where there can be backsiphonage. The pressure vacuum breaker can have shut-off valves downstream of the device. The PVB must be installed at least 12" above the highest outlet or, if it is feeding an open tank, at least 12" above the highest overflow rim of the tank. The following figure shows a typical installation on a sprinkler system.



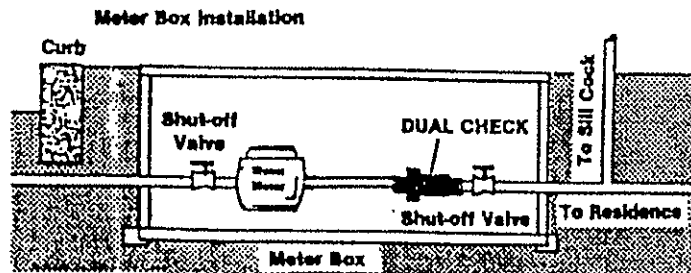
### Atmospheric Vacuum Breaker

Just as the pressure vacuum breaker, the atmospheric vacuum breaker cannot be installed where there can be backpressure, only where there can be backsiphonage. The atmospheric vacuum breaker cannot have any shut-off valves downstream of it. It also must be installed at least 6" above the highest outlet or the topmost overflow rim of a non-pressure tank. The following illustration shows the AVB on a sprinkler system.

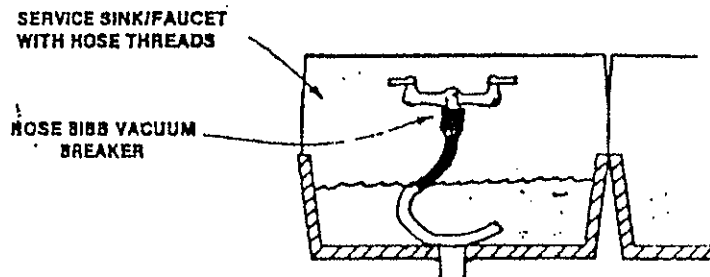


## DUAL CHECK BACKFLOW PREVENTER

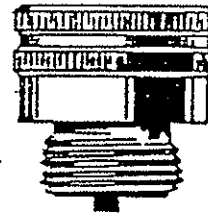
(FOR RESIDENTIAL USE ONLY)



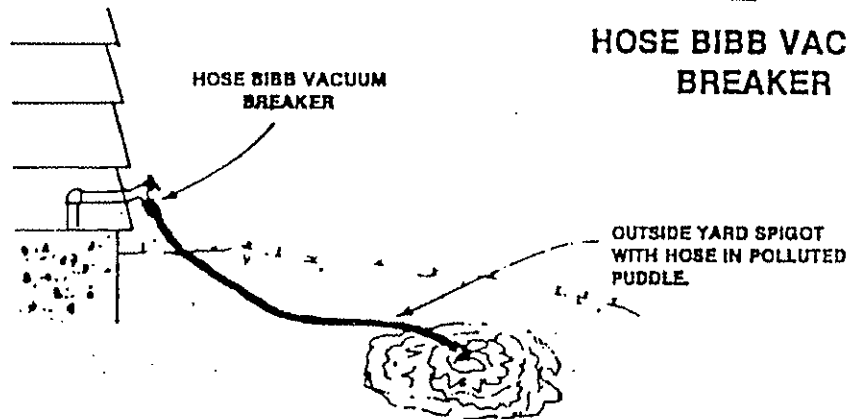
## HOSE BIBB VACUUM BREAKER



TYPICAL INSTALLATION ON SERVICE SINKS, LAUNDRY TUBS, DEVELOPING TANKS AND WASHING MACHINES.



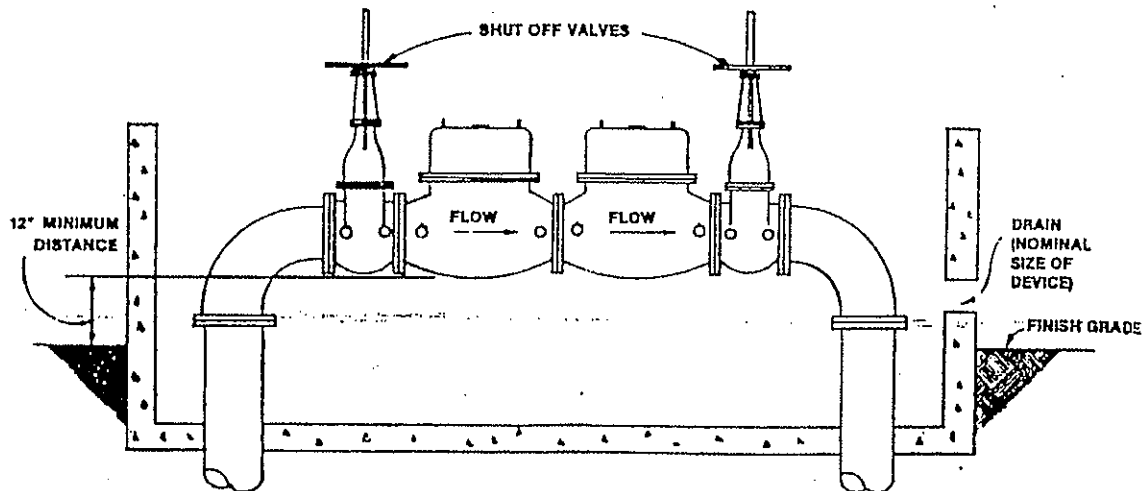
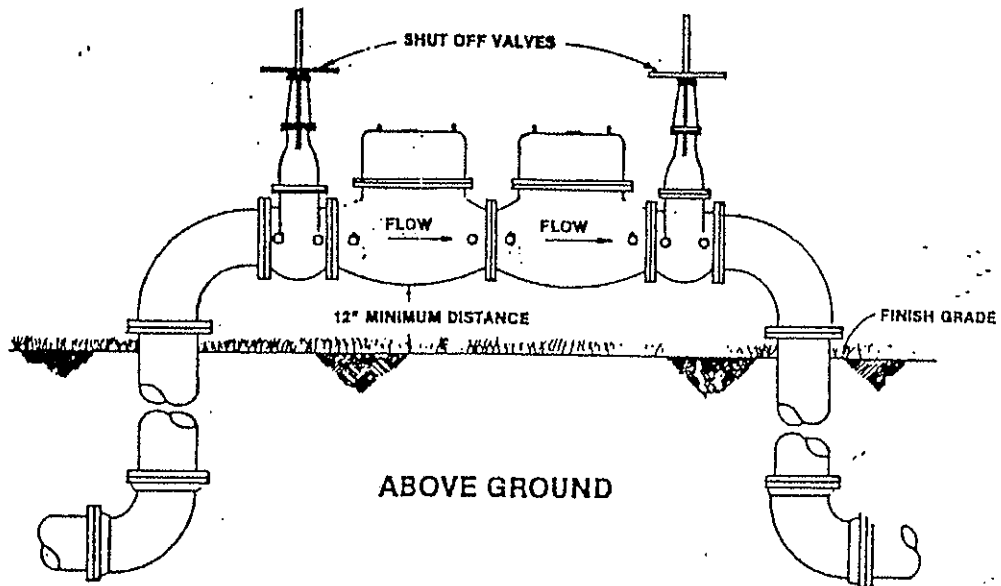
HOSE BIBB VACUUM  
BREAKER



TYPICAL INSTALLATION ON SILL COCKS, HOSE BIBBS, YARD HYDRANTS, SWIMMING POOLS, WASH RACKS AND OTHER FAUCETS WITH GARDEN HOSES.

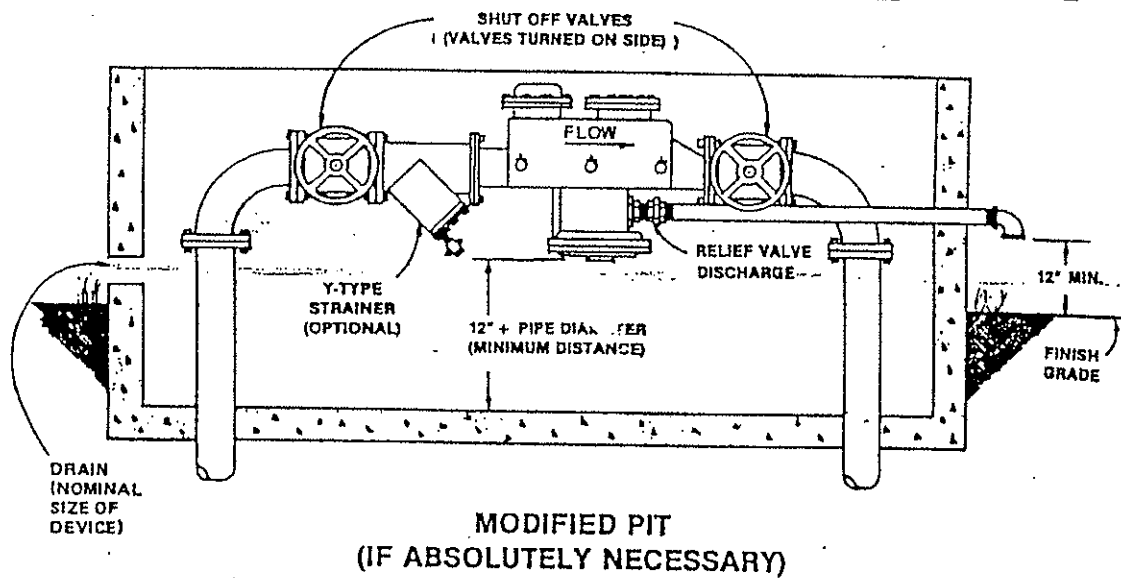
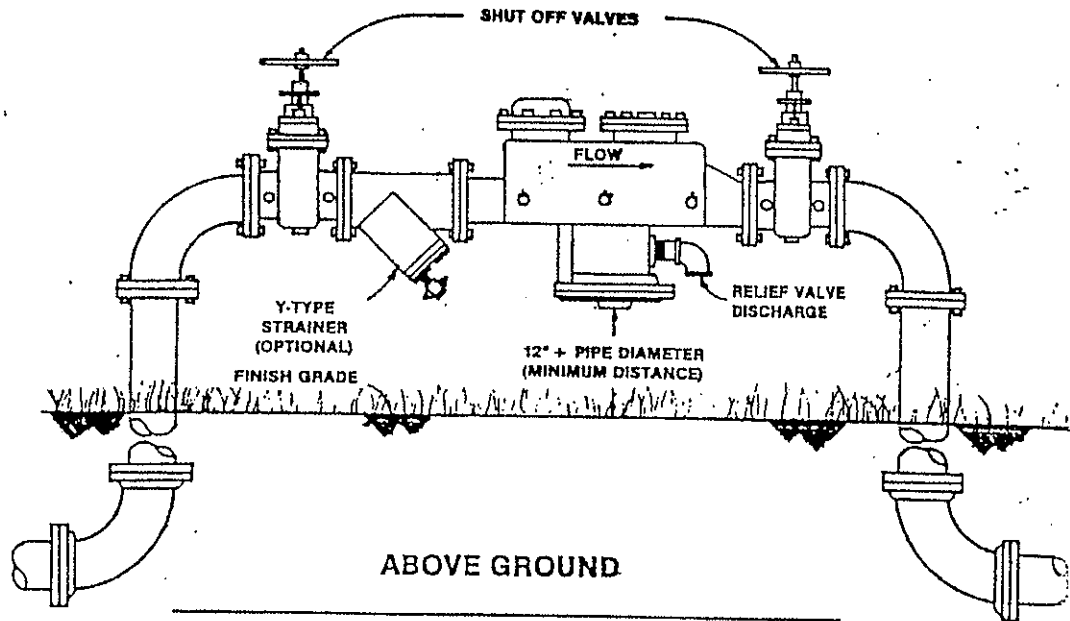


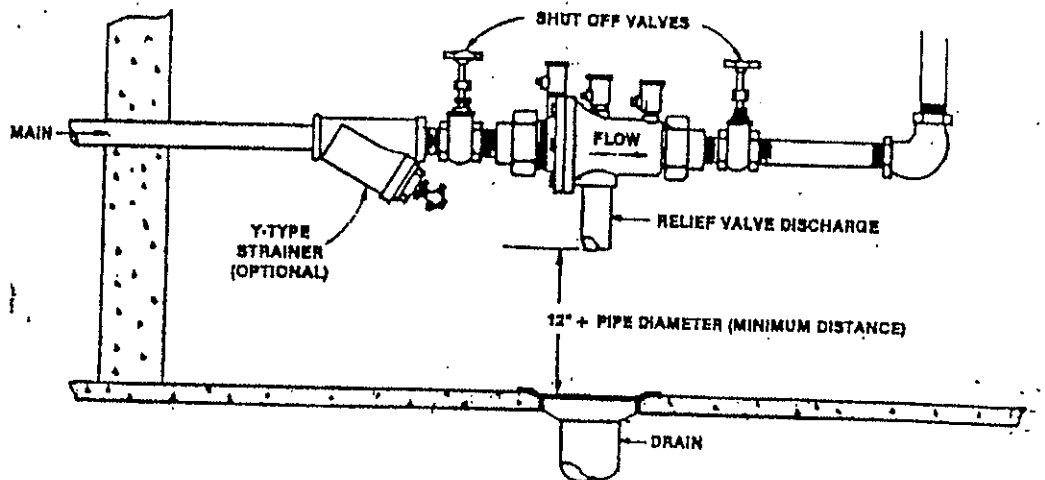
## DOUBLE CHECK VALVE ASSEMBLY TYPICAL INSTALLATION



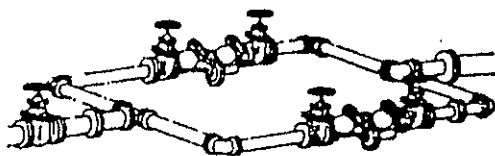
**MODIFIED PIT  
(IF ABSOLUTELY NECESSARY)**

# REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION DEVICE TYPICAL INSTALLATION



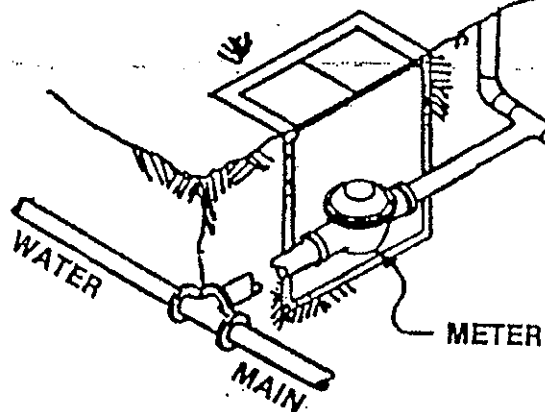
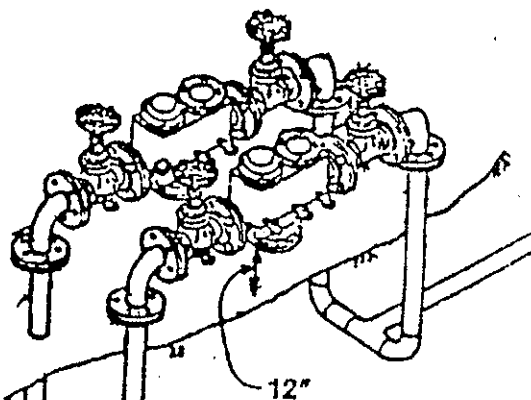


INDOORS  
(IF ABSOLUTELY NECESSARY)



#### PARALLEL INSTALLATION

Where continuous flow may be required even during times of servicing or testing, or where greater capacity than a single unit may be necessary, then two units connected in parallel are recommended.





***Appendix III - Standard Detail Drawings***



- 1 - LOT INCIDENTALS AS INDICATED ON FIRE HYDRANT DETAIL

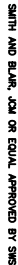


## CONNECTION OF EXISTING SERVICES



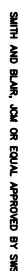
THE NEW WAVE OF FILMS

- WITH SURFACE IF LOCATED IN PAVED TRAVEL-WAYS.



## SERVICE CONNECTION DETAILS

6. AIR RELEASE VALVES ARE NOT ALLOWED BY SMS



# WE NEED SERVICE CONNECTION BENEFITS

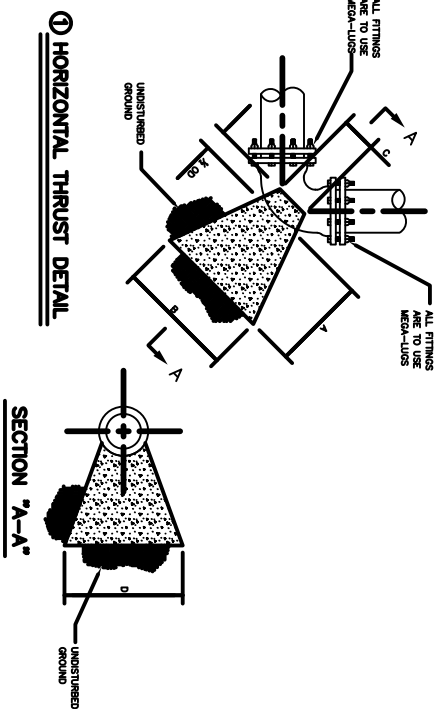
ANCHOR BLOCK					VOLUME (CU. YD.)
PIPE SIZE	A	B	C	D	
4"	1'-0"	1'-0"	4"	4"	0.5
6"	1'-0"	1'-0"	6"	6"	0.8
8"	1'-0"	1'-0"	8"	8"	1.3
10"	1'-0"	1'-0"	1'-0"	1'-0"	1.9
12"	1'-0"	1'-0"	1'-0"	1'-0"	2.8
14"	1'-0"	1'-0"	2'-0"	1'-0"	3.7
16"	1'-0"	1'-0"	2'-0"	2'-0"	4.1

# STANDARD FOR PHONE CONNECTION

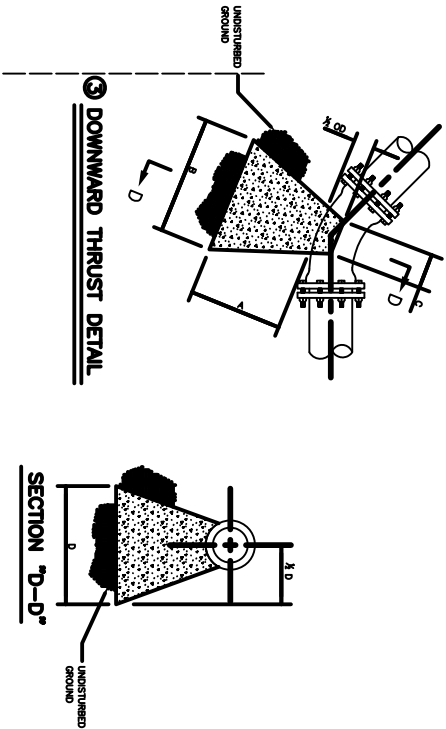
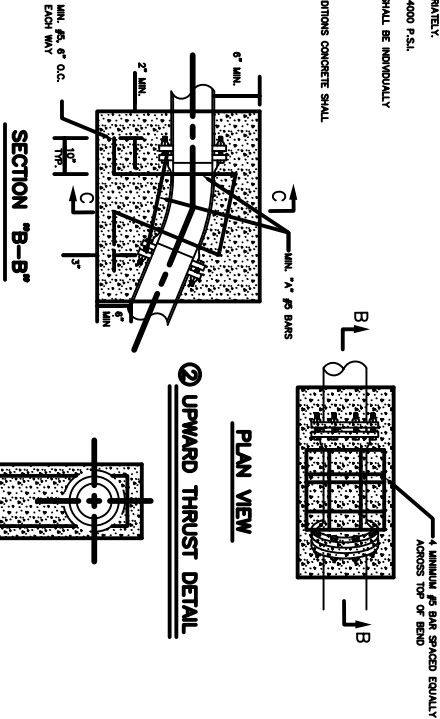


## CONCRETE ANCHOR BENCH

THE BRANCHES  
FLUOS AND CUPS  
(FOR ALL CIRCUMSTANCES)



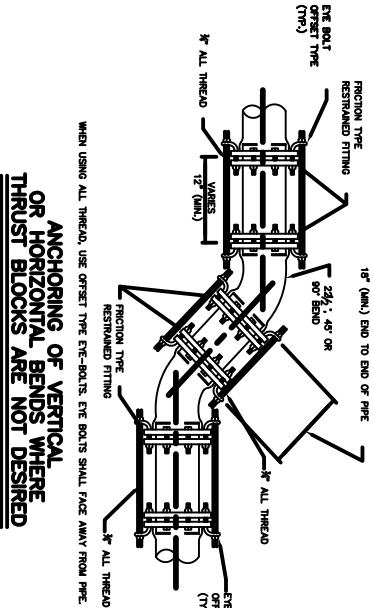
- GENERAL NOTES:
1. SOIL CONDITIONS SHALL BE VERIFIED BY ENGINEER BEFORE CONSTRUCTION. IF SOIL CONDITIONS ARE FOUND TO BE WEAKER THAN INDICATED, THE THRUST BLOCK BEARING AREA SHALL BE INCREASED APPROPRIATELY.
  2. ALL CONCRETE SHALL BE CLASS A, 4000 P.S.I.
  3. ALL WINGS GREATER THAN 12" I.D. SHALL BE INDIVIDUALLY CALCULATED BY THE ENGINEER.
  4. PIPE SHALL BE DUCTILE IRON.
  5. UNLESS OTHERWISE SPECIFIED, CONSTRUCTION CONDITIONS SHALL BE "TYPICAL" TYPE.



BEND	SIZE	DIMENSIONS FOR CONCRETE BLOCKING HORIZONTAL THRUST				VOLUME (CU. YD.)
		A (F.T.)	B (F.T.)	C (F.T.)	D (F.T.)	
114°	6"	1.0	2.0	7"	1.0	0.04
	8"	1.0	2.0	7"	1.0	0.05
	10"	1.0	2.0	7"	1.0	0.1
	12"	1.0	2.0	7"	1.0	0.1
	20"	2.0	3.0	18"	3.0	0.3
225°	6"	1.0	2.0	7"	1.0	0.04
	8"	1.0	2.0	7"	1.0	0.05
	10"	1.0	2.0	7"	1.0	0.1
	12"	1.0	2.0	7"	1.0	0.1
	20"	2.0	3.0	18"	3.0	0.3
45°	6"	1.5	2.0	7"	1.5	0.11
	8"	2.0	3.0	7"	2.0	0.3
	10"	2.0	3.0	7"	2.0	0.3
	12"	2.0	3.0	7"	2.0	0.3
	20"	4.0	6.0	18"	6.0	2.4
90°	6"	1.5	2.0	7"	1.5	0.11
	8"	2.0	3.0	7"	2.0	0.3
	10"	2.0	3.0	7"	2.0	0.3
	12"	2.0	3.0	7"	2.0	0.3
	20"	4.0	6.0	18"	6.0	2.4

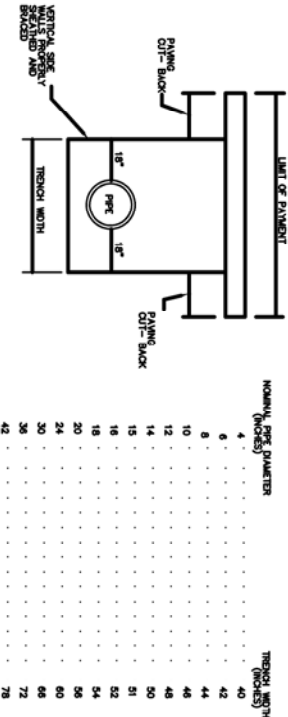
BEND	SIZE	DIMENSIONS FOR CONCRETE REQUIRED TO RESIST UPWARD THRUST			VOLUME (CU. YD.)
		NO. OF WRT. BARS REQD.	MIN. 6" WRT. BARS REQD.	MIN. 6" WRT. BARS REQD.	
114°	6"	2	2	2	0.3
	8"	2	2	2	0.3
	10"	2	2	2	0.3
	12"	2	2	2	0.3
	20"	3	3	3	0.8
225°	6"	2	2	2	0.3
	8"	2	2	2	0.3
	10"	2	2	2	0.3
	12"	2	2	2	0.3
	20"	3	3	3	0.8
45°	6"	2	2	2	0.3
	8"	2	2	2	0.3
	10"	2	2	2	0.3
	12"	2	2	2	0.3
	20"	3	3	3	0.8
90°	6"	2	2	2	0.3
	8"	2	2	2	0.3
	10"	2	2	2	0.3
	12"	2	2	2	0.3
	20"	3	3	3	0.8

BEND	SIZE	DIMENSIONS FOR CONCRETE BLOCKING DOWNWARD THRUST				VOLUME (CU. YD.)
		A (F.T.)	B (F.T.)	C (F.T.)	D (F.T.)	
114°	6"	1.0	2.0	7"	1.0	0.04
	8"	1.0	2.0	7"	1.0	0.05
	10"	1.0	2.0	7"	1.0	0.1
	12"	1.0	2.0	7"	1.0	0.1
	20"	2.0	3.0	18"	3.0	0.3
225°	6"	1.0	2.0	7"	1.0	0.04
	8"	1.0	2.0	7"	1.0	0.05
	10"	1.0	2.0	7"	1.0	0.1
	12"	1.0	2.0	7"	1.0	0.1
	20"	2.0	3.0	18"	3.0	0.3
45°	6"	1.5	2.0	7"	1.5	0.11
	8"	2.0	3.0	7"	2.0	0.3
	10"	2.0	3.0	7"	2.0	0.3
	12"	2.0	3.0	7"	2.0	0.3
	20"	4.0	6.0	18"	6.0	2.4
90°	6"	1.5	2.0	7"	1.5	0.11
	8"	2.0	3.0	7"	2.0	0.3
	10"	2.0	3.0	7"	2.0	0.3
	12"	2.0	3.0	7"	2.0	0.3
	20"	4.0	6.0	18"	6.0	2.4



SARALAND WATER SYSTEM  
SARALAND, ALABAMA

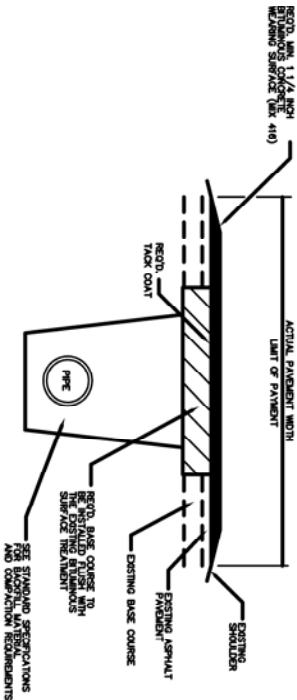
STANDARD DETAIL CONSTRUCTION DRAWINGS  
POTABLE WATER UTILITIES  
AND INFRASTRUCTURE



**CRUSHED STONE FOUNDATION**

TO BE USED AS DIRECTED  
BY THE OWNER

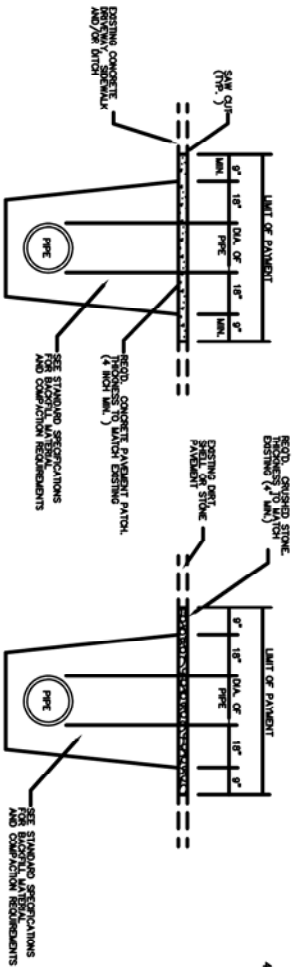
### TRENCH WIDTHS & PAVING CUT- BACKS



**BITUMINOUS WEARING SURFACE FOR FULL WIDTH STREET SURFACING**

- NOTES:
1. ALL SIZES/SPCS SHALL CONFORM TO THE REQUIREMENTS ESTABLISHED BY OSHA.
  2. WHERE THE BOTTOM OF THE TRENCH DOES NOT, IN THE OPINION OF THE ENGINEER, MAKE A SUITABLE FOUNDATION, THE TRENCH SHALL BE UNDERCUT AND BACKFILLED WITH CRUSHED STONE TO PROVIDE ADEQUATE FIRM FOUNDATION.

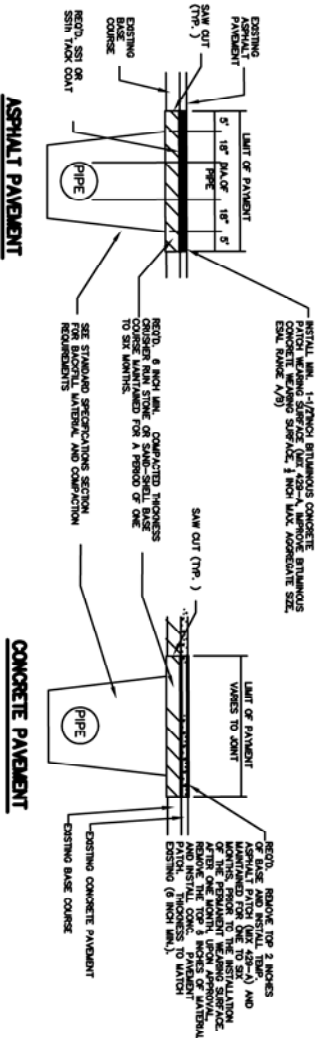
### DETAIL OF PIPE FOUNDATION



- NOTES:
1. THE LIMITS FOR PAVING OVER THE TRENCH SHALL BE THE TRENCH WIDTH SHOWN PLUS THE CUT- BACK ON EITHER SIDE OF THE TRENCH.
2. REPLACEMENT WORK BEYOND TRENCH WIDTH OR LIMITS FOR PAVING SHALL BE AT THE CONTRACTOR'S EXPENSE. NO EXTRA COMPENSATION WILL BE ALLOWED.
3. THE LIMITS FOR SELECT BACELL SHALL BE THE AVERAGE DEPTH OF APPLICABLE TRENCH WIDTH SHOWN MULTIPLIED BY THE TRENCH WIDTH BACELL TO THE TOP OF PIPE.
4. THE ADJACED EDGES OF THE EXISTING PAVEMENT ALONG THE TRENCH CUT SHALL BE PARALLEL TO THE CENTER OF THE PAVEMENT CUT. THE NEW ADJACENT STRONGHOLD SHALL BE PARALLEL TO THE CENTER OF THE PAVEMENT CUT.

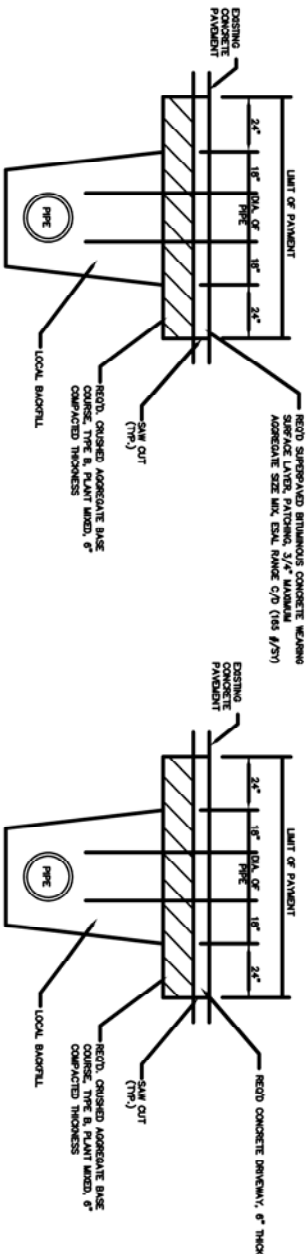
### ASPHALT PAVEMENT

**TEMPORARY ROADWAY PATCH WITHIN CITY R/W**



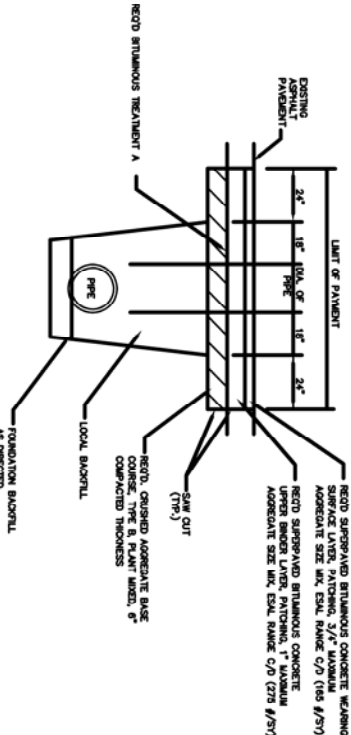
**REMOVING & REPLACING CONCRETE DRIVEWAYS, SIDEWALKS & DITCHES**

## **CRUSHED STONE FOR SURFACING**

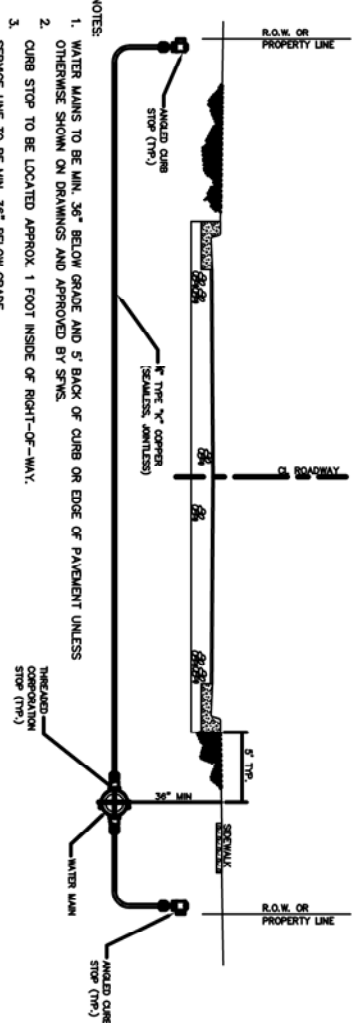


## REMOVING & REPLACING ASPHALT DRIVEWAYS

## **REMOVING & REPLACING CONCRETE DRIVEWAYS**

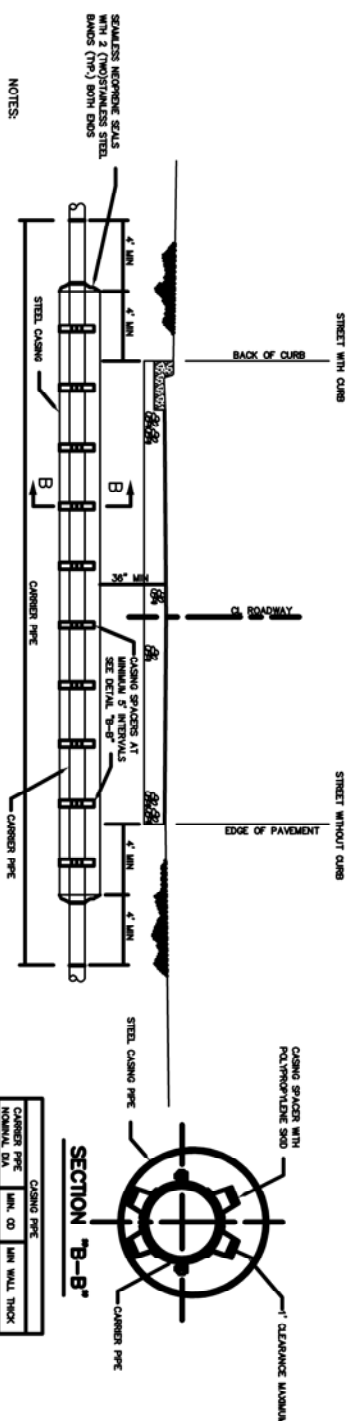


# REMOVING & PREPARATION OF PAVEMENT WITHIN STATE OF ALABAMA R/W



- NOTES:
1. WATER MAINS TO BE MIN. 36" BELOW GRADE AND 5' BACK OF CURB OR EDGE OF PAVEMENT UNLESS OTHERWISE SHOWN ON DRAWINGS AND APPROVED BY STMS.
  2. CURB STOP TO BE LOCATED APPROX. 1 FOOT INSIDE OF RIGHT-OF-WAY.
  3. SERVICE LINE TO BE MIN. 36" BELOW GRADE.
- THREADED —  
CROWN OF CURB TO BE 1/2" BELOW STOP (TYP)

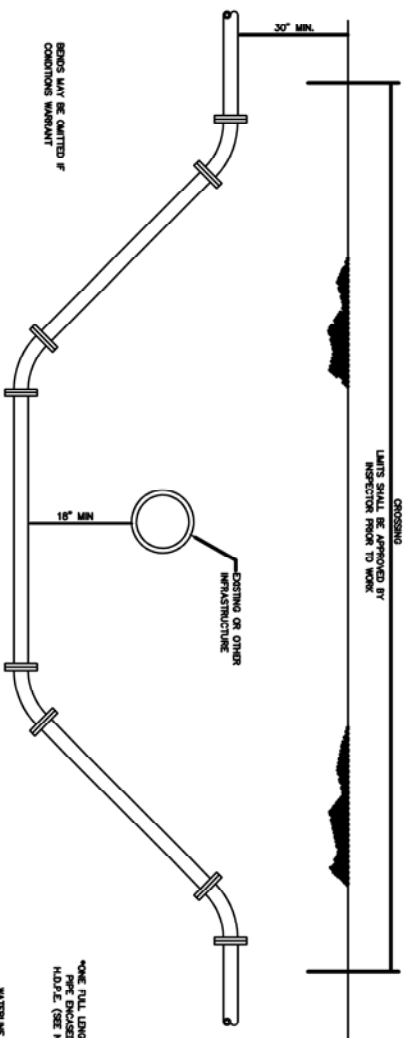
**TYPICAL ROADWAY SECTION AT SERVICE LINE CROSSING**



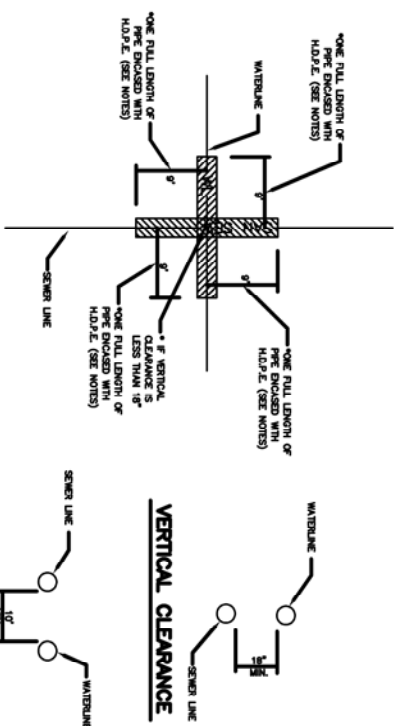
CASING PIPE		
CASING PIPE NOMINAL DIA	MIN. CD	MIN WALL THICK
6"	13.2	0.2340"
8"	16	0.2802"
10"	22	0.3412"
12"	22	0.3412"
16"	28	0.4400"
20"	37	0.4507"

- NOTES:
1. ALL PIPE THRU CASING SHALL BE HDPE, PVC OR D.I.
  2. CASING PIPE TO MEET ALODOT STANDARDS OR OTHER JURISDICTIONS.

## **BORE DETAILS WITH ENCASEMENT**

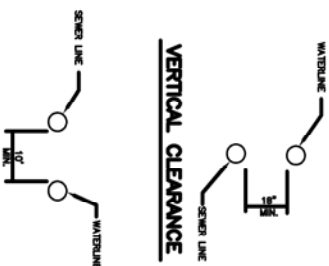


## **CROSSING DETAIL**



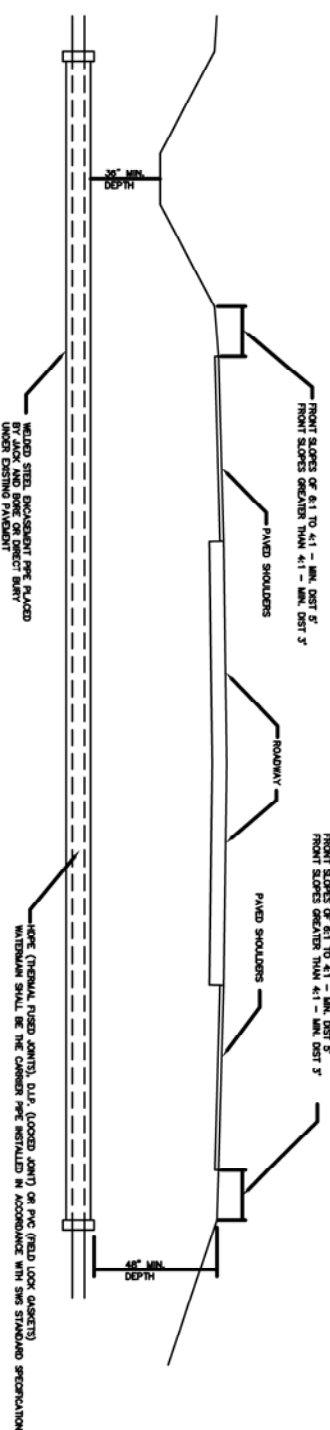
## CROSSING DETAIL

## REQUIRED WATER AND SEWER SEPARATION DETAILS



### HORIZONTAL CLEARANCE

- NOTES:
1. WATERLINES MORE THAN 18" VERTICAL CLEARANCE ABOVE SEWER LINE SHALL REQUIRE NO SPECIAL ACTION.
  2. WATERLINES WITH LESS THAN 18" VERTICAL DISTANCE ABOVE SEWER LINE SHALL REQUIRE A FULL LENGTH OF PIPE ENCASED WITH H.D.P.E (INCLUDING CASING SPACERS, END SEALS AND JO ADAPTERS AT ENDS).
  3. WATER AND SEWER LINES SHALL NOT BE LAID IN THE SAME TRENCH.
  4. IN THE EVENT THE SEWER LINE IS LOCATED ABOVE THE WATER LINE, THE WATERLINE SHALL BE ENCASED IN HOPE FOR A DISTANCE OF 20 FEET ON BOTH SIDES OF THE CROSSING AND CASINO SHALL BE SEALED AND CARRIER PIPE SHALL INCLUDE CASING SPACERS.



**ENCASEMENT INSTALLATION  
JACK AND BORE  
UNDER EXISTING PAVEMENT**

**NOTE:**  
ENCASE FAR ENOUGH BEYOND DITCH SO THAT DITCH FLOW IS  
NOT INTERRUPTED DURING MAINTENANCE OPERATIONS.