

DETAIL SPECIFICATIONS
FOR
MILCROFTON UTILITY DISTRICT

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December 2009

Revised: December, 2011

**MILCROFTON UTILITY DISTRICT
DETAILED SPECIFICATIONS
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STANDARD DRAWINGS

Standard Drawing No.1 - Line Laying Conditions - In Rock or Earth
Standard Drawing No.2 - Line Valve Setting
Standard Drawing No.3 - Anchor Detail
Standard Drawing No.4 - Concrete Blocking Details
Standard Drawing No.5 - Concrete Blocking Details
Standard Drawing No.6 - Creek Crossing Detail
Standard Drawing No.7 - Air Release Valve
Standard Drawing No.8 - Fire Hydrant Assembly
Standard Drawing No.9 - Standard Meter Setting
Standard Drawing No.10 - Compound Meter Setting
Standard Drawing No.11 - Water Line Casing
Standard Drawing No.12 - Backflow Preventer
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Standard Drawing No.14 - Blow Off Detail
Standard Drawing No.15 - Blow Off Detail
Standard Drawing No. 16 - Water Service Line Detail

WATER LINES AND WATER SERVICES

1. SCOPE OF THE WORK

The following specifications are to be used for installing all water lines and services within the Milcrofton Utility District boundaries. The work to be accomplished under these Specifications consists of the furnishing of all materials, labors, excavation, and grading necessary for the construction of the water lines (including all services, meters, fittings, blow-offs, air release valves, valves, accessories, and appurtenances) in strict accordance with the Specifications and the applicable Plans. All items to be furnished shall be approved by the Engineer for the District before construction and all items installed shall be approved by the Inspector for the District before acceptance.

2. DEFINITIONS

- 2.1 The term "District" shall mean the Milcrofton Utility District.
- 2.2 The term "Inspector" shall mean the official inspector of the Milcrofton Utility District.
- 2.3 The term "Engineer" shall mean the consulting engineer employed by Milcrofton Utility District.
- 2.4 The term "Developer" shall mean the entity, which has signed a contract with the District for construction of the water system, which will be transferred to the District upon completion and acceptance by the District.
- 2.5 The term "Contractor" shall mean the Contractor performing the construction of the water system for the developer.

3. INSPECTION

The Contractor/Developer shall make provisions to have all work inspected by the Inspector of the Milcrofton Utility District. All lines must be inspected before backfilling and must have pressure tests and disinfection samples observed by the Inspector.

4. WARRANTY

The Contractor shall be responsible for the water line for one year after construction.

5. AS-BUILTS

The Contractor shall supply three sets of complete as-builts to the Milcrofton Utility District showing exact locations and sizes of water line installation, prior to the District accepting the water lines and turning on water service.

6. LOCATION OF WATER LINES

- 6.1 The approximate location of the water lines in relation to the limits of rights-of-way, pavement, etc., is shown on the Plans but is not guaranteed. The location shown attempts to minimize the overall project with rock excavation, pavement replacement, crushed stone for traffic bound roadway, customer water services, etc, considered.

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- 6.2 The final location (as constructed) may be varied by the Contractor upon approval by the Engineer, provided the proposed location is approved by the Tennessee Department of Transportation, the County Highway Department, or other agency or legal entity having jurisdiction. This approval shall be at the expense of the Contractor.
- 6.3 The final location, in any event, may be varied by necessity due to construction conditions at the direction of the Engineer, or due to the requirements of the Tennessee Department of Transportation, the County Highway Department, or other agency having legal jurisdiction. The construction of pipe lines in the highway, road, or street right-of-way will not be allowed unless there is no other place to construct the line, and only then upon the written approval of the Engineer.

7. CLEARING AND GRUBBING

- 7.1 The Contractor shall accomplish all clearing and/or clearing and grubbing within the limits designated on the Plans or as directed by the Inspector, or as required for the construction of the work involved, and shall satisfactorily dispose of all materials so removed. Normally, the width of the area to be cleared will be five feet on each side of a water line or structure.
- 7.2 The work under this Paragraph shall consist of the cutting and removal of all trees, stumps, brush, logs, trash, weeds, removal of fences, or other loose or projecting materials within the designated area. Unless otherwise specified, it also shall include the grubbing of stumps, roots, and other natural obstructions which, in the opinion of the Inspector, must be removed to allow the proper staking out and construction work and operate properly the facility upon completion of construction. Disposal shall be by approved burning or other methods satisfactory to the Inspector. Trees, which are designated to remain, shall be properly protected. When clearing is performed on private property The Contractor will be required, at his own expense, to dispose of the material cleared by hauling away or other methods acceptable to the Inspector. Before the Contractor enters private property, the Developer must have obtained a signed easement approved by the District and the Contractor must inform the property owner of his schedule.
- 7.3 All merchantable timber shall be cut into logs of merchantable length and neatly piled as directed by the Inspector. Unless otherwise specified, merchantable timber shall remain the property of the owner.
- 7.4 Unless grubbing is specifically not required, all bushes, hedge fences, trees, and stumps within the designated areas, except those occurring under embankments of more than 24 inches in depth, shall be grubbed up so that no root more than three inches in diameter shall be within 18 inches of the finished grade, or within six inches of the surface of any slope. All holes remaining in embankment areas after the grubbing operation, and in excavated areas less than two feet in depth, shall have the sides broken down or leveled if necessary to flatten the slopes, and refilled with acceptable material properly compacted.

8. STRIPPING AND TOPSOIL

Before excavation and grading is commenced for buildings, structures, or other work described hereinafter (except pipe line and manholes) or before material is removed from borrow pits, the topsoil shall be removed from the areas affected and stockpiled. When final grading is accomplished, particularly around buildings and other structures, the topsoil shall be spread evenly over the excavated areas. Rough grading shall have been carried approximately six inches below finished grade (except in solid rock, where it shall be carried 12 inches below finished grade) and brought back up to grade with topsoil as set out herein.

9. CONSTRUCTION METHODS

9.1 Excavation shall be accomplished at such places as are indicated on the Plans to the lines, grades, and elevations shown, or as directed by Inspector, and shall be made in such a manner that the requirements for the pipe lines, structures and/or the formation of embankments as shown on the Plans may be followed. (No excavation shall be started until the Inspector has approved the exact location of the proposed work.) All material encountered (of whatever nature) within the limits designated shall be removed and disposed of as directed. During the process of excavation the grade and/or pitch shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and/or drainage ditches shall be installed at the Contractor's own expense to intercept or divert surface water which may affect the prosecution or condition of the work. If at any time it is not possible to place excavated material in the proper area of the permanent construction, it shall be stockpiled in approved areas for later use.

9.2 Where rock, shale, clay, hard-pan, or other unsatisfactory sub-grade or foundation material is encountered, it shall be excavated to a depth of at least twelve inches below sub-grade, or to such greater depth below sub-grade as the Inspector may direct. The portion so excavated shall be refilled with suitable material properly compacted.

9.3 Structure foundations shall be excavated to permit the placing of the full width and length of footings shown on the Plans with full horizontal beds. Rounded or undercut corners at edges of footings will not be permitted. All rock and other hard foundation material shall be freed from all loose material, cleaned, and cut to a firm surface leveled, stepped, or serrated as directed by the Inspector. All seams shall be cleaned out and filled with concrete, mortar, or grout. When masonry is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and the final removal of the foundation material to grade shall not be made until just before the masonry is placed. If the condition of the excavation for foundations and/or footings is such that concrete cannot be placed without becoming mixed with mud, special operations shall be performed to remedy the situation. The Contractor shall place sufficient sand, coarse aggregate, or a combination of such aggregates to stabilize properly the sub-grade, and then place a layer of waterproof sub-grade paper or other similar material to prevent the infiltration of mud or the entire mass of mud shall be removed entirely and replaced with suitable stable material.

10. SITE GRADING AND FILLS AROUND THE STRUCTURES AND FOR ACCESS ROADS

10.1 All material used for backfill around and under structures or in access roads shall be of a quality acceptable to the Inspector and shall be free from large or frozen lumps, wood, leaves, grass, roots, and other extraneous material. All spaces excavated and not

occupied by footings, foundations, walls or other permanent work shall be refilled with earth up to the surface of the surrounding ground, unless otherwise specified, with sufficient allowance for settlement. In making the fills and terraces around and under structures, the fill shall be placed in layers not exceeding six inches in depth, and shall be kept smooth as the work progresses. Each layer of the fill shall be rolled with an approved type roller and/or be compacted to 95% of the Standard Proctor Density as determined by the Method of Test for Moisture Density Relations of Soils A.S.T.M. designation D-698 and to the satisfaction of the Inspector. When, in the opinion of the Inspector, it is not practicable to roll sections of the fill immediately adjacent to the buildings or structures, then such sections shall be thoroughly compacted by means of tamping, puddling, or both, as may be required by the Inspector. All fills shall be placed so as to load structures symmetrically.

10.2 As set out herein before, rough grading shall be held below finished grade and then the topsoil, which has been stockpiled, shall be spread evenly over the surface. The grading shall be brought to the levels shown on the Drawings or to the elevation established by the Inspectors. Final dressing shall be accomplished by handwork or machine work, or a combination of these methods, as may be necessary to produce a uniform and smooth finish to all parts of the re-grade. The surface shall be free from clods greater than two inches in diameter. Rock and/or shale excavation, which has been removed, may be placed in the fills, but it shall be thoroughly covered. Rock placed in fills shall not be closer than twelve inches from finished grade.

10.3 Before the water line construction can begin, the Developer's engineer shall submit, in writing, a letter certifying that all water line easements have been graded to the final grade and that all roads have been constructed to sub grade. The letter shall be submitted to the Milcrofton Utility District Manger or his representative a minimum of 48 hours before water line construction begins. If the District determines a water line must be adjusted to maintain the minimum and maximum cover as stated in these specifications because water line easements had not been graded to the final grade and/or roads had not been constructed to sub grade before the water line was installed, such adjustment shall be made at the Developer's expense and shall be done before the water lines and appurtenances are accepted by the Milcrofton Utility District for the development or project.

11. PREPARATION FOR TRENCHING

- 11.1 The Contractor shall determine, as far as possible in advance, the location of all existing sewer, culvert, drain, water, electric and gas pipes, and other subsurface structures, and avoid disturbing them in opening his trenches. Sewer, water, and gas services, and other facilities easily damaged by machine trenching within 30 inches of the surface shall be uncovered without damage ahead of trenching machine and left intact or removed without permanent damage ahead of trenching and restored immediately after trenching machine has passed. The Contractor shall protect such existing facilities against danger or damage due to settlement of his backfill.
- 11.2 It shall be the responsibility of the Contractor to inform the Inspector and the utilities of disruption of service as soon as it is known that it has been or will be cut off.
- 11.3 When pipe line is run through wooded terrain, cutting of trees within limits of maximum trench widths, as set forth in these Specifications, will be permitted. However, cutting of additional trees on sides of trench will not be permitted. The Contractor shall obtain specific permission of the Inspector before cutting any tree larger than 4 inches in diameter.

12. EXCAVATION FOR PIPE LINE TRENCHES

- 12.1 The width of the trench shall be only sufficient to permit the pipe to be laid and jointing properly done and the backfill to be placed and compacted as specified. This shall include cutting through pavement, railroad tracks, and sidewalks. In no case shall the width of the trench at the top of the pipe be greater than the pipe bell diameter plus 18 inches (in dirt) without prior approval of the District or Engineer. Rock excavation shall have a minimum excavation width of the bell diameter of the pipe plus 36 inches (18" each side of the bell diameter. All rock excavation shall be done by an approved blasting method. Trenching machines may only be used where the water line is laid in dirt or will be encased through rock.
- 12.2 If the foundation is good firm earth, the earth shall be paired or shaped to give full support to the lower third of each pipe, and, if necessary, a layer of sand, crushed stone, fine gravel, or other suitable material shall be placed for the foundation. The same means of securing a firm foundation shall be adopted in case the excavation has been made deeper than necessary.
- 12.3 If the foundation is rock, an equalizing bed of sand, fine gravel, crushed stone, or other well compacted, suitable material shall be placed upon the rock. The thickness of these beds shall not be less than six inches and the pipe shall be laid in these beds so that at least the lower third of each pipe is supported throughout its length. If crushed stone is used, it shall be size 33C as described in the Standard Specification of the Tennessee Department of Transportation.
- 12.4 All pipe shall have a minimum cover of 30 inches and a maximum of **48 inches**, unless otherwise shown on Contract Drawings. Any variation there from shall be made only at the order of the District

Revised: March 2011

- 12.5 Where trenching is cut through paving which does not crumble on edges, trench edge shall be cut at least 2 inches deep with straight and neat edges, before excavation is started and care taken to preserve edge to facilitate neat paving.
- 12.6 Trenches shall be dug so that the pipe can be laid to the alignment and depth required and shall be excavated only so far in advance of pipe laying as to reveal obstructions, unless specifically directed by the inspector, no more than 400 feet of trench shall be opened ahead of the pipe laying and not more than 200 feet of open ditch shall be left behind the pipe laying. The contractor shall open the trench far enough ahead to reveal obstructions that necessitate changing the line or grade of the water line.
- 12.7 The trench shall be so braced and drained that workmen may work therein safely and efficiently. Discharge from dewatering pumps shall be conducted to natural drainage channels, drains, or sewers. Water shall not be allowed to run or stand in the trench while the pipe laying is in progress or before the joints are completely set or before the trench has been backfilled. The Contractor shall not open up at any time more trench than his available pumping facilities are able to dewater.
- 12.8 No trench shall be left open or work stopped on trench for a considerable length of time. If such is necessary, trench shall be refilled according to backfill operations.
- 12.9 All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made so that street drainage and natural water courses will not be obstructed. Care shall be taken to prevent, as far as practical, water carriage of excavated materials over street surfaces. All surface material, including sod, which in the opinion of the Inspector is suitable for reuse in restoring the surface, shall be kept separate from the general excavation material as directed by the Inspector.

13. SHORING, SHEETING, AND BRACING OF EXCAVATIONS

- 13.1 When unstable material is encountered or where the depth of excavation exceeds four feet, the sides of the trench or excavation shall be supported by substantial sheeting, bracing, and shoring, or the sides sloped to the angle of repose. The design and installation of all sheeting, sheet piling, bracing and shoring shall be based on computations of pressure exerted by the materials to be retained under existing conditions. Adequate and proper shoring of all excavations shall be the entire responsibility of the Contractor; however, the Engineer may require the submission of Shoring Plans, accompanied by supporting computations, for approval prior to the Contractor undertaking any portion of the work.
- 13.2 Foundations, adjacent to where the excavation is to be made below the depth of the foundation, shall be supported by shoring, bracing, or underpinning as long as the excavation shall remain open and the Contractor shall be held strictly responsible for any damage to said foundations.
- 13.3 Even though computations shall determine the size of the various components, no timber sheeting less than two inches in thickness will be acceptable. Timber bracing, cross bracing, or struts must measure at least six inches by six inches.

- 13.4 Solid sheeting will be required for wet or unstable material. It shall consist of continuous vertical sheet piling of timber or steel, with suitable shores and braces.
- 13.5 Trench sheeting shall not be removed until sufficient backfill has been placed to protect the pipe.
- 13.6 All sheeting, planking, timbering, bracing, and bridging, shall be placed, renewed, and maintained, as long as is necessary.
- 13.7 Care shall be taken to avoid excessive backfill loads on the completed pipelines. The requirements that the width of the ditch at the level of the crown of the pipe be not more than the pipe bell diameter plus 18 inches as set out in Paragraph 12.1 herein before, shall be strictly observed.

14. GENERAL REQUIREMENTS FOR TRENCH EXCAVATION

- 14.1 Unless specifically directed otherwise by the Inspector, not more than four hundred feet of trench shall be opened ahead of the pipe laying, and not more than two hundred feet of open ditch shall be left behind the pipe laying. All barricades, lanterns, watchmen, and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations, and other obstructions, shall be provided by and at the expense of the Contractor.
- 14.2 When so required, or when directed by the Inspector, only one-half of a street crossing or road crossing shall be excavated before placing a temporary bridge over the side of excavated for the convenience of the traveling public. All backfilled ditches shall be maintained in such a manner that they will offer no hazard to the passage of traffic. The convenience of the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridged at the direction of the Inspector. Excavated materials shall be disposed of so as to cause the least interference and in every case the disposition of excavated materials shall be satisfactory to the Inspector. The Contractor will cut all streets or roads perpendicular to the road unless otherwise shown on the drawings.

15. UNAUTHORIZED EXCAVATION

Whenever the excavation is carried beyond or below the lines and grade given by the Engineer, the Contractor shall refill such excavated space with such material and in such a manner as will insure stability of the structure involved.

16. BLASTING

- 16.1 Blasting for excavation will be permitted only after securing the approval of the Inspector and only when proper precautions are taken for the protection of persons and property. The Inspector will fix the hours of blasting.
- 16.2 All blasting operations shall be conducted in accordance with the municipal ordinances and state laws, and all explosives shall be stored in conformity with all said ordinances and laws. No blasting shall be done within five feet of any water mains, except with light charge explosives. Any damage done by blasting is the responsibility of the /contractor, and shall be promptly and satisfactorily repaired by him.
- 16.3 To implement these requirements and unless otherwise required by ordinance or law each crew shall be provided with two metal boxes with suitable locks. One of these boxes shall be for storing explosives and one for caps. The boxes shall always be kept locked except when in actual use. They shall be painted with a bright color and stenciled with the appropriate warning signs. At night, all explosives and caps shall be removed from boxes and stored in a central magazine.
- 16.4 All shots shall be covered with heavy timber or steel blasting mats to prevent flying material. Unless otherwise specified or directed, delay caps should be used to reduce earth vibrations and noise. In sparsely populated areas, the Inspector may permit the Contractor to use regular type caps and/or Primacord.

17. SEEDING, SODDING, AND LANDSCAPING

- 17.1 Unless otherwise specified or shown on the Drawings, all graded areas shall be left smooth and thickly sown with a mixture of bluegrass, Italian rye, Kentucky fescue #31, and/or such other grasses as specified by the Inspector.
- 17.2 When the final grading has been completed, the entire area to be seeded shall be fertilized with ammonium nitrate at the rate of five pounds per 1000 square feet and an approved commercial fertilizer at the rate of ten pounds per 1000 square feet. the analysis of the commercial fertilizer shall be determined by soil tests. After fertilizer has been distributed, the Contractor shall disc or harrow the ground to work the fertilizer thoroughly into the soil. the seed then shall be broadcast, either by hand or by approved sowing equipment, at the rate specified. After the seed has been distributed, the Contractor then shall lightly cover the seed by use of a drag to other approved device. All seed must be certified. the seeded area then shall be covered with straw to a depth of approximately 1-1/2 inches.
- 17.3 Any necessary reseeding or repairing shall be accomplished by the contractor prior to final acceptance. If the construction work is brought to completion when, in the opinion of the Inspector, the season is not favorable for the seeding of the grounds, then the Contractor shall delay this item of the work until the proper season for such seeding as directed by the Inspector.

17.4 Sodding shall not be required unless specifically set out in the Detailed Specifications or shown on the Drawings. When sodding is required, it shall be so laid that no voids occur between strips. Weed roots shall be removed as the sod is laid. Sod shall be tamped or rolled immediately after it is laid, and the finished surface shall true to the grade, even and equally form at all points. Well-screened topsoil shall be lightly sprinkled over the sodded area, and shall be raked to insure sealing the sod joints. The sodded areas shall be thoroughly watered.

17.5 Landscaping, when specified or shown on the Drawings, shall be accomplished as set out in the Detailed Specifications and shown on the Plans.

18. OBSTRUCTIONS

In cases where water lines, gas lines, sanitary sewer lines, storm sewer lines, or other underground structures are encountered, they shall not be misplaced or molested unless necessary, in which case they shall be replaced in as good condition as found as quickly as possible. All such lines or underground structures damaged or molested during construction shall be replaced at the Contractor's expense, unless, in the opinion of the Inspector, such damage was caused through no fault of the Contractor.

19. TRAFFIC CONTROL AND UTILITIES

19.1 Before beginning work on any public highway or roadway the Contractor shall make arrangements for maintaining traffic as may be required. The applicable regulations of the Tennessee Department of Transportation must be followed. In addition, the Contractor shall make proper arrangements with the authorities of the Public Transportation Systems whenever the work will interfere with established routing and/or schedules.

19.2 Should it become necessary to provide additional buying or support of power, lighting, or telephone facilities, the authorities of these utilities shall be consulted by the Contractor so that suitable arrangements can be made for the protection of same.

19.3 All costs for temporary or permanent work necessary for protection of utilities, private or public, shall be included in the contract amount to which the items of work pertain, or may be considered to be incidental thereto. In addition, the Contractor shall be responsible for any damage to the existing utilities resulting from the construction operations and shall bear the cost of all repair or replacement necessary for correction.

19.4 The Contractor shall furnish proper equipment which shall be available at all times for maintaining streets and roads upon which work is being performed. All such streets and roads shall be maintained suitable for traffic until complete and final acceptance of work.

19.5 When the Contractor is cutting to cross a street or a highway, he is to cut half of the street at one time, lay the pipe, and complete the backfilling operation so that traffic may pass over this trench before the opening of the trench in the other half of the street or highway. At points of heavy traffic, this work shall be done at night during period of low traffic. The Engineer, and the agency or legal entity having responsibility for maintenance of the street shall approve the time of making such crossings.

20. BACKFILLING OF TRENCHES

- 20.1 Backfilling must be started as soon as practical after the pipe has been laid and jointed and alignment approved. Backfilling shall be conducted at all times in a manner to prevent damage to the pipe and the exterior protection of the pipe. Placing of the backfill about the pipe shall be done only in the presence of the Inspector after his final inspection and acceptance of the pipe in place. Should there be a deficiency of excavated materials for backfilling due to the rejection of part thereof, the Contractor shall "borrow" earth of acceptable quality as directed by the Inspector. The Contractor shall dispose of excess excavated material off site. It shall be the responsibility of the Contractor to obtain locations or permits for its disposal.
- 20.2 Backfill may consist of excavated material, provided that such material consists of loam, clay, sand, gravel, or other materials, which in the opinion of the Inspector are suitable for backfilling. All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, rocks or stones, or other material, which in the opinion of the Inspector, is unsuitable. All public roadways shall be backfilled with crush stone compacted in 6" - 8" layers.
- 20.3 The backfill material shall be carefully and solidly tamped around the pipe up to the point where the pipe is thoroughly covered with at least 12 inches of material. This material may be crushed stone, in rock. The filling of the trench shall be carried on simultaneously on both sides of the pipe in such a manner that the complete pipe line will not be disturbed and injurious side pressures do not occur. Walking or working on the completed pipeline (except and may be necessary in tamping or backfilling) shall not be permitted until the trench has been backfilled to a height of at least one foot above the pipe.
- 20.4 In filling the remainder of the trench, the requirements of the Tennessee Department of Transportation and the County Highway Department shall be met for road crossings, but in general the backfill material free of rock may be shoved into the trench without compacting and mounded, then compacted by rolling with the wheel of a grader or high lift whenever this method of backfilling may be used without inconvenience to the public, unless otherwise specified or required because of street or ramp repaving, or otherwise. Where street crossings are made and street paving is to be replaced, the Contractor will be required to tamp all backfill as is described hereinafter.
- 20.5 Where tamping is required, the backfilling shall be done in layers not to exceed six inches, and firmly tamped into place by use of tampers or reamers.
- 20.6 Backfill material must be uniformly mounded over trench, and excess hauled away, with no rock over 2 inches in diameter. Mounded backfill shall be confined to the width of the trench and not allowed to overlap onto firm original earth, and its height shall not be in excess of needs for replacement of settlement of backfill. All rock over 2 inches in diameter shall be removed from streets, yards, and fields. Streets and walks shall be broomed to remove all earth and loose rock immediately following backfilling.
- 20.7 At the completion of the job, should any backfill have settled below the surrounding ground, it shall be refilled and compacted to meet the surrounding surface levels.
- 20.8 Backfilling shall not be done in freezing weather, except by permission of the Inspector, and it shall not be made where the material in the trench is already frozen.

- 20.9 In case of damage to any existing structures, repair and restoration shall be made at once and backfill shall not be replaced until this is done. In all cases, restoration and repair shall be such that the damaged structure will be in as good condition and serve its purpose as completely as before uncovering.
- 20.10 The Contractor shall repair or pay damage to any paving or structures injured by bumping into, undermining, crumbling edges, scraping off surfaces, or other careless handling of equipment. Where necessary to drive track equipment up over edge of curb, walk, or paving, edge shall be protected from chipping by proper timbering.
- 20.11 Upon completion, all surplus water line materials furnished by the Contractor and the Contractor shall remove all tools and temporary structures from the site. All dirt, rubbish, and excess earth from the excavation shall be hauled to a dump provided by the Contractor and the construction site left clean to the satisfaction of the Inspector.
- 20.12 The backfilled trench shall be finished so that its appearance is as good as or better than before construction. Across lawns, this may include sod replacement or seeding. Across fields, this may include seeding. In steep areas, sodding may be required. When seeding is necessary, the Contractor shall perform such work during the best season even if he has to return to the job several months after completion.
- 20.13 Preliminary clean-ups shall be made during the progress of the job to protect the traveling public and to satisfy the private property owners and the Inspector.
- 20.14 Before final acceptance, the Contractor will be required to remove from the street, roadway, and private property all excess earth or other materials and obtain a release from the agency responsible for the road or street.

21. REMOVING AND REPLACING SIDEWALKS, STEPS, FENCES, ETC.

- 21.1 Where ever sidewalks are removed or disturbed in connection with the construction work, they shall be replaced to the original lines and grades in as good or better condition that which existed prior to the Contractor's operations.
- 21.2 After the sub-base has been brought to satisfactory grade, a 3-inch layer of crushed stone shall be spread over it and thoroughly tamped. Immediately prior to pouring the concrete, the stone shall be wetted thoroughly, or the concrete poured on layer of heavy building paper.
- 21.3 The paving shall consist of 4-1/2 inches of Glass "A" concrete, leveled by accurately placed screeds and worked with a wooden float until the mortar appears at the top. After the surface has been floated thoroughly, it shall be brushed to leave markings of a uniform type similar to the existing walk. All joints and edges shall be finished with and edging tool. The allowance variation shall be 1/8 inch in ten feet, transversely and longitudinally.
- 21.4 Other types of sidewalks such as brick, stone, etc., shall be replaced with materials removed during the progress of the work in equally as good condition as that found before the work started.

- 21.5 Where it becomes necessary in excavating for pipe work to cut fences, remove mailboxes, signs, or culverts, there items shall be replaced after completion of the backfill. Fences shall be restored to their original condition using the same type of materials that were used in the original construction. Mailboxes, etc., shall be replaced in their original condition and location.
- 21.6 Shrubbbery, lawns, flowers, whether on public or private property, will be removed ahead of construction as directed by the Inspector, or as shown on the Plans stored, and reset in such a manner as to damage the plants as little as possible.

22. REPLACING STREETS AND ROADWAYS

22.1 The Contractor shall replace all streets, alleys, driveways, and roadways which may be removed, disturbed, or damaged in connection with his operations under this contract. He shall reconstruct it to the satisfaction of the Tennessee Department of Transportation, the County Highway Department, or other legal entity having jurisdiction. The requirements of the State, County or other legal entity having jurisdiction shall supersede the requirements listed below. The Contractor shall be responsible for adjusting all affected valve boxes so that the valve box tops match the grade of the finished asphalt surface. The re-use of materials removed in making excavations will be permitted, provided said materials are in good condition and acceptable to the Inspectors for the State, County, or other legal entity and the District.

22.2 Care shall be exercised to minimize damage to graveled shoulders and paved surfaces.

22.3 Gravel, crushed limestone, bituminous materials, or other materials used in the resurfacing of streets shall meet the current requirements of the Tennessee Department of Transportation/State Highway Department Specifications.

22.3.1 Traffic Bound Base Course

On all trenches where replacement of streets is required, it shall be handled in the following manner:

22.3.1.1 After the backfill has been compacted and brought up to approximate finish grade, the Contractor then shall place crushed stone when and as directed by the Inspector as a traffic-bound base course, at the proper elevation to allow for settlement but not in such a way as to prevent traffic from using it. Crushed stone shall be Size 33C, of the Standard Specification of the Tennessee Department of Transportation.

22.3.1.2 The Contractor may be required by the Inspector to maintain the traffic bound base course by adding crushed stone as specified herein before in a safe and passable condition for a period of 40 days, or until such time as sufficient settlement has taken place in the opinion of the Inspector and the trenches are ready for final resurfacing.

22.3.2 Sub grade for Final Resurfacing

The traffic bound base course herein before described shall comprise the base course for all types of resurfacing. When, in the opinion of the Inspector, the trench has reached a condition of settlement satisfactory for the final resurfacing, the Contractor shall first strip the base course or backfill with crushed stone to obtain the proper sub grade elevation. The sub grade shall then be rolled with an approved type roller or tamped until thoroughly compacted. Any depression shall be filled with crushed stone and the process of rolling or tamping continued until the sub grade has a smooth and uniform surface.

22.3.3 Portland Cement Concrete Pavement

Where Portland Cement Concrete Pavement is to be replaced, or is required under bituminous pavement replacement, it shall conform to the existing

pavement and/or the Engineer's instruction (not less than 6 inches thick), and be accomplished with Class "A" concrete.

22.3.4 Asphalt Concrete Pavement

22.3.4.1 Where asphalt concrete pavement is to be replaced, the sub grade shall be prepared as herein before specified. This sub grade shall comprise the base course upon which the concrete sub slab and/or the bituminous pavement shall be laid.

22.3.4.2 Where no Portland Cement Concrete Sub slab is required, the sub grade or base shall be cleaned and broomed thoroughly, and a prime coat of medium tar shall be applied uniformly at the rate of approximately 0.20 to 0.25 gallons per square yard. Where Portland Cement Concrete Sub slab is required, the prime shall be applied at the rate of approximately 0.05 gallons per square yard. the prime shall be applied by a pressure distributor or other approved pressure spray method.

22.3.5 Bituminous Surfacing (Surface Treatment)

22.3.5.1 Where bituminous surfacing is to be as shown on the Plans, or as directed by the Inspector, the traffic-bound base shall comprise the sub grade upon which the bituminous surfacing shall be constructed. After the sub grade or base has been prepared, thoroughly cleaned and broomed, a prime coat of medium tar shall be applied at the rate of 0.30 to 0.35 gallons per square yard.

22.3.5.2 When the prime coat has become tacky but not hard, the bituminous material (asphalt of the grade directed by the Inspector) shall be applied in two applications at the rate of 0.35 to 0.45 gallons per square yard for each application. The Contractor shall apply approximately 50 pounds of crushed stone chips per square yard between the two applications of bituminous material, and 35 to 40 pounds of chips after the final application of bituminous material.

22.3.5.3 Materials and workmanship shall conform to Section 58 of the current Standard Specification of the Tennessee Department of Transportation.

22.3.6 Untreated Surface

Where the existing surface is untreated gravel or stone, the Contractor shall reuse all native materials possible, using crushed stone as required, replacing the surfacing that is disturbed or removed with crushed stone as herein before specified. The traffic bound base course herein before specified shall comprise this type of surfacing, except that prior to the final acceptance, the Contractor shall fill in all depressions with crushed stone as herein before specified, and shall thoroughly roll and grade to the existing surface.

22.3.7 General

The Contractor shall be held responsible for any and all damages occurring to the street and road paving due to his operations outside the actual limits of his work, and shall replace any such damage to as good (or better) condition than that which existed prior to the Contractor's operations and at no additional expense to the Owner.

23. MATERIALS

23.1 Cement

23.1.1 Cement shall be Portland Cement conforming to the "Standard Specifications for Portland Cement", Type 1, ASTM Serial Designation C150, and latest revision. Bulk cement, cement salvaged from discarded or used sacks, or lumped or caked cement will not be accepted.

23.1.2 Cement shall have less than 4% magnesium oxide and less than 1% loss by ignition. All cement shall be in sacks bearing the brand name of the manufacturer. The same brand of cement shall be used throughout the job, unless specifically approved otherwise in writing by the Engineer.

23.2 Concrete Aggregate

23.2.1 Aggregates for all concrete shall confirm to the "Standard Specifications of Concrete Aggregates", ASTM Designation C33, and latest revision.

23.2.2 Fine aggregate shall be free of foreign materials. Sand prepared from crushed stone or mountain sand will not be acceptable.

23.2.3 Coarse aggregate shall be one and one-half inches (1-1/2") to No. 4 size.

23.3 Class "A" Concrete

23.3.1 Concrete curbs, gutters, driveways, sidewalks, highways, piers, and collars shall be Ready-Mixed, ASTM Designation C94 with a 28-day compressive strength of 3000 psi, slump 2 to 4 inches.

23.3.2 Concrete for anchors, kickers, cradles, and/or encasement of water lines shall be placed where and as shown on the Plans, or as directed by the Inspector. Concrete for anchors, cradle, and/or encasement shall be Class "C" Concrete with a 28-day compressive strength of 2500 psi and shall be mixed sufficiently wet to permit it to flow under the pipe to form a continuous bed. In tamping concrete, care shall be taken no to disturb the grade or line of the pipe, or to insure the joints.

23.4 Metal Reinforcement

Metal Reinforcement shall comply with the following:

23.4.1 The requirements of the "Standard Specifications for Intermediate Grade Deformed Billet Steel Concrete Reinforcement Bars" (latest ASTM Serial Designation).

- 23.4.2 Welded wire fabric or cold-drawn wire for concrete reinforcement shall conform to the requirements of the "Standard Specifications for Cold Drawn Steel Wire for Concrete Reinforcement" (latest ASTM Serial Designation).
- 23.4.3 All bar reinforcement shall be new intermediate grade deformed billet steel.
- 23.4.4 All bars shall be deformed bars conforming to ASTM Specifications A-305. Bars with deformations not meeting this Specification will not be acceptable.
- 23.4.5 All bending of bars, hooks, splicing of bars, etc., shall be in accordance with the requirements of the "Building Code Requirements for Reinforced Concrete" (latest ACI Code) as published by the American Concrete Institute, and the "Manual of Standard Practice for Detailing Reinforced Concrete Structures", and the "CRSI Design Handbook" except where shown or called for differently on the Drawings.

24. PIPE AND FITTINGS FOR WATER LINES

24.1 General

All water line pipes shall be Ductile Iron as specified herein, unless otherwise specified and as approved by the Inspector. No pipe less than 6 inches in diameter will be accepted unless specifically approved by the Engineer and District.

24.2 Ductile Iron Water Line and Fittings

24.2.1 Ductile cast iron pipe shall be centrifugally cast in sand-lined or metal-lined molds and shall conform to all requirements of ANSI, A21.51 Standards, and AWWA Specification C151. The pipe is to be slip-type, single gasket joints, and plain end ductile iron pipe with wall thickness class 52. The same ductile iron pipe manufacturer shall be used throughout the construction of each subdivision phase or section or construction project. All ductile iron class 52 pipe installed in a casing pipe shall be mechanical joint ductile iron pipe with Mega-Lug Glands and Restraints. U.S. Pipe & Foundry, American Cast Iron Pipe Co., Griffin Pipe Products, **McWane Pipe and Clow Water Systems Co.** shall manufacture ductile iron pipe.

24.2.2 The joints shall be of the slip-on type such as "Fastite," "Tyton," or approved equal which employ a single elongated groove gasket to affect the joint seal. The pipe shall be furnished lengths not to exceed 20' or less than 12', and they shall be cement-lined inside and tar-coated outside, complete with accessories and lubricant. Fittings shall be mechanical joint type, cast or ductile iron ANSI/AWWA-C110/A21.10, complete with all accessories.

24.2.3 When delivered to the job site, all pipes shall be received, unloaded, and carefully inspected by the Contractor for damaged or defective pieces. All damaged or defective pieces shall be rejected. If it is necessary to redistribute or haul any pipe to a new location, such handling of the pipe shall be at the Contractor's cost. The Contractor shall properly protect the pipe after it has been unloaded.

24.2.4 Fittings shall be in accordance with standard ductile iron mechanical joint fittings as manufactured by the U.S. Pipe and Foundry Company, American Cast Iron Pipe Company, or Tyler/Union. All fittings shall have Mega-Lug Glands with Restraints. The restraints shall be as manufactured by EBAA or Ford Metal Box or approved equal.

24.2.5 Magnetic Tape and Locating Wire: All water lines shall have an insulated 12 gauge locating wire installed along the side of the pipe. A magnetic tape shall be located 18" below finished grade. The Contractor shall install metallic faced or backed tape when backfilling the water main trench. Ends or breaks in the tape shall be securely spliced back together.

24.3 Polyvinyl Chloride (PVC) Plastic Pipe (Only for repairs on existing P.V.C. Lines)

24.3.1 All plastic pipes shall be made from Type 1, Grade 1, Polyvinyl Chloride Plastic as defined in ASTM Specification D1784, "Specification for Rigid Poly (vinyl chloride) Compounds." The required Class will be a minimum of 200 and if greater will be as shown on the Drawings. All Class 200, 250, or 315 pipe shall have National Sanitation Foundation (N.S.F.) approval and be manufactured in accordance with Commercial Standard CS-256-64 except for the following tests which shall be run at least once each hour, per machine on each size and type of pipe being produced. The pipe shall also meet the requirements of ASTM D2241.

24.3.1.1 Flattening Test: A specimen of pipe at least 2" long shall be flattened between parallel plates in a suitable press until the opposite inside surfaces touch and 100% flattening has occurred. The rate of loading shall be uniform and such that the compression (100% flattening) is completed within two minutes. Upon completion of the test, the specimen shall not be split, cracked or broken.

24.3.1.2 Extrusion Quality Test: The method of testing as described in Section 7.8 of Commercial Standard CS-256-63 shall be followed except that upon completion of the tests there shall be no flaking, peeling, cracking, or visible deterioration on the inside or outside surface.

24.3.1.3 Quick Burst Test: The time of testing each specimen shall be between 60 and 90 seconds.

<u>SDR</u>	<u>PRESSURE</u>	<u>RATING</u>	<u>MIN. BURSTING</u>	<u>PRESSURE</u>
13.5	315		1200	
17	250		1000	
21	200		800	

24.3.1.4 Impact Tests: All SDR 13.5 to 21 (315 pounds to 200 pounds pressure rated) pipe. Manufacturer will also provide results of impact tests conducted. Regardless of the number of specimens required for testing Commercial Standard CS-256-63, the Flattening Test, Extrusion Quality Test, Quick Burst Test, and Impact Test will be run at least once each hour per machine on each size and type of pipe being produced. Any

specimen failing to meet any of the above mentioned tests will require that all pipes of the size and type manufactured during that hour be scrapped.

24.4 Joints:

24.4.1 The pipe and fittings shall have a push-on joint consisting of a rubber gasket designed to be assembled by the positioning of a continuous molded rubber ring gasket in a recess in the pipe and fitting sockets, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and angular recess shall be so designed and shaped that the gasket is locked in placed against displacement as the joint is assembled. Gasket dimensions shall be in accordance with manufacturer's standard design dimensions and tolerances and shall be of such size and shape to provide an adequate assembly to affect a positive seal under all combinations of joint and gasket tolerance. Gasket shall be vulcanized natural or vulcanized synthetic rubber. No reclaimed rubber shall be used.

24.4.2 All joints shall meet the requirements of ASTM D3139.

24.4.3 All spigot (plain) ends shall be beveled to accommodate easy insertion into the gasket joint. The spigot (plain) end shall also be stripped so as to indicate the distance it should be extended into the socket. The joint shall be designed so that the spigot (plain) end may move in the socket as the pipe expands or contracts. The joints shall be designed so as to provide for the thermal expansions or contractions experienced with a temperature change of at least 75°F.

24.4.4 Lubricant furnished for lubricating joints shall be non-toxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart taste or odor to water. The lubricant containers shall be labeled with the manufacturer's name.

24.4.5 Joints shall be either integral bell or ring type with rubber compression gasket or twin gasket couplings. All gaskets shall be molded in the pipe bell during manufacturing. Pipe and bell must, however, be manufactured by the same manufacturer. Pipe to be as manufactured by Diamond Plastic, NAPCO, Johns-Manville or Vulcan.

24.5 Pipe Lengths: The pipe shall be furnished in manufacturer's standard 20' lengths. However, the Contractor is advised that the Inspector must approve methods of storage and handling and that the pipe shall be supported within 5' of each end and every 15' thereafter. At no time will the pipe be dragged or dropped. The pipe shall be stored away from heat or direct sunlight and "stringing" of the pipe along the project will not be allowed.

24.6 Fittings: Fittings shall be in accordance with standard ductile iron mechanical joint fittings as manufactured by the U.S. Pipe and Foundry Company, American Cast Iron Pipe Company, or Tyler/Union.

24.7 Marking of Pipe: As a minimum, the pipe and fittings shall be the following data applied to each piece:

- 1) Nominal Size
- 2) Type of Material
- 3) SDR or Class
- 4) Manufacturer
- 5) N.S.F. (National Sanitation Foundation's Seal of approval)

24.8 Major Road Crossings: All federal highway, state highway, county roads, city streets and private road water line crossings shall be ductile iron pipe with a steel casing pipe as specified by the Engineer or District.

24.9 Magnetic Tape and Locating Wire: All water lines shall have an insulated 12 gauge locating wire installed along the side of the pipe. A magnetic tape shall be located 18" below finished grade. The Contractor shall install metallic faced or backed detection tape when backfilling the water main trench. Tape ends or breaks in tape shall be securely spliced back together.

24.10 Pipe Handling

The Contractor will be required to stockpile all pipe, fittings, valves, valve boxes and other materials in central locations, and haul only the amount to the job site that can be laid in one day. Pipe will not be strung along the pipeline. Care must be exercised in the handling of all materials and equipment, and the Contractor will be held responsible for all breakage or damage caused by his workmen, agents, or equipment for handling or moving. Pipes and other castings shall not be thrown or dropped for cars, trucks, or wagons to the ground, but shall be lowered gently and not allowed to roll against or strike other castings and unyielding objects.

25. LAYING PIPE

25.1 The trench shall be excavated to the required depth and width, bell holes and/or jointing holes shall be dug in advance of pipe laying. The beds of each piece of pipe shall be prepared carefully so that each individual piece of pipe shall have a uniform bearing. Pipe shall be laid in a straight line and grade without kinks or sags, and shall be laid in a workmanlike manner. Bell holes and/or jointing holes shall be large enough so that the bell or hub will clear the ground and leave ample room for making the joint and inspection of joints.

25.2 All pipes shall have a minimum of 30 inches and a maximum of **48 inches** of cover including ditch crossings unless concrete encasement is used as per the Standard Drawings.

25.3 Before each piece of pipe is lowered into the trench it shall be swabbed out thoroughly to insure it is being clean. Each piece of pipe shall be lowered separately unless the Inspector gives special permission otherwise.

25.4 Care shall be taken to prevent injury to the pipe coating, both inside and outside. No piece of pipe or fitting which is known to be defective shall be laid or placed in the line. If any defective pipe or fitting shall be discovered after the pipeline is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

- 25.5 All angles or bends in the pipe lines, either vertical or horizontal, shall be satisfactorily braced or anchored against the tendency of movement with joint harness, concrete or equal anchors to the satisfaction of the Inspector.
- 25.6 All pipes must be tested for uniform diameter, straightness, and defects by the Inspector before being lowered into the trench. Rejected pipe shall be marked so as not to impair its value, and separated from accepted pipe and removed from the project.
- 25.7 When lying of pipe is stopped or when the line is left for any reason, the exposed end of such pipe shall be closed with plug fitted into the pipe bell so as to exclude earth and other material. Precautions shall be taken to prevent flotation of pipe by runoff into trench.
- 25.8 PVC pipe shall be laid in accordance with manufacturer's recommendations with manufacturer's printed information on top. When a tapping sleeve is used on PVC pipe the trench shall be left open for a minimum of 24 hours, after 24 hours all bolts shall be re-tightened before backfilling the trench.
- 25.9 Where bottom of the trench at sub grade is found to be unstable or to include ashes, cinders, any type of refuse, vegetable or other organic material, or large pieces of inorganic material, which in the judgment of the Inspector should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Inspector. Before the pipe is laid, the sub grade shall be made by backfilling with crushed stone or gravel. The layers shall then be compacted so as to provide uniform and continuous bearing and support for the pipe at every point between bell recesses.
- 25.10 In rock the trench shall be excavated to a depth at least 6 inches below the bottom of the pipe and refilled with crushed stone or gravel to a sufficient depth to provide a firm bed for the bottom quadrant of the pipe. This 6 inch clearance must also hold under pipe bells.
- 25.11 Joints for ductile iron pipe shall be made with mechanical or slip-on joints according to the manufacturer's Specifications with the tools recommended. A copy of the manufacturer's instructions shall be available on-site at all times when pipe is being laid.
- 25.12 All pipes must be forced and held together, or "homed" at the joints before tightening of joint bolts.
- 25.13 Special molded adapters with stainless steel bands as furnished by pipe manufacturer shall be used for connecting dissimilar pipe to ductile iron pipe.
- 25.14 No walking upon the completed pipe lines will be permitted until trench has been backfilled to a depth of at least 6 inches over the top of the pipe. Exception may be made at the discretion of the Inspector where it is necessary in order to tamp the backfill around the pipe.
- 25.15 No backfilling over pipe, except for securing pipe in place will be allowed until the Inspector has had an opportunity to make an inspection of the joints and alignment in the section laid, but such inspection shall not relieve the Contractor of further liability in case of defective joints. The contractor will not proceed with the backfilling until the Inspector gives permission.

25.16 Separation of Water Mains and Sewers

25.16.1 Where the water line crosses over a storm or sanitary sewer, a full joint of pipe shall be centered over the sewer using Ductile Iron Pipe. Where the water line is parallel to a sanitary or storm sewer or near a manhole, the water line shall be a minimum of 10 feet from the sewer or manhole and be in a separate trench. Where this separation is not practical, the bottom of the water main shall be at least 18 inches above the top of the sewer. Where the water line is perpendicular to to a sanitary or storm sewer, the water line shall have a minimum of 18 inch vertical separation.

25.16.2 When routing a water line around the end of a storm sewer, water line shall clear end wall or wing wall by at least 5 feet.

25.17 Crushed Rock or Gravel

25.17.1 Crushed limestone used for backfill or bedding shall be crusher run from a quarry approved by the Inspector. It shall contain no loam or clay, and all material must be capable of being passed through a 3/4-inch sieve.

25.17.2 Gravel used for backfill or bedding shall consist of natural bank or river gravel consisting of durable particles graded from fine to coarse in a reasonably uniform combination with no boulders or stones larger than 3/4 inches in size. It shall be free from slag, cinders, ashes, refuse, and other deleterious or objectionable materials. It shall not contain excessive amounts of loam and clay and shall not be lumpy or frozen. No more than 15% shall be finer than No. 200 sieve.

26. VALVES AND VALVE BOXES

26.1 All gate valves (2"-24") shall be of the resilient seat, iron body, non-rising stem, fully bronze mounted, and suitable for working water pressures of 200 psi. Valves shall be of standard manufacture and of the highest quality both as to materials and workmanship as manufactured by the Mueller Company (Model A-2360 2"-12") and (Model A-2361 14"-24"), American Darling (Series 2500), U.S. Pipe (Metroseal 250), **M&H or Kennedy Valve (Model C509 2"-12") and (Model C515 14"-24")**.

26.2 All gate valves shall be furnished with mechanical joint end connections, unless otherwise shown on the Plans or specified herein. The end connections furnished shall be Mega-Lug Glands with Restraints.

26.3 All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.

26.4 All gate valves shall be provided with a 2-inch square operating nut, and shall open by turning to the left (counter clockwise). At least two operating wrenches shall be furnished.

26.5 Valve boxes shall be as manufactured by Concrete Products of Nashville with cover number 8006 by John Bouchard & Sons Company, Ruscco, Vulcan or equal. Boxes shall be accurately set to finished grade and shall have backfill well tamped around them so as to hold them securely in place. All lid covers to valve boxes shall be marked "Water". Concrete valve boxes made in increments of 6", 12" or 18" shall support lids.

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- 26.6 Valve boxes where possible must be located out of the pavement area. Where they must be located in streets, the boxes must be raised upon final paving. No valves are to be installed in ditches.
- 26.7 All check valves shall be iron body, bronze mounted, and rate for 200 pounds working pressure, suitable for operation in horizontal or vertical lines. Hinge pins and seat rings shall be bronze. A removable cover shall be provided for the removal of internal parts without the necessity of removing the valve from the line. Check valves shall be as manufactured by American or Mueller.
- 26.8 Valves shall be furnished with the type of joints to meet requirements of pipe in which they are to be installed.

27. AIR RELEASE VALVES AND BOXES

Air release valves and boxes shall be installed on water liners at the high points in the lines as shown on the Plans or as directed. The valves shall have one (1") inch diameter inlet and shall be fitted with a 3/16" size orifice. The body and cover shall be of cast iron, the trim shall be of brass, and the float shall be of stainless steel. The valves shall be suitable for use in lines having a maximum water pressure of 150 pounds per square inch. The air release valves shall be Valve & Primer Company No. 200A or an approved equal. The box shall be a 2" Metro Style Meter Box less slab as manufactured by Cloud Concrete, Jarrett Concrete or Hula Concrete. The lid shall be a large plate frame and cover as manufactured by John Bouchard and sons, Rusocco, Vulcan or equal.

28. BLOW-OFFS

- 28.1 Blow-offs shall be installed at the location as shown on the Plans or as directed by the Inspector.
- 28.2 Blow-Offs shall be made with 2" brass piping. A gate valve shall be installed prior to the installation of the cap. A reverse kicker shall be installed prior to the gate valve and the gate valve rodded to the kicker. End of water line shall be capped with a mega-lug plug tapped for 2" threaded brass pipe. The blow-off shall consist of 2" brass pipe, 2" threaded gate valve with 2" nut, valve box with frame and cover, and 2" bronze ball valve. A Mainguard Hydrant may be used. See Standard Drawing No. 14 and 15 for details.

29. FIRE HYDRANTS

- 29.1 Fire hydrants shall be constructed of the highest grade materials and shall conform, in all respects, to the latest American Water Works Association's Standard Specifications (AWWA 502) and the National Board of Fire Underwriters. Fire hydrants shall be cast iron bodied, fully bronze mounted, suitable for a working pressure of 150 pounds per square inch or a hydrostatic pressure of 300 pounds per square inch. Fire hydrants shall be as manufactured by Mueller Co. (Model A423), American Daring (Model B84B) **M&H (Model 929)** or U.S. Pipe (Metropolitan 250). All hydrants shall have Mega-Lug Glands with Restraints.
- 29.2 All 6-inch fire hydrants shall have 6-inch bell-end connection to 6 inch and larger mains, which shall conform to Table 11.1 of the American Standard Specifications A21.11 for mechanical joint cast iron pressure pipe and fittings. The hydrants shall be a 3-way

hydrant with one (1) 4 1/2" pump nozzle or two (2) 2 1/2" hose nozzles and NST threads together with cap fastened securely to each hydrant. The hydrants shall be provided with a pentagonal 1-1/2 inch operating nut. The bottom valve of the hydrant shall be not less than 5-1/4 inch in diameter with a 36 inch buried depth. The riser barrel shall have an inside diameter of 7 inches. All connection threads shall conform to the Standard Specification of the National Board of Fire Underwriters.

29.3 The main valve of the hydrant shall be of the compression type closing with pressure. The valve shall be faced with heavy impregnated waterproof balata or other approved material. The hydrant shall be of the "dry head" type. Hydrants shall have a safety "Breakable Flange" section located above the ground line. Hydrants shall be set so that the distance from the ground line of the hydrants to the top of the hydrants lead shall not be less than 30 inches, and turned so as to be unobstructed by poles or other objects. The hydrants shall be set plumb and shall be set with no less than 3 cubic feet of broken stone or crushed gravel about the waste opening to permit proper drainage. All hydrants shall be backed up with one cubic foot of 3000-pound mix concrete. The waterways of hydrants shall be as free as possible of obstruction, sharp turns, corners, or other causes for resistance. The base of the hydrant shall be constructed in such a manner as to admit a proper mechanical joint connection with mechanical joint pipe.

29.4 All fire hydrants and their appurtenances shall be installed within District easements on private property, whenever possible, and not within any public right-of-way.

29.5 No fire hydrant will be installed until such time as all system improvements necessary to provide adequate pressure and flow have been made, or are in the process of being made.

29.6 The service line from the District's system to any fire protection device, whether a fire hydrant, sprinkler system or other, shall be used only for fire protection. Such service line shall not be tapped for any other purpose, unless specifically permitted in writing by the District.

29.7 After installation, exposed surfaces of hydrants shall be painted with one coat of red and two coats of Sonneborn's Hydrant Enamel. The color shall be in accordance with the District's Standards.

29.8 The Contractor shall provide the Owner with two cartons of collision breakage repair parts and two valve wrenches for the hydrants.

30. PRIVATE FIRE HYDRANTS AND SPRINKLER SYSTEMS

Indicator posts and valves shall be required for all privately owned fire hydrants and/or sprinkler systems on lines from which there is no domestic service, yard hydrant, or other water use. All automatic sprinkler systems and other fire fighting devices must be metered and each such installation must have suitable backflow prevention device. The meter and backflow preventer shall be as specified by the District.

31. INSPECTION OF THE LINES

- 31.1 Before the Contractor backfills any of the lines, or earlier, if deemed advisable, they first shall be inspected by the Inspector. Said Inspector shall give the Contractor permission to proceed with the backfilling. If any joints, pipe, fittings, materials or workmanship are found to be defective, they shall be removed and replaced by the Contractor without any additional expense.
- 31.2 As lines or sections of line are completed, they shall be thoroughly cleaned, disinfected and inspected for leaks. The Contractor shall complete the testing and disinfection as specified below with inspection by said Inspector and completes all clean-up work before requesting a final inspection.

32. WATER METERS

- 32.1 All new water meters shall meet the requirements of the latest AWWA Standard Specification for Cold Water Meters, Displacement Type. Meters shall be housed with a bronze body and lid and cast iron bottom with hinged cover and shall be of the "frost proof" type. The meter register shall read in gallons and shall be sealed hermetically to prevent condensation and to keep out water and other foreign materials. The meters may be either of the pistons operated, or of the disc operated, type. The meter shall be equipped with a stainless steel strainer and shall be of the magnetic drive type. The meters in a subdivision shall have consecutive serial numbers.
- 32.2 The meter sizes required are **5/8 x 3/4** inch through 4 inch, as directed, and shall have minimum capacities as shown in the following table.

<u>Meter Size</u>	<u>Safe Operating Capacity</u>
5/8 x 3/4"	30 gpm
1"	50 gpm
2"	160 gpm
3"	300 gpm
4	400 gpm

- 32.3 **Meters shall be Neptune Radio Read, Model eCoder, R9001.** Meter fee to be paid to the District shall be purchased by the developer and Milcrofton will purchase and install them as needed.

33. METER BOXES

- 33.1 All meter boxes shall be of the molded plastics type, and shall be constructed to a size adequate for the meter to be installed. The meter boxes shall be fully equipped with a removable cover and lid for adequate and proper reading of the meter. The meter box shall be as manufactured by Mid-State Plastics, Inc. (Part No. **MSBCF-1324-18**). The meter box lid shall be ductile iron with a ductile iron reader door and a 1 7/8" pit hole located above the reader door in either corner. The lid shall be as manufactured by Mid-State Plastics, Inc. (Part No. **MSCBC-1324-R-TR**). Shop Drawings of the meter boxes shall be subject to the approval of the Inspector prior to installation. Boxes shall be a minimum of 18 inches deep. Meter box **MSBCF-1730-18** is to be used for 1" meters.

34. METER FITTINGS

The Contractor shall furnish and install the following for each service.

34.1 Bronze Service Saddle (on PVC Water Lines)

All saddles to be double strap and they shall have a thick tapping boss with full length tapered threads and the "O"-ring gasket cemented in place and confined in a retaining groove. Saddles shall be Mueller H-13000 or Ford 570.

Before drilling tap into water main, the service saddle shall be air tested at 150 psi for 5 minutes to check for any leaks.

34.2 Corporation Stops - Stops shall be of bronze construction with one end having tapered threads (AWWA (cc) Thread) for connection to service saddle and the other end with copper service thread connection. Corporation Stop shall be Mueller B-25008 or Ford FB1000-3Q.

34.3 Meter Yoke - Contractor shall install a copper setter meter yoke. The meter yoke shall be the double check valve type, **Mueller B-2404-R6A** with a 7" rise or **Ford VBHC-72-9W-81-33 for 3/4"** and **Mueller B2404-R6A** with a 10" rise or **Ford VBHC-72-9W-81-44 for 1"**. The inlet end shall be a compression type joint, Mueller H-14227. The outlet end shall be a Multipurpose type joint Mueller H-14222. A curb stop shall be installed on the inlet of the meter yoke. The curb stop shall be Mueller B-25170R or Ford B41-233WQ for ¾" and Mueller B25107R or Ford B41-344WQ for 1"

34.4 Fittings - All fittings used on copper tubing shall be compression type. Soldered joints will not be permitted.

34.5 For duplexes, the Contractor shall install a 1" service line to a wye with a 3/4" water line to separate meters. Each side of the duplex to have its own meter.

35. SERVICE CONNECTION PIPING

35.1 Service Connection Piping

Service connection piping shall be 3/4 inch, 1 inch, or 2 inch seamless copper tubing, ASTM B-88 Type K or Relau Municipex Pipe meeting AWWA C904 standards, SDRN copper tube size and certified CSA B137.5, ASTM F876 & F877, NSF Standard 14 and 61. The length necessary to run a direct line, without splices from the main to the meter at the property line. Samples shall be submitted to the Inspector for approval. Special care should be taken to protect the service piping from any sharp and/or hard objects by installing earth around the pipe. Cover is to be at least 18 inches at all points.

35.2 Service Pipe Bored Under Highway, Railroad, or Street

Where it is necessary to cross existing or proposed streets, highways, or railroads, the Contractor shall bore service pipe under said highway, railroad, or street and install a 3" diameter P.V.C., SCH 40 or SDR21, CL.200 encasement pipe so the service line can be installed through the encasement pipe. The encasement pipe shall extend 3 foot from

Revised: December 2011

Milerofton Utility District

Page 25

the main to within 3 foot of the meter box. Such service line shall be bored at least four feet under the surface. Open cutting of highways, streets, or roadways will be allowed only when it is impossible to bore and when approved by the Inspector.

36. CREEK AND DITCH CROSSING

- 36.1 All creek crossings shall be made with mechanical joint ductile iron pipe with Mega-Lug Glands and Restraints and a diggable flowable fill concrete cap.
- 36.2 Where the water line crosses ditches or culverts, the line shall go under the invert of same at such a depth as to provide adequate cover. If the line is within 30 inches of the bottom of a ditch or within a culvert, it shall be encased in concrete. (See Standard drawings). The line shall begin to slope on either side of the ditch or culvert at a sufficient distance to hold a uniform gradient in the line without sags or short breaks.

37. HIGHWAY, RAILROAD, AND SECONDARY ROAD CROSSINGS

- 37.1 The Contractor shall furnish and install at locations shown on the Drawings or where required by Owners or agencies, metal pipe casing for crossing all highways, county and city roadways or railroads. Metal pipe casing shall be steel pipe, or pipe as required by the respective Owner or agency having jurisdiction. Crossing shall have a minimum depth of cover of four feet as measured from the top of the casing pipe. The Contractor is responsible for obtaining construction permits and for notifying Owners or agencies of construction schedules so that they may have a representative at the site to inspect the construction. Specifications published by the owners or agencies when granting permits for this work are to be considered a part of these Specifications. The Contractor shall also be responsible for any bond required by the Owners or agencies, the minimum size of casing pipe for the various sizes of mechanical joint ductile iron carrier pipe shall be as follows:

<u>Ductile Iron Carrier Pipe</u>	<u>Smooth Wall Steel Casing Pipe Diameter/Wall Thickness</u>
6 inch	12 inches / 0.25 inch
8 inch	18 inches / 0.25 inch
10 inch	18 inches / 0.25 inch
12 inch	20 inches / 0.25 inch
14 inch	24 inches / 0.25 inch
16 inch	26 inches / 0.25 inch

- 37.1.2 Pipe under highway or railroad proper shall be installed by the jacking, tunneling, or drilling method, subject to the approval of the Owner or agency involved, the excavated base being made to grade at bottom and no more than one inch larger than the casing at top. Pipe extending beyond the minimum jacking limits may be placed by the open trench method. Jacking methods and procedure shall be as recommended by pipe manufacturer. Adjacent sections shall be completely jointed together, and the joint shall be inspected before jacking is resumed.

- 37.1.3 Joining of steel pipe shall be by welding at joints.

- 37.1.4 Construction must not interrupt or interfere with highway or railroad traffic. Roadways shall be kept clear at all times.
- 37.1.5 Regardless of the type of water pipe used elsewhere, all highway, secondary road and railroad crossings shall be made of mechanical joint ductile iron pipe. The pipe shall be centered and supported in the casing pipe with a minimum of 2 spacers per joint with stainless steel band casing spacers Model SSI as manufactured by Advance Product and Systems, Inc., PSI or Cascade. The number of spacers required to be per the manufacturer's recommendation. The ends of the casing pipe to be sealed using Link-Seal with stainless steel bolts or equal.

37.1.6 A detail of a typical water line casing is shown in the Standard Drawings.

38. DISINFECTION AND FLUSHING OF LINES

- 38.1 The new water lines shall not be placed in service either temporarily or permanently until they have been disinfected thoroughly, in accordance with the following requirements and to the satisfaction of the Inspector. After pressure testing procedures have been completed, the Contractor shall fill the lines and flush them thoroughly, removing all foreign material, dirt, etc. No more than 6,000 feet of line may be disinfected at one time.
- 38.2 After the lines have been flushed, a solution of hypochlorite using HTH or equal sufficient to insure a chlorine dosage of at 50 ppm in the lines shall be introduced into the lines for 24 hours and a residual of at least 25 ppm should be present in the pipe at the end of the 24 hour period. The lines shall be flushed until 2 ppm chlorine residual remains, then a bacteriological sample taken. If a negative sample is obtained, the lines may be put into service. If a positive sample is obtained however, the disinfection procedure shall be repeated until a negative sample is obtained.
- 38.3 Disinfection, pressure testing, other required testing and flushing are not pay items. The Contractor shall pay for all water used for testing, disinfection, and flushing.
- 38.4 The Contractor shall install a temporary by-pass with a meter around a valve at the point of connection to the District's existing water system. This meter will be for the purpose of measuring water used by the Contractor for flushing, testing, and disinfecting the new water lines. The meter shall be large enough to pass the required flows, and shall be tested for accuracy before being installed.

39. PRESSURE TESTING OF THE WATER LINES

- 39.1 All pipes must be tested under 200 pounds pressure. This may be done from valve-to-valve or by plugging the open end of the pipe. (The tests must be made in the presence of the Inspector.) Each joint shall be thoroughly inspected and all joints made watertight before backfilling about the joint. The Contractor shall furnish all equipment and material for testing.
- 39.2 The duration of each pressure test shall be at least two hours.

40. THRUST BLOCKING

- 40.1 Ends of pipe, bends, and other joints or anchors as shown on the plans shall be backed up with concrete. The Contractor shall provide and place concrete in accordance with the Standard Drawings at every bend and fitting.
- 40.2 This concrete shall be mixed in the proportions of 1 part Portland Cement, 3 parts sand, and 5 parts stone or crushed gravel (1 inch size). This concrete work shall be in accordance with the best practices and shall meet the approval of the Inspector. No additional compensation will be allowed for this concrete.

41. FINAL CLEAN UP

- 41.1 In addition to the preliminary clean-ups during the progress of construction, the Contractor shall make a final clean up to ensure that the construction site is returned as nearly as possible to its original state.
- 41.2 The Contractor is to assure the Owner that all property owners are completely satisfied with the clean up. The Owner may require that the Contractor obtain releases from property owners.

42. AS BUILTS

Before final acceptance of a water line, the Developer will provide the District with distances of each service from the closest property line and field measurements for any changes from the plans. The Contractor will draw As-Builts from this information for a permanent record of construction. The Developer is responsible for the cost of locating lines or services which are not found where As-Built information shows.

43. GENERAL WARRANTY

For a period of at least one year after the final acceptance of the water system by the District in writing, the Developer and the Contractor shall warrant the fitness and soundness of all work done and materials and equipment put in place under the Contract. Neither the final acceptance nor any provision in the Plans or Specifications nor partial or entire occupancy of the premises by the District, shall constitute an acceptance of work not done in accordance with the Specifications or relieve the Developer of liability in respect to workmanship. The Developer shall remedy any defects in the work and pay for the damage to other work resulting there from which shall appear within a period of one (1) year from the date of final acceptance of the work, unless a longer period is specified. The District will give notice of observed defects with reasonable promptness.

44. BACKFLOW PREVENTERS

- 44.1 A reduced pressure backflow preventer must be installed at commercial water services at the discretion of the District. The unit may be mounted above grade inside or outside in a heated un floodable area in accordance with Standard Drawing 12 and 13 and must meet all requirements of the State Department of Public Health.
- 44.2 The backflow preventer device shall contain a minimum of two independently operating check valves with an automatically operated pressure differential relief valve located between the two shut off valves, The device shall be equipped with the necessary appurtenances for testing. During normal flow and at the cessation of normal flow, the

pressure between the two check valves shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve shall operate to maintain this reduced pressure by discharge to the atmosphere. When the inlet pressure is two pounds per square inch or less, the relief valve shall open to the atmosphere, thereby producing an air gap in the device.

44.3 The backflow preventer must be tested by the Owner at least once every twelve months by or under the direction of a certified distribution system operator who has special training in testing and maintenance of these devices. The date and other pertinent information concerning the testing and/or repairing of the unit shall be recorded on an operation report attached permanently to the unit. Representatives from the District and from the Tennessee Department of Public Health shall have access for inspection of the backflow preventer at any time.

44.4 If sprinklers are installed on a dedicated private line tying directly to a public line with no domestic, fire hydrant, or yard hydrant service a double detector check is required.

44.5 Only approved devices manufactured by the following will be approved: Febco, Watts, Ames, Wilkens or Conbraco.

45. WATER BOOSTER STATIONS & WATER TANKS

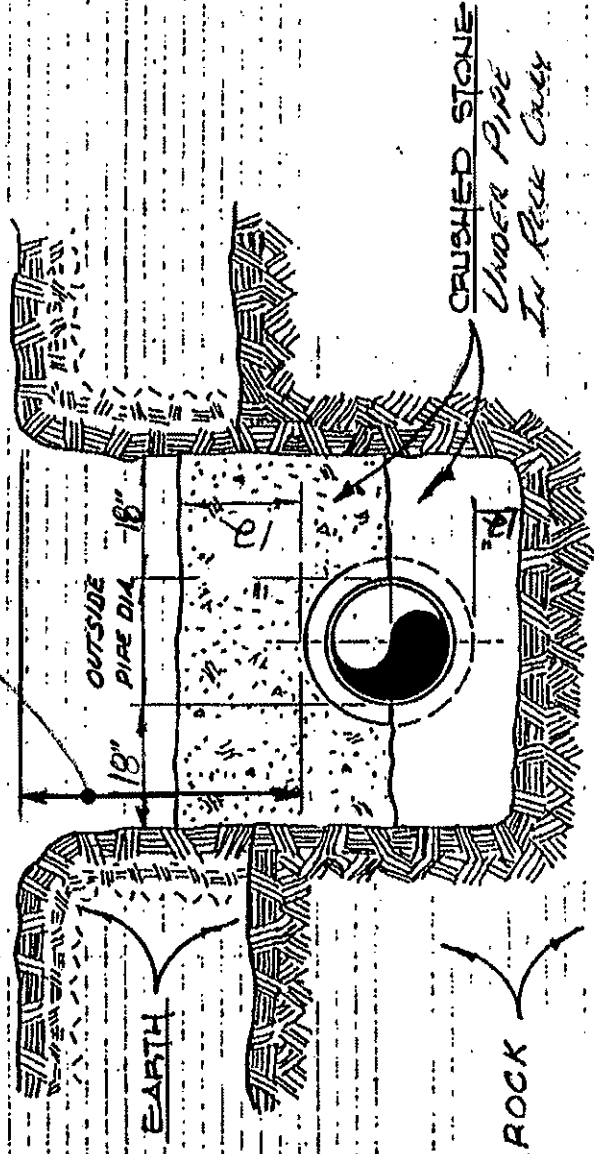
45.1 Water Booster Stations shall be constructed out of concrete block with a poured concrete roof and the exterior of the building to be covered with a brick facade. The interior dimensions of the building will be 20' x 25' x 13' high or as required to house the necessary pumps and equipment. The building will have a concrete floor and will contain as a minimum the following items; an electric heater, exhaust fan, roll up steel door, monorail steel beam **with a minimum 1 ton hand operated hoist or as specified**, electrical controls, telemetry system, pressure transducers, flow meter, backflow preventer, electrical surge suppressor and any other items that may be required by the Engineer or the District. The contractor shall be responsible for the installation of all mechanical and electrical equipment etc. for a complete and workable system. The water booster station access road and parking area shall be constructed with asphalt pavement. See Section 22 for pavement requirements.

45.2 Water Tanks shall be pre-stressed concrete with interior/exterior ladders, OSHA approved safety climbing devices, exterior ladder gate, half travel water level gauge, telemetry system and all appurtenances as specified on the plans and specifications. The water tank access road shall be constructed with asphalt pavement. See Section 22 for pavement requirements.

46. TELEMETRY

46.1 All water booster stations and water storage tanks shall be equipped with telemetry to monitor water tank levels and to turn on and off the water booster pumps. The telemetry system shall be supplied by Micro-Com, local representative Brann & Whittemore, Inc. (377-9444) **no substitute will be allowed.**

30" MINIMUM &
48" MAXIMUM
COVER

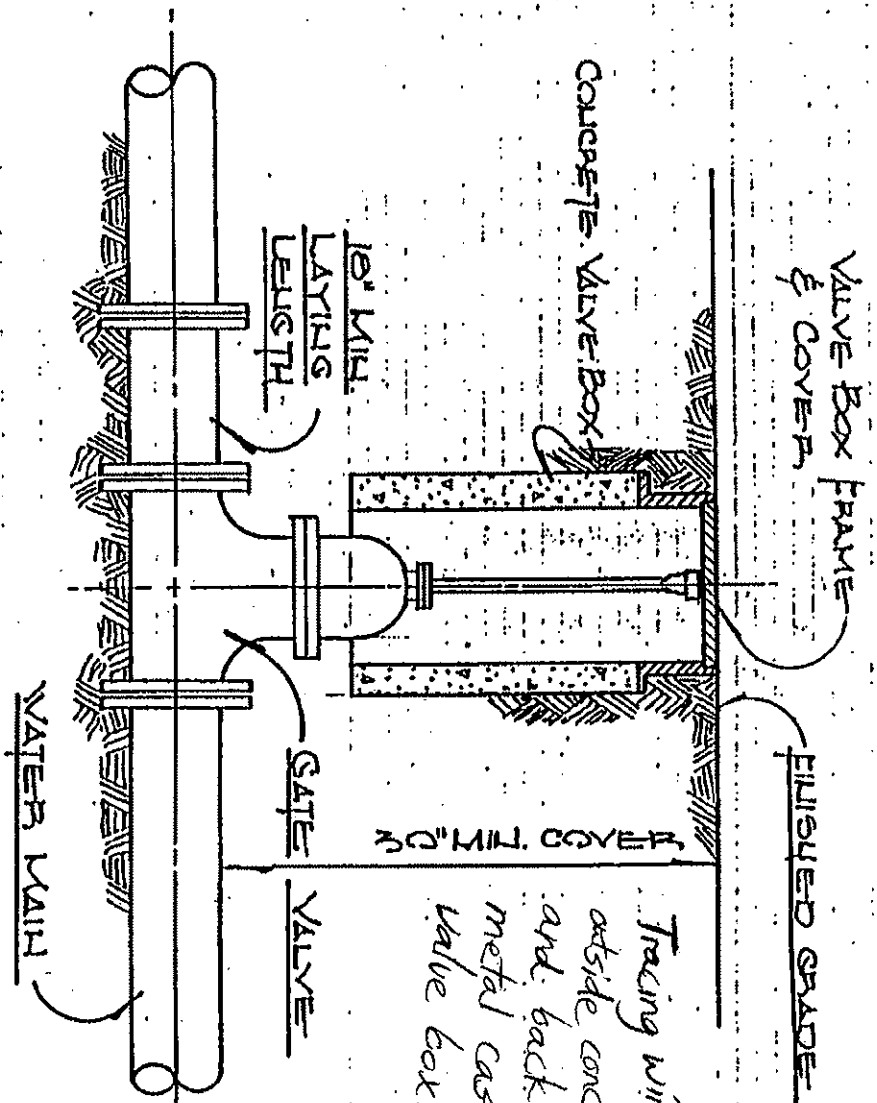


REVISED 12/5/00, 4/1/02, 9/11

LINE LAYING CONDITIONS - IN ROCK

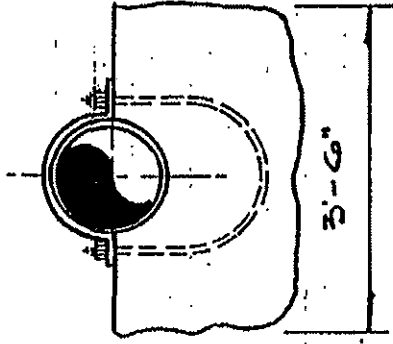
STANDARD DIVG. NO. 1
DATE: 4/6/02 SCALE: NONE

ALLEY, YOUNG & BAUMGARTNER, INC.
ENGINEERS - ARCHITECTS - SURVEYORS
BRENTWOOD TENNESSEE

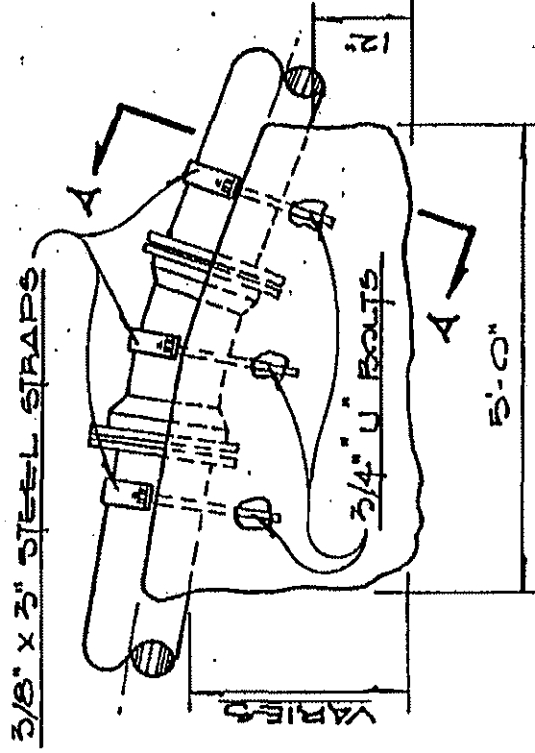


Tracing wire to come up
 outside concrete valve box
 and back underneath
 metal casting, inside
 valve box.

LINE VALVE SETTING
STANDARD DWG. No. 2
DATE: 4/6/88 SCALE: 1/4" = 1'-0"
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD TENNESSEE



SECTION "A-A"



FOR VERTICAL BENDS 10° AND GREATER

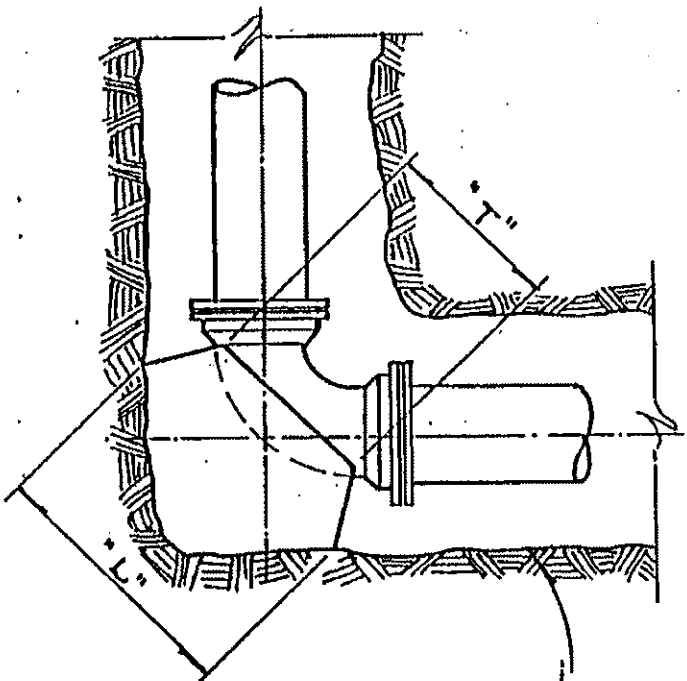
(Up OR Down)

ANCHOR DETAIL

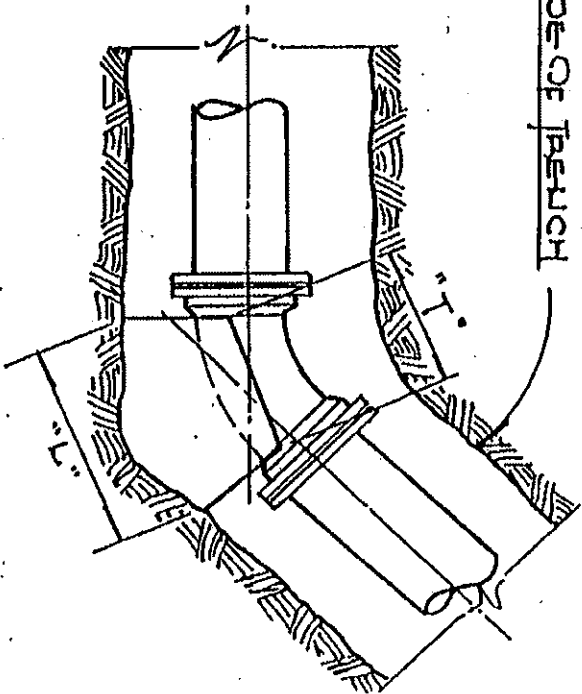
STANDARD DIVG. No. 3

DATE: 4/6/88 SCALE: 1/4" = 1'-0"

ALLEY, YOUNG & BAUMGARTNER, INC.
ENGINEERS - ARCHITECTS - SURVEYORS
BRENTWOOD TENNESSEE



90° BEND (1/4")

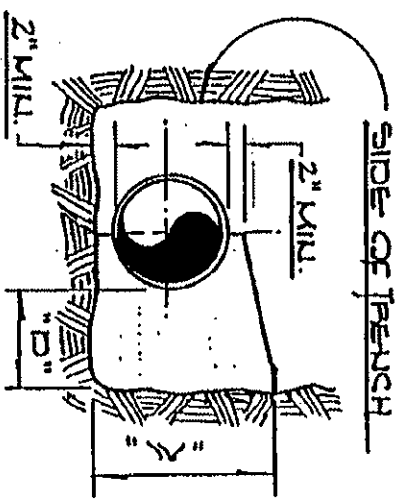


45° BEND (1/8") 22 1/2° BEND (1/8")

90° BEND (1/4")					
SIZE	6"	8"	10"	12"	12"
"D"	8"	10"	12"	12"	12"
"L"	24"	27"	30"	34"	34"
"V"	12"	16"	20"	24"	24"
"T"	16"	18"	20"	22"	22"

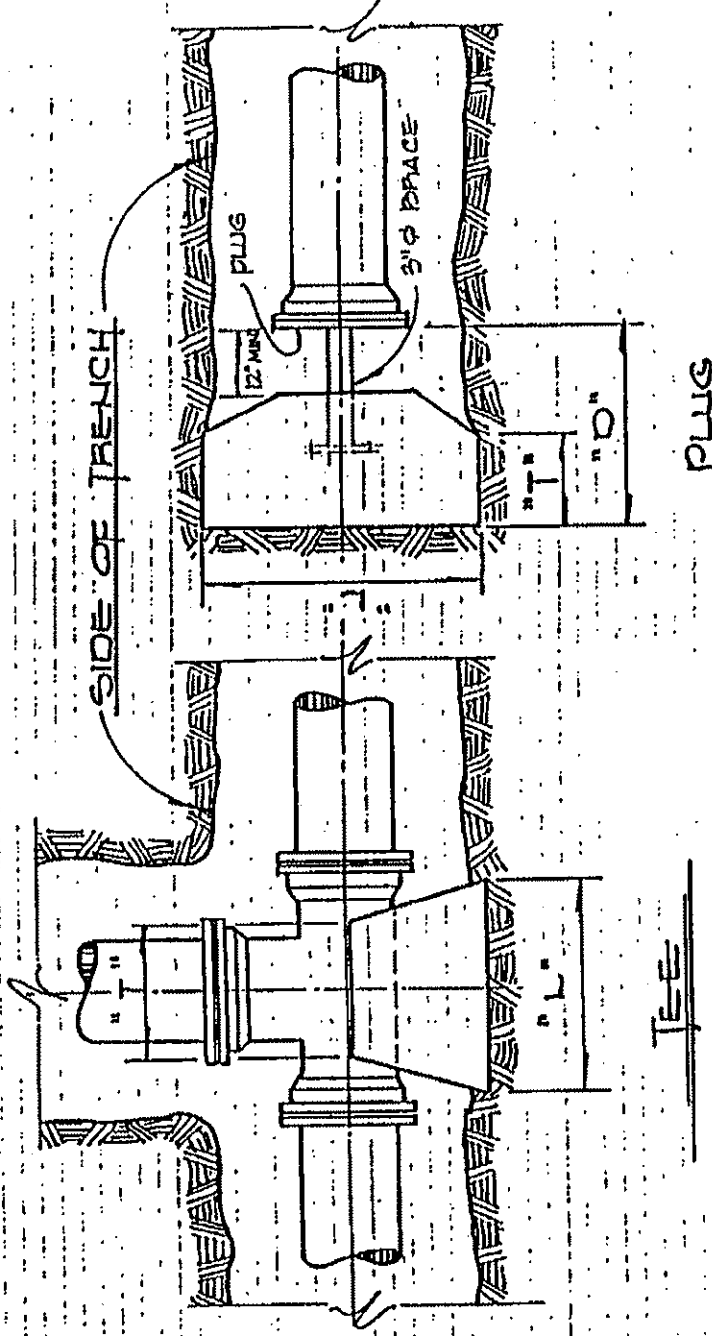
45° BEND (1/8") 22 1/2° (1/8")					
SIZE	6"	8"	10"	12"	12"
"D"	6"	6"	6"	6"	6"
"L"	18"	20"	22"	24"	24"
"V"	12"	14"	16"	18"	18"
"T"	16"	16"	18"	18"	18"

1 1/4° BEND (1/32")					
SIZE	6"	8"	10"	12"	12"
"D"	6"	6"	6"	6"	6"
"L"	14"	16"	18"	20"	20"
"V"	12"	14"	16"	18"	18"
"T"	14"	14"	16"	16"	16"



TYPICAL SECTION

Concrete Blockwork Details	
STANDARD DIV. No.	4
DATE: 4/6/88	SCALE: None
ALLEY, YOUNG & BAUMGARTNER, INC.	
ENGINEERS - ARCHITECTS - SURVEYORS	
BRENTWOOD TENNESSEE	

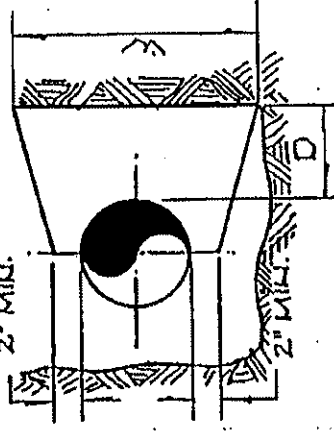


TEE		6"	8"	10"	12"
SIZE	D	6"	8"	10"	12"
	L	18"	18"	22"	27"
	W	12"	16"	20"	24"
	T	12"	12"	16"	18"

PLUG		6"	8"	10"	12"
SIZE	D	6"	8"	10"	12"
	L	16"	24"	30"	30"
	W	18"	24"	30"	30"
	T	12"	18"	24"	24"
	T	12"	12"	12"	12"

NOTE:

DEPTH "D" MAY BE
GREATER THAN SPECIFIED
TO ALLOW WORKING
SPACE. PIER MUST BE
AGAINST UNDISTURBED
EARTH.
2" MIN.



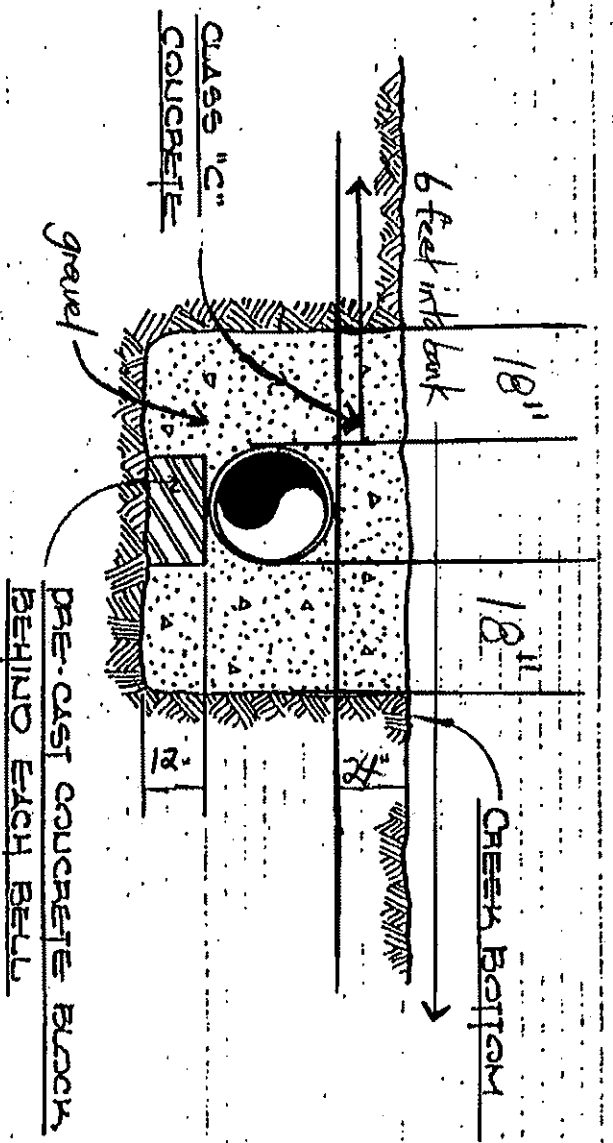
TYPICAL SECTION

CONCRETE BLOCKING DETAILS

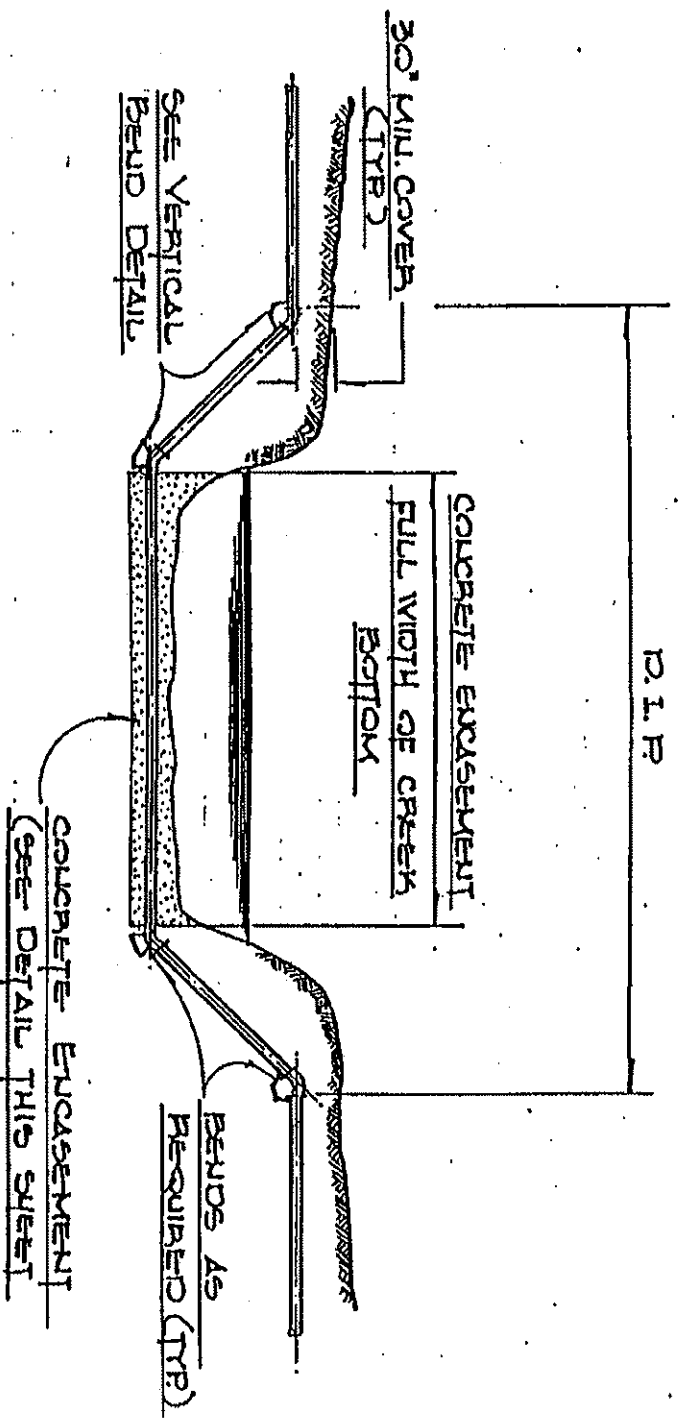
STANDARD DIV. No. 5

DATE: 4/6/88 SCALE: AS SHOWN

ALLEY, YOUNG & BAUMGARTNER, INC.
- ENGINEERS - ARCHITECTS - SURVEYORS
BRENTWOOD TENNESSEE



CONCRETE ENCASED
CREEK CROSSING IN ROCK

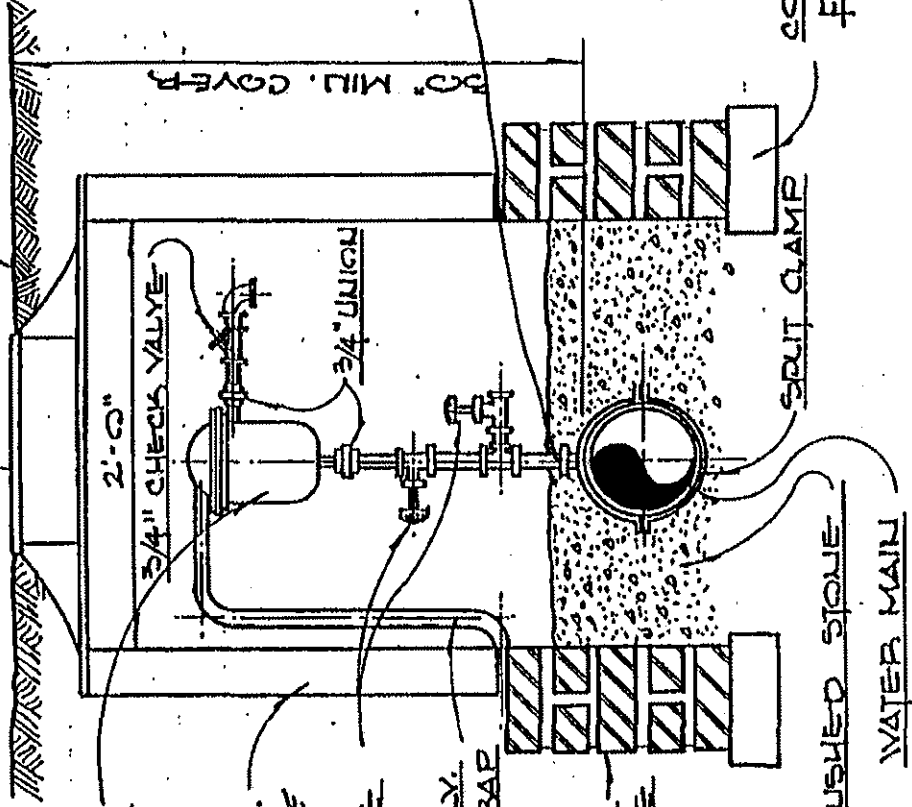


CREEK CROSSING DETAIL Revised 9/11

CREEK CROSSING DETAIL	
STANDARD DIV. NO.	6
DATE: 4/6/88	SCALE: NONE
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD - TENNESSEE	

METRO BOX COVER
SEE SECTION 27

EXISTING GRADE



AIR OR VACUUM
RELEASE

PRE-CAST CONC.
METER BOX SEE
SECTION 27
3/4" BALL VALVE

10' GA. 1/2" WIDE GALV.
STEEL STEADY STRAP

6" BRICK WALL
ADJUST TO GRADE
IF REQUIRED

CRUSHED STONE
WATER MAIN

CONCRETE
FOOTING

SPRIT CLAMP

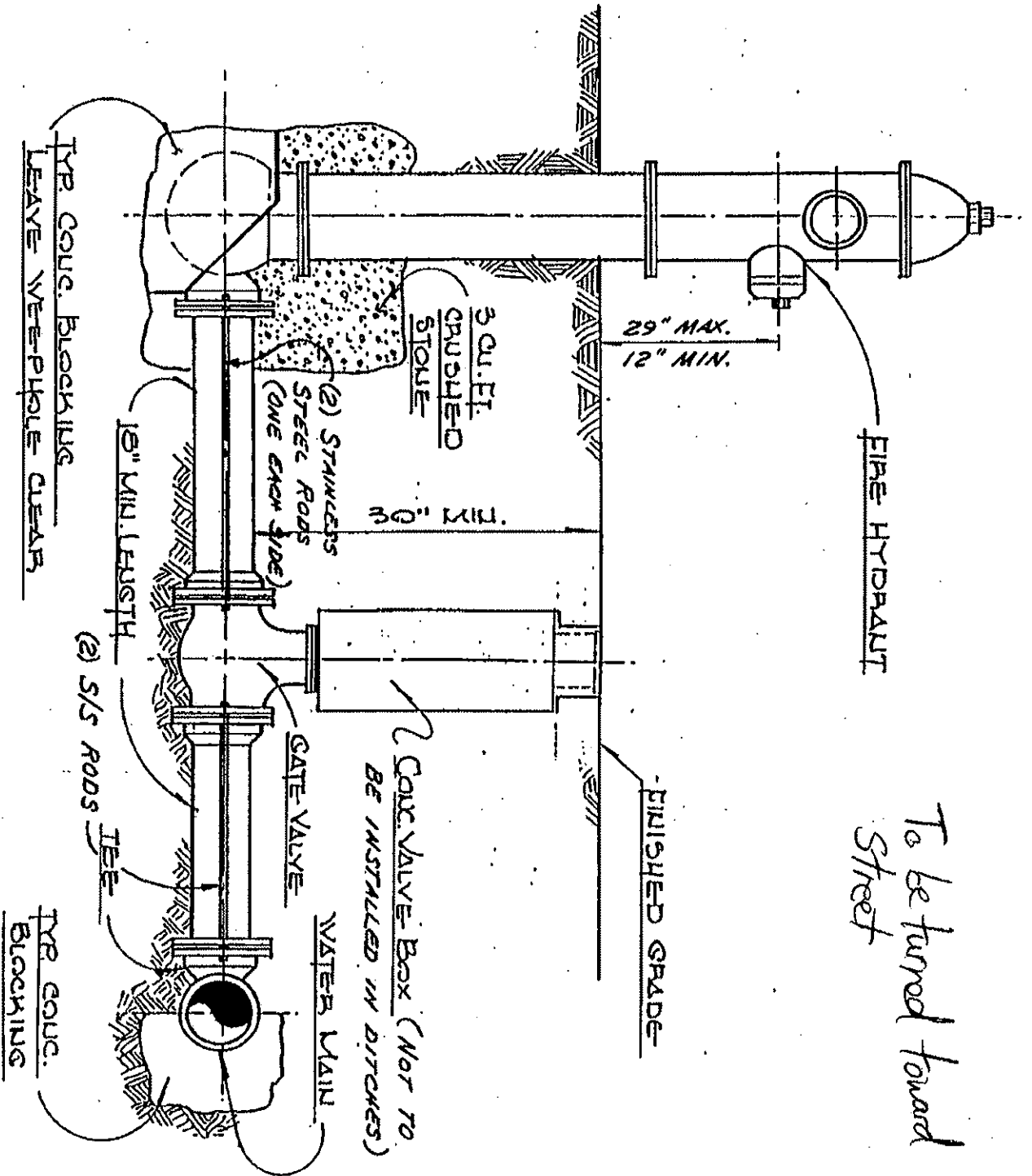
REvised 9/11

AIR RELEASE VALVE

STANDARD DIVS. No. ?

DATE: 4/6/88 SCALE: NONE

ALLEY, YOUNG & BAUMGARTNER, INC.
ENGINEERS - ARCHITECTS - SURVEYORS
BRENTWOOD, TENNESSEE



To be turned forward
Street

FIRE HYDRANT ASSEMBLY

Revised: 9/11

FIRE HYDRANT ASSEMBLY	
STANDARD DWG. No.	8
DATE: 4/6/88	SCALE: 1/4" = 1'-0"
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD TENNESSEE	

DIST. AND GRADE

VARIABLES

Casing pipe to be 3" inch in dia. to be installed from right-of-way to edge of sidewalk/or 3' from meter box; to be determined by MUD inspector.

FRAME & COVER
SEE SEC. 33 OF SPECS.

MALTED PLASTIC

METER BOX
SEE SEC. 33 OF SPECS

GROUND LINE

18" MIN. COVER

METER
(SEE SPECS)

5" CLEARANCE

50" MIN. COVER

curb stop

3" MIN.

3/8" MIN.
TYPE "K"
COPPER
FLARE

METER YOKE
(SEE SPECS)

3" CRUSHED
STONE

DISTRICTS
RESPONSIBILITY

CUSTOMERS
RESPONSIBILITY

SERVICE TO
HOUSE BY
OTHERS

CORPORATION STOP
(SEE SPECS)

SERVICE SADDLE
(FOR PVC ONLY)
(SEE SPECS)

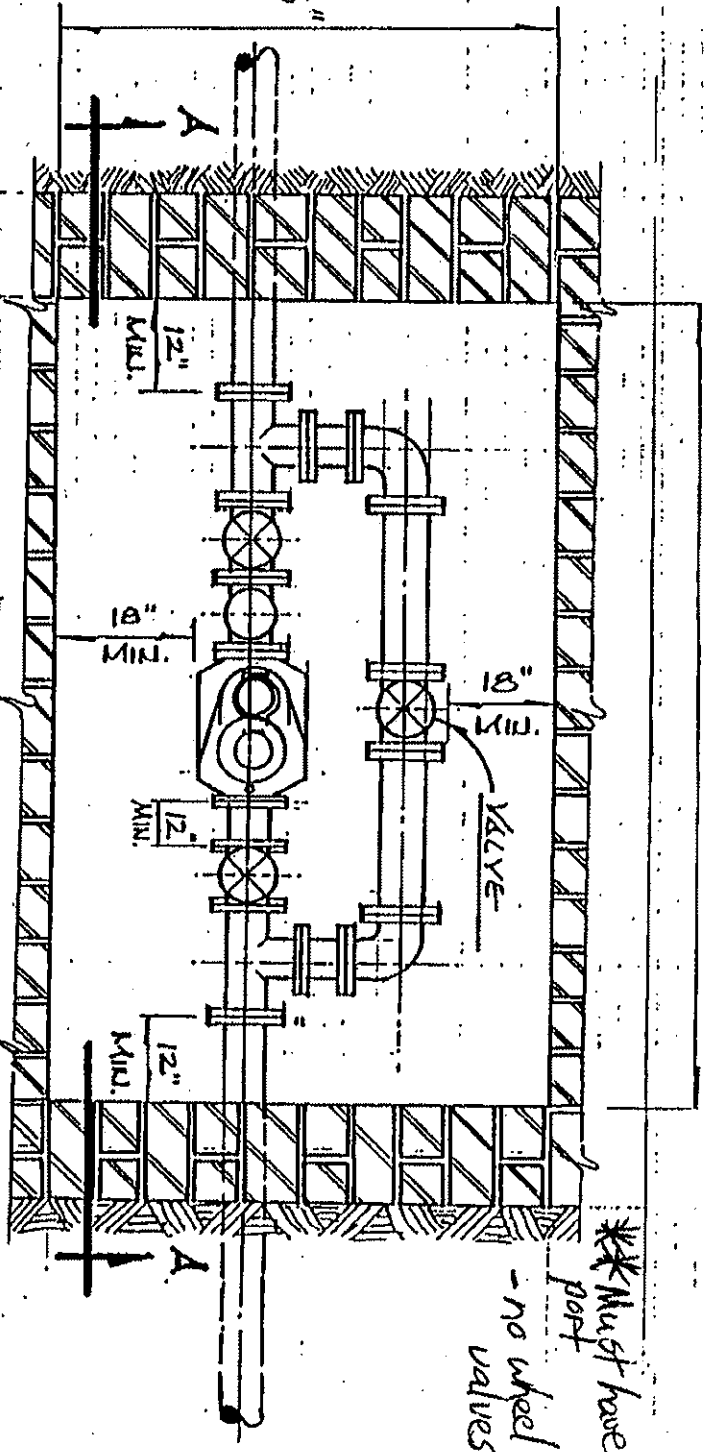
WATER MAIN

NOTE:
TAP TO BE MADE ON
SIDE OF WATER MAIN
WITH MUELLER
CORPORATION STOP

METER SETTING

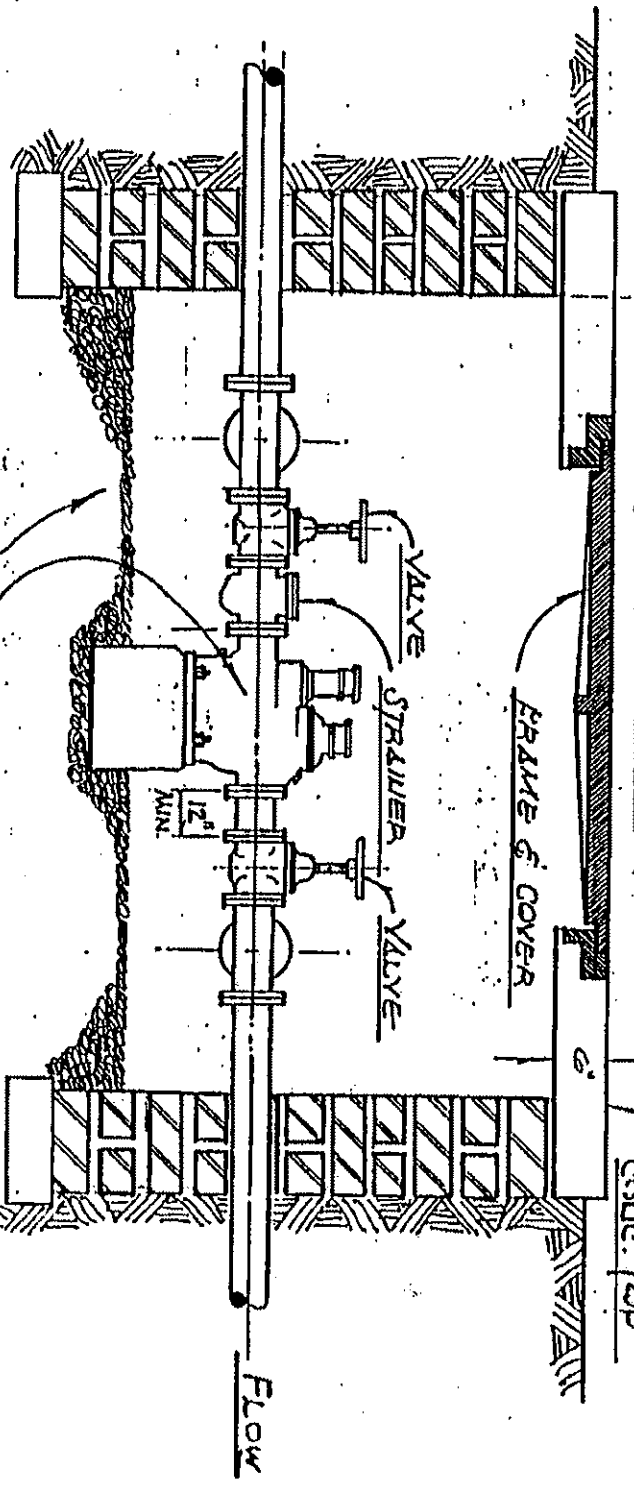
REVISED: 7/11/10; 9/11

<u>STANDARD METER SETTING</u>	
<u>STANDARD</u>	<u>DWG. NO. 9</u>
<u>DATE: 2/20/89</u>	<u>SCALE: 1/8" = 1'-0"</u>
<u>ALLEY, YOUNG & BAUMGARTNER, INC.</u> <u>ENGINEERS - ARCHITECTS - SURVEYORS</u> <u>BRENTWOOD TENNESSEE</u>	



*Must have foot post
- no wheel valves

PLAN

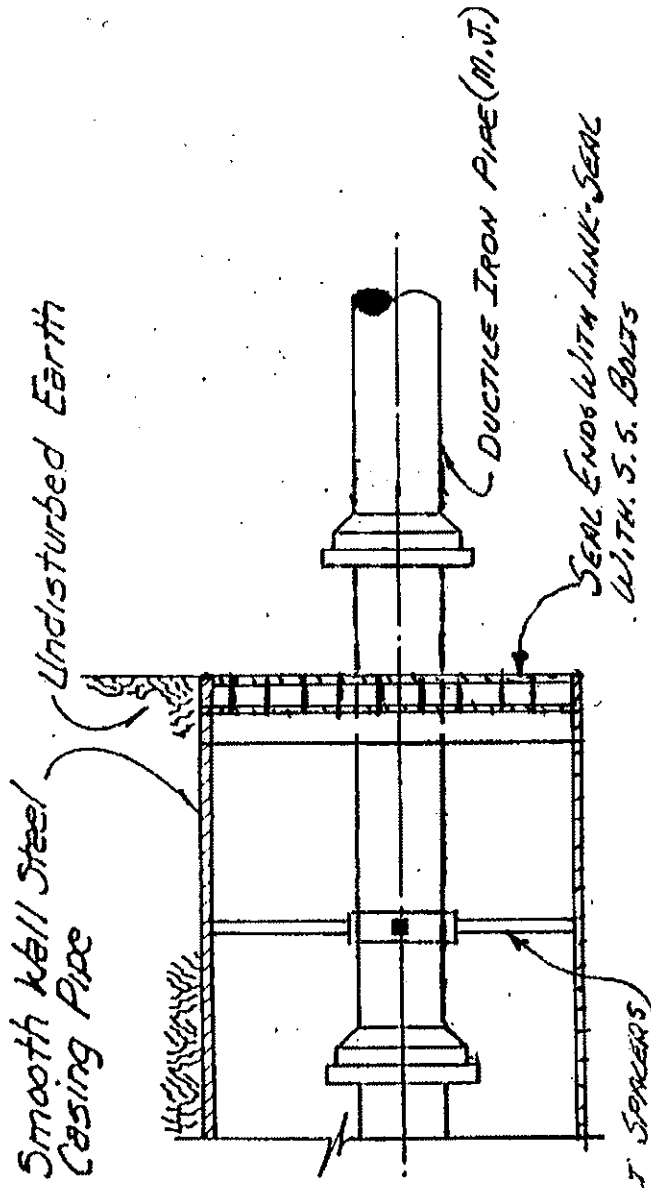


**SECTION
"A-A"**

SIZE	"A"	"B"
2" T.C.	95"	65"
3" T.C.	108"	72"
4" T.C.	121"	75"
6" T.C.	134"	83"

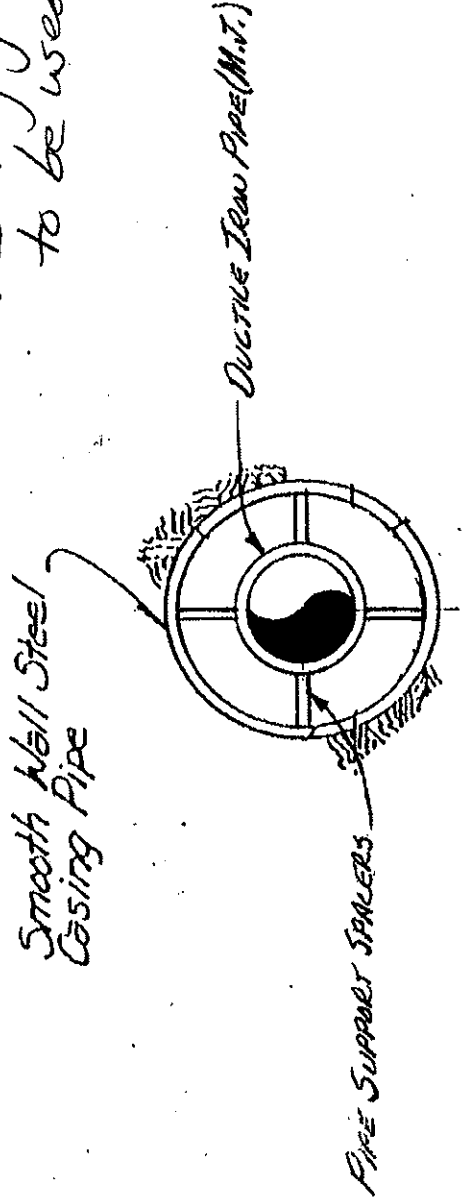
Revised 9/11

Compound Meyer Settling	
STANDARD DWG. NO. 10	SCALE: None
DATE: 4/7/88	
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD TENNESSEE	



PIPE SUPPORT SPACERS
 MIN. 2 PER JOINT OF
 PIPE. SEE SPECS SEC. 37

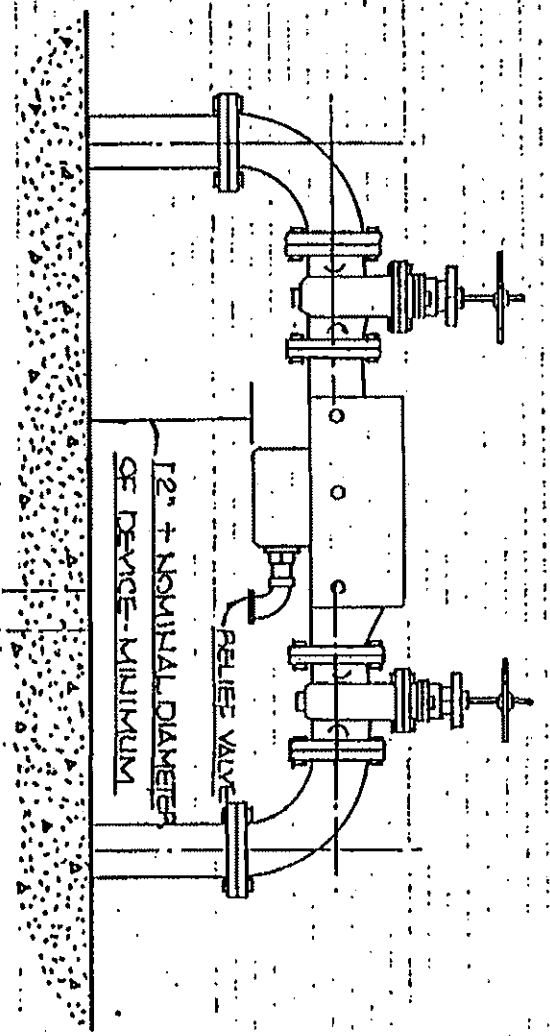
* Locking gaskets
 to be used



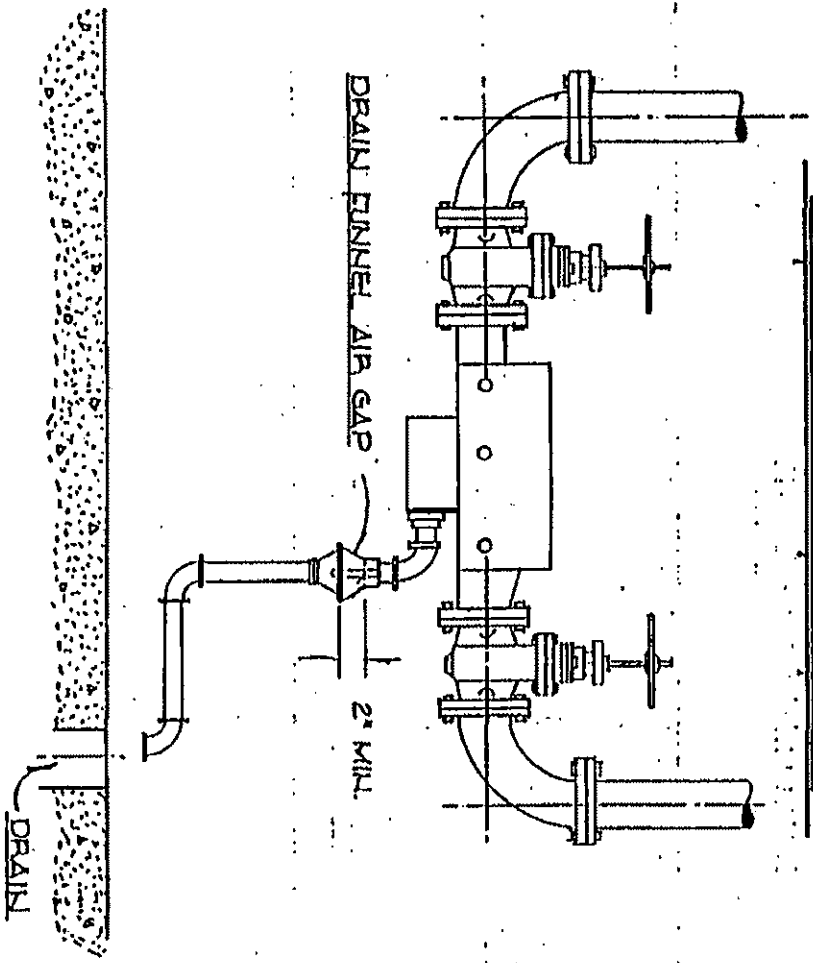
NOTE:
 CASING MUST MEET ALL RAILROAD
 OR TDOT SPECIFICATIONS *Revised 8/10/02, 7/16/0*

WATER LINE CASING		9/11
STANDARD	DWG. No.	11
DATE: 4/7/88	SCALE:	AS SHOWN
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD TENNESSEE		

TYPICAL BACKFLOW PREVENTER INDOOR INSTALLATION

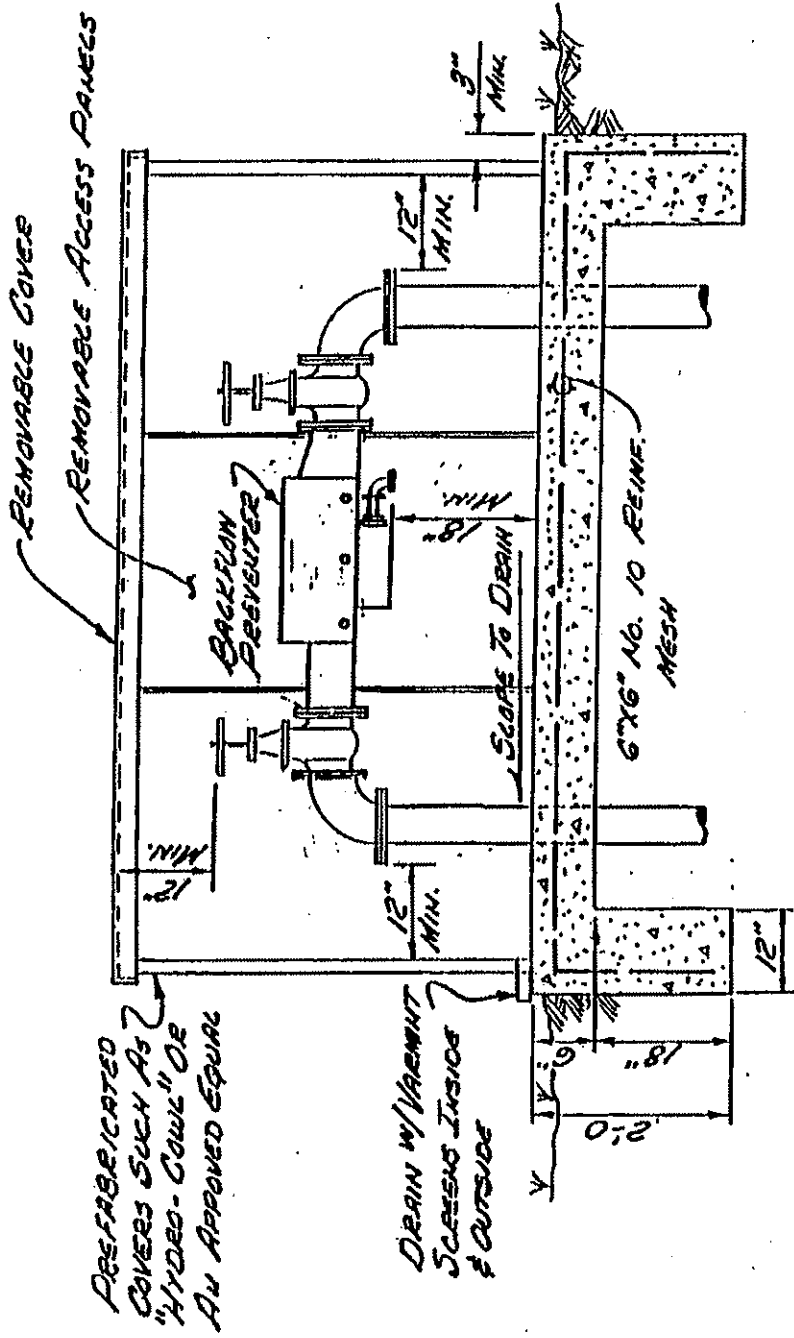


STANDARD INSTALLATION



ALTERNATE INSTALLATION

BACKFLOW PREVENTER
STANDARD DWG. No. <u>12</u>
DATE: <u>4/7/88</u> SCALE: <u>None</u>
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD TENNESSEE



PREFABRICATED
COVERS SUCH AS
"HYDRO-COWL" OR
AN APPROVED EQUAL

DRAIN W/ VALVE MT
SCREENS INSIDE
& OUTSIDE

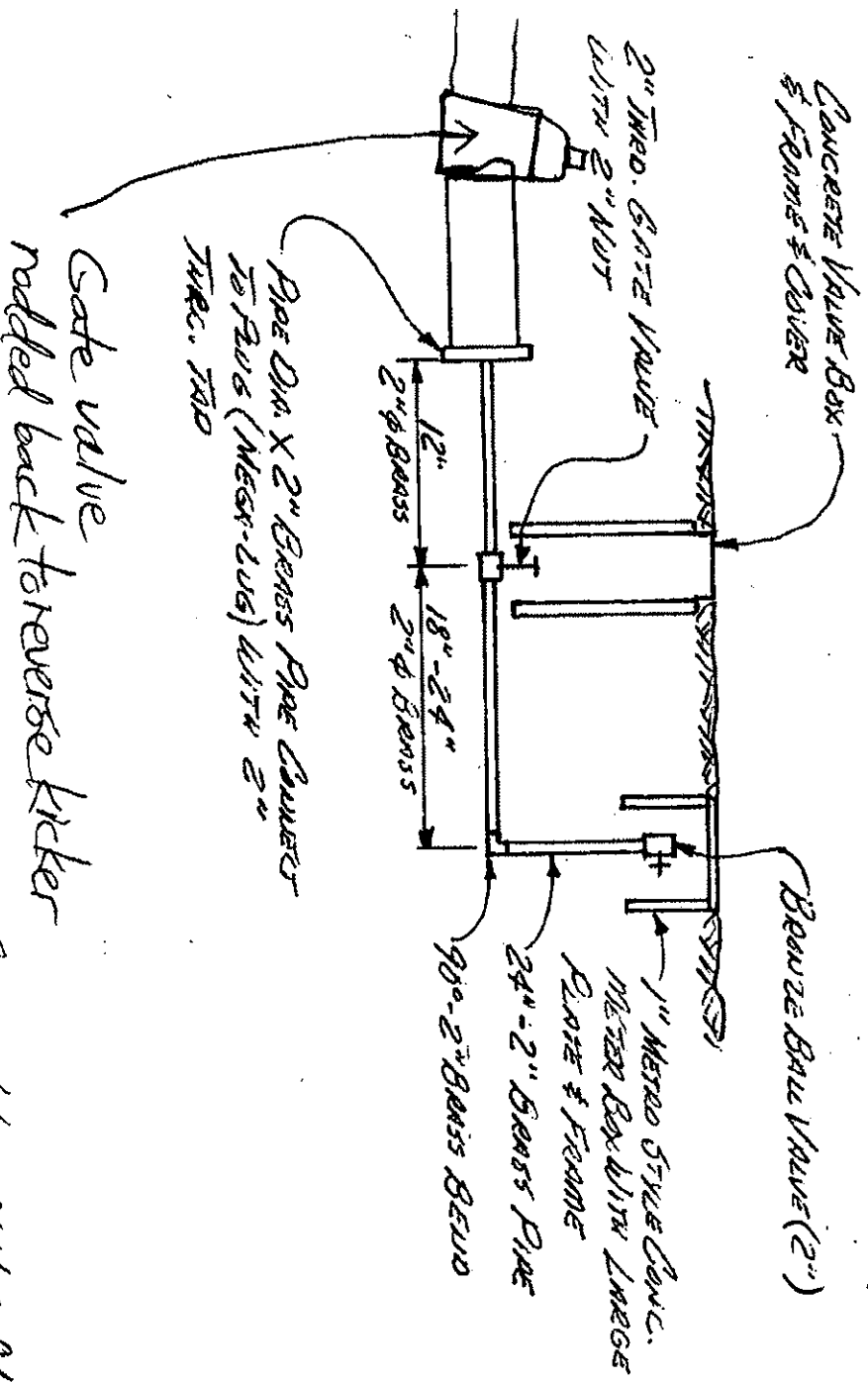
NOTES:

1. COVERS SHALL HAVE A GALVANIZED STEEL LINING WITH HIGH PERFORMANCE CLOSED CELL INSULATION WHICH WILL NOT READILY ABSORB WATER.
2. THIS DRAWING INDICATES MINIMUM INSIDE DIMENSIONS FOR CLEARANCE AND ACCESS ONLY. THE TOP OF COVER FINISH IS OPTIONAL WITH OWNER.

BACKFLOW PREVENTER INSTALLATION FOR OUTDOORS

BACKFLOW PREVENTER
STANDARD DIV. No. 13
DATE: 5-12-88 SCALE: NONE
ALLEY, YOUNG & BAUMGARTNER, INC. ENGINEERS - ARCHITECTS - SURVEYORS BRENTWOOD TENNESSEE

* No wheel valves



REVISED 3/1/93 Revised 11/10/02, 2/14/04, 9/1/11

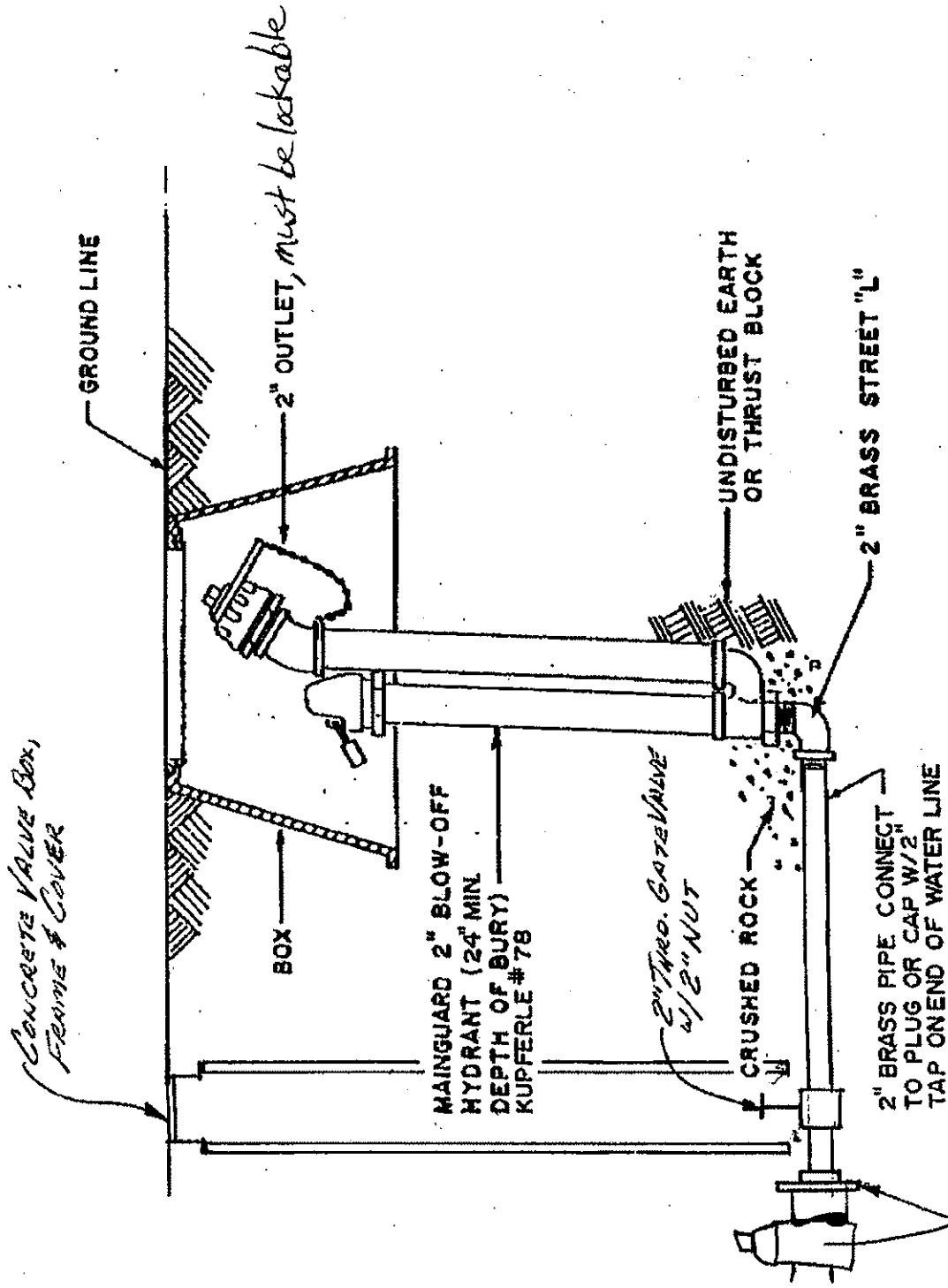
BLOW OFF DETAIL

STANDARD DWG. NO.: 14

DATE: 4/7/88 SCALE: NONE

ALLEY, YOUNG AND BAUCGARTNER, INC.
CONSULTING ENGINEERS

*no wheel valves

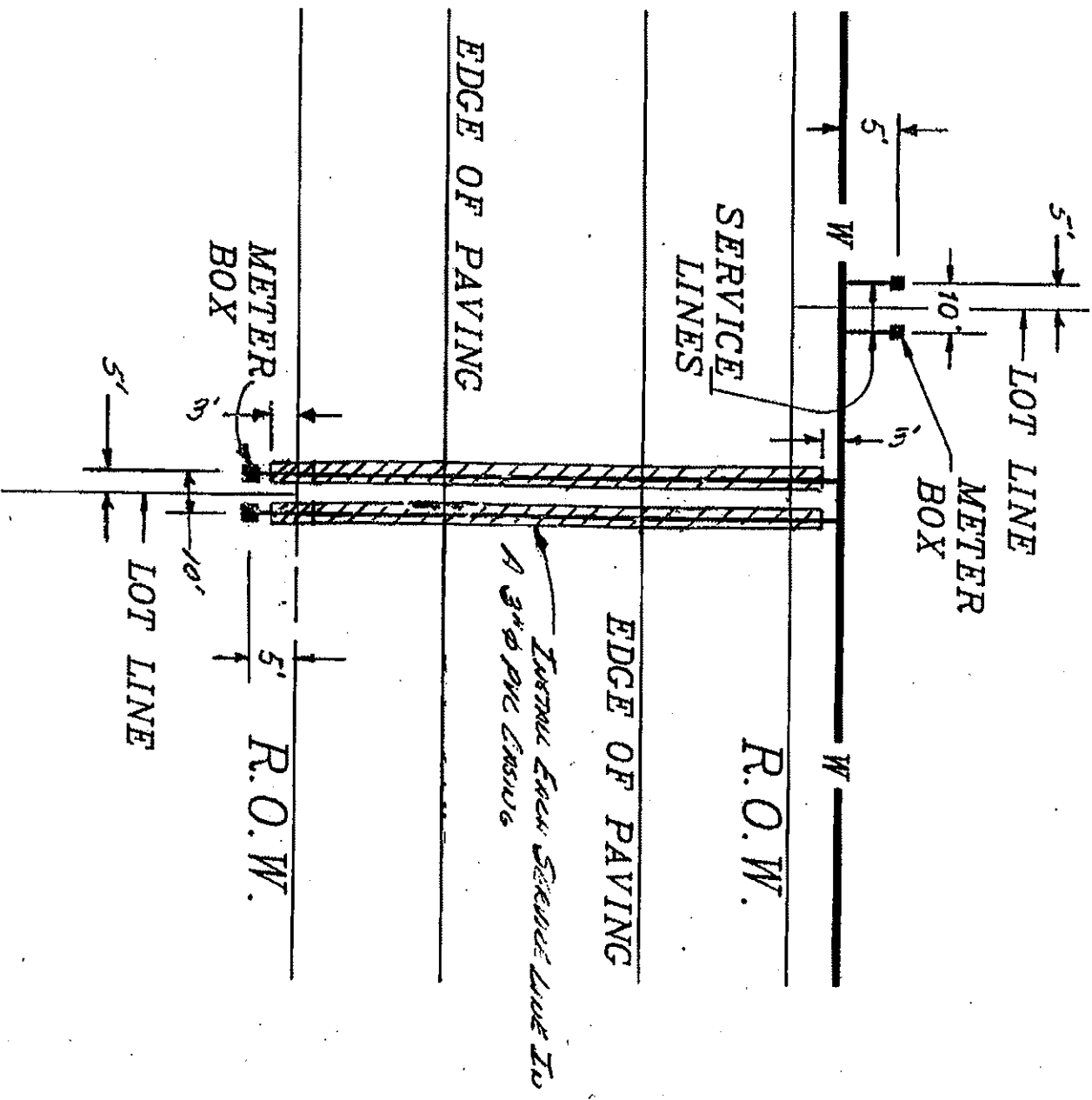


Pipe DIA X 2" BRASS PIPE CONNECT TO PLUG (MEGA-LOG) WITH 2" THRO. TAP

Gate valve redDED back to reverse kicker

REVISED 3/1/93, 2/1/04, 9/1/11

BLOW OFF DETAIL - <i>ALTERNATE</i>
STANDARD DWG. NO.: 15
DATE: 4/7/88 SCALE: NONE
ALLEY. YOUNG AND BAUMGARTNER, INC. CONSULTING ENGINEERS



Parsons 4/10/2, 10/15/03

WATER SERVICE LINE DETAIL

STANDARD DWG. NO.: 16

DATE: 4/7/88 SCALE: NONE

ALLEY, YOUNG AND BAUMGARTNER, INC.
 CONSULTING ENGINEERS
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