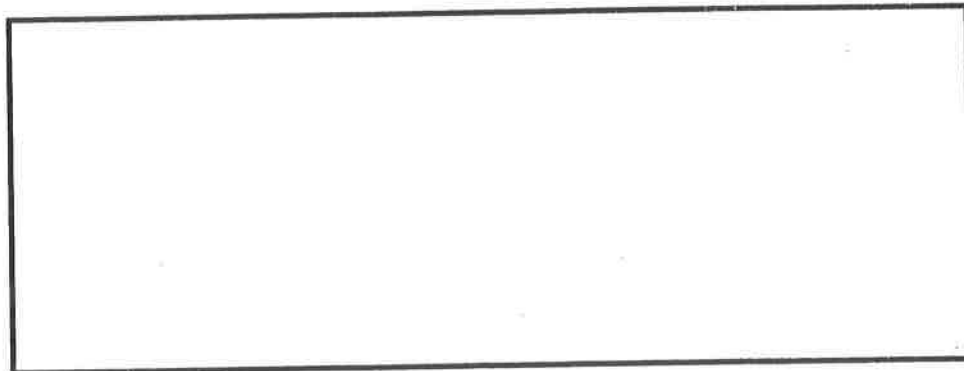


**MT. STERLING**  
**WATER & SEWER**  
**SYSTEM**

**SPECIFICATIONS**

**FOR**

**WATER SYSTEM AND SEWER SYSTEM DESIGN,  
CONSTRUCTION, AND INSPECTION**



**MT. STERLING WATER & SEWER SYSTEM**  
**300 East Main Street, P. O. Box 392**  
**Mt. Sterling, Kentucky 40353-0392**

**APRIL, 1999**

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# INTRODUCTION

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**1.0 PURPOSE** - The purpose of this manual is to provide information and guidance to land developers, design engineers, and contractors in the design and construction of water and sewer facilities that are to become a part of or be connected to the Mt. Sterling Water and/or Sewer System. These regulations and procedures are to be followed by any person or corporation in the development of a residential subdivision or shopping center, or in any development in which the Developer is required to construct facilities that will become an asset to the Mt. Sterling System. The ultimate goal of this manual is to insure the protection of the health and welfare of the general public through the use of proper sanitary design features and construction methods.

**1.1 AUTHORITY** - The Mt. Sterling Water and Sewer Commission was established to be responsible for the acquisition, administration, maintenance, operation and control of the City's water and sewer facilities, and to this end this manual is hereby established. The Mt. Sterling Water and Sewer Commission reserves the right to revise the information in this manual, at any time.

**1.2 REFERENCES** - Certain technical aspects concerning construction materials and methods of construction are based on the Kentucky Department of Highways; Standard Specifications for Road and Bridge Construction, 1994 edition, hereafter referred to as Kentucky Department of Highways Specifications or KDHS.

Other standards or specifications referred to are those of the American Society of Testing Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), Portland Cement Association (PCA), American Public Works Association (APWA) and the American Water Works Association (AWWA).

Standard drawings showing details of certain improvements, which may be issued by the ENGINEER, shall be complementary to and a part of this manual.

**1.3 GENERAL REQUIREMENTS** - In order to insure that the design and construction of water and sewer facilities meet generally accepted sanitary engineering design criteria and generally recognized construction methods for such facilities, the OWNER or DEVELOPER of lands in which water and/or sewer lines are to be constructed that are to be connected to and become a part of the Mt. Sterling Municipal Utilities System, must employ a Licensed Professional Engineer, licensed in the Commonwealth of Kentucky, as set out in KRS Chapter 322. The OWNER-DEVELOPER shall employ the ENGINEER to:

1. Prepare detailed construction drawings and specifications.
2. Submit drawings and specifications to the UTILITY for approval, prior to beginning construction.
3. Provide full-time resident inspection during construction.
4. Certify to the UTILITY and the Division of Water that the facilities were constructed in accordance with the approved plans and the detailed specifications contained herein.

**5. Agreement of Acceptance of Ownership Form** - The Mt. Sterling Water and Sewer System agrees, in conjunction with the developer/developers of the named project, to accept ownership of all water and/or sewer mains serving the development, excluding all house service lines and/or sewer laterals. This agreement will become effective immediately upon execution by the developer and the Mt. Sterling Water and Sewer System, which would allow the water and sewer commission to permit additional customers access to these lines, however the water and sewer commission's

responsibility for repairs and maintenance of this system will not begin until the one year warranty period for the project has expired, which will be one year from the date of the signed agreement.

6. In addition the developer or contractor also agrees to provide the following items to the Mt. Sterling Water and Sewer System before the UTILITY can accept ownership of the above named project:

- a. Plans were submitted to the Division of Water (DOW) and have obtained approval letter from the DOW for construction.
- b. Minimum of a 10-foot utility easement for all water/sewer mains to provide access for any necessary repairs and maintenance. Please note easements or a copy of the plat noting easements shall be furnished to our office prior to construction. (No construction to start until easements are obtained and filed.)
- c. Results from bacteriological testing if applicable.
- d. Documentation of results from pressure tests.
- e. Minimum of 2 sets of as-built/record drawings (24" x 36") for both water and sewer shall be furnished upon completion of this project. Record drawings shall show exact location of all water/sewer service connections.
- f. Estimated cost of water and sewer systems serving the development (necessary for financial purposes).

1.4 UTILITY'S AUTHORITY - The UTILITY, or its designated representative, shall decide questions which may arise as to the quality and acceptability of materials furnished and work performed. The UTILITY shall interpret the intent of these specifications and standard drawings in a fair and unbiased manner.

Nothing contained in these specifications or standard drawings is intended to conflict with any state or federal laws or regulations. If any requirement of these specifications or standard

drawings are found to be in conflict with a state or federal law or regulation, then the more stringent requirement shall be met. In no case shall the requirements of this manual be less stringent than any existing state or federal law or regulation.

This manual shall be revised from time to time to insure that the requirements of this manual keep abreast with current state and federal laws and regulations, approved construction material and recognized construction methods.

1.5 OBLIGATION OF THE CONTRACTOR - The CONTRACTOR shall perform and complete the work to the satisfaction of the UTILITY and in accordance with these specifications. The CONTRACTOR shall conduct his work so as to minimize interference with public and private business and traffic. He shall at his own expense, whenever necessary or required, provide barricades, flagmen, maintain lights, and take other precautions as may be necessary to protect life, property, adjacent buildings and structures. The CONTRACTOR shall be liable for all damages and injuries received or sustained by any person, persons or property in consequence of any neglect in safeguarding the work or by any act of neglect or misconduct by him or his agents, subcontractors, employees or workmen.

1.6 COOPERATION - Cooperation with the office of the UTILITY concerning construction planning and procedures is required. Reasonable notice shall be given the UTILITY, or its representative, prior to beginning any phase of construction. In no case should such notice be less than 24 hours.

1.7 DEFECTIVE MATERIAL AND WORKMANSHIP - Materials not in accordance with the specifications or defective work may be condemned by the ENGINEER or UTILITY at any time before final approval and acceptance by the UTILITY. Failure by the ENGINEER or UTILITY to condemn defective work shall not be construed as an acceptance of same.

1.8 FINAL INSPECTION - In addition to normal inspection which may be conducted during construction of development improvements, a final inspection will be made by a representative of the UTILITY. Final inspection will be made prior to acceptance of

any unit for maintenance by the UTILITY and only after all improvements are completed. As part of the final inspection, the UTILITY shall be given a completed set of "as-built" plans. All sanitary manholes or access openings shall be opened and all facilities shall be cleaned of all dirt, mud and other foreign matter. The OWNER-DEVELOPER shall provide personnel as required to aid in the final inspection.

1.9 EXISTING UTILITIES - Special precautions shall be taken by the CONTRACTOR to avoid damage to existing overhead and underground utilities owned and operated by public or private utility companies.

Where existing utilities or appurtenant structures, either underground or aboveground, are encountered, they shall not be displaced or molested unless necessary, and in such case shall be replaced in as good or better condition than found as quickly as possible.

The OWNER-DEVELOPER, or his representatives, shall bear the entire responsibility for locating, avoiding, or repairing damage to said existing utilities.

1.10 PERMITS, EASEMENTS AND RIGHTS-OF-WAY - Unless otherwise required by the agencies involved, the OWNER-DEVELOPMENT shall make application for, obtain and pay for all licenses, permits, easements and rights-of-way. The CONTRACTOR shall be required to comply with all state and municipal ordinances, laws, and/or codes which may apply to same.

#### 1.11 DEFINITIONS

APPROVED - Material, equipment, workmanship, process or method that has been accepted by Mt. Sterling Municipal Utilities as suitable for the proposed use.

AS-BUILT - A certification by the ENGINEER whose stamp appears on the plans that the measurements, depths, materials, and facilities that are shown on the plans are true and correct and are constructed in accordance with the Water System and Sewerage System Improvement Specifications of the Mt. Sterling Water and Sewer Commission.

CONTRACTOR - The person, firm or corporation with whom the OWNER-DEVELOPER has executed an agreement to perform the utility construction for the project.

ENGINEER - A licensed professional engineer, licensed in the Commonwealth of Kentucky as set out in KRS Chapter 322.

OWNER-DEVELOPER - An individual, group or individuals, partnership, firm, association or corporation that is constructing, or having constructed, water and/or sewer facilities that are to become a part of, or be connected to the Mt. Sterling Water and/or Sewer System.

RESIDENT INSPECTOR - The ENGINEER, or his representative, who is required to be on the job site during any construction of facilities that are to become part of the Mt. Sterling Water and/or Sewerage facilities to insure that the facilities are being constructed in accordance with the Water System and Sewerage System Improvement Specifications of the Mt. Sterling Water and Sewer Commission.

SANITARY SEWER - A pipe or conduit that primarily carries sewage, and to which storm, surface, and ground waters are not intentionally admitted.

SHALL - Means a mandatory requirement.

UTILITY - Mt. Sterling Water and Sewer Commission.

# PROCEDURES

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**2.0 PURPOSE** - The purpose of this section is to establish a working relationship between the OWNER-DEVELOPER, ENGINEER, CONTRACTOR and UTILITY by describing the step-by-step procedure to be followed by each party in initiating and completing the construction of any utility services that are to be connected to or become a part of the UTILITY system.

**2.1 APPLICATION PHASE** - The first step in the procedure is for the OWNER-DEVELOPER to file an application to the Water-Sewer Division of Mt. Sterling requesting permission to connect the proposed new facilities to the existing utilities. In order to properly coordinate the work with Planning and Zoning, a copy of the application should also be submitted to Mt. Sterling-Montgomery County Planning and Zoning Commission to serve as notification of the project. The application form may be obtained from the main office at 300 East Main Street. It is recommended that the OWNER-DEVELOPER engage the services of an ENGINEER in the beginning to assist in preparing the application since much of the information requested must be provided to the ENGINEER.

In addition to the information to be provided on the application form, the following attachments are to be provided.

- a. A site plan shall be provided on an 8-1/2" x 11" sheet in sufficient detail to show the location of the proposed development. A portion of an existing city map may be adequate for this purpose.
- b. An executed copy of the Agreement between the OWNER-DEVELOPER and the ENGINEER.

Upon receipt of an application, the UTILITY shall evaluate the impact the proposed development will have upon the existing facilities. From the estimated water demand and the wastewater flow provided by the OWNER-

DEVELOPER'S ENGINEER, the UTILITY shall determine whether the existing water system is adequate to provide service (both domestic and fire protection) and whether the existing sewer system has capacity to receive the estimated wastewater flow. A determination that capacity is available at the time of application does not guarantee nor reserve that capacity indefinitely for that development. Approval of the application by the UTILITY indicates that capacity will be available only to that section of the development that is to be constructed, marketed and made available for service immediately upon completion of the project proposed in the application. If the UTILITY is capable of providing these services, a letter of conditions shall be issued listing the requirements that must be met in order to obtain acceptance of the proposed facilities by the UTILITY. Should it be determined that capacity for water or sewer service is unavailable, the OWNER-DEVELOPER should contact the Mt. Sterling-Montgomery County Health Department to explore alternate solutions.

**2.2 DESIGN PHASE** - Upon receipt of the letter of conditions from the UTILITY, the OWNER-DEVELOPER may authorize his ENGINEER to prepare plans for the proposed development, in accordance with the requirements contained in the detailed specifications herein.

During the design phase, the ENGINEER shall work closely with the Review Personnel at Mt. Sterling to insure that the final product meets all requirements of the UTILITY. There shall be no provisional approval. All plans must show all necessary details before approval is granted.

The ENGINEER shall provide the following design data attached to the plans:

1. Hydraulic calculations for the water system (the OWNER-DEVELOPER or the ENGINEER may obtain pressure readings at or near the point of connection from the UTILITY upon



request). A minimum pressure of 30 psi must be maintained at all service connections. All water lines must be looped unless a dead end line is approved by the UTILITY.

2. Design calculations of gravity sewer lines shall show the grade, expected average flow, and capacity and velocity at peak flows between each manhole.

3. Design calculations of sewage lift stations and force mains shall show pump capacity at design TDH, head loss through the force main, static head between pump discharge and force main discharge, the velocity through the force main, capacity of wet well and expected frequency of operation. A copy of the manufacturer's pump curve data and specifications must be provided.

Plans prepared by the ENGINEER for the construction of water lines shall be drawn on plan sheets, 24" x 36", to a scale of 1"=100' and shall contain the following minimum information:

#### Title Sheet

1. Name and address of ENGINEER.
2. Name and address of OWNER-DEVELOPER.
3. Name of development.
4. Vicinity map.

#### Plan Sheet

1. Topography and layout of development (streets, curb and gutter, sidewalks, drainage headwalls, storm drains, lot lines and utility easements):
2. Pipe material and pressure rating.
3. Pipe size.
4. Location and type of valves.
5. Location and size of hydrants.
6. Location and size of blowoffs.
7. Location, size and material of service tubing, curb stop and box.
8. Profile of water line and other proposed underground utilities.
9. Existing facilities; i.e. hydrants, valves, line sizes, storm drains, and sewer lines.
10. The statement "All construction shall be in accordance with the specifications."

Plans prepared by the ENGINEER for the construction of sewer lines shall be drawn on plan sheets, 24" x 36", to a scale of 1"=100' and shall contain the following minimum information:

#### Title Block

1. Name and address of ENGINEER.
2. Name and address of OWNER-DEVELOPER.
3. Name of development.
4. Vicinity map.

#### Plan Sheet

1. Topography and layout of development (streets, curb and gutter, sidewalks, drainage headwalls, utility poles, lot lines and utility easements).
2. Pipe material.
3. Pipe size.
4. Location by station number and type manhole.
5. Length of sewer and grade between manholes.
6. Invert of sewer at each manhole for both inlet and outlet and the fall within the manhole.
7. Location, size and material of house connections.
8. Profile of sewer line and other proposed underground utilities.
9. Existing facilities; i.e. manholes, line sizes, storm drains, and water lines.
10. The statement "All construction shall be in accordance with the specifications."

Plans prepared by the ENGINEER for the construction of sewage lift stations shall be drawn on plan sheets, 24" x 36", to a scale of 1/4"=1'0" and shall contain the following minimum information:

#### Title Sheet

1. Name and address of ENGINEER.
2. Name and address of OWNER-ENGINEER.
3. Name of development.
4. Vicinity map.

#### Plan Sheet

1. Name of station manufacturer.
2. Name of pump manufacturer.
3. Number of pumps.

4. Pump discharge at design TDH.
5. Dimensions, elevations and capacity of wet well.
6. Location and type of pump controls.
7. Cathodic protection for steel tanks.
8. Piping and valve arrangement inside station.
9. The statement "All construction shall be in accordance with the specifications."

2.3 REVIEW PHASE - After the completed plans have been reviewed by the OWNER-DEVELOPER with the ENGINEER, and approved by him, two sets shall be submitted to the UTILITY for its review and approval. The OWNER-DEVELOPER should allow a 30-day period for the review time, however, the UTILITY shall conduct its review as expeditiously as possible.

The UTILITY shall review the plans as to the sanitary features of design and the standard specifications contained herein. Any plans submitted that do not completely comply with all requirements of the UTILITY shall be returned to the ENGINEER unapproved with the necessary corrections noted. After all corrections are made, the corrected plans shall be returned to the UTILITY so that each sheet may be stamped "Approved." Final written approval shall not be granted until the UTILITY has received a copy of the approval from the Kentucky Department for Natural Resources and Environmental Protection.

2.4 BIDDING AND AWARDING OF CONTRACT - If the OWNER-DEVELOPER requests the refund method, bids must be advertised and received in accordance with KRS 45A.365 and are to be opened in the presence of a representative of the ENGINEER, OWNER-DEVELOPER and UTILITY and any bidders who may desire to attend. Subject to joint approval of all three parties, bids may be awarded based on the lowest and/or best bid; with the UTILITY reserving the right to reject any or all bids submitted.

2.5 CONSTRUCTION PHASE - Before construction begins, the OWNER-DEVELOPER shall obtain a Surety Bond to run for one year after the date of final acceptance of the work. The bond shall be executed by a surety company duly authorized to do business in the state in which the work is to be performed and shall be

in an amount not less than one hundred(100%) percent of the contract price, as security for the faithful performance of this Contract and as security for the payment of all persons performing labor and furnishing materials in connection with this Contract. This bond shall be provided on a form approved by the ENGINEER.

The CONTRACTOR will not be permitted to commence work until he has obtained all insurance required by these documents and such insurance has been approved by the UTILITY.

Such insurance shall be secured from an insurance company or companies authorized to write casualty and property insurance in the state where the work is located and shall protect the CONTRACTOR, his subcontractors, and the OWNER-DEVELOPER from claims for bodily injury, death, property damage, fire and other risks set out herein.

#### Insurance, Workmen's Compensation

The CONTRACTOR shall take out and maintain during the life of this Contract Workmen's Compensation Insurance, as required by statute, for all of his employees employed at the site of the project, and in case any work is sublet, for all the subcontractor's employees not otherwise insured. In case any class of employee which is engaged in hazardous work at the site of the project is not protected under the Workmen's Compensation Statute, the CONTRACTOR shall provide adequate coverage for the protection of the employees not otherwise protected.

#### Insurance, Public Liability

The CONTRACTOR shall take out and maintain during the life of this Contract such Public Liability (Bodily Injury and Property Damage) Insurance as shall protect his and any subcontractor performing work at the site from claims for damages because of bodily injury, including accidental death, and from claims for property damages which may arise from operations under this Contract, whether such operations be by his or by any subcontractor, or by anyone directly or indirectly employed by either of them.

Liability coverage is to be written on a comprehensive general liability policy and must include (a) premises-operations, manufacturers

and contractors, and owners, landlords and tenants; (b) contractors protective; (c) products-completed operations; (d) contractual liability. General liability shall also include "underground property damage by mechanical equipment" and when blasting is done coverage must be provided for the explosion hazard.

Where work on railroad right-of-way is involved, the CONTRACTOR shall also be covered by Railroad Property Liability Insurance with limits of liability as required by the railroad company on whose property the work is being performed.

All comprehensive-automobile-general liability insurance policies shall include as named insured the CONTRACTOR, the OWNER-DEVELOPER, the City of Mt. Sterling, Kentucky and Mt. Sterling Water and Sewer System.

#### Minimum Insurance Limits

The minimum amounts of insurance to be furnished by and for the general contractor and the subcontractors under this Contract are:

- a. Workmen's Compensation-KY Statutes Employer's Liability - \$100,000 limit of liability
- b. Comprehensive General Liability Coverage A-Bodily Injury Liability \$500,000 each occurrence \$500,000 aggregate Coverage B-Property Damage Liability \$100,000 each occurrence \$300,000 aggregate
- c. Comprehensive Automobile Liability Coverage A-Bodily Injury Liability \$200,000 each person \$500,000 each occurrence Coverage B-Property Damage Liability \$100,000 each occurrence
- d. Railroad Protection Insurance-(where work to be within railroad right-of-way) Loss of Life or Injury to Person - As required by railroad Property Damage - As required by railroad

2.6 GENERAL REQUIREMENTS - The construction phase shall not begin until a written Notice to Proceed from the UTILITY is received by the OWNER-DEVELOPER. When

the UTILITY is ready to issue a Notice to Proceed, a preconstruction conference will be scheduled and held jointly by the UTILITY and the Planning and Zoning Commission. The OWNER-DEVELOPER shall be responsible to the UTILITY for the proper construction of the facilities. In no case shall the construction of the water and sewer system begin until the rough grade on the streets and drainage ditches are complete.

The utility shall be notified immediately of any conflicts encountered in the field between the water and sewer facilities and the drainage work.

The ENGINEER shall provide a full-time resident inspector paid for by the OWNER-DEVELOPER to insure that all construction is accomplished in accordance with the approved plans and the standard specifications contained herein. The ENGINEER'S resident inspector shall be on the job anytime the CONTRACTOR is working on the construction of water and/or sewer facilities.

In addition to the inspection, it is requested that the CONTRACTOR or the ENGINEER'S resident inspector contact the City Street Department when water or sewer lines have been backfilled under streets so that a representative of that department may visually inspect the backfill material before final surface is placed on the streets. Any deviation, change, addition or deletion from the approved plans must be approved by the UTILITY in writing before the deviation, change, addition or deletion is made in construction. The ENGINEER must submit weekly inspection reports to the UTILITY during the construction period. Representatives of the UTILITY shall have the right to enter upon the project site to make periodic inspections of the work in progress.

Upon completion of construction, the CONTRACTOR shall pressure test and disinfect all water lines, and conduct infiltration, exfiltration or air tests on sewer lines as outlined in these standard specifications. Any section of lines that does not pass the prescribed test must be corrected to the satisfaction of the UTILITY and retested until all testing procedures are satisfied. All testing must be conducted in the presence of representative of the OWNER-DEVELOPER, ENGINEER, CONTRACTOR and

UTILITY, except that the ENGINEER may represent the OWNER-DEVELOPER, if authorized by him.

**2.7 CERTIFICATIONS OF COMPLETION -**

Upon completion of construction, the OWNER-DEVELOPER shall certify to the UTILITY in writing that all payments have been made to all parties involved in the construction of the facilities. The certification shall state the final total project cost. Upon completion, the OWNER-DEVELOPER shall transfer ownership of the new facilities to the UTILITY and said facilities shall be come an asset of the UTILITY.

Upon completion of construction, the ENGINEER shall certify in writing to the UTILITY that the project has been constructed in accordance with the approved plans and the standard specifications contained herein. A complete set of "as-built" drawings must accompany the ENGINEER'S certification.

Upon receipt of these certifications and "as-built" record drawings, the UTILITY shall accept the facilities as an extension of the existing public system and deliver water service to and accept wastewater from the development.

## SECTION THREE

# WATER MAINS

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**3.0 PURPOSE** - The purpose of this chapter is to outline requirements for proper design, construction, inspection, and final acceptance of potable water mains and appurtenances, customer services connections, and public fire protection systems.

**3.1 DESIGN REQUIREMENTS** - A complete set of hydraulic computations, in a tabular form, shall be made available to the UTILITY which indicates average and peak flows, ground elevations, elevation of hydraulic grade line and pressures.

**3.1.1 Size of Water Mains** - All water mains shall be designed to carry peak flows and maintain a minimum line pressure of 30 psi at all points. Design peak flows shall be the greater of the following:

- a. Flow determined by the ENGINEER as the instantaneous demand placed upon the system by the development.
- b. Flow required for fire protection by Insurance Services Office of Kentucky guidelines;
- c. Computed peak flow if development is commercial or industrial.
- d. All designs are to meet minimum Ten State Standards.

No water main shall be smaller than that required by the Mt. Sterling Municipal Utilities master plan for expansion, nor shall any water main be smaller than 6 inches in diameter.

**3.1.2 Size of Service Pipe** - All service piping shall be 3/4-inch minimum diameter, unless otherwise required by the UTILITY. Where greater flows are anticipated than those normally expected for residential services, the service piping shall be designed to maintain minimum 30 psi pressure at peak design flow.

**3.1.3 Depth of Cover** - All water pipe shall be covered with a minimum of 30 inches of backfill material, measured from the top of pipe to the finished ground level or as directed by the UTILITY. Maximum depth of cover shall be that which is easily accessible with a backhoe, approximately 10 feet.

**3.1.4 Public Fire Protection** - The ENGINEER shall follow the current suggested minimum fire protection requirements of the Insurance Services Office of Kentucky in providing for public fire protection.

**3.1.5 Separation of Water Lines and Sewers**- See Section 4.13.

**3.2 PIPE MATERIAL** - All water mains shall be constructed of ductile iron or polyvinyl chloride (PVC), unless otherwise approved by the UTILITY, except that lines 10 inches and larger shall be ductile iron.

**3.2.1 Ductile Iron Pipe, Fittings and Joints** - Ductile iron pipe shall conform to the latest AWWA Standard, ANSI/AWWA C150/A 21.50-96 and ANSI/AWWA C151/A21.51-96 with thickness as designated in AWWA C150. Pressure class shall be noted on the plans by the ENGINEER.

The interior of the pipe shall be cement-mortar lined with bituminous seal coat in accordance with the latest AWWA C104 (ANSI A21.4). Thickness of the lining shall be as set forth in Section 4-10-1 of the aforementioned specifications unless otherwise directed by the UTILITY. The exterior of all pipe, unless otherwise specified, shall receive either a coal tar or asphalt base coating a minimum of one mil thick.

Where ductile iron pipe is to be installed in corrosive soil conditions, the pipe shall be protected by an 8-mil thick polyethylene encasement meeting the requirements of ANSI A21.5. Such corrosive soils include but are not limited to salt marshes, saturated alkaline soils,

cinder fills, areas of decaying vegetation, and waste dumps. If such corrosive soils are expected, the ENGINEER shall be responsible for conducting resistivity tests on the soil.

Fittings shall be Class 250 or 350, conforming to AWWA Specification C153 for short body ductile iron fittings. Fittings shall be asphalt-coated outside and shall receive the standard cement lining with bituminous seal coat on the inside as specified for the ductile iron pipe.

Pipe joints shall be of the push-on or mechanical joint type, conforming to the latest AWWA C111 (ANSI A21.11). Bells for push-on type joints shall have an annular recess in the pipe socket to accommodate a single rubber gasket. Plain ends shall be suitably beveled to permit easy entry into the bell. The gasket and annular recess of the socket shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled.

Mechanical joints shall be bolted and of the stuffing box type and shall consist of a bell with exterior flange and interior recess for the sealing gasket, a pipe or fitting plain end, a sealing gasket, a follower gland, tee-head bolts and hexagon nuts.

Joints for ductile iron fittings shall be mechanical joint type only. All valves for buried service on the water mains shall be of the mechanical joint type.

Mechanical joint plain and bell ends of fittings shall conform to the dimensions set forth in AWWA C111-95 (ANSI A21.11), or AWWA C153-94.

The cleaning and assembly of pipe and fitting joints shall be in accordance with the manufacturer's recommendations.

3.2.2 Polyvinyl Chloride Pipe, Fittings and Joints - PVC water pipe shall conform, as a minimum, to AWWA C900, latest revision. The pipe furnished shall be rated to a working pressure of at least 200 psi at 73.4 degrees Fahrenheit, and have DR=14.

Fittings for PVC water pipe shall be ductile iron mechanical joint Class 250 conforming to AWWA Specifications C153 for short body ductile iron fittings. Fittings shall be tar-coated outside, and

shall receive the standard cement lining with bituminous seal coat on the inside as specified for ductile iron pipe.

Joints shall be of the push-on type conforming to ASTM D3139 and F477 requirements for elastomeric-gasket joints. All jointing material and lubricants shall be non-toxic.

No. 8 solid copper wire (tracer wire) shall parallel all non-metallic pipe.

3.2.3 Encasement Pipe - Encasement pipe shall be steel, plain end, uncoated and unwrapped, have a minimum yield point strength of 35,000 psi and conform to ASTM A 252 Grade 2 or ASTM A 139 Grade B without hydrostatic tests. The steel pipe shall have welded joints and be in at least 18-foot lengths.

The wall thickness of the pipe shall be a minimum of 0.250 inches for highway crossings and 0.344 inches for railroad crossings. The diameter of the pipe shall conform to the requirements of American Railway Engineering Association for railroad crossings, and the requirements of the Kentucky Transportation Cabinet, Department of Highways for highway crossings.

### 3.3 WATER LINE APPURTENANCES

3.3.1 Gate Valves - All gate valves shall be resilient seat type, iron body, nonrising stem, fully bronze mounted and suitable for water working pressure of 150 psi. Valves shall be of standard manufacture and of the highest quality both as to materials and workmanship.

All gate valves shall be furnished with mechanical joint end connections, unless otherwise approved by the UTILITY.

Gate valves on fire hydrant branch lines shall be tied to the branch tee with a minimum of two 3/4-inch stainless steel all thread rods and nuts, or by use of locking nipple joints.

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 water pressure cast on the body of the valve.

Each underground gate valve shall be installed in a vertical position with a valve box, as shown in Drawing WD-1. Gate valves set with valve boxes shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counterclockwise). Gate valves for installation in meter vaults shall be flanged ANSI B16.1 Class 125 and handwheel operated.

All valves shall conform with the latest revision of AWWA Standard C509. Valves shall be as manufactured by Mueller, M & H, Darling, Smith, Kennedy or approved equal.

**3.3.2 Butterfly Valves** - All butterfly valves shall be of the tight closing, rubber seat type with rubber seats which are recess mounted and securely fastened to the valve body. Valves shall be rated for 150 psi pressure and shall be satisfactory for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90° from the full open position to the tight shut position. Valves shall meet the full structural requirements of AWWA Specification C504, latest revision. The manufacturer shall have manufactured tight-closing, rubber-seated butterfly valves for a period of at least 5 years.

The valve bodies shall be constructed of cast iron (ASTM A126, Class B) and shall have integrally cast mechanical joint ends. Two trunnions for shaft bearings shall be integral with each valve body. Body thickness shall be strictly in accordance with AWWA C504.

All valve discs shall be constructed of cast iron Type-1. All disc seating edges shall be smooth and polished. Valve shafts shall be constructed of 18-8 type 304 stainless steel and shall be a one-piece unit extending full size through the valve disc and valve bearings. Valve seats shall be of a natural rubber or a synthetic compound. Bonded-in seats must be simultaneously molded in, vulcanized and bonded to the body; and the seat bond must withstand 75 pounds pull under test procedure ASTM D429-58, Method B.

Valves shall be fitted with sleeve type bearings. Bearings shall be corrosion resistant and self-lubricating. Bearings load shall not exceed 2500 psi.

Valve operators shall be of the traveling-nut type designed to withstand at least 300 foot-pounds of input torque at full open or closed positions without damage to the valve or operator. All operators shall be fully gasketed and grease-packed and designed to withstand submersion in water to 10 psi. Valves shall open by turning operating nut to the left (counterclockwise) and shall require a minimum of 32 turns to open from fully closed.

All surfaces of the valve shall be clean, dry and free from grease before painting. The valve interior surfaces, except seating surfaces, shall be evenly coated with black asphalt varnish in accordance with Federal Specification TT-V-51A and AWWA C504-58.

See Drawings WD-2 for typical setting for a buried butterfly valve.

Hydrostatic and leakage tests shall be conducted in strict accordance with AWWA C504, latest revision.

**3.3.3 Tapping Sleeves and Valves** - Tapping sleeves for connections to existing water lines shall be full body mechanical joint type suitable for working pressures of 150 psi and shall be Mueller No. H-615, American Darling No. 1004, M & H No. 1174, or approved equal.

Tapping valves shall be of the mechanical joint type suitable for working pressures of 150 psi and shall be Mueller No. H-667, American-Darling No. 565, M & H No. 751, or approved equal.

**3.3.4 Valve Boxes** - Valve boxes shall be of 5-1/4 inch standard cast iron, 2-piece, screw type valve box with drop cover marked "WATER." Valve boxes shall be accurately centered over valve operating nut, and backfill thoroughly tamped about them. Valve box bases shall not rest on the valves but shall be supported on crushed stone fill. They shall be set vertically and properly cut and/or adjusted so that the tops of boxes will be at grade in any paving, walk or road surface, and 2 to 3 inches above ground in grass plots, fields, woods or other open terrain. Concrete collars shall be poured in place around all valve boxes, not precast.

3.3.5 Fire Hydrants - The CONTRACTOR shall furnish and install fire hydrants where shown on the plans and a maximum of 500 feet apart. Hydrants shall conform in all respects to the requirements of AWWA C502, latest revision. Hydrant barrel shall have safety breakage feature above the ground line. All hydrants shall have 6-inch mechanical joint shoe connection, two 2-1/2 inch discharge nozzles and one 4-1/2 inch pumper nozzle with caps fitted with cap chains. Connection threads and operating nuts shall conform to National Standard Specification as adopted by National Board of Fire Underwriters.

Operating nut shall be 1-1/2 inches, and shall open left (counterclockwise). Main valve shall have 5-1/4 inch full opening and be of the compression type opening against water pressure so that the valve remains closed should the barrel be broken off.

Hydrant shall be fully bronze mounted. Main valve shall have a threaded bronze seat ring assembly of such design that it is easily removable by unscrewing from a threaded bronze drain ring. Bronze drain ring shall have multiple ports providing positive automatic drainage as the main valve is opened or closed.

Drainage waterways shall be completely bronze to prevent rust or corrosion.

Operating stem shall be equipped with anti-friction thrust bearing to reduce operating torque and assure easy opening. Stop shall be provided to limit stem travel. Stem threads shall be enclosed in a permanently sealed lubricant reservoir protected from weather and the waterway with O-ring seals.

Hydrants shall be designed for 150 psi working pressure and shop tested to 300 psi pressure with main valve both opened and closed. Under test the valve shall not leak, the automatic drain shall function and there shall be no leakage into the bonnet.

Hydrants shall be set plumb with not less than 3 cubic feet of crushed stone and backed with at least one cubic foot of Class "C" concrete or equivalent.

Fire hydrants shall be located not more than 10 feet from the edge of existing or proposed pavement and shall not be more than 20 feet from a street intersection unless otherwise specified by the UTILITY. Hydrants shall be installed with a vertical distance from the center of the pumper nozzle to the ground of 16 to 18 inches. All fire hydrants shall be provided with a shut-off valve in the hydrant lateral as shown in Drawing WD-3.

Hydrants shall be Mueller Company, Mueller Centurion Model A-423 Compression Type Traffic Model.

All new fire hydrants installed in accordance with these specifications shall be painted as follows:

Preparation - The fire hydrant surface shall be washed with No. 40 Metalprep. Let completely dry for one hour.

\*Priming - Apply one coat of No. 296 zinc chromate primer to fire hydrant surface. Care shall be taken to insure that the operating nut remains clean of primer. Allow to dry for a minimum of 24 hours.

\*Final Coat - Apply one coat of No. 2472 Safety Red to fire hydrant surface.

Care shall be taken to insure that the operating nut remains clean of paint.

All coatings and paints shall be as manufactured by Porter Paint Company, or approved equal.

\*Unless otherwise approved by this UTILITY, no coating or paint shall be applied when the ambient temperature is below 50 degrees Fahrenheit or the relative humidity is above 85 percent.

3.3.6 Air Release Valves and Boxes - Air release valves shall be equipped with cast iron body and cover, stainless steel float, Buna-N seat and bronze linkage. Valve shall have one inch threaded inlet and be suitable for 150 psi water working pressure. Valve shall be APCO No. 200-A as manufactured by Valve and Primer Corporation, Schaumburg, Illinois, or approved equal.



Air release valves shall be installed at the high point on the water main as shown on the Drawings and to the main by a corporation stop with inside IPS threaded outlet. The inlet pipe to the valve shall be ASTM B43 extra strong seamless red brass pipe with IPS male threaded ends.

The air release valve box shall be a 24-inch reinforced concrete pipe conforming to ASTM C76, Class II, Wall B, and shall be set on a No. 9 crushed stone or gravel base. The cover shall be cast iron, medium duty, perforated and of the size to fit the bell of the pipe.

3.3.7 Blowoffs - Blowoffs shall be installed at right angles to the water main at the locations shown on the Drawings or as directed by the UTILITY. Blowoffs are required on all dead end lines. Blowoffs shall be as shown on Standard Drawings No. WD-4.

3.3.8 Fire Protection Lines - Installation of water lines to be used for private fire protection systems (i.e., sprinkler systems) shall have an approved double detector check valve installed at the property line. For the purpose of cross-connection control, fire protection systems shall be classified per AWWA M14 based on their water source and arrangement of supplies as follows:

Class 1 - Water supplied by a direct connection to the public water supply with no physical connections to any water supply; no pumps storage tanks or reservoirs; no chemical additives (including antifreeze); all sprinkler drains discharge to atmosphere, dry wells or other safe outlets.

Class 2 - Same as Class 1 with the exception of a booster pump in the connection to the public water supply. Care should be taken to prevent drafting so much water that pressure in the water main is reduced below 20 psi.

Class 3 - Water supplied by a direct connection to the public water supply plus one or more of the following: elevated storage tanks; fire pumps taking suction from above ground covered tanks; pressure tanks. All storage facilities must be filled with potable water; the stored water must be maintained in a potable condition; no chemical additives (including

antifreeze); all sprinkler drains discharge to atmosphere, dry wells or other safe outlets.

Class 4 - Water supplied directly by the public water systems with an auxiliary water supply on or available to the premises; an auxiliary water supply located within 1,700 feet of a pump connection.

Class 5 - Water supplied directly by the public water system and interconnected with an auxiliary water supply or supplies such as reservoirs not maintained in a potable condition, rivers and ponds, driven wells, industrial water systems; antifreeze or other additives are added to the system.

Class 6 - Combined industrial and fire protection system with a direct connection to the public water supply; may include pump suction tanks or gravity storage systems.

### 3.3.9 Backflow Prevention Device Requirements

a. Generally a double detector check valve backflow preventer is required protection for Class 1 and 2 fire protection systems and a reduced pressure principle detector check backflow preventer is required for Class 3, 4, 5 and 6 fire protection systems.

b. Class 6 fire protection systems will require the protection of a double check valve assembly or a reduced pressure principle backflow preventer contingent on an on-site survey (existing system) or plan review (new system) of the system.

c. The high pressure losses experienced through a reduced pressure principle detector may make their installation undesirable in some fire protection systems that would normally require them. In such instances the water supplier may allow the installation of a double detector check valve backflow preventer with an increase in the frequency of required device testing. This variance of the general requirements will be considered on a case by case basis.

d. Any backflow prevention device installed in a fire protection system must have prior UL/FM approval for use in fire protection systems. The device shall be Watts, Ames, or equal.

**3.4 TRENCH EXCAVATION** - Unless specifically directed otherwise by the UTILITY, not more than 500 feet of trench shall be opened ahead of the pipe laying work of any one crew and not more than 500 feet of open ditch shall be left behind the pipe laying work of any one crew.

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 property owners abutting shall be taken into consideration. All public or private drives shall be taken into consideration and shall be promptly backfilled or bridged. Excavated materials shall be disposed of so as to cause the least interference.

Trenches in which pipes are to be laid shall be excavated in open cut to the depths shown on the approved plans. The minimum allowable trench width shall not be less than the outside diameter of the pipe plus 8 inches. Where rock is encountered, it shall be removed to a minimum depth of 4 inches below the pipe bells.

Unless specifically authorized by the UTILITY, trenches shall in no case be excavated or permitted to become wider than 2 feet 6 inches plus the nominal diameter of the pipe at the level of or below the top of the pipe. If the trench does become wider than 2 feet 6 inches at the level of or below the top of the pipe, special precautions may be necessary, such as providing compacted granular fill up to the top of the pipe or providing pipe with additional crushing strength as determined by the UTILITY. This determination shall take into account the actual trench loads that may result and the strength of the pipe being used.

All excavated materials shall be placed a minimum of 2 feet back from the edge of the trench.

Where conditions exist that may be conducive to slides or cave ins, proper and adequate sheeting, shoring and bracing shall be installed (see Section 3.4.2) to provide safe working conditions and to prevent damage of work.

Trenches shall be kept free of water during the laying of pipe and until the pipeline has been backfilled.

Backfilling shall be as set out hereinafter.

**3.4.1 Obstructions** - In cases where storm sewers, gas lines, water lines, telephone lines, and other utilities, or other underground structures are encountered, they shall not be displaced or molested unless necessary, in which case they shall be replaced in as good condition as found as quickly as possible.

The CONTRACTOR shall notify the utility companies 48 hours prior to excavation adjacent to their facilities.

**3.4.2 Shoring, Sheeting and Bracing** - Where unstable material is encountered or where the depth of excavation in earth exceeds 6 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. Sloping the sides of the ditch to the angle of repose will not be permitted in streets, roads, narrow rights-of-way or other constructed areas unless otherwise specified. 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 construction 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 the supporting computations) for review prior to the CONTRACTOR undertaking any portion of the work.

Foundations adjacent to where the excavation is to be made below the depth of the existing foundation, shall be supported by shoring, bracing or underpinning as long as the excavation shall remain open, or thereafter if required to insure the stability of the structure supported by the foundation, and the CONTRACTOR shall be held strictly responsible for any damage to said foundation.

Solid sheeting will be required for wet or unstable material. It shall consist of continuous vertical sheet piling of timber or steel with suitable walers and braces.

Care shall be taken to avoid excessive backfill loads on the completed pipelines; and the requirements that the width of the ditch at the level of the crown of the pipe be not more than 2 feet 6 inches plus the nominal diameters of the pipe shall, as set out in Section 3.4 hereinbefore, be strictly observed.

Trench sheeting shall not be removed until sufficient backfill has been placed to protect the pipe.

All sheeting, planking, timbering, bracing and bridging shall be placed, renewed and maintained as long as necessary.

3.4.3 Blasting - All blasting operations shall be conducted in accordance with the municipal ordinances, state laws, and Section 9 of the Manual of Accident Prevention in Construction published by the Associated General Contractors of America, Inc. All explosives shall be stored in conformity with said ordinances, laws and safety regulations. No blasting shall be done within 5 feet of any water mains, except with light charges of explosives. Any damage done by blasting is the responsibility of the CONTRACTOR and shall be promptly and satisfactorily repaired by him. Material must be on hand should a repair to existing lines be required.

All shots shall be covered with heavy timber or steel blasting mats to prevent flying material. Unless otherwise specified or directed, delay caps shall be used to reduce earth vibrations and noise.

All blasting operations shall be covered by public liability insurance, or if said public liability insurance does not cover blasting, then the CONTRACTOR shall have separate public liability insurance to cover his blasting operations.

All blasting operations shall be supervised and performed by qualified personnel. A seismograph may be required.

3.5 PIPE BEDDING - In all cases the foundation for pipes shall be prepared so that the entire load of the backfill on top of the pipe will be carried on the barrel of the pipe and insofar

as possible where bell and spigot pipe are involved so that none of the load will be carried on the bells.

Where undercutting and granular bedding are involved, the depth at the bottom of the bells of the pipe will be at least 4 inches above the bottom of the trench as excavated.

Supporting of pipe shall be as set out hereinbefore, and in no case shall the supporting of pipe on blocks be permitted.

3.5.1 Earth Foundation - All PVC water main pipe shall be supported on a bed of size no. 9 crushed stone as defined by KTC and as shown on Standard Drawing No. WD-5. Bedding material shall be free from rock and be acceptable to the UTILITY. In no case shall pipe be supported directly on rock. Earth bedding is acceptable for ductile iron water pipe, except in solid rock trenches.

3.5.2 Rock Foundation - If the trench bottom is in rock, the excavation shall be undercut to a minimum depth of 6 inches below the bottom of the pipe. The pipe shall be laid on a bed of granular material to provide continuous support for the lower section of the pipe. Granular bedding shall be no. 9 crushed stone (see Standard Drawing No. WD-5).

3.5.3 Special Bedding - In wet, yielding mucky locations, where pipe is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective. When ordered by the UTILITY, yielding and mucky material in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. Crushed stone or other such granular materials, if necessary, as determined by the UTILITY to replace poor subgrade material, shall be classified as "Special Pipe Bedding."

Granular material for "Special Pipe Bedding" shall be no. 9 crushed stone.

3.6 LAYING PIPE - All pipe shall be laid with ends abutting and true to line and grade as shown on the plans. Supporting of pipe shall be

as specified under "Pipe Bedding" hereinbefore and in no case will the supporting of pipes on blocks be permitted.

Fittings for the water mains shall be provided and placed as and where directed by the UTILITY or shown on the plans. All open ends of pipes and of branches shall be sealed or plugged.

Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure its being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in the lines. Any defective pipe or fitting discovered after the pipe is laid shall be removed and replaced with a satisfactory pipe or fitting. 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.

Granular bedding material as specified hereinbefore, shall be used to correct irregularities in the earth trench subgrade.

The interior of the pipe, as the work progresses, shall be clean. When laying of any pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood plug fitted into the pipe bell, so as to exclude earth or other material.

No backfilling (except for securing pipe in place) over pipe will be allowed until the ENGINEER, or his representative has made an inspection of the joints, alignment and grade in the section laid, but such inspection shall not relieve the CONTRACTOR of further liability in case of defective joints, misalignment caused by backfilling and other such deficiencies that are noted later.

3.7 JOINTING PIPE - The type of joints described hereinbefore in Section 3.2.1 and 3.2.2 shall be installed in accordance with the manufacturer's recommendations.

3.8 BACKFILLING PIPELINE TRENCHES - All backfilling shall be accomplished in accordance with the details shown on Standard Drawings No. WD-5 and the requirements of this section. Any variances must be approved in writing by the UTILITY.

When directed by the ENGINEER, the CONTRACTOR shall add water to the backfill

material or dry out the material when needed to attain a condition near optimum moisture content for a maximum density of the material when it is tamped. The CONTRACTOR shall obtain a compaction of the backfill of at least 95 percent of standard (ASTM D698) proctor density where mechanical tamping of backfill is required.

Before final acceptance, the CONTRACTOR will be required to level off all trenches or to bring the trench up to the level of the surrounding terrain. The CONTRACTOR shall also remove from roadways, rights-of-way and/or private property all excess earth or other materials resulting from construction.

In the event that pavement is not placed immediately following trench backfilling in streets and highways, the CONTRACTOR shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times.

In all cases walking or working on the completed pipelines except as may be necessary in tamping or backfilling will not be permitted until the trench has been backfilled to a point one foot above the top of the pipe. The filling of the trench and the tamping of the backfill shall be carried on simultaneously on both sides of the pipe in such a manner that the completed pipeline will not be disturbed and injurious side pressures do not occur.

3.8.1 Method "A" Backfilling in Open Terrain - Backfilling of pipeline trenches in open terrain shall be accomplished in the following manner:

The lower portion of the trench, from the pipe bedding to the springline (centerline) of the pipe shall be backfilled with no. 9 crushed stone. (Earth bedding is acceptable provided it does not contain large rocks.)

When installing ductile iron pipe, the portion of the trench from the springline of the pipe to a point 6 inches above the pipe shall be backfilled with material which is free from large rock. Incorporation of rock having a volume exceeding 1/2 cubic foot is prohibited. This material shall be placed in 6-inch layers and mechanically tamped.

When installing PVC pipe, the portion of the trench from the springline of the pipe to a point 6 inches above the pipe shall be backfilled with no. 9 crushed stone.

The upper portion of the trench above the compacted portion shall be backfilled with material which is free from large rock. Incorporation of rock having a volume exceeding 1/2 cubic foot is prohibited. This material shall be placed in 6-inch layers and mechanically tamped.

When installing PVC pipe, the portion of the trench from the springline of the pipe to a point 6 inches above the pipe shall be backfilled with no. 9 crushed stone.

The upper portion of the trench above the compacted portion shall be backfilled with material which is free from large rock. Incorporation of rock having a volume exceeding 1/2 cubic foot is prohibited. Backfilling this portion of the trench maybe accomplished by any means approved by the ENGINEER.

3.8.2 Method "B" Backfilling Under Paved Areas - Backfilling of pipeline trenches under sidewalks, streets, proposed streets, and driveways shall be accomplished in the following manner:

The lower portion of the trench, from the pipe bedding to a point 6 inches below the bottom of the pavement or concrete sub-slab, shall be backfilled with crushed stone or fine gravel.

The upper portion of the trench, from a point 6 inches below the bottom of the pavement or concrete sub-slab up to grade, shall be backfilled with a base course of dense graded aggregate, crushed stone, or fine gravel and sand suitable to the appropriate governing body having jurisdiction over the street or roadway. At such time that pavement replacement is accomplished, the excess base course shall be removed as required.

Backfilling and pavement replacement for water lines within the city limits of Mt. Sterling shall comply with detail shown on standard drawing WD-10.

3.8.3 Settlement of Trenches - Wherever water lines are in, or cross, driveways and streets, the CONTRACTOR shall be responsible for any trench settlement which occurs within these rights-of-way within one year from the time of final acceptance of the work. If paving shall require replacement because of trench settlement within this time, it shall be replaced by the OWNER-DEVELOPER or his CONTRACTOR. Repair of settlement damage shall meet the approval of the appropriate governing body.

3.9 CONCRETE CRADLE, ANCHORS OR ENCASEMENT - Concrete cradle, anchors or encasement of water mains and fittings shall be placed where shown on the plans. Concrete shall be 3500 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 not to disturb the grade or line of the pipe or injure the joints.

Water mains shall have poured from concrete batch plant (no ready mix), concrete thrust or "kicker" blocks at all pipe intersections and changes of direction to resist forces acting on the pipeline, as shown on Standard Drawings Nos. WD-6 and WD-7. Larger kicker may be required as direct by the UTILITY or the ENGINEER.

Encasement of water mains under creeks and drainage waterways shall be constructed as shown on Standard Drawing WD-9.

3.10 HIGHWAY AND RAILROAD CROSSINGS - Steel encasement pipe for road and railroad crossings shall be bored and/or jacked in place to the elevations shown on the plans. All joints between lengths shall be solidly welded with a smooth non-obstructing joint inside. The encasement pipe shall be installed without bends. The water line pipe shall be installed after the encasement pipe is in place.

Installation of the water pipe in the encasement pipe shall be as per manufacturer's recommendations or per details. Spacers are required. After the water main has been installed, inspected, and tested as specified, both ends of the cover pipe shall be closed in a manner acceptable to the UTILITY and per detail of these standards.

**3.11 TESTING OF LINES** - On all projects involving the installation of water pipeline, the finished work shall comply with the provisions listed below, or similar requirements which will insure equal or better results:

- a. Mt. Sterling Water and Sewer Commission has the right to require the CONTRACTOR cut the line and test against plug/cap.
- b. All water mains shall be given a hydrostatic test to pressure class of pipe, under which leakage shall not exceed the limits established in Section 4 of AWWA Standard Specifications C600. The test pressure at no time shall exceed the pressure class of the pipe.
- c. Where practicable, pipelines shall be tested between line valves or plugs in lengths of not more than 1500 feet.
- d. When the line or section being tested is pumped up to the required pressure, it shall be valved off from the pump and a pressure gauge placed in the line. The pressure drop in the line, if any, shall be noted. If no pressure drop is noted in 2 hours, the ENGINEER, at his discretion, may accept the line or section as being tested, or he may require the test run the full 24 hours. Mt. Sterling Water and Sewer Commission has the right to extend the test duration.

At the end of the 24-hour test period, the pressure shall be recorded. If there is a drop in pressure, the CONTRACTOR will be required to pump the section being tested up to initial test pressure and maintain that pressure for 24 hours. The pressure shall be within 1 psi of original test pressure at all times, measuring the amount of water required to accomplish this. The line will not be accepted until the leakage shall prove to be less than 10 gallons per inch diameter per mile of pipe per 24 hours.

Should there be leakage over the allowable amount, the CONTRACTOR will be required to locate and repair the leaks and retest the section. It is suggested, but not required, that the CONTRACTOR have a geophone (underground listening device) on

the job at time of testing. This has proven very helpful in the past in locating leaks.

e. If the leakage of a section of pipeline being tested is below the allowable amount, but a leak is obvious, in the opinion of the ENGINEER, due to water at the surface of the ground, or by listening, the leak can be heard underground with the geophone, or any other means of determining a leak, the CONTRACTOR will be required to repair those leaks.

f. All pipe, fittings and other materials found to be defective under test shall be removed and replaced.

g. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.

h. The UTILITY shall furnish a recording gauge and clock used during leakage test and recording pressure charts during duration of test. Recording pressure charts shall remain the property of the UTILITY at conclusion of test.

### **3.12 DISINFECTION OF WATER LINES** -

Unless otherwise directed by the UTILITY, the CONTRACTOR shall connect the new water main to the existing water system. The CONTRACTOR must notify the UTILITY when the connection is to be made so that representatives of the UTILITY may operate existing valves and witness the connection. A minimum notice of 24 hours must be given.

After testing, a liquid solution of chlorine using HTH or equal shall be introduced into the section of the line being disinfected sufficient to insure a chlorine dosage of at least 50 ppm in the main. While the solution is being applied, the water should be allowed to escape at the ends of the line until tests indicate that a dosage of at least 50 ppm has been obtained throughout the pipe. Open and close all valves and cocks while chlorinating agent is in the piping system. The chlorinated water shall be allowed to remain in the pipe for 24 hours, after which a residual of at least 25 ppm shall be obtained. The procedure shall be repeated until 25 ppm is obtained, after which time the main shall be thoroughly flushed

until the residual chlorine content is not greater than 1.0 ppm. Disposal of chlorinated water shall comply with state requirements.

Following disinfection of the line, bacteriological samples shall be collected and analyzed in accordance with the requirements of the Kentucky Department for Natural Resources and Environmental Protection. When the samples have been approved, the new line then may be connected to the system.

### 3.13 CONNECTION TO EXISTING SYSTEM -

Unless otherwise directed by the UTILITY, the CONTRACTOR shall connect the new water main to the existing water system. The CONTRACTOR must notify the UTILITY when the connection is to be made so that representatives of the UTILITY may operate existing valves and witness the connection. A minimum notice of 24 hours must be given.

In case a wet tap must be made in connecting to the existing system, the tapping sleeve, valve and box and all other necessary materials shall be provided by the CONTRACTOR. The actual work in tapping the line shall be performed by the CONTRACTOR.

### 3.14 CUSTOMER SERVICE CONNECTIONS -

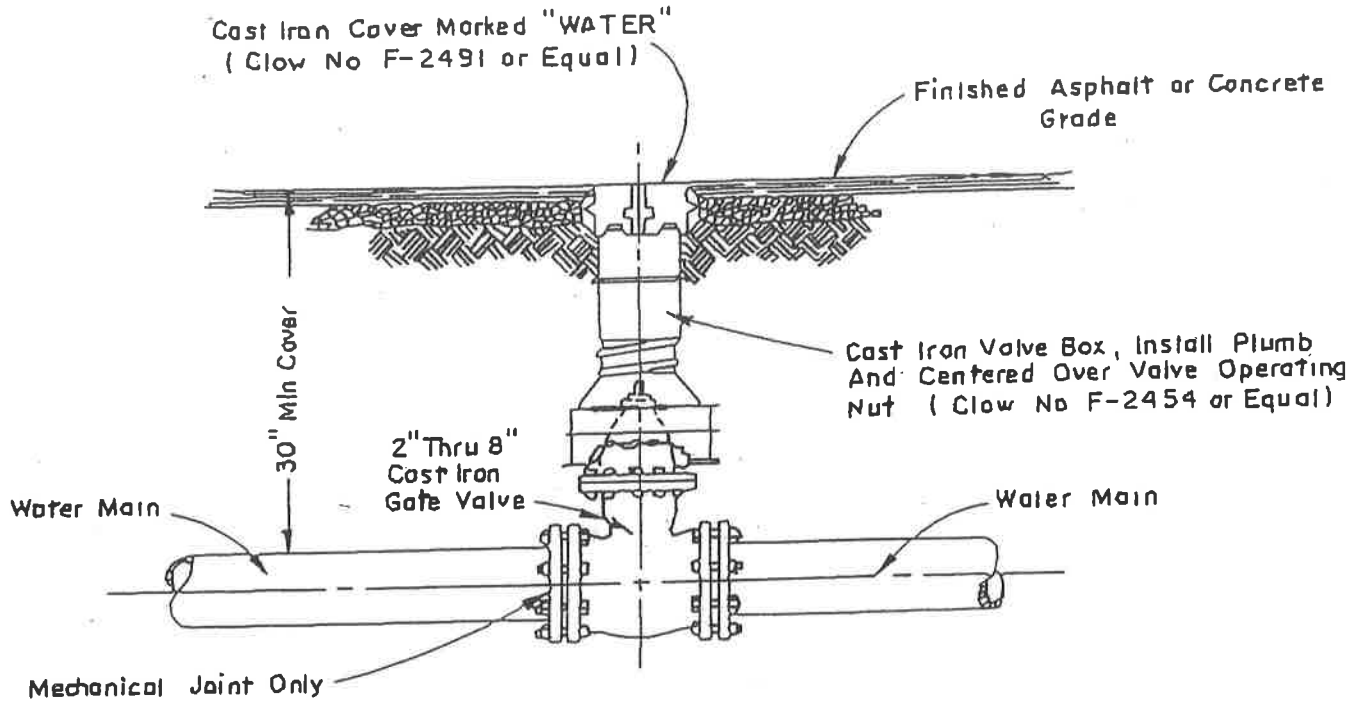
Residential water service connections shall be made in accordance with the details shown on Standard Drawings No. WD-8. Locations and sizes of service connections shall be as directed by the UTILITY. All valve vaults and meter boxes are to be located as close to property lines as possible. The UTILITY shall install a tap on the new main, service piping from the water main to the customer's property line.

3.14.1 Pipe and Fittings - Residential water services piping shall be seamless copper water tube, ASTM B 88, Type K.

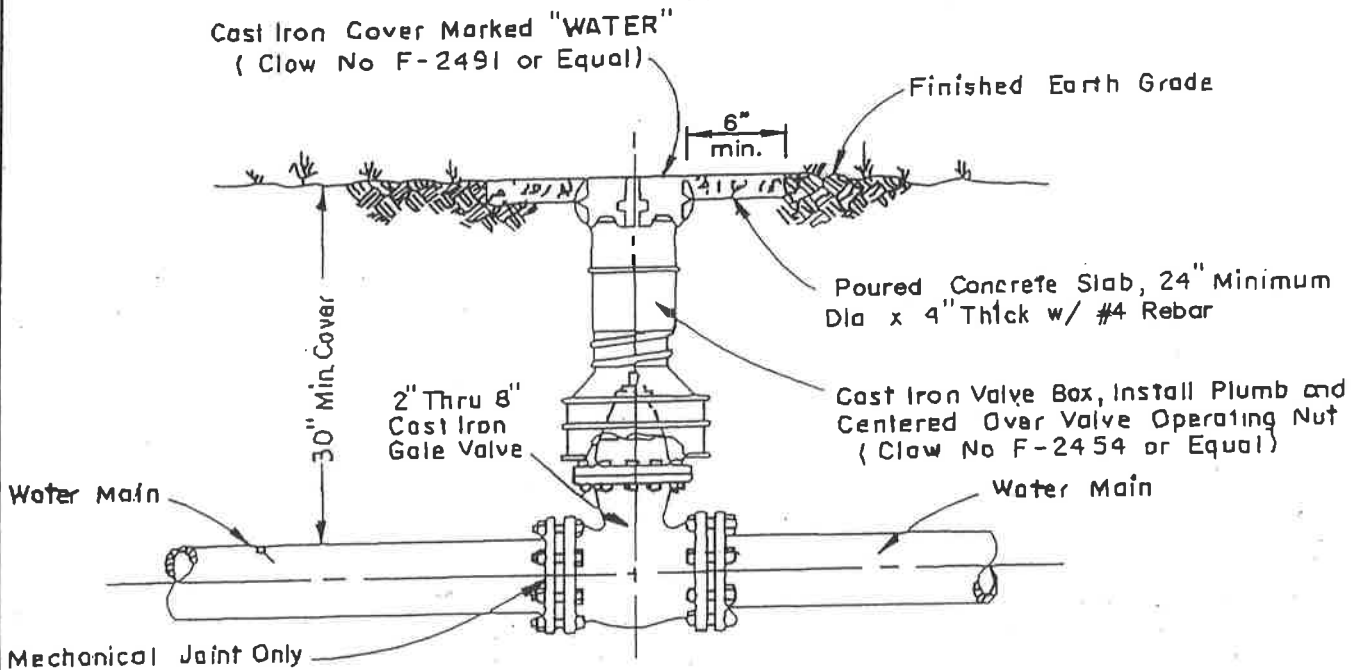
3.14.2 Corporation Stops - Corporation stops shall have AWWA C800 C.C. threaded inlet. Outlets shall be suitable for the type of service piping furnished and laid. Corporation stops shall be Mueller H-15000, H-15008, or approved equal.

3.14.3 Large Commercial and Industrial Service Connections - These types of water service connections shall include a concrete meter vault with appurtenances as shown on Standard Drawing No. WD-11.

3.14.4 Concrete Thrust Blocks - Concrete thrust blocks shall be provided at all bends in the force main as shown on Standard Drawings WD-7. The UTILITY reserves the right to increase the size of these thrust blocks, if necessary.



**PAVED OR CONCRETE AREAS**



**EARTH AREAS**

TYPICAL  
GATE VALVE SETTING

STANDARD DRAWING

WATER DIVISION

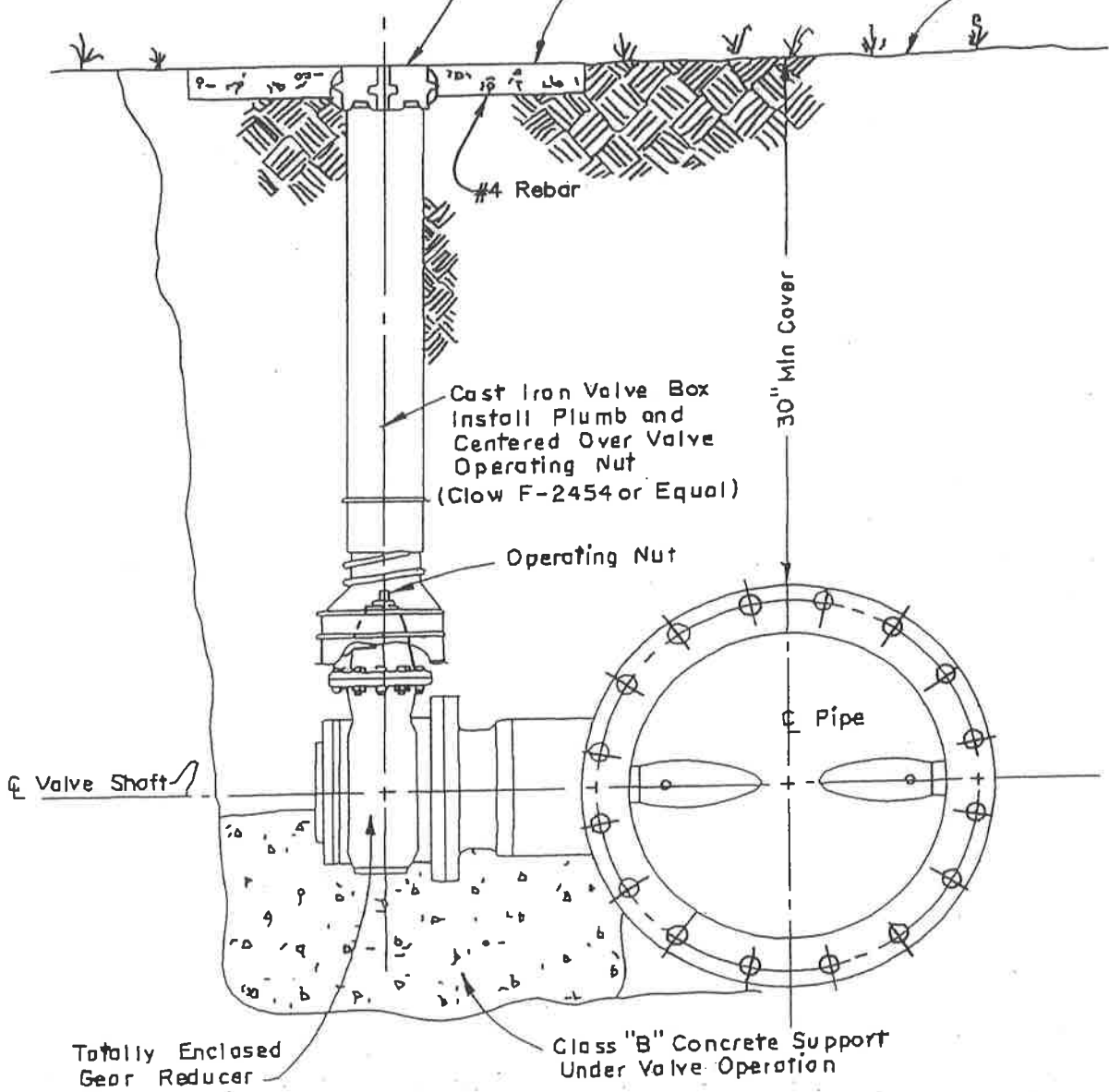
DWG. No. WD-1



Cast Iron Cover Marked "WATER"  
 (Clow No F-2491 or Equal)

Poured Concrete Slab  
 24" Min Dia x 4" Thick  
 (Typ. all Valve Boxes)

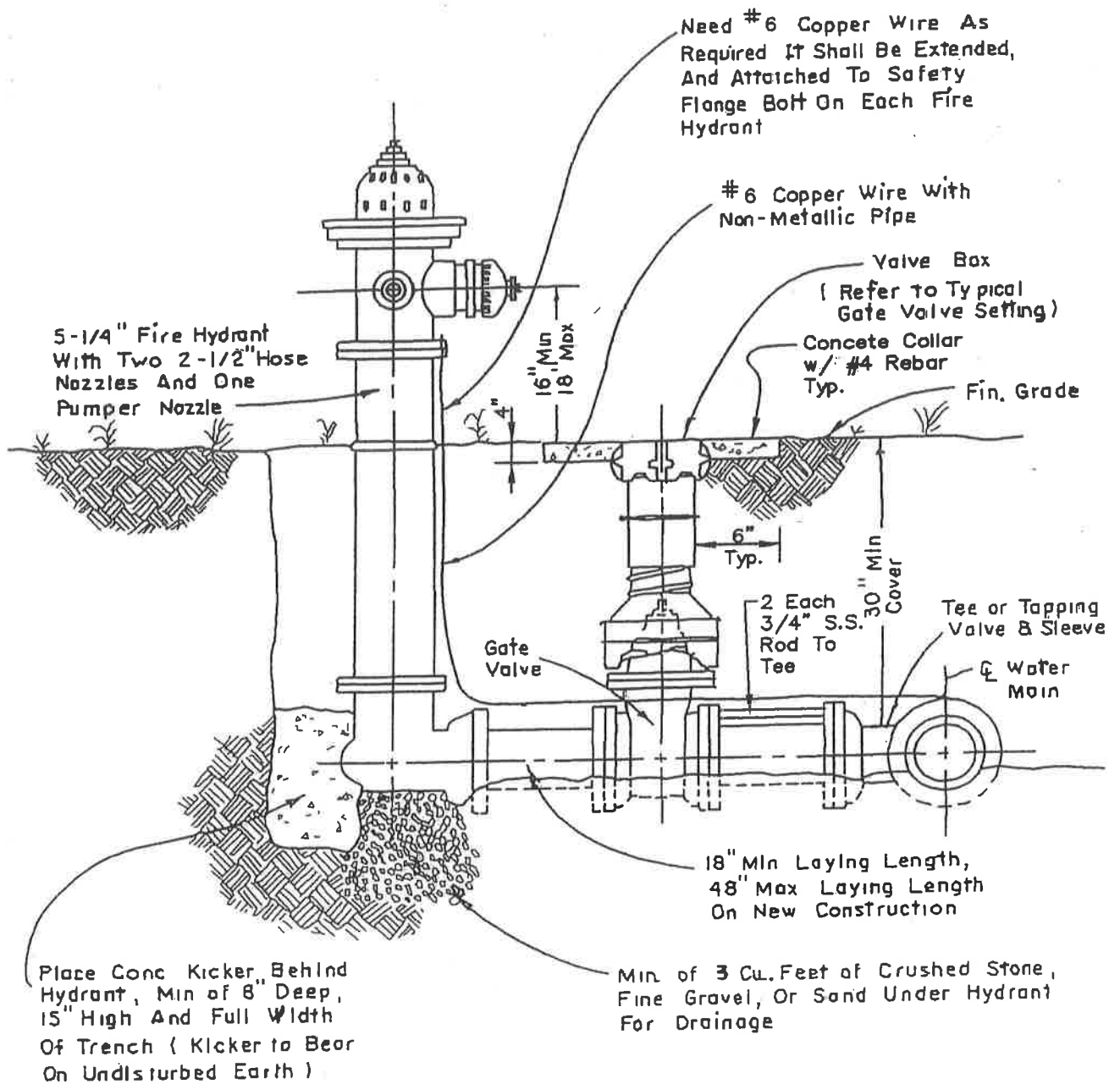
Fin. Grade



NOTE : Butterfly Valves to be used on  
 Water Mains 10" or larger

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TYPICAL SETTING FOR BURIED BUTTERFLY VALVE	
STANDARD DRAWING	WATER DIVISION      DWG. No. WD-2



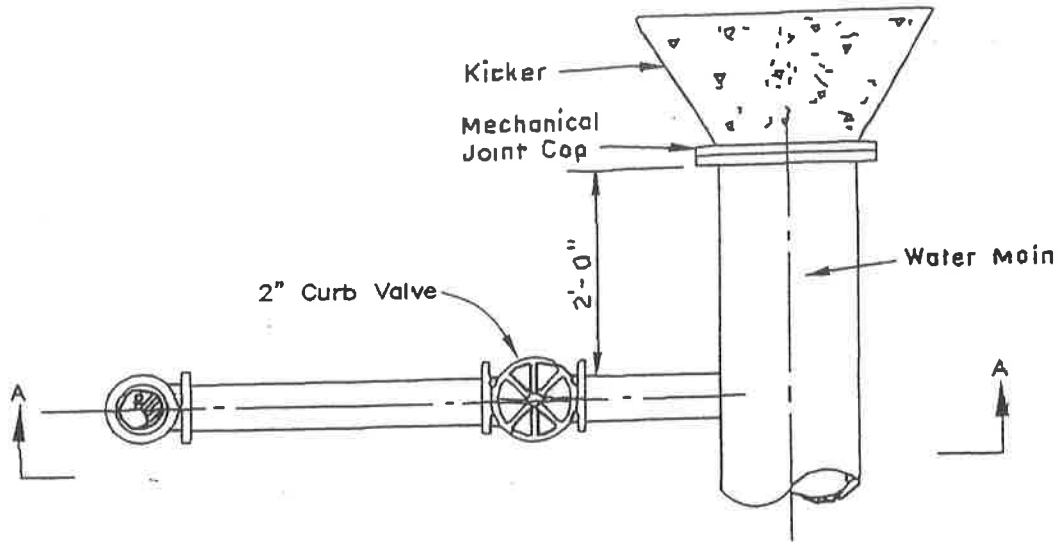
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TYPICAL  
FIRE HYDRANT SETTING

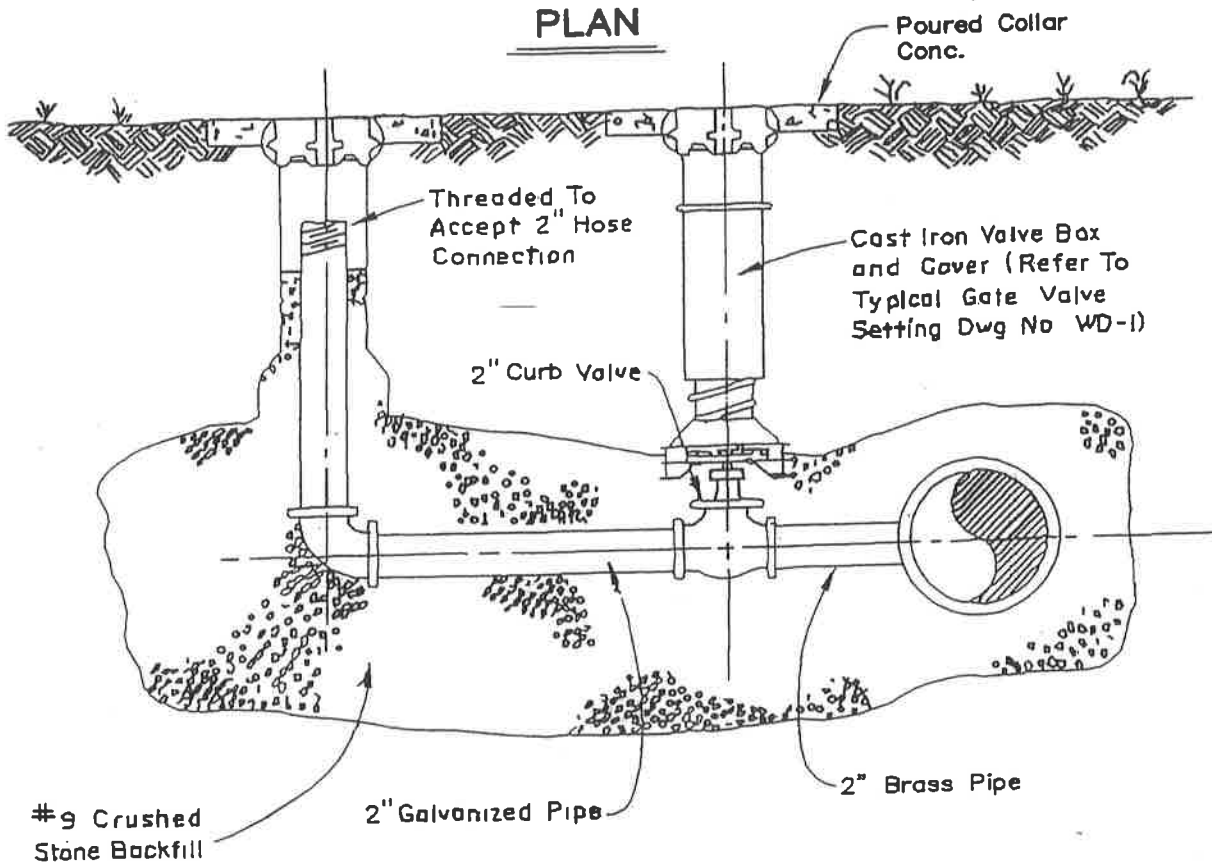
STANDARD DRAWING

WATER DIVISION

DWG. No. WD-3



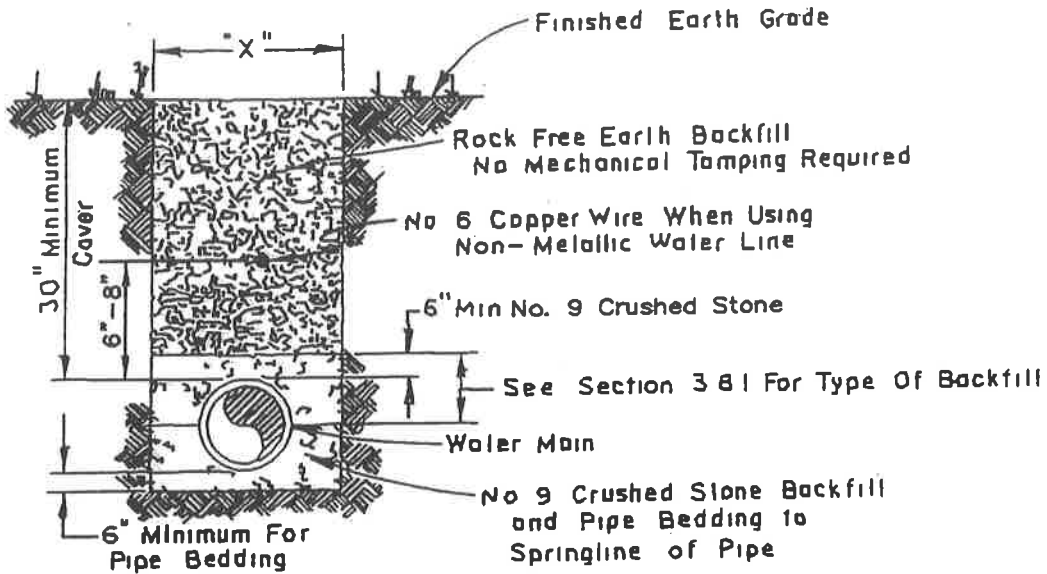
**PLAN**



**SECTION A-A**

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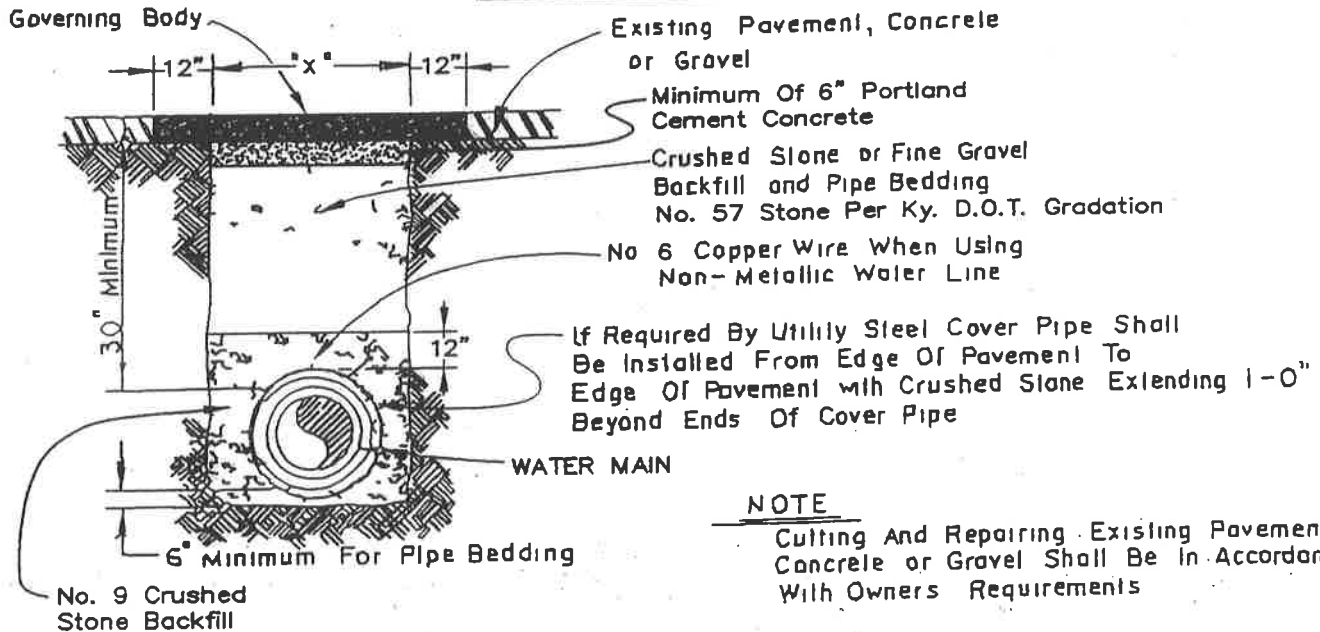
		TYPICAL END OF LINE BLOW OFF	
STANDARD DRAWING		WATER DIVISION	DWG. No. WD-4



— M E T H O D " A " —  
OPEN AREAS

TRENCH WIDTH	
PIPE SIZE	"X"
4" Thru 12"	30"
14" Thru 18"	36"
20" Thru 24"	42"
26" Thru 36"	54"

Pavement Replacement To Meet The Requirements Of The Appropriate Governing Body



NOTE

Cutting And Repairing Existing Pavement, Concrete or Gravel Shall Be In Accordance With Owners Requirements

— M E T H O D " B " —  
PAVED AREAS

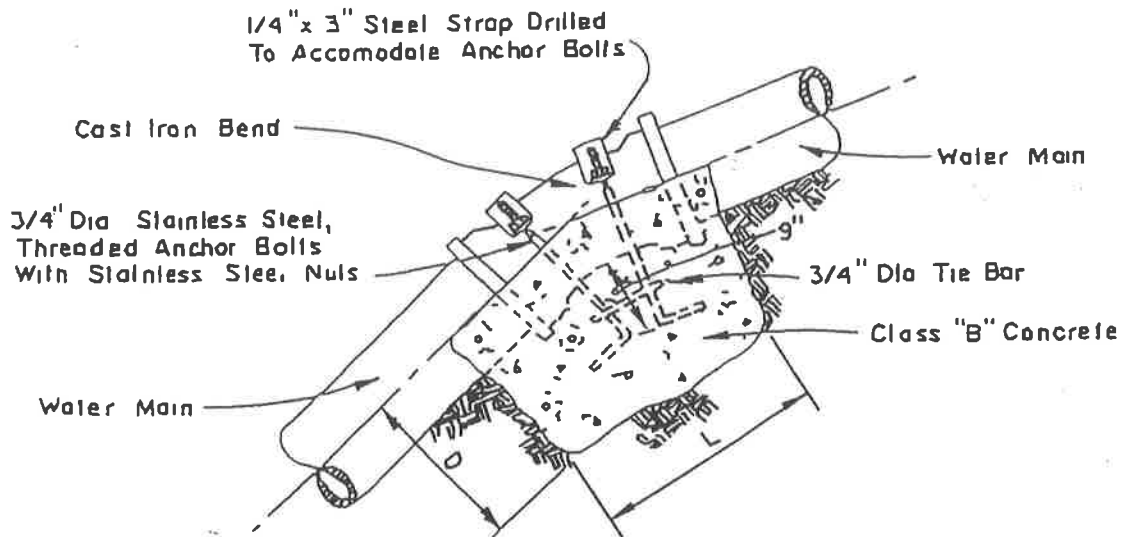
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TYPICAL  
 BACKFILL & BEDDING METHODS

STANDARD DRAWING

WATER DIVISION

DWG. No. WD-5

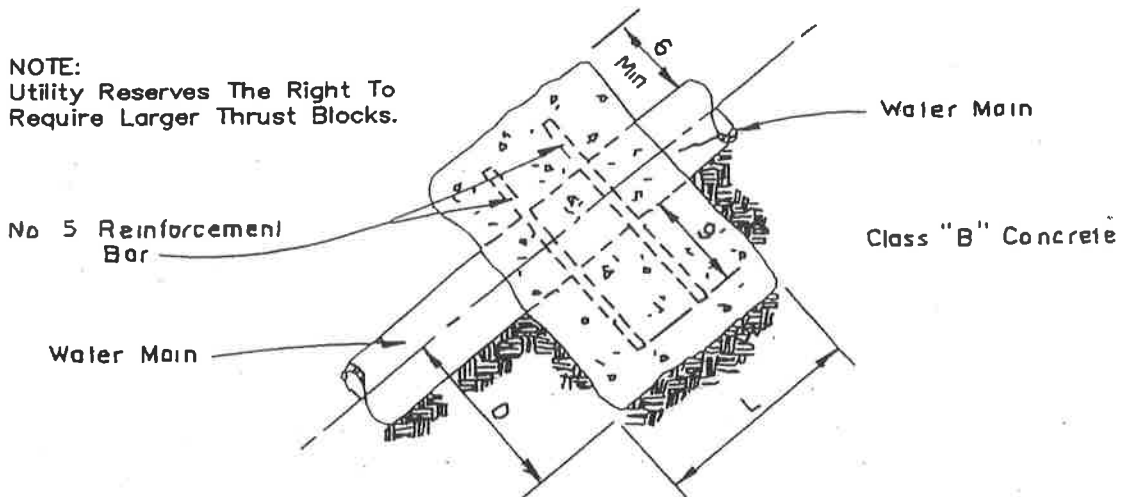


## VERTICAL BENDS

VERTICAL BEND & STRAIGHT PIPE							
SIZE	2"	3"	4"	6"	8"	10"	12"
"D"	10"	12"	12"	15"	15"	18"	18"
"L"	12"	18"	18"	24"	24"	30"	30"

NOTE Anchors To Be Full Width Of Trench  
Anchors Must Be Placed Against Undisturbed Earth

NOTE:  
Utility Reserves The Right To  
Require Larger Thrust Blocks.



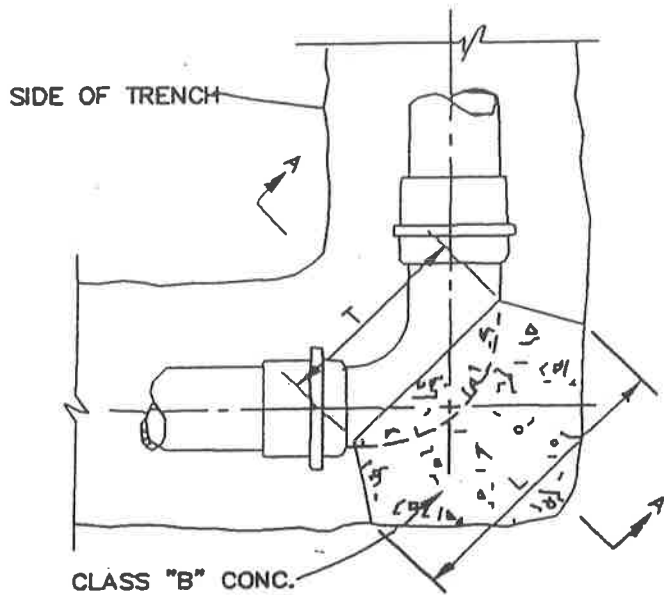
## STRAIGHT PIPE

TYPICAL  
CONCRETE ANCHOR BLOCKS

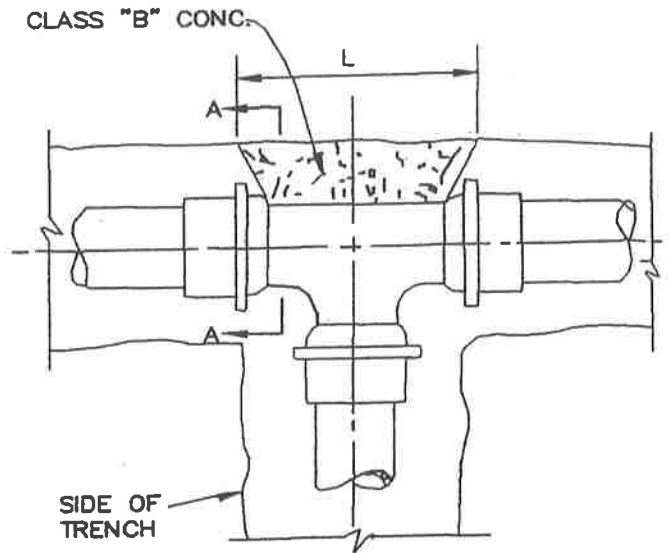
STANDARD DRAWING

WATER DIVISION

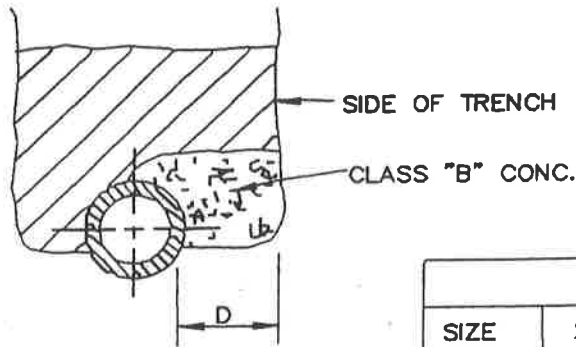
DWG. No. WD-6



**45° & 90° BENDS**



**TEES**



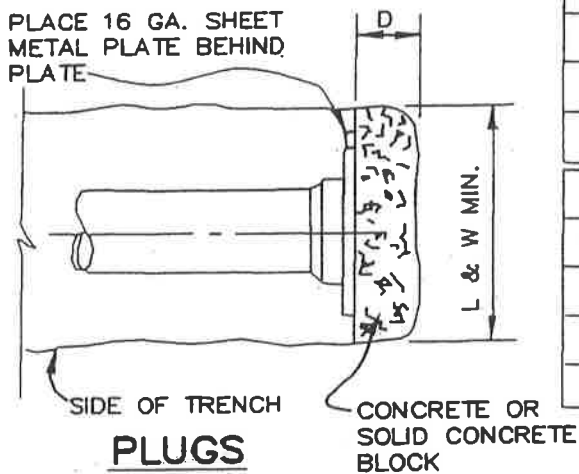
**SECTION A-A**

NOTE:  
Utility Reserves The Right To  
Require Larger Thrust Blocks.

PLUGS & TEES							
SIZE	2"	3"	4"	6"	8"	10"	12"
D	6"	6"	6"	6"	6"	6"	6"
L & W	14"	16"	18"	20"	22"	24"	24"

(45°) EIGHTH BENDS							
SIZE	2"	3"	4"	6"	8"	10"	12"
D	6"	6"	6"	6"	6"	6"	6"
L	12"	14"	16"	18"	20"	22"	24"
T	10"	12"	14"	16"	16"	18"	18"

(90°) QUARTER BENDS							
SIZE	2"	3"	4"	6"	8"	10"	12"
D	6"	6"	6"	8"	10"	12"	12"
L	15"	18"	21"	24"	27"	30"	34"
T	10"	12"	14"	16"	18"	20"	22"



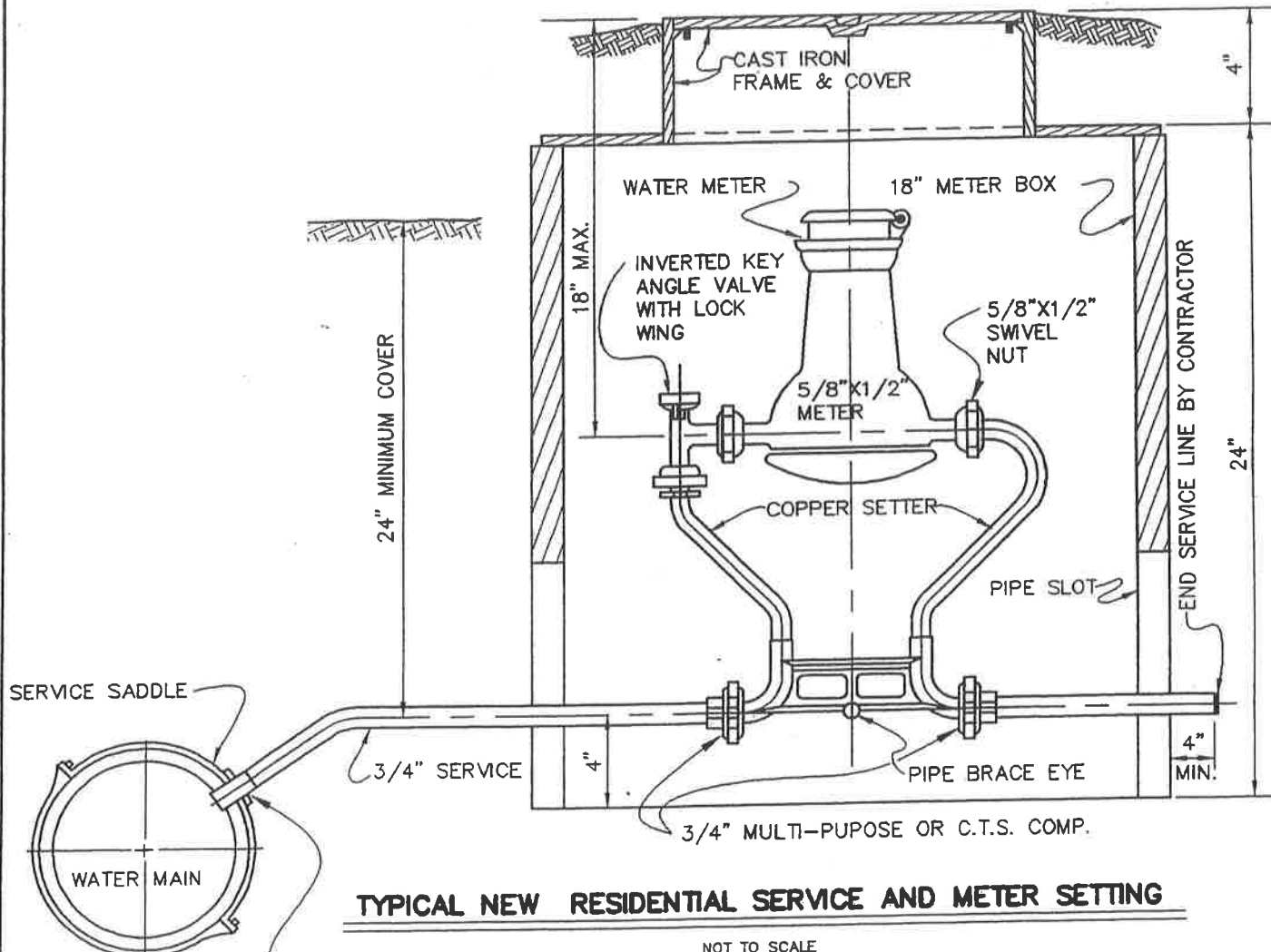
**PLUGS**

CONCRETE THRUST BLOCK

STANDARD DRAWING

WATER DIVISION

DWG. No. WD-7



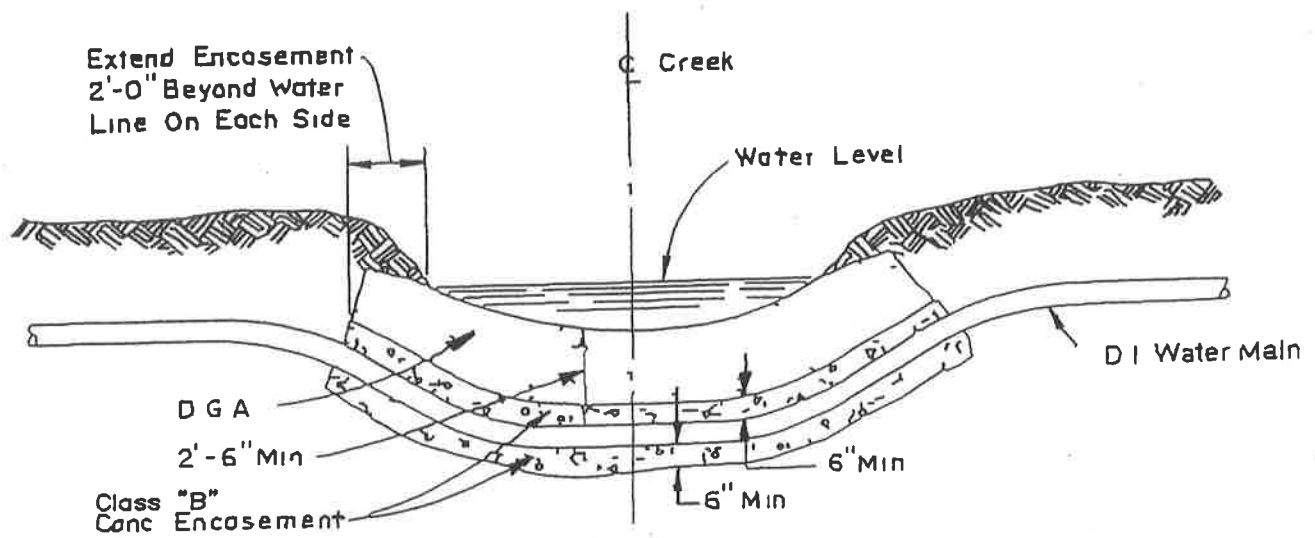
**TYPICAL NEW RESIDENTIAL SERVICE AND METER SETTING**

NOT TO SCALE

CORPORATION STOP - 3/4" C.C. INLET X 3/4" C.T.S. COMP. OUTLET  
 OR  
 3/4" C.C. INLET X 3/4" FLARE OUTLET

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STANDARD DRAWING	TYPICAL NEW SERVICE AND METER SETTING	
	WATER DIVISION	DWG. No. WD-8



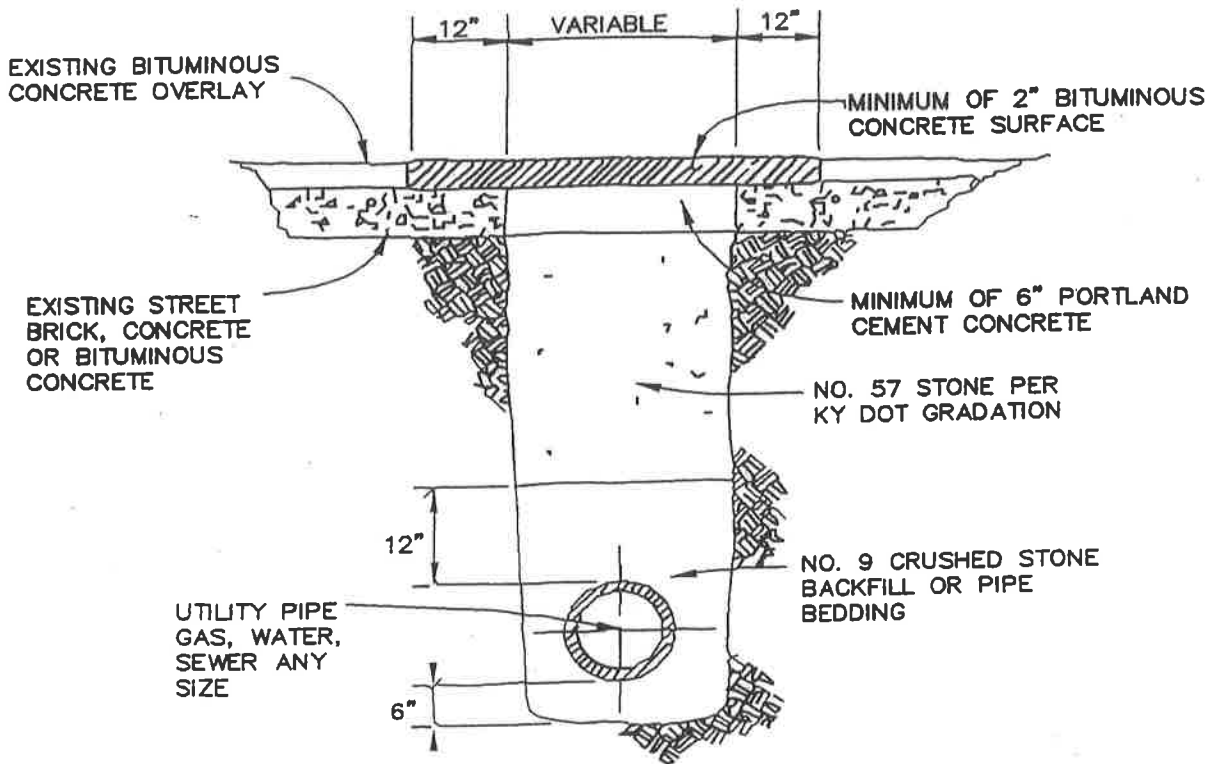
TYPICAL CREEK CROSSING FOR  
D.I. WATER MAIN

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	WATER LINE ENCASEMENT	
STANDARD DRAWING	WATER DIVISION	DWG. No. WD-9



**NOTE:** CONTRACTOR AND/OR UTILITY COMPANY SHALL SAW OR CUT EXISTING STREET SURFACE A MINIMUM DISTANCE OF 12" (INCHES) WIDER THAN THE EXCAVATED TRENCH OR DITCH WALL IN ORDER TO KEY THE FINAL REPLACEMENT SURFACE IN TO THE EXISTING SURFACE.



DATE: NOVEMBER 19, 1984  
NO SCALE

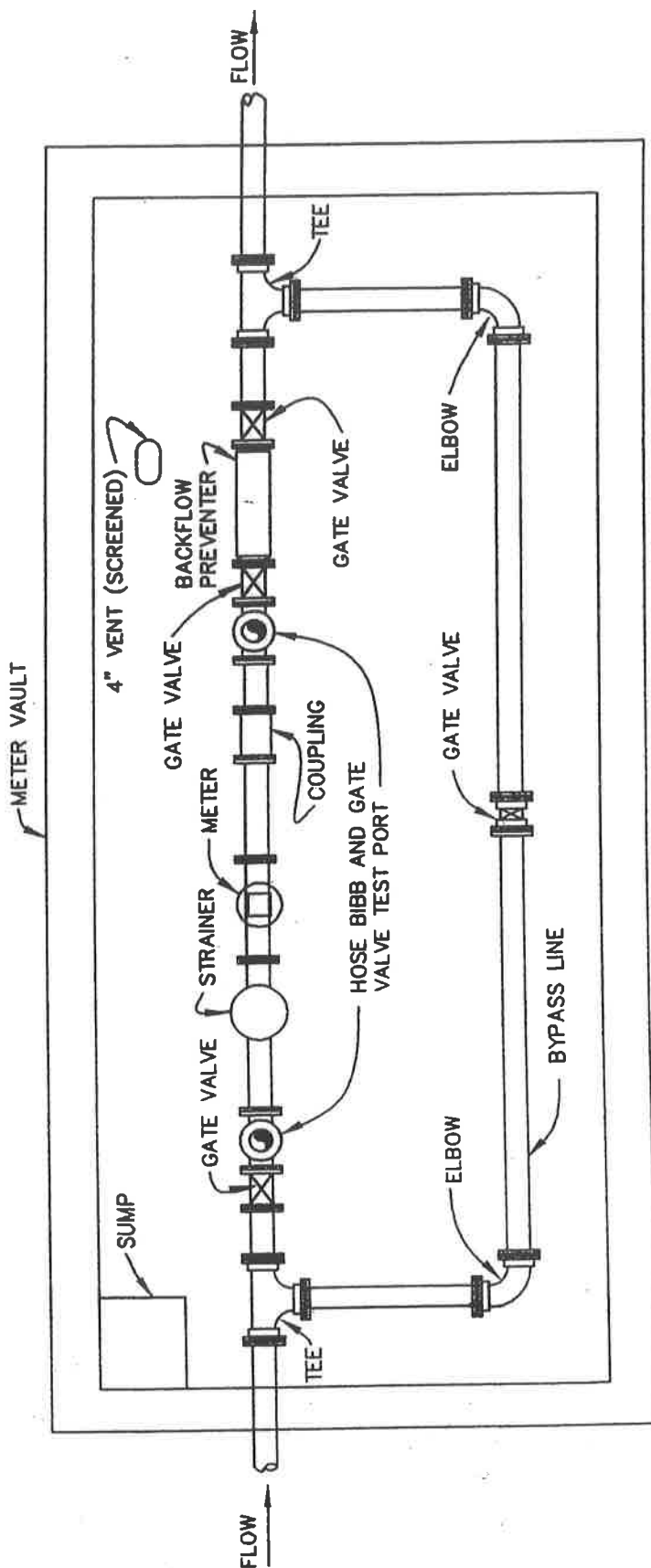
CITY OF MT. STERLING, KENTUCKY  
STANDARD DRAWING  
UTILITY LINES  
TRENCHING STREETS, PLACING BACKFILL  
AND REPLACEMENT OF PAVING

TRENCH BACKFILL AND PAVEMENT REPLACEMENT  
ON CITY STREETS

STANDARD DRAWING

WATER DIVISION

DWG. No. WD-10



**NOTE:**

1. PIPING, VALVES, METER, AND OTHER ITEMS TO BE SIZED TO MEET CUSTOMER REQUIREMENTS.

**REQUIREMENTS FOR METER PIT:**

1. BADGER CU. FT. RECORDALL OR TURBO METER WITH SCREEN.
2. METER TO HAVE TEST PLUG OR PROPER SIZE TAP IS TO BE MADE ON OUTLET JUST INSIDE OF BYPASS FOR TEST PURPOSES
3. ADEQUATE SIZE BYPASS (FOR METER REPAIRS).
4. SUMP PUMP AND PIT WITH ELECTRICAL OUTLET.
5. LADDER IF NEEDED (STEEL COATED WITH PLASTIC OR ALUMINUM).
6. 4" VAULT VENT INSTALLED IN TOP.
7. ALUMINUM HINGE DOOR OF ADEQUATE SIZE.
8. BACKFLOW PREVENTION ON OUTLET SIDE.
9. ADEQUATE ROOM FOR REPAIRS IN VAULT.
10. PIT IS TO BE PRECAST OR POURED IN PLACE.

TYPICAL METER ARRANGEMENT  
COMMERCIAL/INDUSTRIAL SERVICE

STANDARD DRAWING

WATER DIVISION

DWG. No. WD-11