

STANDARD SPECIFICATIONS

BULLOCK PEN WATER DISTRICT

Crittenden, Kentucky

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
SECTION ONE – INTRODUCTION	
A. Purpose	1
B. Authority	1
C. Reference	1
D. General Requirements	1
E. District’s Authority	2
F. Obligation of the Developer or Contractor	2
G. Coordination	2
H. Acceptable Materials	2
I. Defective Material and Workmanship	2
J. Final Inspection	3
K. Existing Utilities	3
L. Public and Private Highways and Streets	3
M. Permits, Easements and Right of Way	3, 4
N. General Guaranty	4
O. Indemnification	4
P. Variance	4
Q. Definitions	4, 5
SECTION TWO – PROCEDURES	
A. Purpose	6
B. Request for Water Service	6

C.	Plan Submission	6
D.	Construction Phase	6, 7
E.	Inspection by Bullock Pen Water District	7
F.	Meter Service	7
G.	Final Inspection	7

SECTION THREE – WATER MAINS

A.	Purpose	8
B.	Design Requirements	8
C.	Materials	9-17
D.	Excavation for Trenches	17-18
E.	Blasting	18
F.	Pipe Bedding	19
G.	Pipe Laying	19
H.	Backfilling Pipeline Trenches	20
I.	Highway and Railroad Crossings	20
J.	Concrete Encasement	21
K.	Creek Crossing	21
L.	Clean-up and Restoration	21
M.	Connection to Existing System	21
N.	Testing	21
O.	Disinfection of Water Lines	22
P.	Variance	22

SECTION FOUR – SEEDING

A.	Purpose	23
B.	Materials	23
C.	Soil Improvements	23
D.	Seeding and Mulching	23, 24
E.	Planting Season	24
F.	Clean-up	24
G.	Guarantee	24

SECTION ONE: INTRODUCTION

A. **PURPOSE** – The purpose of this manual is to provide information and guidance to land owners, land developers, design engineers, and contractors in the construction of sanitary water facilities that are to become a part of the Bullock Pen Water District system. These regulations and procedures are to be followed by any person or corporation in the development of residential subdivisions, shopping centers, industrial developments, water main extensions or in any development in which the Developer desires water service from the Bullock Pen Water District. The goal of this manual is to help insure the protection of the health and welfare of the general public, within the Grant County Sanitary Sewer District through the use of proper design features and construction methods.

B. **AUTHORITY** – The works and facilities supplying water services within the boundary of the Bullock Pen Water District as they presently exist and as they may hereafter from time to time be extended was authorized by an order of Grant County Fiscal Court in accordance with Kentucky Revised Statutes, Chapter 74.

C. **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, Latest Edition, hereafter referred to as K.D.H.S.S.

Other standards or specifications referred to are those of the American Society of Testing Materials (ASTM), American Association of State Highway Officials (AASHO), 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 District, shall be complementary to and a part of this manual.

D. **GENERAL REQUIREMENTS** – In order to insure that the design and construction of water facilities meet generally accepted engineering design criteria and generally recognized construction methods for such facilities, the Owner or Developer of lands in which water lines are to be constructed that are to be part of the District's System, must employ a Registered Professional Engineer, Registered in the Commonwealth of Kentucky, set out in KRS Chapter 322. The Owner-Developer shall employ the Engineer to:

- (1) Prepare detailed construction drawings.
- (2) Design all water facilities to meet all requirements of the specifications contained herein and meet all local, state and federal regulations.
- (3) Provide information on the number and type of water users.
- (4) Certify to the District that the facilities were constructed in accordance with the approved plans and the detailed specifications contained herein.

(5) Provide a complete set of “As-Built” drawings to the District.

E. DISTRICT’S AUTHORITY – The District or its designated representative, shall review and approve all plans submitted to the District. The cost incurred in the review and approval of plans shall be invoiced to the Developer/Contractor. The District shall inspect all work and must approve as to the quality and acceptability of materials furnished and work performed before the water facility will be accepted by the District. The District shall interpret the intent of these specifications in a fair and unbiased manner.

Nothing contained in these specifications or standard drawings 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 regulations, then the more stringent requirements 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.

F. OBLIGATION OF THE DEVELOPER OR CONTRACTOR – The Developer or Contractor shall perform and complete the work to the satisfaction of the District and in accordance with these specifications. The Developer or 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 Developer or Contractor shall be liable for and indemnify and hold harmless the District against any and all claims for 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 the Developer or Contractor, its agents, subcontractors, employees or workman. Indemnification shall include but not be limited to any and all attorney’s fees or related cost incurred by the District in defense of any such claim, cause of action or damage.

G. COORDINATION – Coordination with the District is required concerning construction planning and procedure. A minimum of one week notice shall be given to the District prior to the planned beginning of any phase of construction. Developer and/or Contractor shall provide District with a written bar line schedule showing when construction will be performed. Construction shall not begin without the District’s written approval of the construction schedule.

H. ACCEPTABLE MATERIALS – Whenever manufactured products, devices or materials are specified under a particular trade name or name of manufacturer, it shall be understood that the

specifications are open to other manufacturers upon prior approval the District. Only products comparable in type, quality, utility and price will be considered by the District. Burden of proof of equality shall rest with Developer or Contractor. The District shall be the sole judge of equality and reserves the right to require products or material specified by name.

I. DEFECTIVE MATERIAL AND WORKMANSHIP – Materials not in accordance with the specifications or defective work may be rejected by the District at any time before final approval and acceptance by the District. Failure by the District to reject defective work shall not be construed as an acceptance of same.

J. FINAL INSPECTION - A final inspection will be made by a representative of the District. Final inspection will be made prior to acceptance of any unit for use by the District and only after all improvements are completed. As part of the Final Inspection, the District shall be given a completed set of “As-Built” plans. No meters will be installed until a copy of the final plat and as-built plans are submitted to Bullock Pen Water District. Any engineering fees, incurred by the District will be reimbursed by the Developer/Contractor.

K. EXISTING UTILITIES – All existing utilities shall be shown on the plans submitted to the District for approval. Before proceeding with work, the Developer or Contractor shall verify location of, and possible interference with, existing utilities, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities. The Developer or Contractor shall protect all utility lines which are to remain in service. The Developer shall bear the entire responsibility for locating, and avoiding existing utilities. The Developer or Contractor shall be responsible for any and all damage done to existing utilities. Damage done to existing utilities shall be repaired promptly, to satisfaction of utility company, at no cost to the District.

L. PUBLIC AND PRIVATE HIGHWAYS AND STREETS – Developer or Contractor shall ascertain and obey all State and County road load limits in order to prevent damage to pavements resulting from his operation.

Developer or Contractor shall, at all times, conduct work in such manner as to insure minimum obstruction to public travel. Convenience of general public and of residents along and adjacent to area of work shall be provided for in a satisfactory manner, consistent with operation and local conditions. Flagmen shall be used at all times where work is being performed adjacent to the roadway.

“Construction” signs shall be placed immediately adjacent to work, in conspicuous positions at such locations as traffic demands. Control Devices (MUTCD) published by U. S. Department of Transportation, Federal Highway Administration, Latest Edition. At any time that streets are required to be closed, Contractor shall notify law enforcement agencies, fire departments, and parties operating emergency vehicles before streets are closed and again as soon as it is reopened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times.

Trenches shall be backfilled at end of each day's work. When this is not possible, trenches left open shall be adequately protected with suitable flashing barricades, in compliance with MUTCD.

M. PERMITS, EASEMENTS AND RIGHT OF WAY – The Developer or Contractor shall obtain all easements needed in the name of the Bullock Pen Water District. The easements shall be filed or shown on preliminary plats before any construction is started. All construction shall be contained within the easement.

Developer or Contractor shall obtain permit from Kentucky Transportation Cabinet for construction within State right-of-way. Contractor shall not begin work in State right-of-way until he has furnished copy for approved encroachment permit to the Water District. Use of rights-of-way shall be subject to written conditions on permits. Developer or Contractor shall comply with all requirements of access documents, for storage of materials, traffic control, restoration, etc.

Written permission shall be received and furnished to the District for any work on city or county street right-of-ways.

All fees or cost required for permits, licenses, easements and right of ways shall be the responsibility of the Developer or Contractor. The Developer or Contractor shall be required to comply with all state and municipal ordinances, laws and/or codes which may apply.

N. GENERAL GUARANTY – The Developer or Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from date of acceptance. Developer or Contractor warrants and guarantees for a period of one (1) year from date of acceptance of system that completed system is free from all defects due to faulty materials or workmanship and Developer or Contractor shall promptly make such corrections as may be necessary by reason of such defects including repairs or damage of other parts of system resulting from such defects. The District will give notice of observed defects with reasonable promptness.

If any defective material, equipment or construction services are provided by the Developer or Contractor which cannot be reasonably detected within one year of acceptance of the system by the District, such one year guaranty of material, equipment and work performed by the Developer or Contractor shall be extended for a period of one year after such defective equipment, material or work performed could reasonably be detected. In no event shall such guaranty extend greater than the period of seven years following the date of acceptance by the District of the materials, equipment or work furnished by the Contractor or Developer.

O. INDEMNIFICATION – The Developer or Contractor shall indemnify and hold harmless the District for any claim, cause of action or demand made against the District arising by, from and through the Developer's or Contractor's construction of any water lines or related structures. Such obligation of indemnification shall include but not be limited to the reimbursement of the District for any and all

attorney's fees and related costs reasonably incurred by the District in defense of any such claim, cause of action or demand.

P. VARIANCE – The District reserves the right to grant a variance from the Specifications set forth herein as the District may deem appropriate in its sole judgment and discretion. In no event shall such variance allow the Developer or Contractor to construct any water lines or related structures to standards which are less stringent to those set forth herein.

Q. DEFINITIONS

APPROVED – Material, equipment, workmanship, process or method that has been accepted by the District as suitable for the proposed use.

AS-BUILT – A revised plan showing all water line, valves, hydrants, and other miscellaneous items actual location. The plan shall be stamped and dated by an Engineer.

CONTRACTOR – The person, firm, or corporation with whom the Developer, Owner, or Water District has executed an agreement to perform the utility construction for the project.

DEVELOPER – An individual, group of individuals, partnership, firm, association or corporation that is constructing, or having water facilities that are to become a part of, or be connected to the District System.

DISTRICT – Bullock Pen Water District or an authorized employee or representative of the Bullock Pen Water District.

ENGINEER – A Registered Professional Engineer, registered in the Commonwealth of Kentucky as set out in KRS Chapter 322.

OWNER – The property owner of the land.

SHALL – Means a mandatory requirement.

SECTION TWO: PROCEDURES

A. PURPOSE - The purpose of this section is to establish a working relationship between the Owner, Developer, Contractor, Engineer and District by describing the procedure to be followed in initiating and completing the construction of water mains for connection to the Bullock Pen Water District.

B. REQUEST FOR WATER SERVICE – The first step in the procedure is for the Owner or Developer to file a request to the Bullock Pen Water District to connect the proposed facilities to the District’s existing facilities. The request shall be submitted by the 15th of the month for the District to consider it at their next monthly meeting. The request shall be accompanied by a map or plat of the area to be served with existing and proposed streets, roads and lots, with as a minimum 5-foot contours. A copy of the preliminary plat as required by the governing planning commission shall be acceptable as this map.

The District with their Engineer will determine if water can be provided to serve the proposed development and if adequate flow is available to provide fire protection as required by 807 KAR 5:066. A letter will be sent to Owner or Developer stating the results of this determination with a copy sent to the governing planning commission or other governing authority. All cost for this determination shall be billed to the Owner or Developer by the District including but not limited to any and all engineering fees incurred by the District relative to the review and/or approval of any such plans submitted to the District for review and approval.

C. PLAN SUBMISSION – The Owner or Developer shall submit two sets of plans to the District for review and approval. The plans shall be submitted by the 15th of the month for the District to consider them at their next meeting. All plans shall be prepared in accordance with requirements contained in these detailed specifications. Any plans submitted that do not completely comply with all requirements of the District shall be returned unapproved with the necessary corrections noted.

Once corrected plans are submitted to the District, the District will issue a letter to the Drinking Water Branch of the Division of Water stating that they have reviewed the plans, they approve of the plans and they will supply water to the proposed project. A copy of this letter shall be sent to the Owner or Developer. A copy of the hydraulic analysis will be submitted to the Drinking Water Branch of the Division of Water per their requirements. Final approval of the plans and specifications shall be dependent on receipt of an approval letter from the Drinking Water Branch of the Division of Water. All cost for the review, hydraulic analysis and approval of the plans shall be billed to the Owner or Developer

by the District including but not limited to any engineering fees incurred in the review of any and all plans submitted to the District for review and approval.

D. CONSTRUCTION PHASE – Construction shall not begin until the approval letter from the Drinking Water Branch of the Division of Water has been received by the District and a written bar line schedule showing when construction shall be performed has been approved by the District. A minimum of one week notice shall be given to the District prior to the planned beginning of any phase of construction. Any work performed prior to this time shall not be accepted by the District. The construction schedule shall be revised as necessary so the District knows when construction is being performed.

Any deviation or changes from the approved plans shall be approved by the District in writing prior to the deviation or change being performed.

E. INSPECTION BY BULLOCK PEN WATER DISTRICT – For every 300’ of line laid, 10’ of the line must be exposed. For any ditch with rock; for every 100’ of line laid, 10’ of the line must be exposed. All valves, T’s and mechanical joints must be exposed. All service line connections to the main must be exposed. Two days notice is required for the inspection. The Developer/Contractor shall reimburse the District for any and all such inspection fees.

F. METER SERVICE – The District will provide all materials as required for the meter setting. The Contractor or Developer shall construct and install all materials for the meter setting including corporation stop, service line, service line road crossing, meter box with lid, copper setter, necessary fittings and all other items needed for the meter setting. The meter box and lid shall be installed to match the proposed grade line. Any meter box that are either too low or high shall be reinstalled at the correct ground elevation. All cost for the lowering or raising the meter box shall be borne by the Developer. No meters will be installed until the final plat and a copy of the as-built plans are submitted to Bullock Pen Water District.

G. FINAL INSPECTION – Upon completion of construction a final inspection shall be held by the District. The Owner’s or Developer’s Engineer shall certify in writing to the District that the project has been constructed in accordance with the approved plans and standard specifications. A set of “As-Built” shall be submitted to the District with the Engineer’s certification.

The water mains shall not be accepted into the Bullock Pen Water District system until the following items are provided or completed:

- (1) All items corrected from final inspection
- (2) Engineer’s certificate on construction
- (3) “As-Built” plans
- (4) All billing have been paid for the plan review and request for water process.

- (5) All tap-on fees have been paid per the current tariff as approved by the Public Service Commission.

SECTION THREE: WATER MAINS

A. PURPOSE – The purpose of this chapter is to outline requirements for the proper design, construction, and final acceptance of potable water mains and appurtenances.

B. DESIGN REQUIREMENTS – All water mains and appurtenances shall be designed in accordance with requirements and regulations of the Public Service Commission and the Department for Natural Resources and Environmental Protection, Division of Water, Drinking Water Branch.

(1) Water Pressure – Information on the plans shall be included showing USGS elevations along all high and low points of the water main. Water mains shall be designed such that the maximum water pressure does not exceed two-thirds of the class of the pipe for ASTM rated pipe and does not exceed the rating for AWWA (C-900) rated pipe.

(2) 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 including meter installations. No water main shall be smaller than six inches in diameter. The District shall approve all water mains sizes.

(3) Size of Service Pipe – All service piping shall be $\frac{3}{4}$ inch minimum diameter for single dwelling and one inch minimum diameter for multi-services. All service piping crossing under roads or streets shall be one inch minimum diameter. Where greater flows are anticipated than normally expected for residential services, the service piping shall be designed to maintain a minimum 30 psi pressure at peak flow design. All service piping crossing under road will have tracer wire with 2 feet of the wire in the meter box.

(4) Depth of Cover – All water pipe shall have a minimum cover of thirty six inches of backfill, measured from the top of the pipe.

(5) Separation of Water Lines and Sewers – Water main shall be laid at least ten feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.

(6) Gate Valves – Gate valves shall be provided at all intersections so as to isolate any section of water main and past fire hydrants to allowing flushing of water mains.

(7) Hydrants – Fire hydrants shall only be allowed if a minimum fire flow of 250 gpm plus consumption at the maximum daily rate for two hours. Where fire flow cannot be maintained, flush hydrants shall be provided. Hydrants shall be located at the end of all water mains, at other locations

during construction needed to adequately flush the water mains and at other locations as required by the District.

(8) End of Water Line – At the end of all water lines where there is a chance for the water line to be extended a gate valve and 20 feet of pipe will be installed at the end of the water line. The Water District will determine whether there is a possibility for the water line to be extended.

C. MATERIALS

(1) Polyvinyl Chloride Pipe (PVC)

a. ASTM Rated PVC Pipe - All water mains shall be constructed of polyvinyl Chloride Pipe. Polyvinyl Chloride Pipe shall conform to ASTM Specification D-2241, latest revision. Pipe shall be pressure rated Class 250 (SDR 17). Pipe material shall conform to latest revisions of ASTM D-1784 (PVC pipe compounds), ASTM D-2241 (PVC plastic pipe, SDR), and ASTM D-2672 (Bell-End PVC pipe).

Joints for PVC pipe shall conform to latest revision of ASTM D-3139, (joints for plastic pressure pipes using flexible elastomeric seals). Joints shall be bells that consist of an integral wall section with a locked-in, solid cross section elastomeric ring which meets requirements of ASTM F-477. Bell sections shall be at least as hydrostatically strong as pipe wall.

Fittings shall be ductile iron, mechanical joint, Class 250, conforming to AWWA specifications C110 for short body cast iron fittings. Fittings shall be tar-coated outside and shall receive standard cement lining with bituminous seal coat on inside as specified for ductile iron pipe.

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

b. AWWA C-900 Rated PVC Pipe

All water mains with maximum pressures between 160 psi and 200 psi shall be constructed of C-900 Polyvinyl Chloride Pipe. Polyvinyl Chloride Pipe shall conform to AWWA Specifications C-900, pressure rated Class 200 (SDR 14). Fittings shall be cast iron Mechanical Joint Class 250 conforming to AWWA Specification C-110 for short body cast iron fittings. Fittings shall be tar-coated outside, and shall receive the standard cement lining with bituminous seal coat on the inside. Joints shall be of push-on type conforming to the AWWA Specifications for C-900 water mains. AWWA

Specifications C-900 pressure rated Class 150 (SRR 18) can be used and is considered an equal to ASTM Specification Class 250 (SDR 17).

c. PVC Pipe General

All 90° bends and other fittings that require trust blocks shall be ductile iron (or approved equal) with transition gaskets to accommodate outside diameter of PVC pipe.

Lubrication for rubber connected joints and fittings shall be water soluble, non-toxic, non-objectionable in taste and odor and have no deteriorating effect on PVC or gaskets and shall be supplied by pipe manufacturer.

All PVC pipe and fittings shall bear National Sanitation Foundation (NSF) approved seal for potable water.

Grip rings (mega lug style or allgrip #3600) shall be used in joining PVC pipe to ductile iron fittings, valves, etc. Grip rings will be required only on bends, tees or end of lines.

(2) Ductile Iron Pipe - Mechanical and Rubber Slip Joint Type

All water mains with maximum pressures exceeding 200 psi shall be constructed of Ductile Iron. Ductile iron pipe shall be designed in accordance with ANSI-AWWA C1150/A21.50-91 and ANSI/AWWA C151/A21.51-91 specifications and supplements thereto.

The net weight, class or nominal thickness, and casting period shall be shown on each pipe. The manufacturer's mark, the year in which the pipe was produced and the letters "DI" or "DUCTILE" SHALL BE CAST OR STAMPED ON THE PIPE. The spigot end of the pipe shall be free of blemishes and defects which might be responsible for a poor fit with the rubber ring gasket and result in leakage. All ductile iron pipe for water service shall have manufacturer's standard outside bituminous or asphaltic base coating and cement lining and bituminous seal coat on the inside. Cement mortar lining and bituminous seal coat inside shall conform to ANSI/AWWA C104/A21.4-90.

Ductile iron compact fittings, meeting the requirements of ANSI/AWWA C153/A21.53-88, will be accepted through 16 inch diameter. Fittings larger than 16 inch diameter shall meet the requirements of ANSI/AWWA C110/A21.10-87. Fittings shall be 350 psi pressure rating for all sizes through 30 inches. All fittings shall be lined and coated the same as adjacent pipe.

Pipe joints shall be mechanical joint or rubber ring slip joint. All items used for joining pipe shall be furnished with the pipe. The joints shall be made with tools and lubricant in strict conformity with the manufacturer's instructions. Copies of the instructions shall be delivered to the ENGINEER at start of construction in sufficient numbers that will permit the ENGINEER to retain 3

copies. Mechanical joints are to be furnished according to ANSI/AWWA C111/A21.11-90. All pipe joints must be furnished complete with all accessories. Mechanical joint bolts and nuts shall be of alloy cast iron or alloy steel (Corten type such as U.S. Alloy) or equal. Rubber gaskets shall be made of plain first grade rubber, free of imperfections and porosity. Hardness shall be 75±5 durometer. Rubber ring slip joint shall be equal to ANSI/AWWA C111/A21.11-90.

When the water main is located within 200 foot radius of an underground storage tank (UST), special rubber gaskets shall be provided for the water main joints. These gaskets shall be manufactured of "nitrile rubber" material or other acceptable material possessing superior resistance to deterioration from petroleum based products. This requirement will apply to the gaskets supplied for mechanical joints and push-on joints.

(3) High Density Polyethylene Pipe (HDPE)

High Density Polyethylene Pipe shall be used on all bores, creek crossing and other encased pipe over 50 feet long. High density polyethylene pipe shall conform to AWWA C906, latest revision. Pipe shall have a minimum be pressure rated DR 7.5 for water lines and DR 17 for encasement pipe. Pipe material shall conform to latest revisions for PE 3408 high density polyethylene for ASTM D3350 cell classification 345444C.

Polyethylene fittings shall be made from material meeting the same requirements as the pipe. Polyethylene fittings shall be molded or fabricated by the manufacturer of the pipe. Fittings shall meet the requirements of AWWA C906. Molded fittings shall be manufactured in accordance with either ASTM D2682 (socket fused) or ASTM D3261 (butt fused) and shall be so marked.

Joints between plain ends of polyethylene pipe shall be made by butt fusion. The Pipe Manufacturer's fusion procedures shall be followed at all times as well as the recommendations of the Fusion Machine Manufacturer. The wall thickness of the adjoining pipes shall have the same DR at the point of fusion. All employees working on fusions connections shall be certified by the pipe manufacturer as qualified to perform fusion connects. On each day butt fusions are to be made, the first fusion of the day shall be a trial fusion. The trial fusion shall be allowed to cool completely, then fusion test straps shall be cut out. The test strap shall be 12" or 30 times the wall thickness in length (minimum) and 1" or 1.5 times the wall thickness in width of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.

(4) Steel Encasement Pipe – Steel encasement pipe shall be steel, plain end uncoated and unwrapped, have a minimum yield point strength of 35,000 psi and conform to ASTM A252 Grade 2 or ASTM A139 Grade B without hydrostatic tests. Steel pipe shall have continuous welded joints and be in at least 18-foot lengths. Used pipe can be used if the minimum wall thickness is met.

Wall thickness of pipe shall be a minimum of 0.250 inches. Diameter of pipe shall conform to requirements of Kentucky Transportation Cabinet, Bureau of Highways for highway crossings and the American Railway Engineering Association.

When crossing existing paved streets, Contractor shall install encasement pipe by boring method. Encasement pipe shall be installed using equipment that mechanically bores the whole with a cutting head and continuous auger inside the encasement pipe. Encasement pipe shall be installed simultaneously with boring the hole.

On roads under construction, the steel encasement pipe can be installed by open cutting road. Flowable fill shall be used for backfill over top of the steel encasement.

Spacers shall be used at every 10 feet. Manufactured end sections shall be used at the end of the steel encasement.

Attached threaded rod to nearest fitting outside of encasement pipe.

(5) PVC Encasement Pipe (creek crossings)

PVC encasement pipe shall have a minimum dimension ration of 35.

Spacers shall be used at every 10 feet. Manufacturers end sections shall be used at end of steel encasement.

On creek crossings encasement pipe shall be installed with a minimum of 12" concrete over top of encasement pipe.

(6) Gate Valves and Boxes

All gate valves shall be of double disc, parallel seat type or resilient seated type, iron body, non-rising stem, fully bronze mounted with O-ring seals and stainless steel bolts. Valves shall be of standard manufacture and of highest quality both as to materials and workmanship and shall conform to latest revisions of AWWA Specification C-500. Valves shall have a rated working pressure of 250 psi, with standard mechanical joint, A-2380-23 as manufactured by Mueller Co., Darling, Smith, Kennedy, or approved equal.

Gate valves for buried service shall be furnished with mechanical joint end connections, unless otherwise indicated on Drawings. End connections shall be suitable to receive ductile iron, or PVC.

Gate valves for inside service shall be handwheel operated, double disc, parallel seat type, iron body, fully bronze mounted with O-ring stem seals, flanged faced and drilled to match ASA Class 125.

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

Gate valves set with valve boxes shall be provided with a 2" square operating nut and shall be opened by turning to left (counterclockwise); gate valves set in vaults or pits shall be furnished with handwheels.

Gate valves shall be installed in a vertical position with valve box. Valve boxes shall be six inch PVC pipe with a cast iron cover marked "WATER". They shall be set vertically and properly adjusted so that cover will be in same plane as finished surface of ground, street, or sidewalk.

Valve boxes shall be accurately centered over valve operating nut, and backfill thoroughly tamped about them. Valve box bases shall not rest on valves but shall be supported on crushed stone fill. They shall be set vertically and properly cut and/or adjusted so that tops of boxes will be at grade in any paving, walk or road surface, and two inches above ground in grass plots, fields, woods or other open terrain.

A pre-cast concrete valve pad 24 inches in diameter by four (4) inch thick shall be furnished around valve boxes. A blue stake shall be installed to mark all valve locations.

Tracer wire shall be run outside of valve box and then laid inside the top of the box below the cap.

(7) Creek Crossing Valve

The creek crossing valve will consist of a gate valve installed in the main water line, two saddles and one inch PE pipe on either side of the gate valve and a meter setting connecting the two 1 inch lines.

The copper meter setters shall be as specified elsewhere in the specifications except that both valves shall be angle ball valves (Ford #VB 72-7W-44-33).

(8) Fire Hydrants

Contractor shall furnish and install dry head type fire hydrant where indicated on Drawings or as directed by District. Hydrants shall conform in all respects to requirements of AWWA C502-73. Hydrant barrel shall have safety breakage feature above the ground line. All hydrants shall have mechanical joint shoe connection, two 2- ½ 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- ½ inches, and shall open left (counterclockwise). Main valve shall have 5-1/4 inch full opening for 6 inch hydrants, and be of the compression type opening against water pressure so that 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 a 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 three cubic feet of crushed stone and backed with at least one cubic foot of Class "C" concrete or equivalent. Hydrants shall be attached to water main by an anchor tee, anchor coupling, gate valve and 36 inch ductile iron connecting coupling. All piping from water main to hydrant shall be ductile iron.

Hydrants shall be installed with a vertical distance from the center of the pumper nozzle to the ground of 16 to 18 inches. A 24 inch anchor coupler shall be installed between the valve and the hydrant. Gradelock by Assured Flows, Inc. shall be installed between the gate valve and hydrant when the 16 to 18 inch clearance cannot be obtained with the finish grade. All fire hydrants shall be provided with a shut-off valve in the hydrant lateral as indicated on Drawings. Inlet cover depth shall be minimum 36 inches.

Hydrants shall be Centurion Model A423 with 5-1/4 inch opening for 6 inch hydrants as manufactured by Mueller Company.

Hydrants shall be painted with one (1) coat of No. 2472 Safety Red (Porter Paint or approved equal). All cleaning, priming and painting shall be in accordance with paint manufacturers recommendations.

Hydrants shall be bagged until they are in operation.

(9) Flush Hydrants

Contractor shall furnish and install dry head type flush hydrants where indicated on Drawings or as directed by Engineer. Hydrants shall conform in all respects to requirements of AWWA C502-73. Hydrant barrel shall have safety breakage feature above the ground line. All hydrants shall have mechanical joint shoe connection having two 2- 1/2" inch discharge nozzels and with both having 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", and shall open left (counterclockwise). Main valve shall have 4-1/2" opening, and be of the compression type opening against water pressure so that 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 a 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 three cubic feet of crushed stone and backed with at least one cubic foot of Class "C" concrete or equivalent. Hydrants shall be attached to water main by an anchor tee, gate valve and 36" ductile iron anchor coupling. All piping from water main to hydrant shall be ductile iron. All piping from water main to hydrant shall be ductile iron.

Hydrants shall be installed with a vertical distance from the center of the nozzle to the ground of 16 to 18" . Gradelok by Assured Flows, Inc. shall be installed between the gate valve and hydrant when the 16 to 18" clearance cannot be obtained with finish grade. All fire hydrants shall be provided with a shut-off valve in the hydrant lateral as indicated on Drawings. Inlet cover depth shall be minimum 36".

Flush hydrant shall be Mueller A420 two way hydrant with a 4 ½" barrel.

Hydrants shall be painted with one (1) coat of No. 2472 Safety Red (Porter Paint or approved equal.) All cleaning, priming and painting shall be in accordance with paint manufacturers recommendations

Hydrants shall have bags placed over them until they are in operation.

(10) Air Release Valves

Air release valves and boxes shall be installed at high points in lines. Valve shall have a 1 inch screwed inlet diameter with a minimum 3/32 inch size orifice. Body and cover shall be constructed of cast iron and float shall be of stainless steel or hard rubber. Valves shall be suitable for use in lines with an operating pressure range of 0 to 150 psi. Valves shall be equivalent to APCO No. 75, or approved equal.

Air release valve box shall be 18 inch by 30 inch PVC meter box and shall be set on a No. 9 crushed stone or gravel base. Cover shall be cast iron, medium duty, perforated and of proper size to fit bell of pipe.

(11) Tapping Sleeve and Valves

Tapping sleeves for connections to existing water lines shall be of the mechanical joint type suitable for working pressures of 150 psi and shall be 3490 MJ Powerseal (fully gasketed).

Tapping valves shall be of mechanical joint type suitable for working pressures of 150 psi and shall be Mueller No. H902020, or approved equal.

All wet taps will be done by Bullock Pen Water District with cost to be paid by Developer. One week notice shall be given when a wet tap is needed.

(12) Meter Service Connections

Service clamps or saddles shall be used for service connections to PVC pipe of all sizes. Saddles for PVC mains shall be bronze and be Mueller Series H-13000 or S-13000 or approved equal.

Corporation stops for use in service clamps or in direct taps shall be Mueller H-15000 or approved equal, for PVC pipe. Stops shall be appropriate for ¾ and 1 inch size polyethylene service pipe for 1-1/2 and 2 inch size HDPE service pipe. Rigid plastic insert stiffeners shall be used inside polyethylene pipe at junction with corporation stop.

Corporation stops shall be placed from 9:00 to 3:00. In areas with pressure over 100 psi, ball valves must be used. The areas to receive the ball valves shall be shown on the plans.

(13) ¾" and 1" Polyethylene Pipe (PE)

Pipe shall be made from virgin, ultra-high molecular weight polyethylene resin. Dimensions and tolerances shall meet values as listed in ASTM D-2737, latest revision, "Specifications for Polyethylene Plastic Pipe (SDR-PR)". Standard dimension ratio shall be SDR9-PE3048. Pipe shall be rated for use with water at 73.4° F at hydrostatic design stress of 630 psi and a maximum working pressure of 200 psi. Surface shall be homogeneous inside and out and completely free of irregularities. The tubing shall carry the National Sanitation Foundation seal of approval for potable water. Pipe shall be marked in lettering at intervals of not more than five (5) feet and such marking shall include nominal size; manufacturer's name or trademark; pressure rating for water at 73.4° F., 200 psi; applicable ASTM specification; ASTM material specification, PE 3408; standard dimension ratio, SDR-9; the National Sanitation Foundation Seal of Approval (NSF mark) and production code. Polyethylene pipe shall be SDR-9, Driscopipe 5100 ultra-line.

(14) 2" HDPE Service Pipe

2" HDPE pipe shall meet the same requirements as those for HDPE pipe.

(15) Meter Setting Equipment

Copper meter setters for 5/8" x 3/4", ¾" and 1" meter settings without individual pressure reducing valves, shall be catalog number B1434-22 by Mueller Co. or approved equal. All setters shall have two valves, one being an angle ball valve and the other being an angle check valve. Locking devices with pins and seals furnished, shall be provided for all setters. All connections shall be the type for PE pipe. Meter setters for settings having individual PRV's shall be those corresponding to the catalog numbers listed above.

A rigid plastic insert stiffener shall be used inside the PE pipe at its connection to both sides of the meter yoke. Stiffener shall be approved equal to Ford Catalog insert 71 for ¾" pipe and insert 72 for 1" pipe.

The valve used inside the meter box on the 1-1/2" and 2" meter services shall be Ford BF 73-666 for 1-1/2" PVC pipe and Ford BF 73-777 for 2" PVC pipe, or approved equal. All 1-1/2" and 2" meter setters shall have a bypass.

A 3/4" X 18" P.V.C. pipe shall be installed in box to hold the meter setter in place. The meter setter should have a brace eye to accommodate this pipe.

(16) Pressure Reducing Valves

Pressure reducing valves for individual residences shall be installed when maximum pressure at the meter exceeds 150 psi and shall be Wilkins Model 70 or approved equal, with maximum inlet pressure 200 psi, factory set outlet pressure 60 psi. PRV's shall be installed in customer's meter box in tandem copper meter setter.

(17) Meter Boxes

Meter boxes shall be PVC and shall be 18" in diameter x 30" and be of the ultra-rib style of construction.

Metal lids shall be solid with 1/2" ring around bottom (vestal) with a 1 3/4" touch pad hole.

(18) Water Meters

Water meter will be furnished by the District.

(19) Tracer Tap

Tape shall consist of a solid aluminum foil coil encased in a protective plastic jacket. The materials and ink color shall not change when exposed to the alkalies, acids and other destructive chemical variances common found in soil. The foil coil shall be visible to ensure continuity. Tape shall be a minimum width of 2 inches and colored blue with the word "water" marked on the tape. The minimum thickness shall be 5.5 mil with a minimum tensile strength of 4000 psi. Tape shall be installed a minimum of one foot above the top of the pipe".

(20) Tracer Wire

A No. 12 coated copper wire shall be installed parallel to all nonmetallic pipe. Tracer wire shall be installed to ground level for all valves and hydrants as shown on typical details. Tracer wire shall be run outside valve box to top of valve box then over top of valve box with 4 feet of tracer wire in the valve box. When gate valves or hydrants are not within 800 feet, cast iron boxes will be installed with

prefab holes for the tracer wire. Tracer wire will come to the surface at a maximum distance of 800 feet. All service lines running under road will have tracer wire with 4 feet inside meter box.

(21) Blow-offs

On all water lines where hydrants are not shown at location needed to blow air off the water line, a two inch saddle will be installed on the water line with two inch HDPE piping with metal inserts installed in a standard meter box. Location of the blow-off will be approved by the District prior to construction of blow-off.

D. EXCAVATION FOR TRENCHES – Except as otherwise noted or directed by District, trenches in which water lines are to be laid shall be excavated in open cut to depths as indicated on Drawings. In general, this shall be interpreted to mean that machine excavation in earth shall not extend below an elevation permitting lower quadrant of pipe to be bedded in undisturbed ground, and excavation in rock shall extend below invert elevation a sufficient distance to accommodate a layer of bedding material as specified elsewhere in this section.

When excavated material is placed on paved roads, the Contractor shall clean road with power broom at the end of each days work or as directed by the Engineer. When excavated material is placed on gravel or dirt roads, the Contractor shall place crushed stone to the same thickness of the road prior to construction as determined by the Engineer.

If foundation is good firm earth and machine excavation has been accomplished as set out hereinbefore, remainder of material shall be excavated by hand and earth pared or molded to give full support to lower quadrant of barrel of each pipe. Where bell and spigot are involved, bell holes shall be excavated during this latter operation to prevent bells from being supported on undisturbed earth. If for any reason machine excavation in earth is carried below an elevation that will permit type of bedding specified, then a layer of granular material shall be placed so that lower quadrant of pipe will be securely bedded in granular fill.

If foundation is rock and excavation has been undercut as set out hereinbefore, a bed of No. 9 crushed stone or tamped earth shall be placed to provide continuous support for lower quadrant of pipe.

Trenches shall be a minimum width of 12 inches plus diameter of pipe to provide free working space on each side of pipe and to permit proper backfilling around pipe, but unless specifically authorized by District, trenches shall in no case be excavated or permitted to become wider than 2'-6" plus nominal diameter of pipe at level of or below top of pipe. If trench does become wider than 2'-6" plus nominal diameter of pipe at level of or below top of pipe, special precautions may be necessary such as providing compacted, granular fill up to top of pipe or providing pipe with additional crushing strength as determined by District after taking into account actual trench loads that may result and strength of pipe

being used. Trenches cut in roads and streets shall not exceed a maximum width of 3'-6" plus nominal diameter of pipe at level or street surface.

Unless specifically directed otherwise by District, not more than 1000 feet of trench shall be opened ahead of pipe laying work of any one crew, and not more than 1000 feet of open ditch shall be left behind pipe laying work of any one crew. Watchmen or barricades, lanterns and other such signs and signals as may be necessary to warn public of dangers in connection with open trenches, excavations and other obstructions, shall be provided by and at expense of Contractor.

Pipe laying operation shall be continuous from beginning to end with no gaps allowed in the line. Means shall be made available for prompt and continuous removal of water from all excavation.

E. BLASTING – All blasting operations shall be conducted in strict accordance with Kentucky Revised Statutes 351.320 to 351.340 and 351.340, effective October 6, 1972, and subsequent revisions, which shall be deemed to be included in these specifications the same as though herein written out in full. Contractor shall also comply with applicable municipal ordinances, federal safety regulations 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 any other underground utility lines, except with light charges of explosives. Any damage done by blasting is the responsibility of the Developer or Contractor and shall be promptly and satisfactorily repaired by him.

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

All blasting shall be supervised and performed by qualified personnel.

F. PIPE BEDDING – Foundation for pipes laid in trenches shall be prepared so that entire load of backfill on top will be carried uniformly on barrel of pipe. Pipe bells shall not carry any load of backfill.

In trenches where solid rock is removed from trench bottom, pipe shall be bedded on six (6) inches thickness of No. 9 crushed stone.

When wet, mucky, yielding or otherwise unsuitable material is located below proposed pipe bedding elevation, such material shall be removed and replaced with No. 9 crushed stone.

G. PIPE LAYING – All pipe shall be laid with ends abutting and true to lines indicated on Drawings. Pipe shall be fitted and matched so that it will provide a smooth and uniform invert and be centered in the trench. All pipe shall be laid uphill when grade exceeds five percent.

Fittings and special connections for water main shall be provided and laid as pipe is laid and where directed by District or as indicated on Drawings.

Before each piece of pipe is lowered into trench, it shall be thoroughly swabbed out to insure its being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in trench. If defective pipe or fittings shall be discovered after pipe is laid, it 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 longitudinal axis of pipe. Jointing shall be accomplished in accordance with the manufacturer's recommendations.

Interior of pipe shall be cleaned of dirt, jointing materials, and superfluous materials of every directions. When laying pipe is stopped for any reason, exposed end of pipe shall be closed with a plug fitted into pipe bell so as to exclude earth or other material and precautions taken to prevent floatation of pipe by runoff into trench.

No backfilling (except for securing pipe in place) over pipe will be allowed until District has had an opportunity to make an inspection of joints, alignment and grade in section laid, but such inspection shall not relieve Owner/Developer of further liability in case of defective joints, misalignment caused by backfilling and other such deficiencies that are noted later.

At all tees, plugs, caps and bends of 11-1/4° and greater, and at reducers or in fittings where changes in pipe diameter occur, movement shall be prevented by using suitable harness, thrust blocks or ballasts. Hydrants and valves shall be provided with similar protection. Thrust blocks and supports shall be as indicated on Drawings, with sufficient volumes of concrete being provided; however, care shall be taken to leave weep holes unobstructed and allow for future tightening of all nearby joints. Unless otherwise directed by Engineer, thrust blocks shall be placed so that pipe and fitting joints will be accessible for repair.

Bridles, harness or pipe ballasting shall meet with approval of District. Steel rods and clamps shall be galvanized or otherwise rust-proofed.

In cold weather, extra caution shall be used in handling and laying PVC pipe.

H. BACKFILLING PIPELINE TRENCHES

Backfilling pipeline trenches shall be accomplished in accordance with methods outlined hereinafter. In all cases, walking or working on the completed pipelines, except as may be necessary in tamping or backfilling, will not be permitted until trench has been backfilled to a point one (1) foot above top of pipe. Filling of trench shall be carried on simultaneously on both sides of the pipe in such a manner that completed pipeline will not be disturbed and injurious side pressures do not occur.

The methods of backfilling shall be as follows:

Method A – Areas Not Subject to Vehicular Traffic

The lower part of the trench up to a point one (1) foot above the top of the pipe shall be backfilled with earth free from rock, acceptable to the District, or with crushed stone when a condition exists as mentioned below in this article. In the remainder of the trench, the backfill material shall be reasonably free from large rock (over one-half cubic foot in volume) and may be shoveled into the trench without compacting and heaped over whenever, in the opinion of the District this method of backfilling may be used without inconvenience to the public.

Method B – All Proposed Streets, Roads, and Drives and Existing Gravel Streets, Roads, and Drives (Open Cut Method)

Trench shall be backfilled with DGA. Backfill shall be placed full depth in trench to bottom of surfacing material. Flowable fill can be used in place of DGA.

Method C – All Existing Asphalt or Concrete Paved Drives

All existing paved driveways shall be free bored.

In areas where large quantities of rock are excavated, and the available excavated earth in the immediate vicinity is insufficient for placing the required amount of backfill over the top of pipe as set forth in Method A this article, then the Contractor must either haul in earth or order crushed stone aggregate for backfilling over the top of the pipe.

When directed by the District, 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 90 percent of standard (ASTM D-698) Proctor density where mechanical tamping of backfill is required.

I. 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 material specifications.

J. CONCRETE ENCASUREMENT – Concrete encasement shall be placed where shown on drawings, or as directed by District. Concrete shall be Class 3500 psi and shall be mixed sufficiently wet to permit it to flow under pipe to form a continuous bed. In tamping concrete, care shall be taken not to disturb grade or line of pipe or injure joints.

K. CREEK CROSSINGS – Water main at creek crossings shall be encased in PVC pipe. One foot of concrete encasement shall be poured above the encasement pipe. A creek crossing valve shall be installed prior to the crossing.

L. CLEAN-UP AND RESTORATION – Contractor shall remove all debris and surplus construction materials resulting from his work on a daily basis. Contractor shall grade ground along each side of pipe trench in a uniform and neat manner leaving construction area in a shape as near as possible to original ground line or proposed ground line.

M. CONNECTION TO EXISTING SYSTEM – Unless otherwise directed by District, the District shall connect the new water main to the existing water system. The Contractor must notify the District when the connection is to be made. A minimum notice of 7 days must be given.

The tapping sleeve, valve and box and all other necessary material shall be provided by the Contractor or Developer. Contractor shall excavate a ditch one foot below water line, 4 feet wide and 6 feet long.

During connection to AC pipe all state, federal and local regulations must be abided by in the replacement, cutting, repair, and disposal of the pipe.

N. TESTING

Water mains, services and all appurtenances shall be tested to 50 psi over the operating pressure of the pipe. Defective joints of pipe shall be cut out and replaced as directed by Engineer. Cracked or defective pipe fittings, valves or hydrants disclosed in pressure test shall be replaced by Developer with sound material, and test shall be repeated until test results are satisfactory to District.

Developer shall maintain required pressure for six hours and shall measure the amount of water necessary to maintain this pressure for this length of time. The amount of water used to maintain pressure shall not exceed five gallons per 24 hours per mile of pipe per inch nominal diameter of the pipe.

All leaks shall be repaired whenever or wherever there is evidence of a leak. Water used by Developer shall be paid for by Contractor at the rate of \$4.30 per 1 ,000 gallons or as revised on the Public Service Commission approved rate schedule.

All fittings, meters, equipment, tools and other material required for testing shall be provided by Developer, and remain property of Owner/Developer at completion of project.

O. DISINFECTION OF WATER LINES – New potable water lines shall not be placed in service, either temporarily or permanently, until they have been thoroughly disinfected in accordance with the following requirements and to the satisfaction of District.

After testing, a solution of hypochlorite using granule chlorine 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. A chart will be supplied by the District showing the amount of granule chlorine that will be needed. While the solution is being applied, the water should be allowed to escape at end 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 disinfection 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.

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

P. VARIANCE – The District, in its discretion, can grant a variance or modification from items contained in this section of the specifications. In no event shall such variance from the specifications and standards set forth in this section be less than those contained therein or as may be required by any governmental regulatory agency.

SECTION FOUR: SEEDING

A. PURPOSE - The purpose of this section is to outline the requirements for proper seeding in areas of construction.

B. MATERIALS - Mulch shall be a high quality small-grain straw or a hydraulically applied wood-cellulose fiber mulch approved by District.

Commercial fertilizer shall be a complete fertilizer, uniform in composition, dry and free flowing. Fertilizer which becomes caked or otherwise damaged making it unsuitable for use will not be accepted.

Lime shall be agricultural limestone containing not less than 85% of total carbonates and shall be ground to a fineness that 50% will pass through a 100-mesh sieve and 80% will pass through a 20-mesh sieve. Coarser material will be acceptable provided that specified rates of application are increased proportionally on basis of quantities passing 100-mesh sieve.

Lawn Seed shall be guaranteed by dealer and distributed as follows:

(1) Farm or pasture

80% Kentucky 31 Tall Fescue
20% Annual Ryegrass

(2) Residential Yards

40% Kentucky Bluegrass
40% Fine Leaf Fescue
20% Annual Ryegrass

Seed mixture shall be sown at rate of 5 pounds per 1000 square feet.

C. SOIL IMPROVEMENTS

Fertilizer shall be applied to all seeded areas as follows:

(1) Agricultural limestone - 75 pounds per 1000 square feet. Limestone shall be thoroughly mixed into topsoil as far ahead of seeding as will not interfere with other grading operations.

(2) Fertilizer - 20 pounds, 10-10-10 fertilizer per 1,000 square feet. Fertilizer shall be applied to areas being prepared for seeding and shall be mixed lightly in top few inches of topsoil.

D. SEEDING AND MULCHING - Immediately before seed is sown, loosen soil to a depth of 3 inches by rotary tools, discs, harrows, or other approved methods. Engineer may reduce depth to which soil is loosened on steep slopes or places inaccessible to mechanical equipment.

Remove all large or unsightly clods or stones, and other foreign material brought to surface and repair all gullies, washes, or disturbed areas before seed is applied.

Seed shall be broadcast either by hand or by approved sowing equipment at rate specified.

Do not perform seeding during high winds that would prevent uniform distribution of seed.

E. PLANTING SEASON - Spring seeding season shall be between February 15 and April 15. Fall seeding season shall be between August 1 and October 20. Seeding seasons may be extended only at direction of District.

F. CLEAN-UP - Soil, peat or similar material which has been brought onto paved areas within or outside construction limit by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all times. Upon completion of seeding, all excess soil, stones and debris which have not previously been cleaned up shall be removed from site. All lawn areas shall be prepared for final inspection.

G. GUARANTEE – Seeding shall be guaranteed for a period of one year. Developer shall perform all corrective work as soon as favorable working conditions occur after being advised of corrective action.