

# CITY OF INDEPENDENCE, MISSOURI



## WATER MAIN INSTALLATION STANDARDS

Last Update 01/25/16

CITY OF INDEPENDENCE

WATER DEPARTMENT

-----  
STANDARDS  
FOR  
WATER MAIN INSTALLATION

Approved: Samuel D. Montgomery Date 1/25/16  
Water Director

Approved: Matthew J. McLaughlin Date 1/25/16  
Distribution Manager

Approved: Scott A. Nowell Date 1/25/16  
Engineering Supervisor



# City of Independence Water Department



## STANDARDS AND SPECIFICATIONS FOR WATER MAIN EXTENSIONS AND RELOCATIONS

### Table of Contents

FORWARD

-

#### INSTRUCTIONS TO CONTRACTOR

Page No.

IC-1	General Statement	1
IC-2	Scope	1
IC-3	Definitions	1
IC-4	Performance and Maintenance Bond	2
IC-5	Insurance	2
IC-6	Licenses, Permits and Certificates	3
IC-7	Pre-Construction Conference	3
IC-8	Construction Notification	4
IC-9	Engineering Plans	4
IC-10	Reference Standards	4
IC-11	Field Changes	4
IC-12	Acceptance of Water Pipe	4

#### PIPELINE MATERIALS

PM-1	General	5
PM-2	Ductile Iron Pipe and Fittings	5
	Fitting Metal Thickness	5A
PM-3	Polyethylene Encasement	6
PM-4	Valves	6
PM-5	Valve Boxes, Bases, Lids, Covers and Valve Stem Extension	7
PM-6	Fire Hydrant	7
PM-7	Inspection of Materials	9
PM-8	Thrust Restraints	9

#### EXISTING UTILITIES AND IMPROVEMENTS

EU-1	Location of Underground Utilities	10
EU-2	Protection of Property & Existing Improvements	10
EU-3	Removing and Restoring Street Pavement, Driveways, and Other Surfaced Areas	10
EU-4	Maintenance of Traffic	11

## Table of Contents (Cont.)

<u>Drawing</u>	<u>CONSTRUCTION DETAILS</u>	<u>Drawing No.</u>
CD-1	Typical Hydrant Installation: Straight Set	26
CD-2	Typical Hydrant Piping Layout: Straight Set	27
CD-3	Typical Valve and Valve Box Installation – Roadway	28
CD-4	Typical Valve and Valve Box Installation	29
CD-5	Typical Valve Stem Extension	30
CD-6	Typical Thrust Blocking for – Bends	31
CD-7	Typical Thrust Blocking for – Tees	32
CD-7A	Typical Thrust Blocking for – Plugs	33
CD-8	Typical Field Lok Gasket Installation for Ductile Iron Pipe – 11-1/4°, 22-1/2°, 45° and 90° (Bends)	34
CD-9	Typical Field Lok Gasket Installation for Ductile Iron Pipe – Tees	35
CD-10	Typical Field Lok Gasket Installation for Ductile Iron Pipe – Dead Ends	36
CD-11	Typical Encasement Under Roadway for Ductile Iron Pipe – 6” thru 36”	37
CD-12	Typical Encasement Under Railroad for Ductile Iron Pipe – 6” thru 36”	38
CD-12A	Typical Encasement Under Railway and Roadway for Ductile Iron Pipe 6” thru 36”	39
CD-13&13A	Polyethylene Encasement for Ductile Iron Pipe	40
CD-14	Typical Blow-off Assembly – Dead End	41
CD-15	Typical Blow-off Detail	42
CD-16	Typical Tapping Sleeve Connection	43
CD-17	Typical Blow-off Connection	44
CD-18	Typical Sanitary Sewer Main Crossing Water Main	45
CD-19	Standard Laying Conditions for Ductile Iron Pipe	46
CD-20	Typical Air Release Pit	47
CD-20A	Typical 2” Air Release Pit	48
CD-21	Joint Deflection for Ductile Iron Pipe	49
CD-22	Night Plug for Ductile Iron Pipe	50
CD-23	Marker Post Detail	51
CD-24	Concrete Drive Replacement	52
CD-25	Gravel Drive Replacement	53
CD-26	Asphalt Drive Replacement	54
CD-27	City Street Cut Replacement	55
CD-28	Typical Driveway Plan	56
CD-29	Typical River Creek Crossing	57
CD-30	Service Under Storm or Sanitary	58
CD-31&31A	Cutting in a Curb Valve	59
CD-32	Typical Grass Seed & Fertilizer	60

INDEPENDENCE, MISSOURI  
WATER DEPARTMENT

STANDARDS FOR WATER MAIN INSTALLATION

INSTRUCTIONS TO CONTRACTOR

IC-1. GENERAL STATEMENT: The purpose of these Standards is to provide for the furnishing of all materials, labor, equipment, tools, superintendence, and other services necessary to construct, complete with appurtenances, water main extensions as approved by the Water Department.

IC-2. SCOPE: These Standards are general in scope and will refer to conditions which may not be encountered. Any provision of these Standards which pertains to a nonexistent condition and is not applicable to the work to be performed shall have no meaning and shall be disregarded.

IC-3. DEFINITIONS: Any word, phrase, or other expression defined hereunder and used in these Standards shall have the meaning herein given:

DEVELOPER: An individual, firm, partnership, joint venture, corporation, company or association who desires a water main extension and who by means of a contract with the City agrees to pay all bills for engineering, labor, and materials used on the design, construction, and installation of said water main extension.

CITY: City of Independence, Missouri.

CONTRACTOR: The individual, firm, partnership, joint venture, corporation, company or association contracting with the developer to perform the construction and installation of said water main extension.

DIRECTOR: The Director of the Independence Missouri Water Department or his authorized representative.

DISTRIBUTION MANAGER: The manager of the Transmission and Distribution System of the Independence, Missouri-Water Department.

ENGINEER: Unless otherwise specified, the term "Engineer" when used in these Standards and Specifications shall mean the individual, firm, partnership, joint venture, corporation, company or association contracting on behalf of the Applicant to perform the design of said water main extension.

**STANDARDS FOR WATER MAIN INSTALLATION (Cont.)**

**The following must be included on Insurance Certificate:**

- |     |                             |              |                       |
|-----|-----------------------------|--------------|-----------------------|
| (1) | Public Liability Insurance: |              |                       |
|     | Bodily Injury               | \$300,000.00 | Per Person            |
|     |                             | 500,000.00   | Per Occurrence        |
|     | Property Damage             | 500,000.00   | Per Occurrence        |
| (2) | Auto Liability              |              |                       |
|     | Bodily Injury               | \$300,000.00 | Each Occurrence       |
|     |                             | 300,000.00   | Aggregate             |
|     | Property Damage             | 150,000.00   | Each Occurrence       |
|     |                             | 150,000.00   | Aggregate             |
|     |                             | or           |                       |
|     |                             | 500,000.00   | Combined Single Limit |
- (3) Worker's Compensation and Employer's Liability as required by the State of Missouri.
- (4) City of Independence must be named as held Harmless.
- (5) All certificates of insurance shall state that ten (10) days written notice will be given to the City before the policy is canceled or changed.

A copy of said insurance shall be issued to the City of Independence Water Department, Engineering Division, and said insurance shall remain in effect until said work has been completed and accepted by the City.

IC-6. LICENSES, PERMITS AND CERTIFICATES: All licenses, permits, certificates, etc., required for and in connection with the work to be performed under the provisions of the Water Main Extension Agreement Contract shall be secured by the Developer or his Contractor entirely at his own expense prior to starting any construction work. The requirements of the authority or authorities issuing the license, permit, or certificate shall be fully complied with, and a copy of said licenses, permits and certificates shall be issued to the City of Independence Water Department, Engineering Division.

IC-7. PRE-CONSTRUCTION CONFERENCE: The Developer or his Contractor will be required to schedule a Pre-Construction Conference with the City of Independence Water Department prior to starting construction of pipeline.



# City of Independence Water Department



## PIPELINE MATERIALS

PM-1. GENERAL: All pipeline materials necessary for the complete installation of the work shall be furnished by the Developer or his Contractor. All materials shall be new and shall comply with the standards that follow unless approval for other is given by the Director.

### PM-2. DUCTILE IRON PIPE AND FITTINGS:

PM-2.01. Ductile Iron Pipe: All pipe and fittings to be incorporated into the City's potable water system shall be ductile iron pipe with a maximum joint deflection of 5 degrees in accordance with the following specifications: Centrifugally cast ductile iron pipe, with Tyton joints complete with necessary gaskets and lubricant in accordance with ANSI/AWWA Specifications C151/A21.51 for ductile iron pipe. Pipe will be furnished cement lined per ANSI/AWWA C104/A21.4, seal coated inside and bituminous coated outside. Nominal 18-foot lengths in quantity pipe class, and M.T., as shown below:

- I. 6-inch Class 52 Tyton Joint Cast Ductile Iron pipe, .031" M.T.
- II. 8-inch Class 52 Tyton Joint Cast Ductile Iron Pipe, 0.33" M.T.
- III. 12-inch Class 52 Tyton Joint Cast Ductile Iron Pipe, 0.37" M.T.

Fittings are to be ductile-iron with Tyton joint per ANSI/AWWA C110/A21.10 specifications.

The Tyton joint shall conform in all respects to requirements for the push-on joint in ANSI/AWWA C111/A21.11 specifications.

All ductile-iron fittings to have a rated minimum working pressure of 350 psi M.T. and a maximum joint deflection of 5 degrees.

- I. 6-inch Class 350 Tyton Joint Cast Ductile Iron, See Page 5a for M.T.
- II. 8-inch Class 350 Tyton Joint Cast Ductile Iron, See Page 5a for M.T.
- III. 12-inch Class 350 Tyton Joint Cast Ductile Iron, See Page 5a for M.T.

Outside coating: petroleum asphaltic coating approximately 1 mil in thickness.

Cement-mortar inside lining: cement lining in accordance with ANSI/AWWA C104/A21.4 Standard for Cement-Mortar Lining for Ductile Iron Fittings for Water.

## PIPELINE MATERIALS (Cont.)

Alternate coating and lining; ductile iron fittings may be coated with a 6-8 mil nominal thickness fusion bonded epoxy conforming to requirements of ANSI/AWWA C550 and C116/A21.16.

### PM-3. POLYETHYLENE ENCASEMENT:

PM-3.01. Polyethylene Encasement: All ductile iron pipe fittings, valves, and other appurtenant items shall be encased in polyethylene material as specified in the polyethylene encasement specifications contained herein. Polyethylene encasement materials shall be:

#### 20-INCH POLYWRAP (for 6-inch and 8-inch pipe)

Polyethylene encasement of Ductile Iron Pipe in accordance with ANSI/AWWA C105/A21.5. It shall be Flat 20-Inch and be a natural color (not black) with an 8 mil thickness. It shall be perforated at 20-foot intervals.

#### 30-INCH POLYWRAP (for 12-inch pipe)

Polyethylene encasement of Ductile Iron Pipe in accordance with ANSI/AWWA C105/A21.5. It shall be Flat 30-Inch and be a natural color (not black) with an 8 mil thickness. It shall be perforated at 20-foot intervals.

PM-3.02. Adhesive tape shall be a general purpose adhesive tape 1-inch wide and approximately 8 mils thick, such as Scotchtape No. 50, Polyken No. 900, Tapecoat CT, or accepted equal.

### PM-4. VALVES

PM-4.01. Gate Valves: The type, size, and location of valves shall be as shown on the accepted plans. Except as modified or provided herein, all gate valves in pipelines shall be 250 psi (pressure rating shall be cast on the outside of the valve), d.i. resilient-seated, tight closure gate valves, with non-rising stems, with TYTON<sup>®</sup> joint ends and name shall be cast on near the bell for recognition conforming with all applicable requirements of ANSI/AWWA C509 and C500.

PM-4.02. Valve Coating: All internal and external surfaces shall be coated with a fusion bonded epoxy to a minimum thickness of 8 mils. Said coating shall be non-toxic, impart no taste to water and shall conform to ANSI/AWWA C550. Said coating shall be applied prior to assembly such that all exposed external areas, including end connection bolt holes, body to bonnet bolt holes shall be coated with epoxy.

PM-4.03. Valve Gate: The gate shall consist of a ductile iron gate having a vulcanized synthetic rubber coating with no rubber-to-metal seams or edges to the waterway when in fully closed position. The gate shall provide zero leakage at the water working pressure in either direction.

## PIPELINE MATERIALS (Cont.)

Nozzles shall have two 2-1/2" hoses 180° apart and one 4-1/2" pumper. All nozzles shall be at same elevation. Nozzle threads shall be National Standard Fire Hose Coupling Screw Thread as described in Appendix A of AWWA C502. Nozzle caps shall be provided with chains and gaskets. Nozzles shall be reversed threaded into the upper barrel and mechanically locked into place.

Hydrant shall be 5-1/4" main valve opening minimum, and shall be of the full compression design, opening and closing with the pressure. The main valve seat ring shall thread into a bronze subseat and all the gaskets sealing the seat ring shall be on a bronze-to-bronze seating surface. The seat ring threads shall not serve as a pressure seal. The entire valve and rod assembly shall be removable by use of a small lightweight seat removal wrench.

The drain valves shall allow complete drainage of all residual water in the hydrant. The circumferential drain passage inside the hydrant shall be bronze on all surfaces.

All exterior bolting and fasteners below the ground line shall be stainless steel. Plated steel bolts and nuts are not acceptable.

Hydrant shall be the breakaway type, with a frangible ground line and rod coupling designed to break upon traffic impact and prevent further damage to the hydrant and connecting piping. The frangible coupling shall allow the upper section to be rotated to any desired position. Couplings which employ lugs, keeper devices, or a breakaway barrel are not acceptable. Frangible bolts are not acceptable either, due to the possibility of the use of non-frangible bolts.

Hydrant operating nuts shall be ductile iron and shall be pentagonal in shape, 1-1/2" point to flat (AWWA standard). The operating nut shall function as a weather shield. Hydrant shall open to the left.

The operating mechanisms shall utilize two "O" ring seals between the revolving nut and bronze-sheathed upper section of the valve rod. The top of the rod shall also be fitted with a travel stop nut to limit downward travel of the rod. All-weather grease shall be used to reduce friction in the thruster collar while opening the hydrant. The hydrant inlet shall be Tyton® Joint. Opening shall be 6 inches.

- Hydrant shall be painted orange with black nozzle caps and chain using Benjamin Moore & Co., Industrial Maint. Coating, Orange M22-65, Black M22-82.
- Manufacturer shall certify that hydrants furnished meet this specification.
- Fire hydrants shall be U.S. Pipe Metropolitan 250, American Darling or equal and approved.



# City of Independence Water Department



## EXISTING UTILITIES AND IMPROVEMENTS

EU-1. LOCATION OF UNDERGROUND UTILITIES: The Contractor shall locate all underground utilities and other obstacles which will be encountered during the course of construction; and locations shall be established before excavation by power-driven equipment. Destruction or damage to any utility such as telephone conduits, gas mains and services, water mains, valves, hydrants and services, electrical conduits, culverts, sewers, etc., shall be repaired or replaced at the expense of the Contractor.

EU-2. PROTECTION OF PROPERTY AND EXISTING IMPROVEMENTS: The Contractor shall protect from damage or injury all existing improvements. Any such items inadvertently damaged shall be replaced or repaired at the Contractor's expense.

Water and gas mains, sanitary and storm sewers, telephone and electric power conduits and cables, and house drains and services shall be exposed in advance of excavation so that they may be protected against damage and so that minor changes in grade and alignment may be made.

If the Contractor desires the removal of an existing sewer, conduit, cable, tree, shrub, curb, or pavement to facilitate construction, such item not conflicting with the final location of the water main or appurtenances thereto, he shall apply to the proper authority for permission for such temporary removal with the expressed understanding that if such permission is granted, all costs incurred in removing and replacing the item shall be paid by the Contractor.

Adequate provision shall be made for the flow of sewers, drains, and water courses encountered during construction; and the structures which may have been disturbed shall be satisfactorily restored upon completion of the work.

Trees, fences, poles, guy wires and anchors, shrubs, flower beds, sod, and all other property shall be protected unless their removal is authorized; any property damaged shall be satisfactorily restored by the Contractor.

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the trenched roadway or walkway. Whenever required, watchmen shall be provided to prevent accidents. Rules and regulations of local authorities respecting safety provisions shall be observed.



## *City of Independence Water Department*



### EXCAVATION AND TRENCHING

EX-1. SCOPE: Excavation and trenching work shall include the necessary clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation and trenching as required; the handling, storage, transportation, and disposal of all excavated material; all necessary sheeting, shoring, and protection work; preparation of subgrades; pumping and dewatering as necessary or required; protection of adjacent property; and other appurtenant work.

Backfilling, pipe embedment, and surfacing and grading are covered in other portions of these Standards.

EX-2. GENERAL: Excavation and trenching work shall be performed in a safe and proper manner with suitable precautions being taken against all hazards and to provide adequate working space and clearances for the work to be performed therein.

The Contractor shall explore and expose any known or possible obstructions in advance of excavation for installation, for the purpose of eliminating abrupt changes in grade requiring the installation of unnecessary fittings.

In paralleling present water and gas mains, the Contractor shall protect all service connections and shall arrange to furnish service to the consumers with a minimum of interruptions.

All excavated material shall be placed in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

EX-3. BLASTING: Before any blasting is done within the City Limits of Independence, Missouri, the Contractor shall obtain a blasting permit from the City Engineer's Office, 2nd Floor, City Hall (111 E. Maple) when in Independence, Missouri. No person may do the actual work of preparing, placing, and detonating explosives unless he possesses a blasting permit issued by the City Engineer. The blasting permit and license must be shown to the Water Department Inspector before any blasting work is done.

All existing safety regulations, laws, and ordinances on the storage, transportation, and use of explosives shall be enforced at all times.

Blasting will be permitted only when proper precautions are taken for the protection of persons, the work, private property, public utilities, and the public from damage or injury. Any damage done by blasting will be repaired by the Contractor at his own expense.

## EXCAVATION AND TRENCHING (Cont.)

EX-8. TRENCH EXCAVATION: The Contractor shall not open more trench in advance of pipe laying than is necessary to expedite the work. One block or 300 feet (whichever is the shorter) shall be the maximum length of open trench ahead of pipe laying unless by written permission of the Water Department Inspector.

Except where tunneling is specified on the Construction Plans or by the Water Department, all trench excavations shall be open cut from the surface.

All excavations shall conform to the regulations set forth in the Traffic Code of the City of Independence, Missouri, or governing authority, and shall be protected with adequate lights and barricades.

EX-8.01. Alignment and Grade: The Engineer shall establish lines and grades to govern construction by setting offset stakes every 50 feet (25 feet on curves) and offset stakes with hub elevations at each fitting and appurtenance, such as tee, bend, valve, fire hydrant, etc. Offset stakes are required and shall be marked to indicate the offset and cuts. True copies of "cut" notes shall be furnished by the Engineer to the Contractor and to the Water Department Inspector before construction begins.

The Engineer will notify the Water Department, Division of Engineering, one (1) day prior to staking the project for construction.

Vertical and horizontal alignment of pipes and the maximum joint deflection used in connection therewith shall be in conformity and as specified in the "LAYING AND BACKFILL" section of these Standards.

When possible, stakes shall be set to locate any underground utilities that may conflict with the water main construction. However, in all cases, the Contractor shall be governed by the section of the Standards entitled "EXISTING UTILITIES AND IMPROVEMENTS".

It shall be the Contractor's responsibility to transfer the alignment and grades to the bottom of the pipeline trench.

The Contractor must maintain a constant check of the pipe alignment and trench depth and will be held responsible for any deviations therefrom.

## EXCAVATION AND TRENCHING (Cont.)

EX-8.05. Trench Bottoms in Rock: All rock excavation shall be carried to a minimum of six (6) inches below the bottom of the pipe. Granular pipe embedment material, as specified in the "LAYING AND BACKFILL" section of these Standards and also as shown in Construction Detail CD-19, "Standard Laying Conditions for Ductile Iron Pipe".

EX-8.06. Trench Grade: If, after placing the pipe in the trench, it is found the prepared trench bottom is not at the proper elevation, the pipe shall be removed and the grade corrected. In no case shall the pipe be raised from and dropped on the trench bottom for the purpose of lowering a subgrade which is too high.

EX-9. HIGHWAY AND RAILROAD CROSSING: The Contractor shall make highway and railroad crossings in accordance with these Standards and as shown in Construction Detail CD-12, "Typical Encasement Under Railroads for Ductile Iron Pipe".

All construction or work performed and all operations of the Contractor, his employees, or his subcontractors within the limits of highway or railroad right-of-ways shall be in conformity with all the requirements and regulations of the authority owning or having jurisdiction over the right-of-way in each case.

The Contractor shall pay fees and obtain permits to make the crossings unless otherwise directed.

EX-10. EXPEDITED CROSSINGS: The installation of crossings for streets, driveways, obstructions, or any other purpose to facilitate the construction or development of projects prior to the actual installation of water mains is prohibited unless prior approval is granted and all material and installations are inspected and approved.

EX-11. BARRICADES AND WARNING SIGNS: The Contractor shall provide and maintain in place all barricades, warning signs, lights, and other safety devices required to protect the work, divert traffic, and warn the general public of open excavations, unfilled trenches, and other areas or conditions which might be hazardous or dangerous during the daytime or at night.

## LAYING AND BACKFILL (Cont.)

LB-1.06. Laying Pipe: Pipe shall be protected from lateral displacement by pipe embedment material installed, as specified for "Pipe Embedment" (see Construction Detail CD-19). Under no circumstances shall the pipe be laid in water; and no pipe shall be laid under unsuitable trench conditions. (See EX-7. STABILIZATION).

Pipe shall be laid with the bell ends facing the direction of laying except when reverse laying is specifically authorized by the Inspector.

Whenever pipe laying is stopped, the open end of the line shall be sealed with a watertight plug which will prevent trench water from entering the pipe.

The pipe is to be installed inside a tunnel liner in accordance with these Standards and as shown in Construction Detail CD-11 "Typical Encasement Under Roadways for Ductile Iron Pipe" and in Construction Detail CD-12 "Typical Encasement Under Railroads for Ductile Iron Pipe." The ends of each tunnel liner shall be closed with a dry brick wall.

LB-1.07. Trench Backfilling: After the pipes and joints have been inspected, the trench shall be filled with selected material free of rock in the following manner when required by the Inspector: The material shall be carefully placed and tamped under the bell of the pipe to insure a uniform bearing surface and to prevent lateral movement of the pipe, then carefully placed until the fill reaches the one (1) foot depth over the top of the pipe. The remainder of the backfill shall be made by placing the excavated material back in the trench and compacting by a method approved by the local governing authority. Note: No rocks larger than grapefruit size will be allowed in backfill and at no time will there be over 100 lineal feet of pipe left exposed to the atmosphere.

LB-1.08. Rock Excavation: When the excavation is made through rock or other material too hard to be readily removed for admitting the bell of the pipe, the trench shall be excavated at least six (6) inches deeper than the grade of the outside bottom of the pipe, and refilled with ½" x 5/16" clean crushed stone. After the pipe has been installed ½" x 5/16" clean crushed stone will be placed one (1) foot above the pipe.

LB-1.09. Freezing Weather Backfilling: Backfilling during freezing weather shall not be done except by permission of the Inspector. No backfill materials shall be placed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill.

LB-1.10. Push-On Joints: In the case of the push-on joint, the gasket seat in the bell shall be wiped clean with a cloth after which the gasket should be sprung into place. Thereafter, a thin film of lubricant should be applied to all of the inner surface of the gasket which will come into contact with the entering pipe.

The lubricant and the gaskets shall be as recommended and supplied by the manufacturer of the pipe being used. The lubricant shall be odorless, tasteless, and shall be non-toxic, suitable for use in potable water, and shall be water soluble.

## LAYING AND BACKFILL (Cont.)

LB-2.03. Pipe-Shaped Appurtenances: Bends, reducers, offsets, and any other pipe-shaped appurtenances shall be covered with polyethylene in the same manner as the pipe.

LB-2.04. Odd-shaped Appurtenances: Valves, tees, crosses, and other odd-shaped pieces which cannot practically be wrapped in a tube shall be wrapped with a flat sheet or split length of polyethylene tube. The sheet shall be passed under the appurtenance and brought up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Tape polyethylene securely in place at overlaps, valve stems, and other penetrations.

LB-2.05. Openings in Encasement: Openings for branches, service taps, blow-offs, air valves, and similar appurtenances shall be made by making an x-shaped cut in the polyethylene and temporarily folding the film back. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut as well as any other damaged areas in the polyethylene with tape.

LB-3. SETTING VALVES AND FITTINGS: All valves and fittings shall be set and jointed in the manner heretofore specified for cleaning, laying, and jointing pipe. The valves shall be set vertical in the horizontal pipeline. Cast iron valve covers and lids shall be installed by the Contractor and shall be supported and maintained, centered and plumb over the operating nut of the valve with the cover flush with the surface of the roadway or final grade. See Construction Details CD-3, CD-4, and CD-5.

Each valve shall be inspected before installation to insure that all foreign substances have been removed from within the valve body, and shall be opened and closed to see that all parts are in first-class working condition.

Valve boxes and valve bases shall be installed on all valves. Valve box trench adaptors may be used.

All bends and tees shall be provided with adequate thrust blocking or restraint joint. This thrust blocking or restrained joint shall be of plain concrete or field lok gaskets, as specified, and as called for in Construction Details CD-6, CD-7, CD-8, CD-9, and CD-10.

LB-4. SETTING FIRE HYDRANTS: All new hydrant installations shall be as shown in the Construction Details CD-1 and CD-2 and shall include all necessary excavation and backfill to make the installation complete. Hydrant lead to be polyethylene encased to hydrant shoe only.

The weep holes shown on Construction Detail CD-1 of the hydrant shall be kept clear and free to drain. All hydrants shall stand plumb and when placed behind curbs, the centerline of the hydrant shall be at least twenty-four (24) inches to thirty-six (36) inches from the back of the curb.

In general, the hydrants shall be rotated so as to have the nozzle facing the street. Special circumstances may require otherwise, as determined by the Inspector.



# City of Independence Water Department



## WATER MAINS NEAR SEWERS

WMS-1. HORIZONTAL SEPARATION: In accordance with the Missouri Department of Natural Resources, water mains shall be laid at least 10 feet, horizontally from any sanitary sewer, drainage pipe, storm sewer, or manhole. When local conditions prevent a lateral separation of 10 feet, a water main may be laid closer than 10 feet to a sanitary or storm sewer, provided that the water main is laid in a separate trench, or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer must be constructed of mechanical or slip-on ductile iron pipe and should be pressure-tested to assure water-tightness before backfilling.

WMS-2. VERTICAL SEPARATION: Whenever water mains must cross sanitary sewers, house sewers, or storm drains, the water main shall be laid at such an elevation that the bottom of the water main is 18" above the top of the drain or sewer. A full length of water main pipe shall be centered over the sewer line to be crossed so that the joints will be equally distant from the sewer and as remote therefrom as possible. This vertical separation shall be maintained for that portion of the water main located within 10 feet, horizontally, or any sewer or drain it crosses. See Construction Detail CD-18, "Typical Sanitary Sewer Main Crossing Water Main."

WMS-3. UNUSUAL CONDITIONS: Where conditions prevent the minimum vertical separation set forth above from being maintained, or when it is necessary for the water main to pass under a sewer or drain, the water main shall be laid with Tyton ductile iron pipe and the water main shall extend on each side of the crossing to a distance from the sewer of at least 10 feet. In making such a crossing, a full length of water main pipe must be centered over or under the sewer to be crossed, so that the joints will be equidistant from the sewer and as remote therefrom as possible. The sewer line must also be constructed of ductile iron pipe with slip-on or mechanical joints until the normal distance from the sewer line to the water main is at least 10 feet. Where a water main must cross under a sewer, a vertical separation of 18 inches between the bottom of the sewer and the top of the water main shall be maintained, with adequate support, especially for the larger sized sewer lines, to prevent them from settling on and breaking the water main. The sewer shall be constructed of ductile iron pipe for a distance of 10 feet on either side of the crossing, or other suitable protection as approved by the Water Department shall be provided. Where these conditions cannot be met, the Water Department shall be consulted as to the precautions to be taken to protect the public water supply.

WMS-4. SEWER MANHOLES: No water pipe shall pass through, or come into contact with, any part of a sewer or a sewer manhole.



# City of Independence Water Department



## CONCRETE SPECIFICATIONS

CS-1. SCOPE: These specifications are intended primarily for concrete to be used for thrust blocks. Concrete for all roadway pavement and/or curb and gutter replacement shall conform to the requirements of the appropriate authority having jurisdiction thereof.

CS-2. CONCRETE: The concrete shall be MCIB A618-1-4 as designated by the Mid-West Concrete Industry Board, Inc., Kansas City, Missouri.

CS-2.01. Cement: The cement shall be Portland Cement Type I unless high early strength is required in which instance Type III shall be used. All cement shall conform to the "Standard Specification for Portland Cement," ASTM Serial Designation C150.

CS-2.02. Aggregate: All aggregates shall conform to the appropriate bulletins and specifications of the Mid-West Concrete Industry Board, Inc.

CS-2.03. Water: Water for mixing and curing concrete shall be clean and free from injurious amounts of sewage, oil, acid, alkali, salt, or organic matters. (Only potable water will be acceptable without testing.)

CS-3. MIXING: Ready-mixed concrete shall be used unless otherwise prohibited by the Engineering Supervisor or Inspector.

Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in the "Standard Specifications for Ready-Mixed Concrete," ASTM Serial Designation C94.

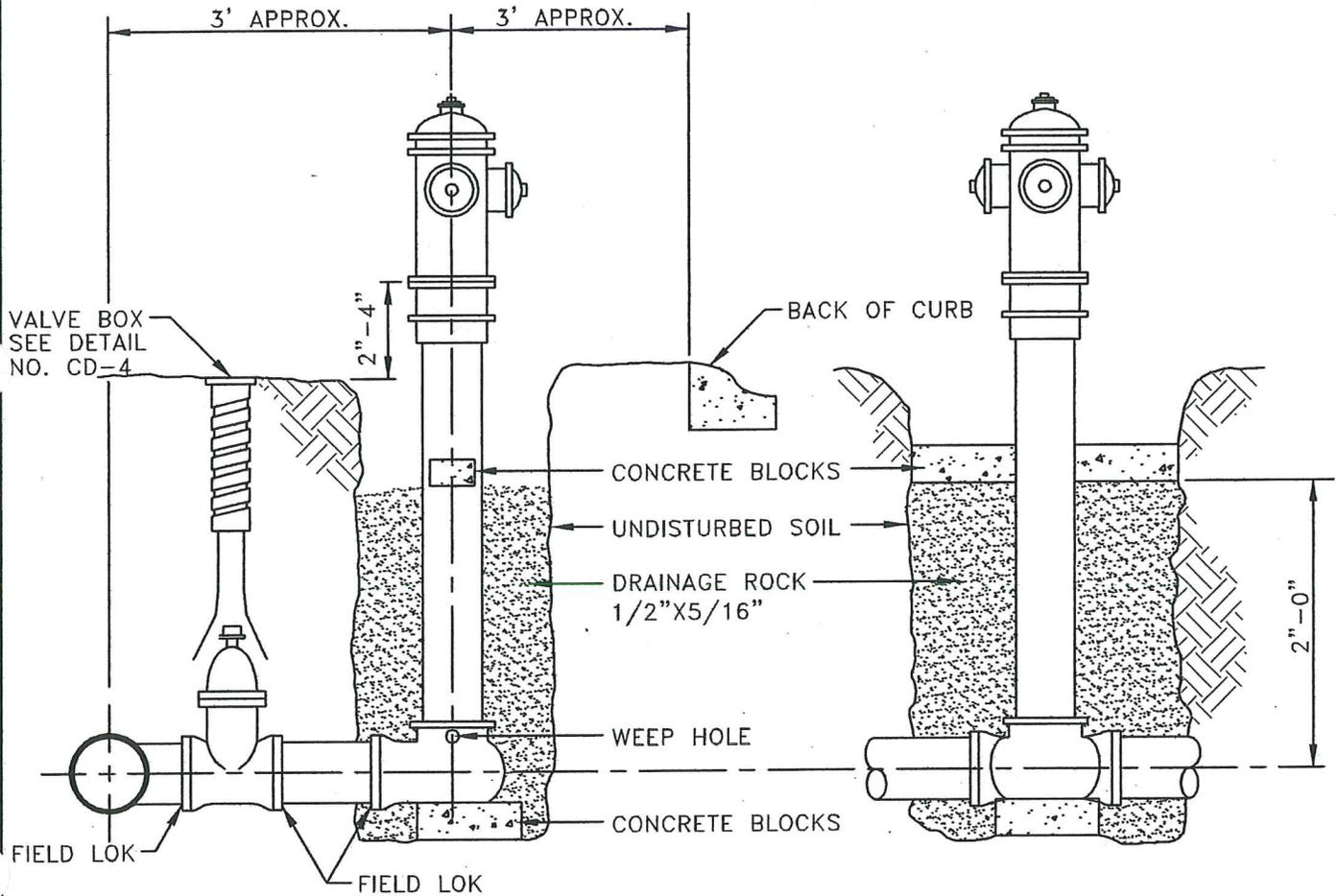
CS-4. FORMS: Suitable and substantial forms shall be provided for all thrust blocks. All forms shall be constructed and maintained plumb and true, securely braced and shored, and tight enough to prevent leakage of mortar.

CS-4.01. Forms shall be constructed of sufficient size to permit the entire bearing area of thrust block to bear against undisturbed earth. There shall be no form material between the thrust area and undisturbed earth. See Construction Details CD-6, CD-7 and CD-7A.

CS-5. PLACING OF CONCRETE. Only those methods and arrangements of equipment shall be used which will reduce to a minimum any segregation of coarse aggregate from the concrete.

Concrete shall be deposited into the forms or on the grade as nearly as practicable in its final position and in such manner that the concrete will completely fill the forms.

# INDEPENDENCE WATER DEPARTMENT



**NOTES:**

1. HYDRANT LEAD TO BE POLYETHYLENE ENCASED TO HYDRANT SHOE ONLY.

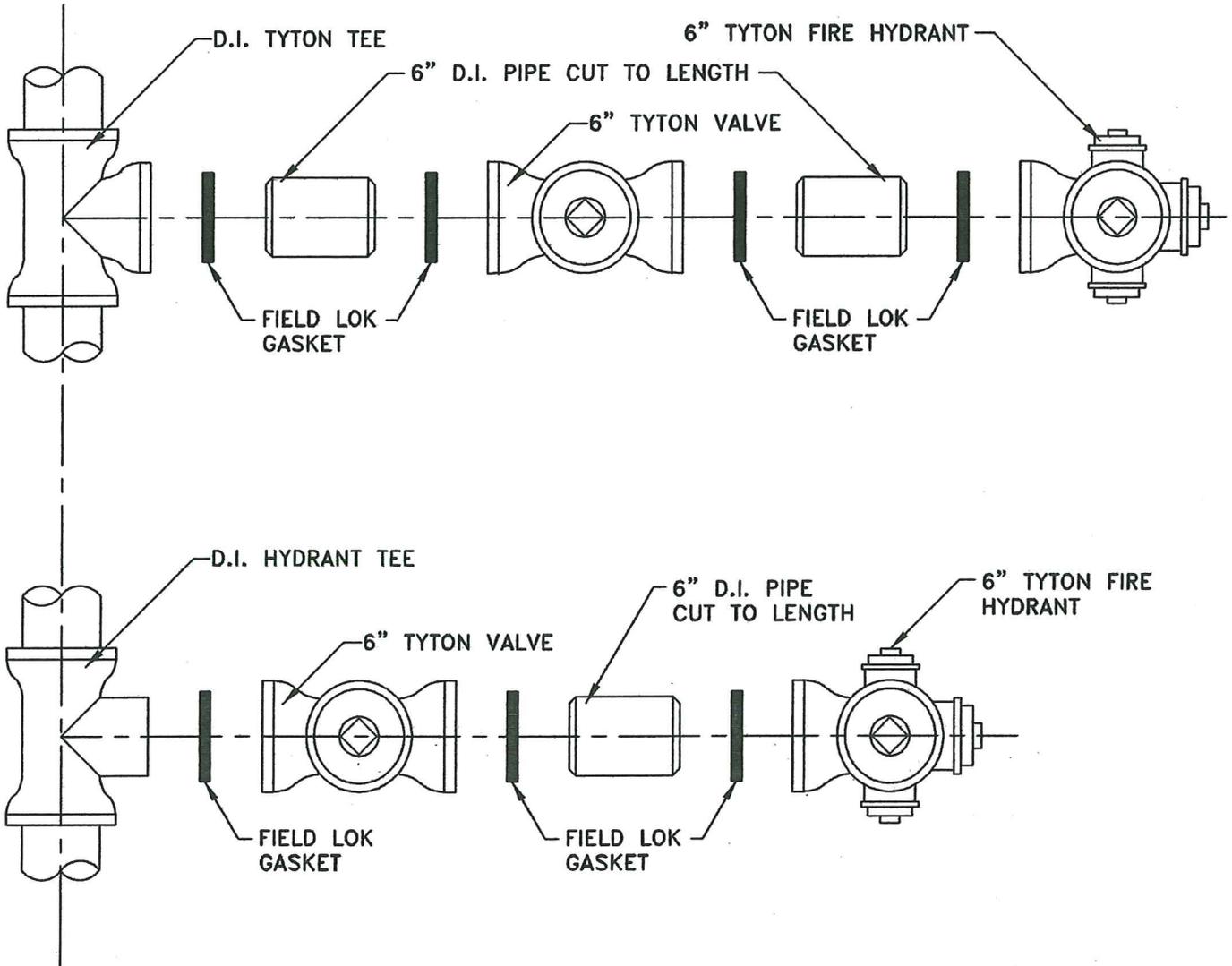
**TYPICAL HYDRANT INSTALLATION: STRAIGHT SET**

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER   1  

DRAWN BY:   SDH.                        APPROVED BY:   R.V.    
 DATE:   3/20/89  

**CD-1**

INDEPENDENCE WATER DEPARTMENT



**TYPICAL HYDRANT PIPING LAYOUT: STRAIGHT SET**

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 2

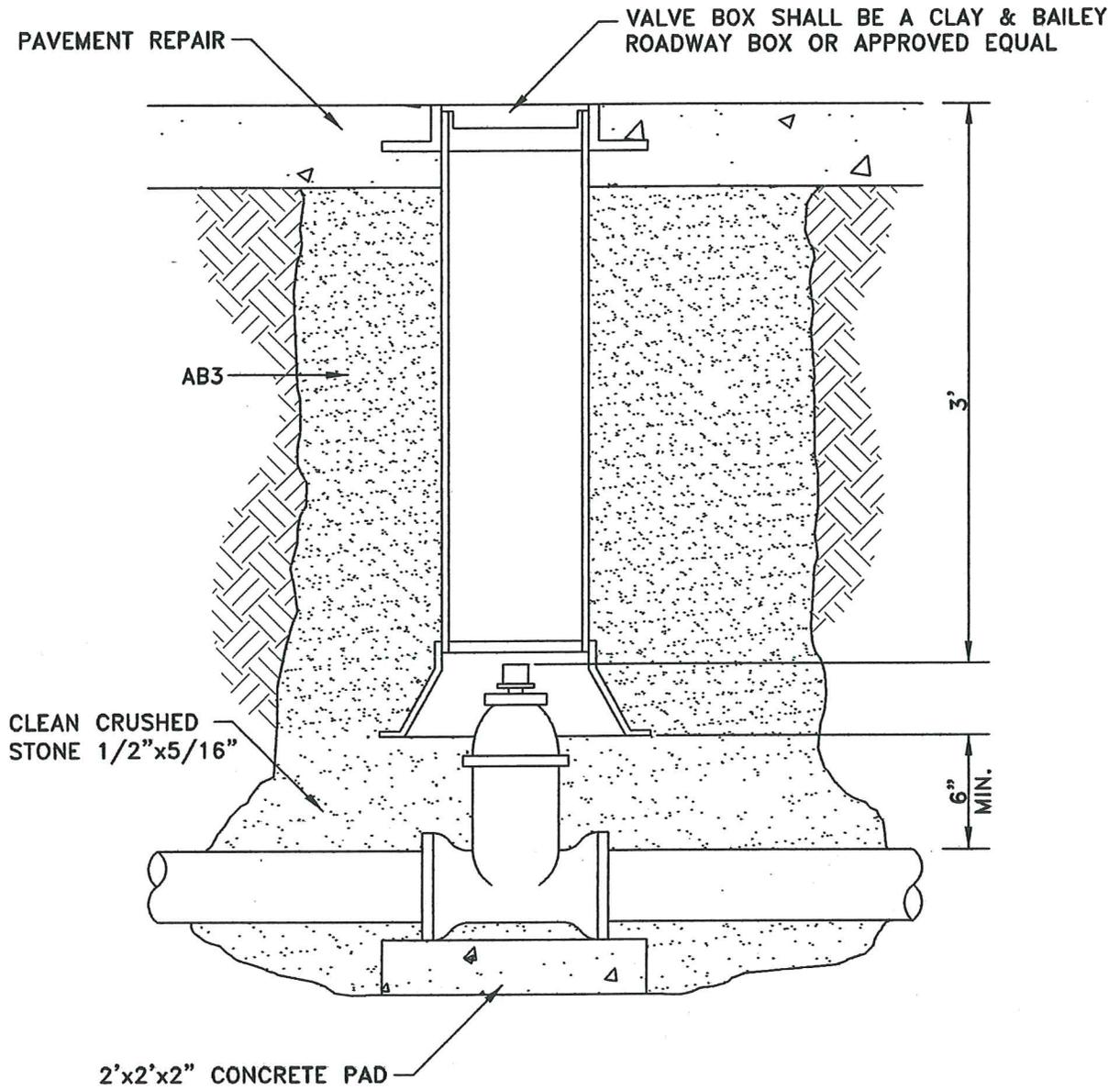
APPROVED BY: R.V.

DRAWN BY: S.D.H.

DATE: 3/20/89

CD-2

INDEPENDENCE WATER DEPARTMENT



TYPICAL VALVE AND VALVE BOX INSTALLATION - ROADWAY

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 3

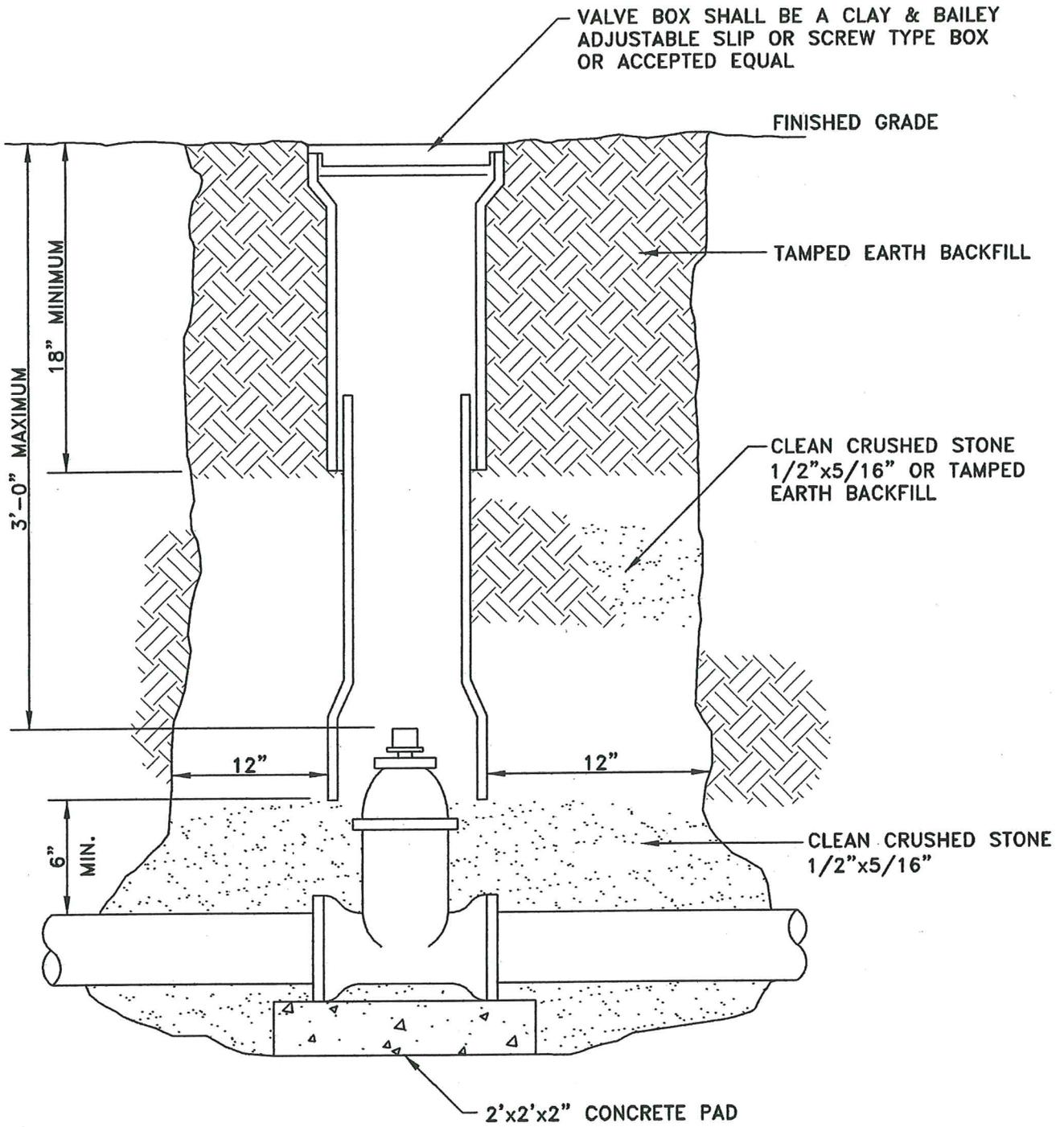
APPROVED BY: SH.

DRAWN BY: C.J.

DATE: 2/15/02

CD-3

INDEPENDENCE WATER DEPARTMENT



**TYPICAL VALVE AND VALVE BOX INSTALLATION**

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 4

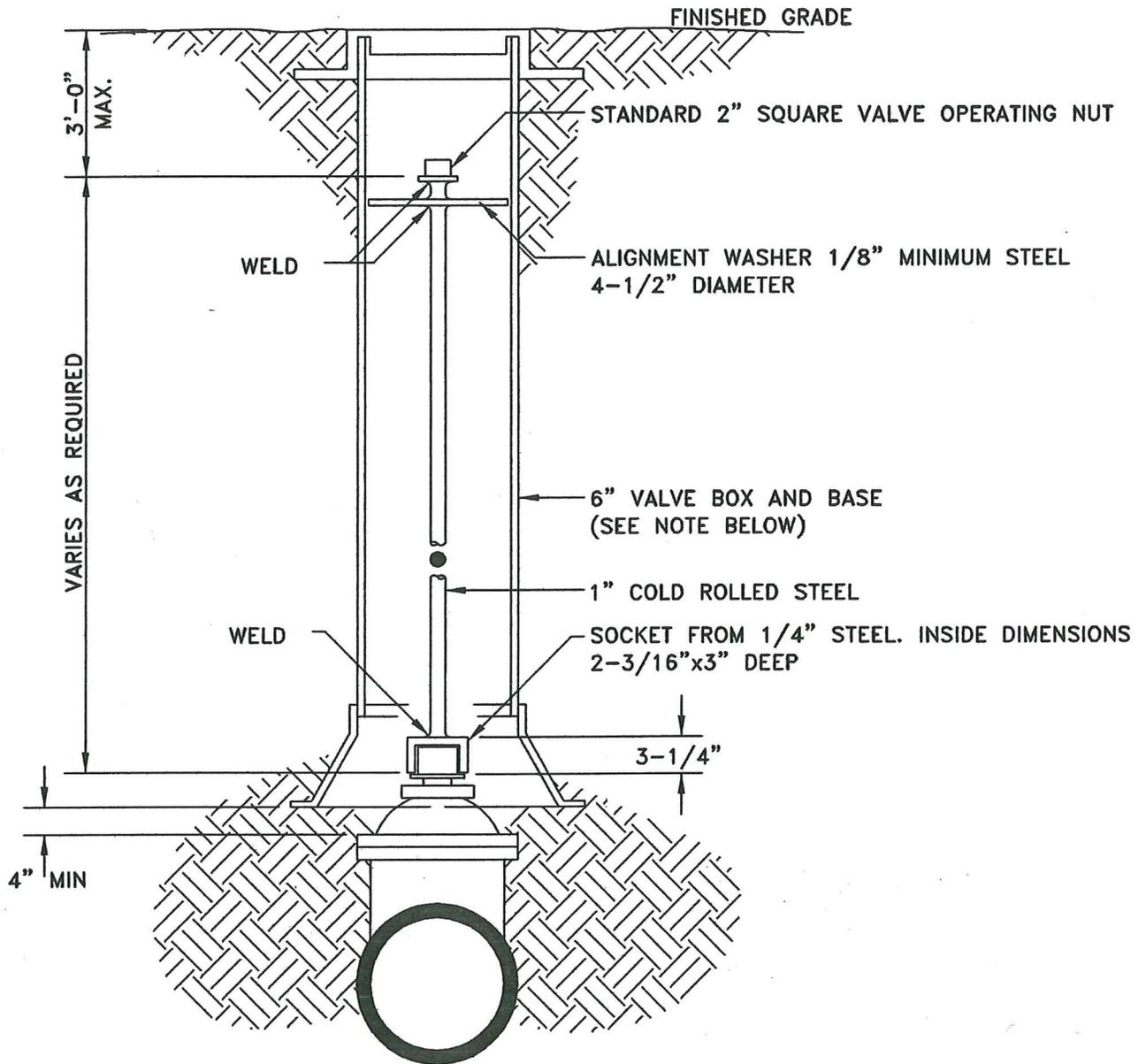
APPROVED BY: R.V.

DRAWN BY: S.D.H.

DATE: 3/20/89

CD-4

INDEPENDENCE WATER DEPARTMENT



**NOTE:**

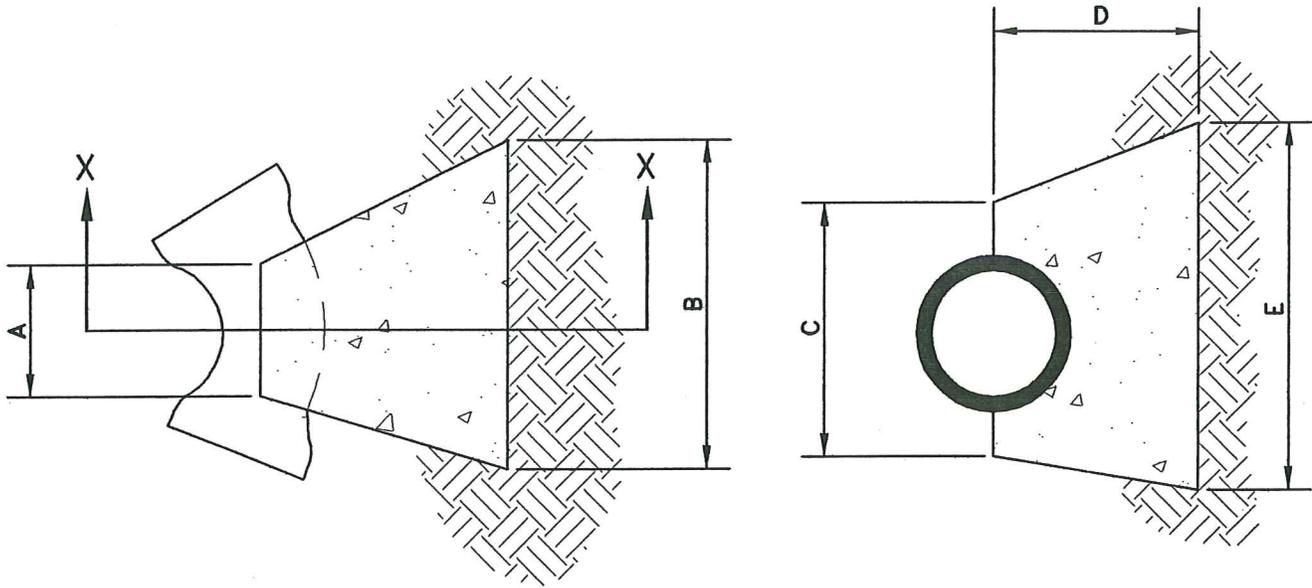
VALVE BOX AND BASE CAN BE ONE PIECE DUCTILE IRON PIPE, AS SPECIFIED IN PARAGRAPH PM-5.01 OR TWO PIECES AS SPECIFIED IN PARAGRAPHS PM-5.01

**TYPICAL VALVE STEM EXTENSION**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 5  
 APPROVED BY: R.V.  
 DRAWN BY: S.D.H. DATE: 3/20/89

CD-5

# INDEPENDENCE WATER DEPARTMENT



**SECTION X-X**

**NOTES:**

1. THRUST BLOCKING DESIGNED FOR A MINIMUM INTERNAL PIPE PRESSURE OF 175 P.S.I. PLUS 50% SURGE.
2. ALL THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BEARING AREA FOR CONCRETE THRUST BLOCKS ARE ON SOIL HAVING ALLOWABLE SAFE LATERAL BEARING OF ONE (1) TON PER SQUARE FOOT. CALCULATED AREA MUST BE INCREASED FOR SOILS WITH LOWER BEARING CAPACITY

BEND	A	B	C	D	E
6" 11-1/4° & 22-1/2°	8"	18"	8"	24"	18"
6" 45°	8"	30"	8"	24"	30"
6" 90°	8"	36"	8"	24"	36"
8" 11-1/4° & 22-1/2°	10"	24"	10"	24"	24"
8" 45°	10"	36"	10"	24"	36"
8" 90°	10"	48"	10"	24"	48"
12" 11-1/4° & 22-1/2°	14"	36"	14"	24"	36"
12" 45°	14"	54"	14"	24"	54"
12" 90°	14"	72"	14"	24"	72"

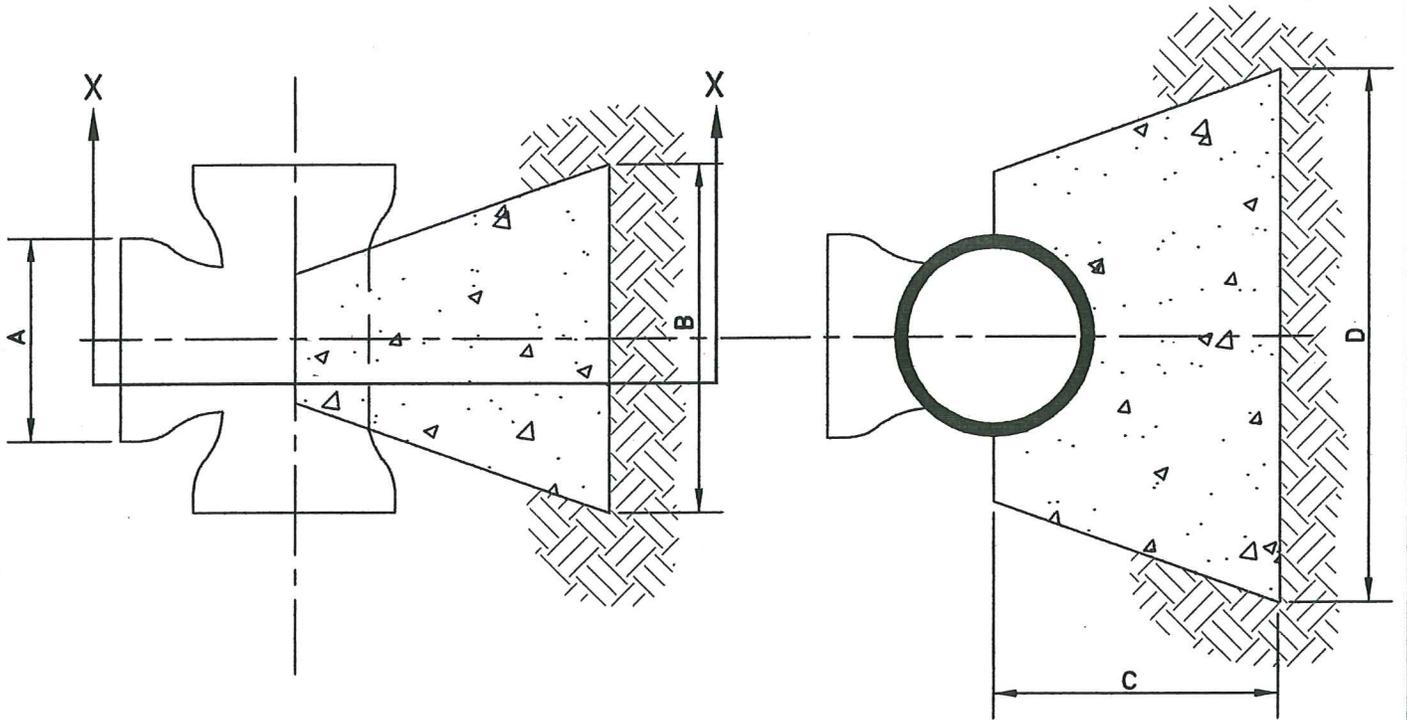
CUBIC YARD OF CONCRETE REQUIRED				
BEND	11-1/4°	22-1/2°	45°	90°
6"	0.2	0.2	0.4	0.7
8"	0.3	0.3	0.7	1.2
12"	0.7	0.7	1.5	2.7

**TYPICAL THRUST BLOCKING FOR - BENDS**

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 6

DRAWN BY: SDH                      APPROVED BY: R.V.  
DATE: 3/20/89

INDEPENDENCE WATER DEPARTMENT



SECTION X-X

NOTES:

1. THRUST BLOCKING DESIGNED FOR A MINIMUM INTERNAL PIPE PRESSURE OF 175 P.S.I. PLUS 50% SURGE.
2. ALL THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BEARING AREA FOR CONCRETE THRUST BLOCKS ARE ON SOIL HAVING ALLOWABLE SAFE LATERAL BEARING OF ONE (1) TON PER SQUARE FOOT. CALCULATED AREA MUST BE INCREASED FOR SOILS WITH LOWER BEARING CAPACITY

BRANCH SIZE	A	B	C	D
6"	8"	30"	24"	30"
8"	8"	40"	24"	40"
12"	12"	54"	30"	54"

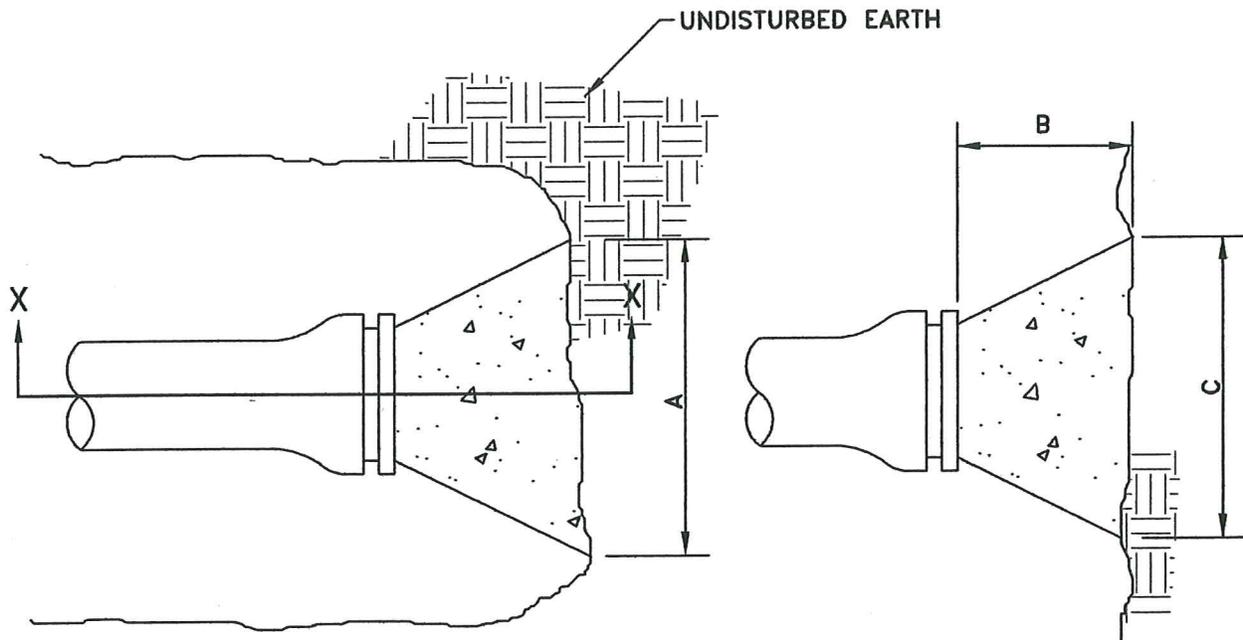
CUBIC YARD OF CONCRETE REQUIRED					
PLUG		TEE			
		RUN	BRANCH		
SIZE	CU. YD.		6"	8"	12"
6"	1	6"	1.0	---	---
8"	1.5	8"	1.5	1.5	---
12"	2	12"	2.0	2.0	2.7

TYPICAL THRUST BLOCKING FOR - TEES

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 7  
 APPROVED BY: R.V.  
 DRAWN BY: SDH. DATE: 3/20/89

CD-7

# INDEPENDENCE WATER DEPARTMENT



SECTION X-X

PLUGS	A	B	C
6"	36"	24"	36"
8"	48"	24"	48"
12"	72"	24"	72"
16"	72"	36"	72"

CU. YD OF CONC. REQUIRED	
6"	.7
8"	1.2
12"	2.7
16"	3.3

**NOTES:**

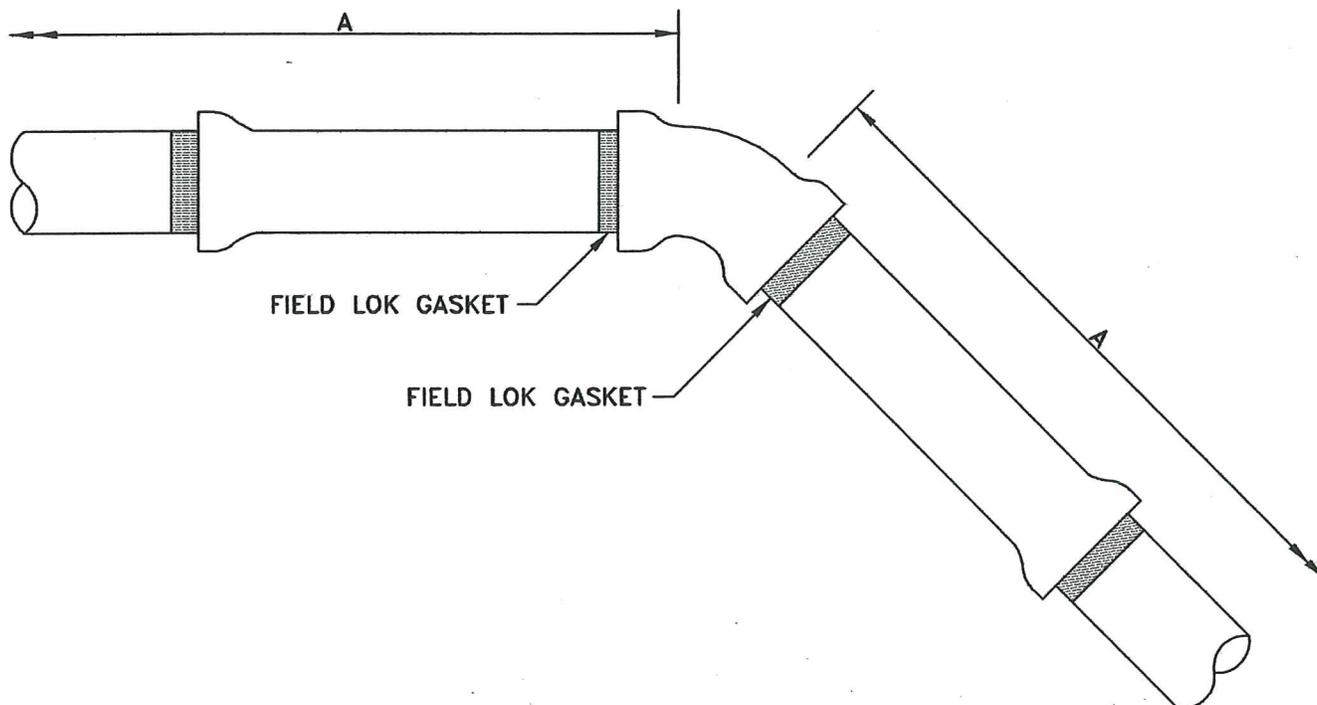
1. THRUST BLOCKING DESIGNED FOR A MINIMUM INTERNAL PIPE PRESSURE OF 175 P.S.I. PLUS 50% SURGE.
2. ALL THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BEARING AREA FOR CONCRETE THRUST BLOCKS ARE ON SOIL HAVING ALLOWABLE SAFE LATERAL BEARING OF ONE (1) TON PER SQUARE FOOT. CALCULATED AREA MUST BE INCREASED FOR SOILS WITH LOWER BEARING CAPACITY

**TYPICAL THRUST BLOCKING FOR - PLUGS**

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 7A  
 APPROVED BY: R.V.  
 DRAWN BY: S.D.H.                      DATE: 3/20/89

**CD-7A**

# INDEPENDENCE WATER DEPARTMENT



FITTING SIZE	6"	8"	12"
BENDS	A	A	A
11-1/4°	11'	14'	21'
22-1/2°	22'	27'	42'
45°	46'	60'	87'
90°	111'	210'	210'

**NOTE: RESTRAIN ON EACH SIDE OF FITTING**

**TYPICAL FIELD LOK GASKET INSTALLATION FOR  
DUCTILE IRON PIPE - 11-1/4°, 22-1/2°, 45° AND 90° (BENDS)**

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 8

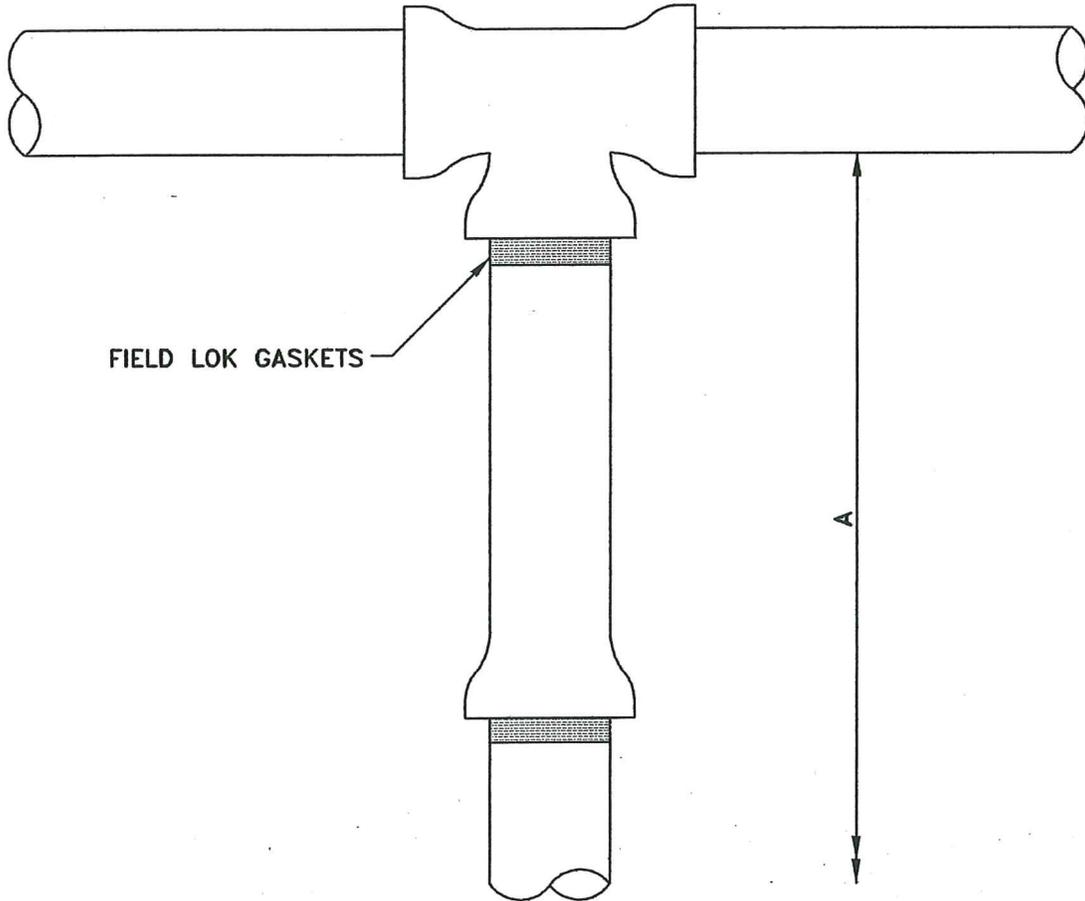
APPROVED BY: RV.

DRAWN BY: SDH.

DATE: 3/20/89

**CD-8**

INDEPENDENCE WATER DEPARTMENT



FIELD LOK GASKETS

TEE SIZE	BRANCH LINE SIZE		
	6"	8"	12"
6"	A	A	A
8"	79'	105'	
12"	76'	103'	156'

**NOTE:** TEES ARE TO BE RESTRAINED ON BRANCH ONLY

**TYPICAL FIELD LOK GASKET INSTALLATION FOR  
DUCTILE IRON PIPE - TEES**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 9

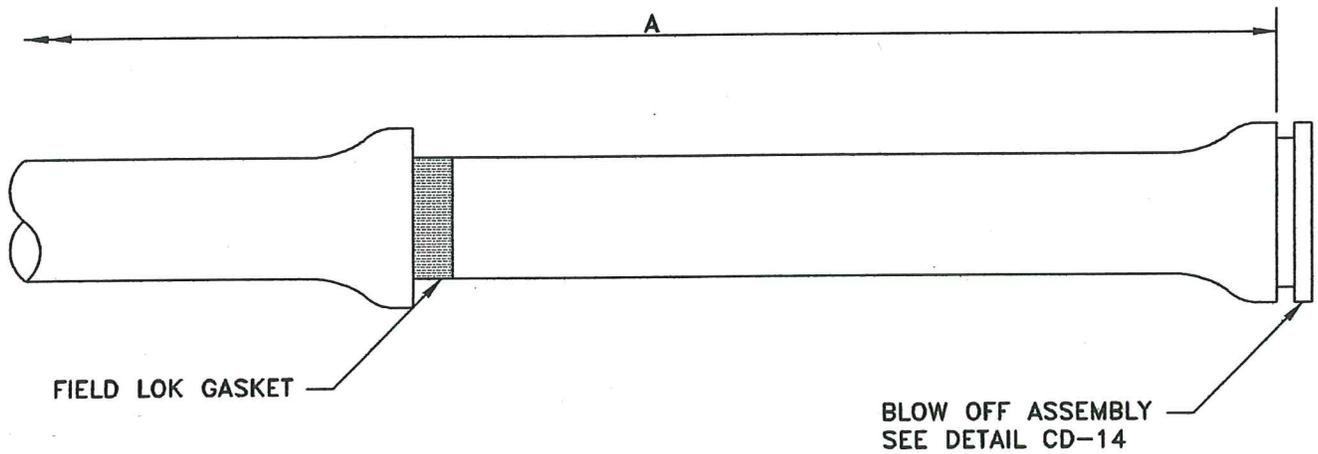
APPROVED BY: R.V.

DRAWN BY: SDH.

DATE: 3/20/89

**CD-9**

INDEPENDENCE WATER DEPARTMENT



DEAD ENDS			
	A	A	A
6"	83'		
8"		105'	
12"			158'

**TYPICAL FIELD LOK GASKET INSTALLATION FOR  
DUCTILE IRON PIPE - DEAD ENDS**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 10

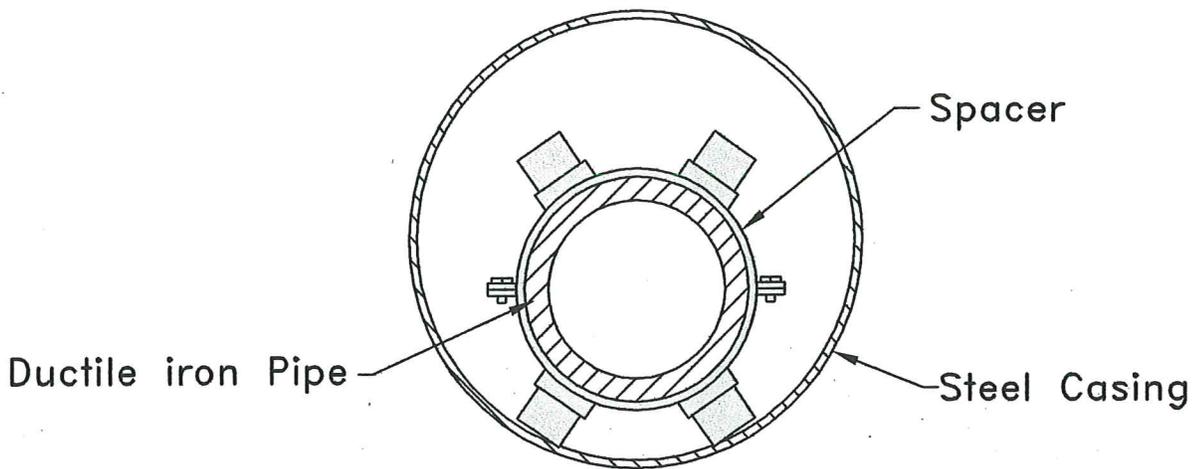
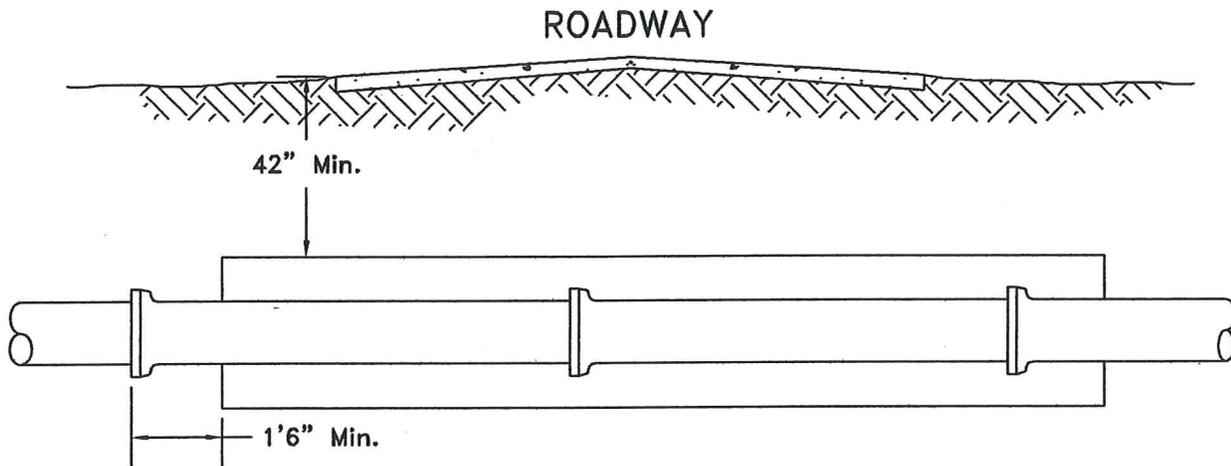
APPROVED BY: R.V.

DRAWN BY: SDH.

DATE: 3/20/89

CD-10

INDEPENDENCE WATER DEPARTMENT



**NOTES:**

1. POLYETHYLENE ENCASEMENT SHALL BE INSTALLED ON ALL DUCTILE IRON PIPE AND FITTINGS INCLUDING DUCTILE IRON PIPE WHICH IS IN ENCASEMENT.
2. ENCASEMENT SHALL BE INSTALLED PER RAILROAD AND/OR HIGHWAY SPECIFICATIONS.
3. ALL PIPE IN CASING WILL BE FIELD LOCKED.
4. SEE DETAIL CD-12A FOR ADDITIONAL DETAIL AND NOTES.

**TYPICAL ENCASEMENT UNDER ROADWAY FOR DUCTILE IRON PIPE-6" THRU 36"**

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 11

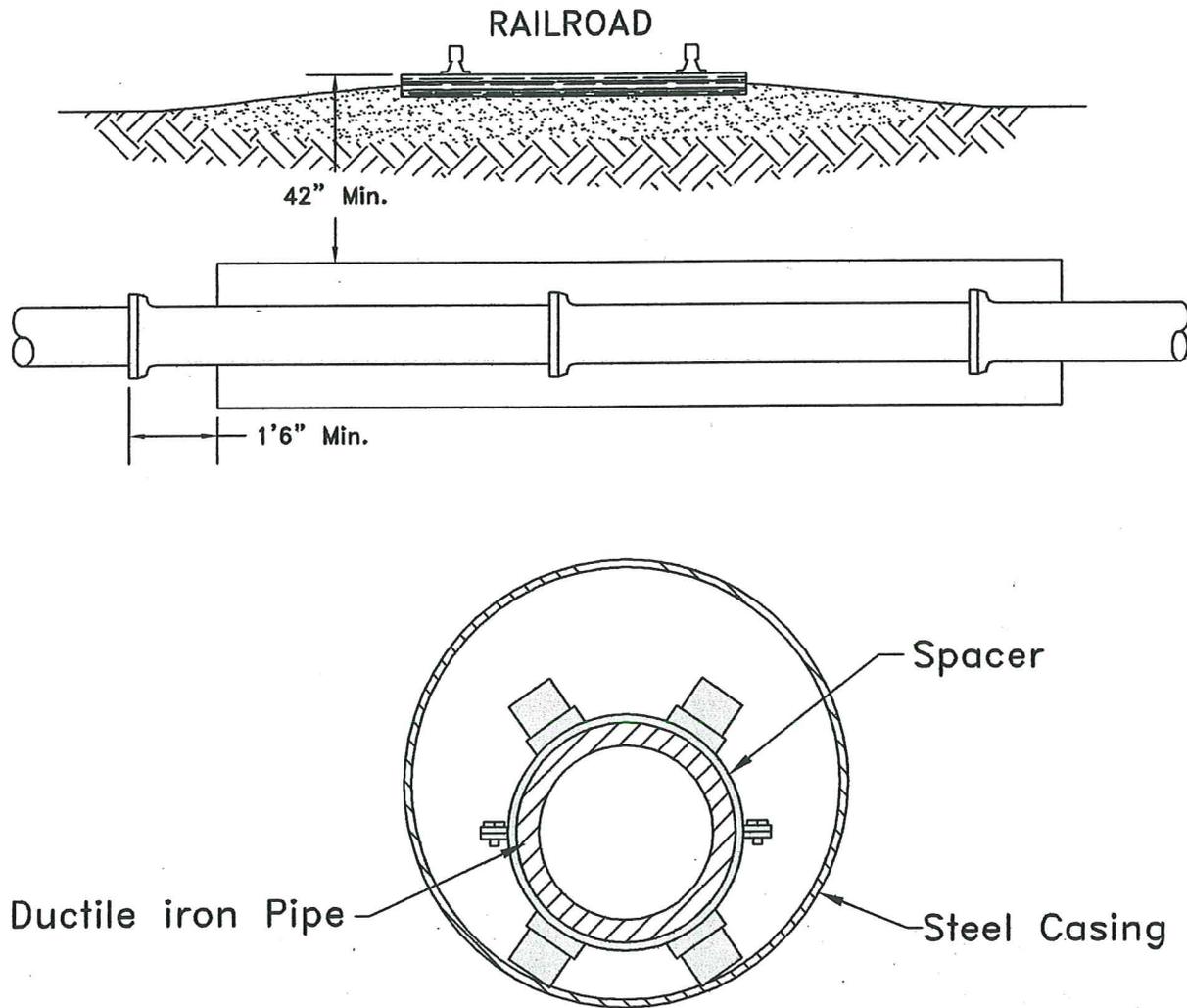
APPROVED BY: SDH

DRAWN BY: CJ

DATE: 9/21/11

CD-11

INDEPENDENCE WATER DEPARTMENT



**NOTES:**

1. POLYETHYLENE ENCASUREMENT SHALL BE INSTALLED ON ALL DUCTILE IRON PIPE AND FITTINGS INCLUDING DUCTILE IRON PIPE WHICH IS IN ENCASUREMENT.
2. ENCASUREMENT SHALL BE INSTALLED PER RAILROAD AND/OR HIGHWAY SPECIFICATIONS.
3. ALL PIPE IN CASING WILL BE FIELD LOCKED.
4. SEE DETAIL CD-12A FOR ADDITIONAL DETAIL AND NOTES.

**TYPICAL ENCASUREMENT UNDER RAILROAD FOR DUCTILE IRON PIPE-6" THRU 36"**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 12

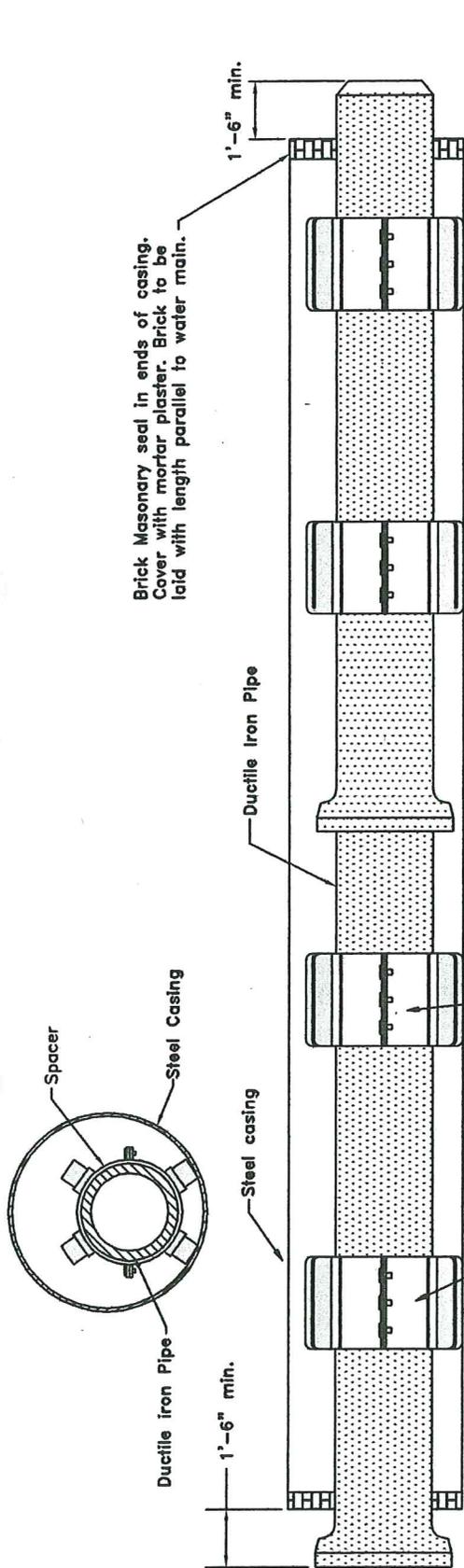
APPROVED BY: SDH

DRAWN BY: CJ

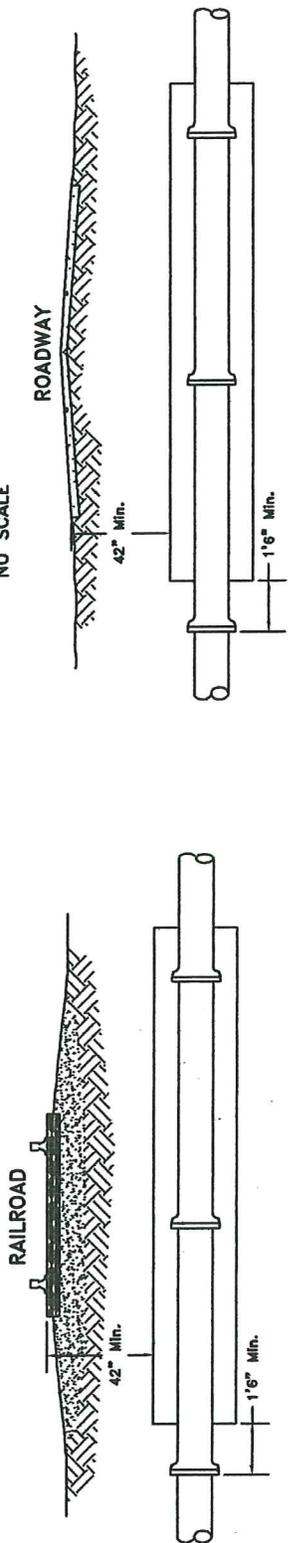
DATE: 9/21/11

CD-12

# INDEPENDENCE WATER DEPARTMENT



6" thru 36" D.I. PIPE  
Minimum of two (2) spacers for each joint of pipe.  
NO SCALE



Length and wall thickness of Encasement Pipe to be as shown on construction plans.

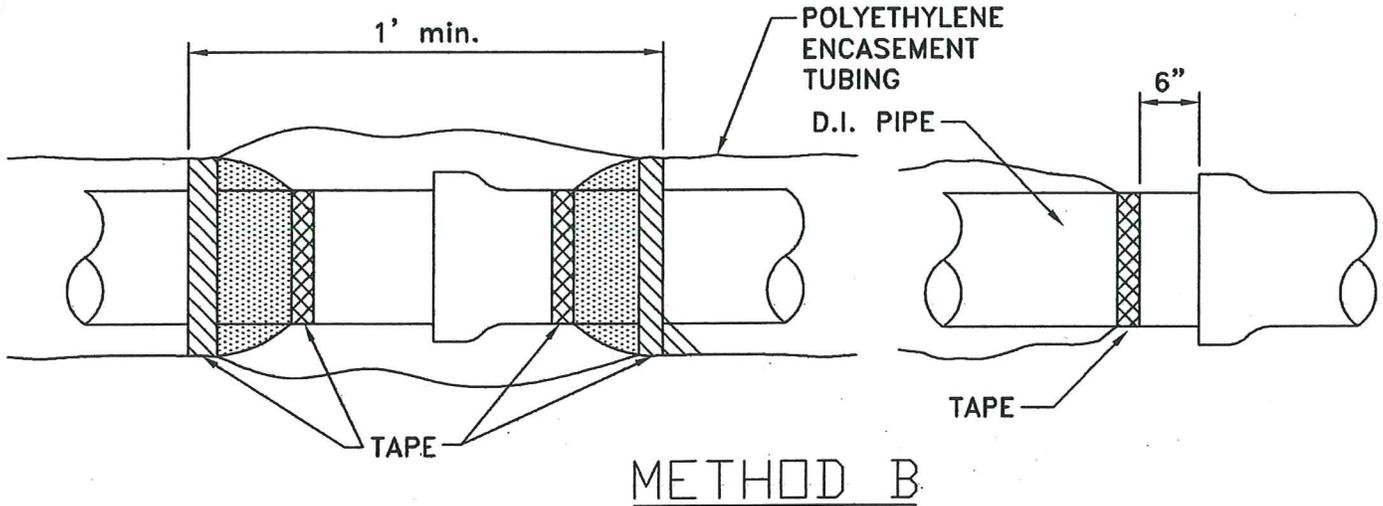
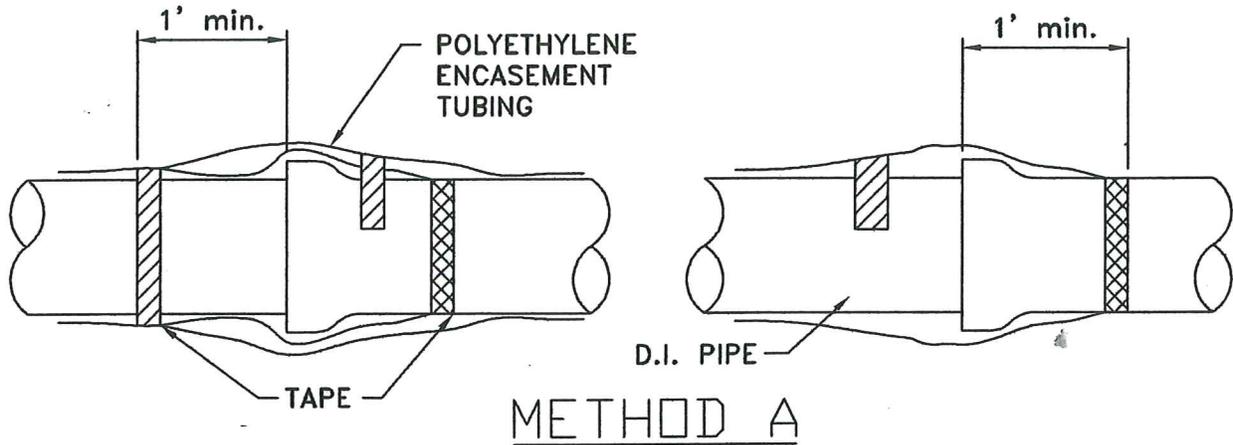
TYPICAL ENCASEMENT UNDER RAILROADS and ROADS FOR DUCTILE IRON PIPE 6" thru 36"  
NO SCALE

## TYPICAL ENCASEMENT UNDER RAILROAD AND ROADWAY FOR DUCTILE IRON PIPE-6" THRU 36"

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 12A

DRAWN BY: CJ                      APPROVED BY: SDH  
DATE: 9/21/11

CD-12A



POLYETHYLENE ENCASEMENT TUBING TO BE A  
 NATURAL COLOR (CLEAR) WITH AN 8 MIL  
 THICKNESS.  
POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE  
 no scale

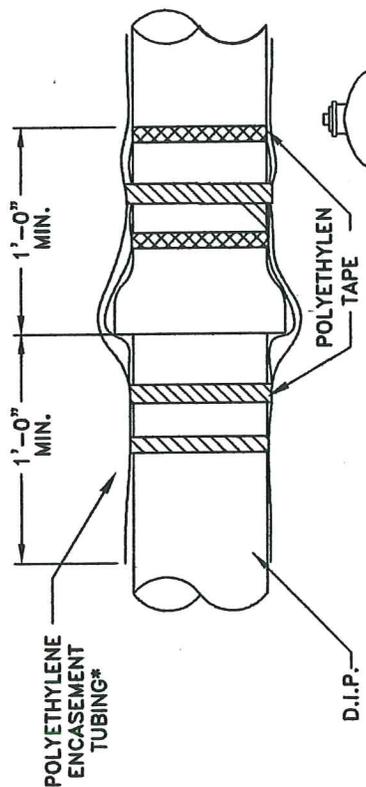
POLYETHYLENE ENCASEMENT FOR D.I. PIPE

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 13

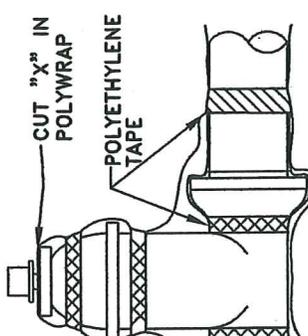
APPROVED BY: \_\_\_\_\_  
 DRAWN BY: C.J. DATE: 12/16/04

CD-13

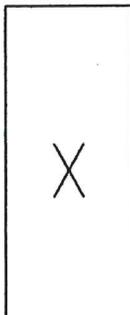
INDEPENDENCE WATER DEPARTMENT



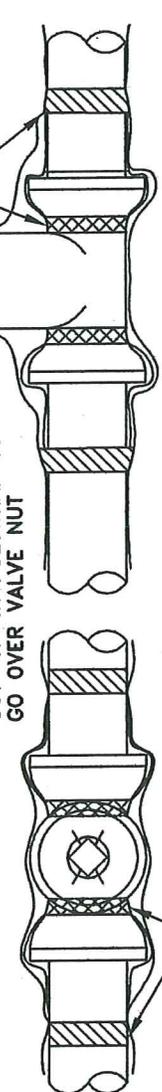
D.I.P.  
POLYETHYLENE ON PIPE



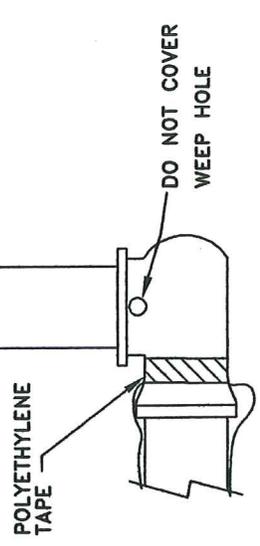
POLYETHYLENE ON VALVES



CUT "X" IN POLYWRAP TO GO OVER VALVE NUT

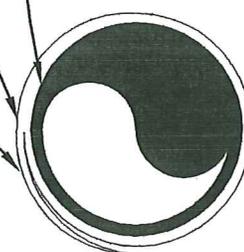


POLYETHYLENE TAPE



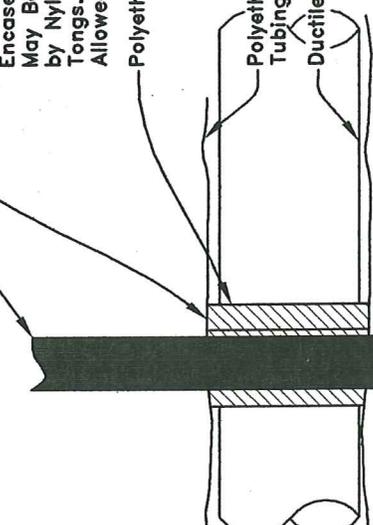
POLYETHYLENE ON HYDRANTS

Extra Polyethylene Tubing Folded Over to Remove Slack and Secured with Polyethylene Tape  
Polyethylene Encasement Tubing  
Ductile Iron Pipe



NOTES:  
POLYETHYLENE ENCASEMENT TUBING TO BE A NATURAL COLOR (CLEAR) WITH AN 8 MIL THICKNESS

Nylon Strap or Pipe Tongs Wrap Polyethylene Encasement With Polyethylene Tape in Location Where Polyethylene Encasement and Ductile Iron May Be Hoisted or Adjusted by Nylon Strap or Pipe Tongs. NO Chains Will be Allowed to Move Pipe.  
Polyethylene Tape



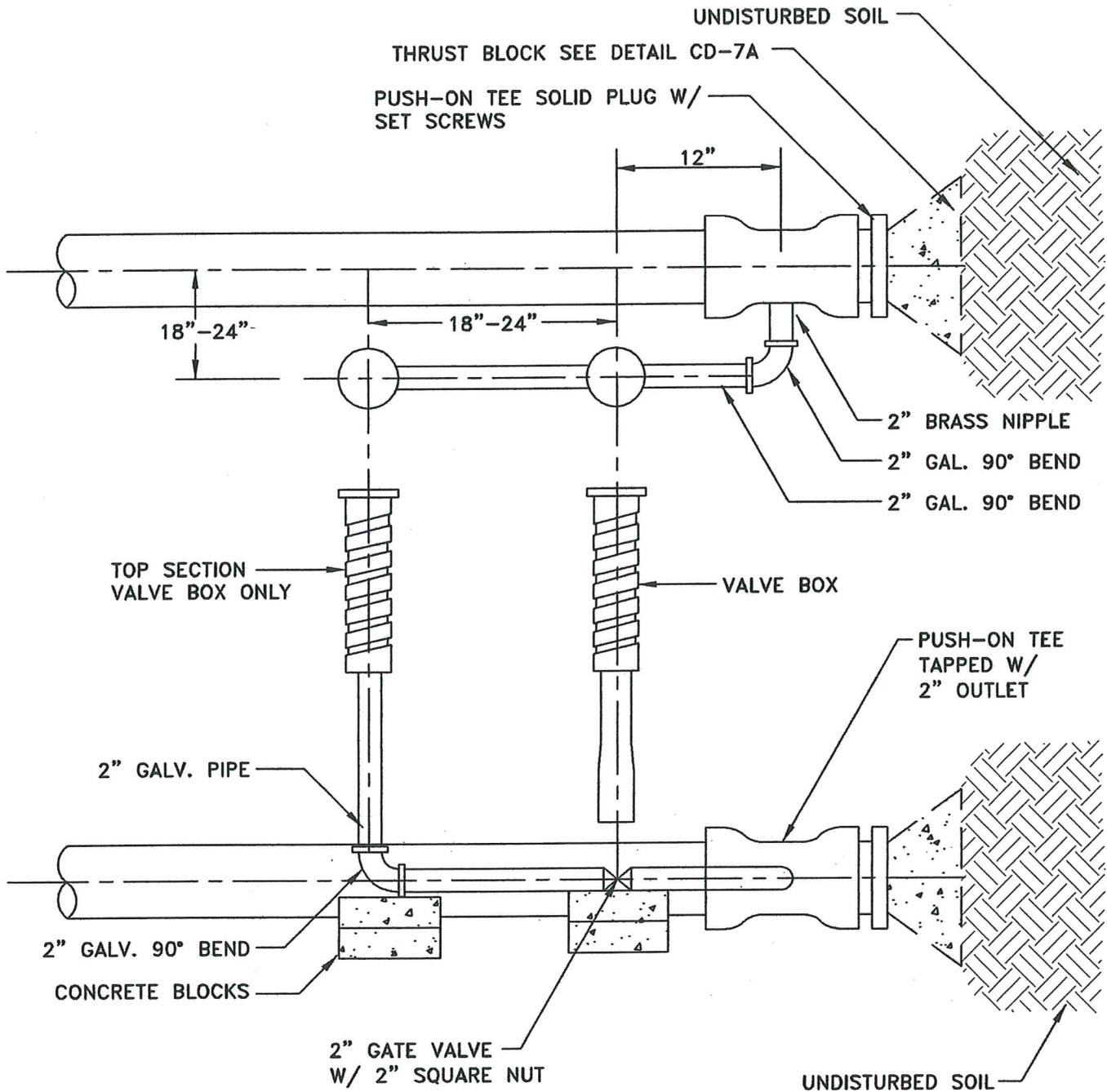
**POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER **13A**

DRAWN BY: M.J.F. APPROVED BY: SH.  
DATE: 01/03/2007

CD-13A

# INDEPENDENCE WATER DEPARTMENT



**NOTE:**  
 THRUST BLOCK TO BE USED IF FIELD LOK GASKETS  
 ARE NOT USED. SEE DETAILS FOR CONCRETE BLOCK  
 AND FIELD LOK GASKETS

**DO NOT CUT NOTCH IN 2" GALV.  
 90° BEND**

## TYPICAL BLOW OFF ASSEMBLY - DEAD END

WATER DEPARTMENT
CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 14

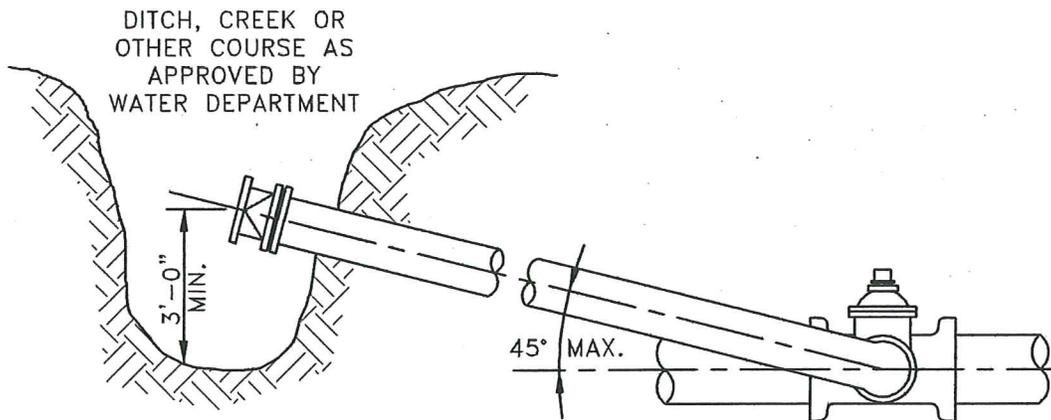
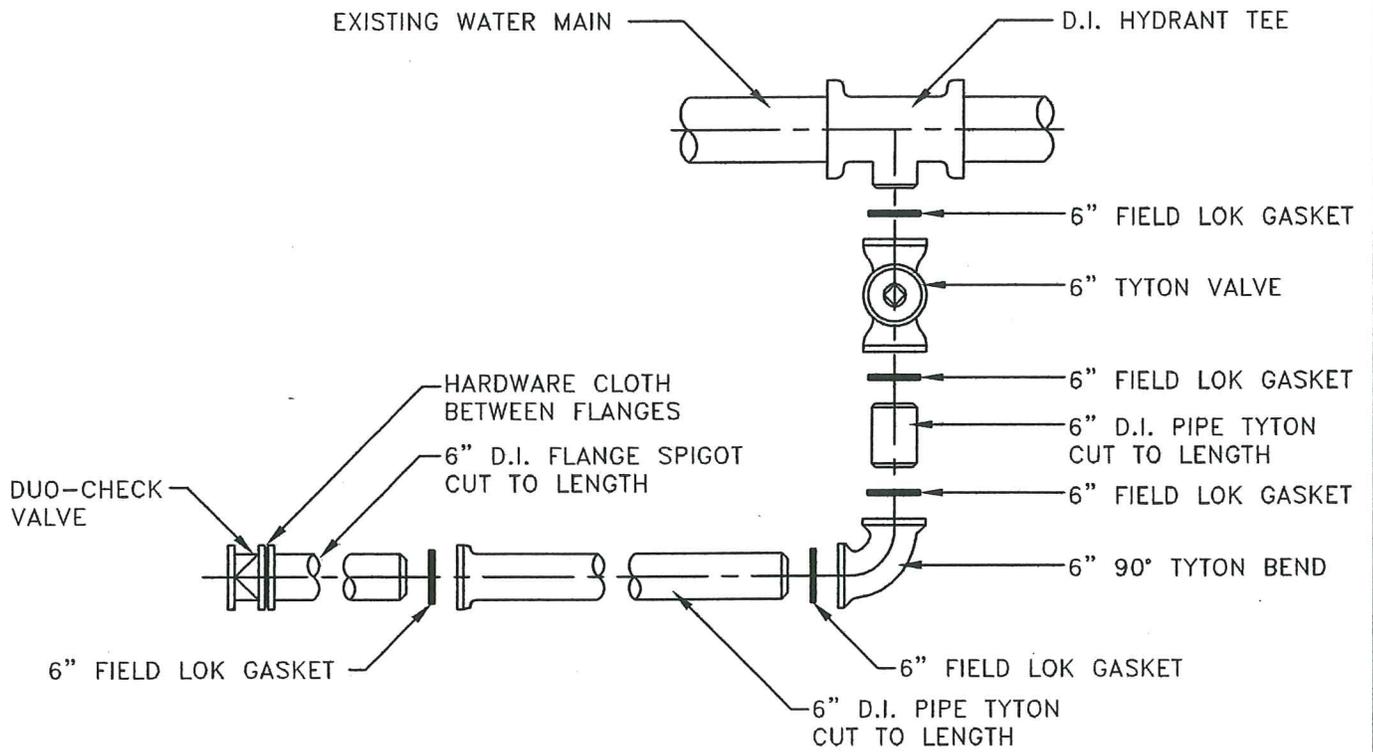
APPROVED BY: R.V.

DRAWN BY: S.D.H.

DATE: 3/20/89

CD-14

# INDEPENDENCE WATER DEPARTMENT



## TYPICAL BLOW OFF DETAIL

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER **15**

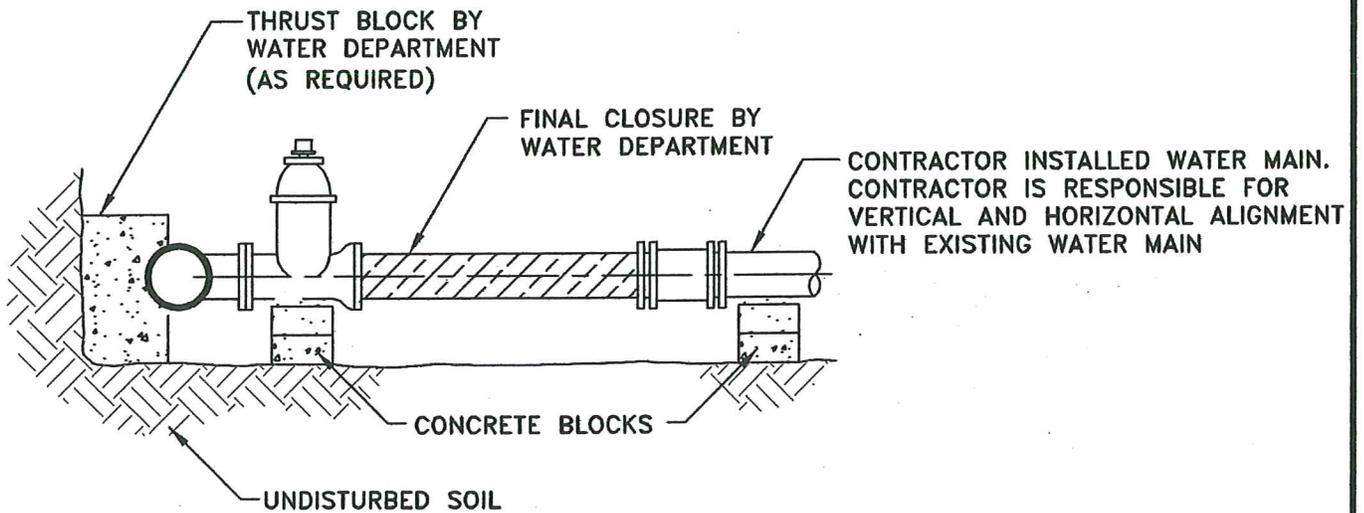
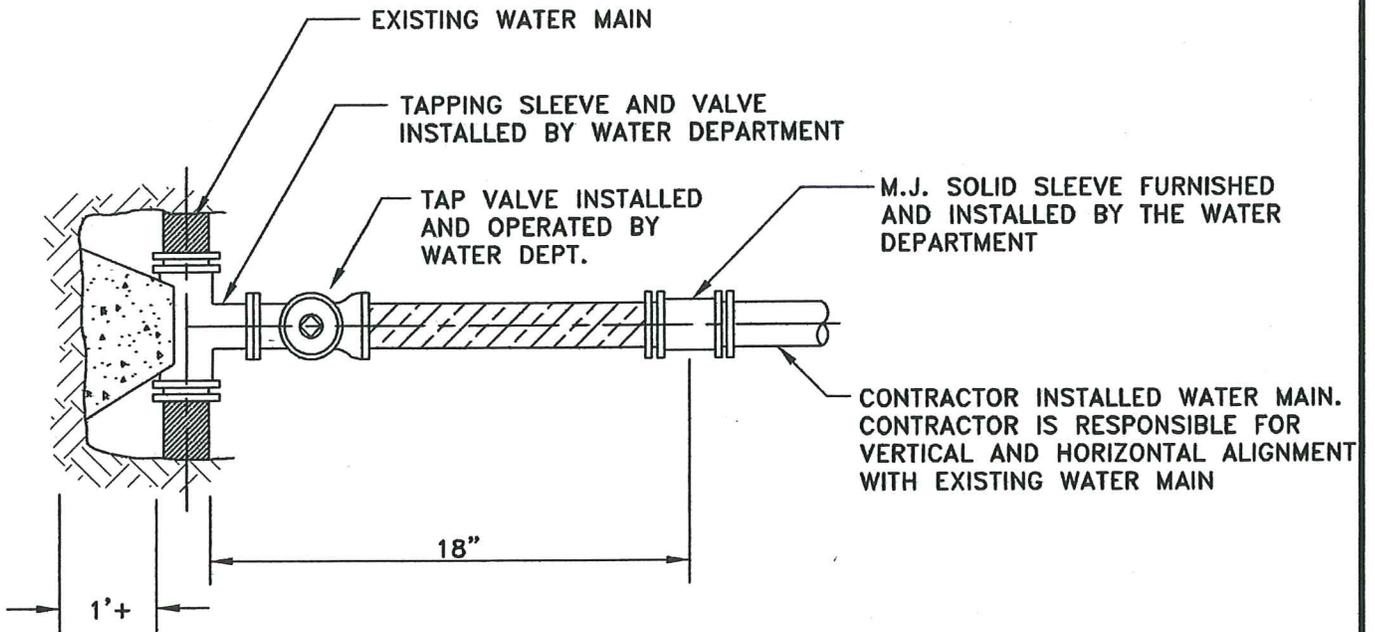
APPROVED BY: R.V.

DRAWN BY: SDH.

DATE: 3/20/89

CD-15

INDEPENDENCE WATER DEPARTMENT



TYPICAL TAPPING SLEEVE CONNECTION

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 16

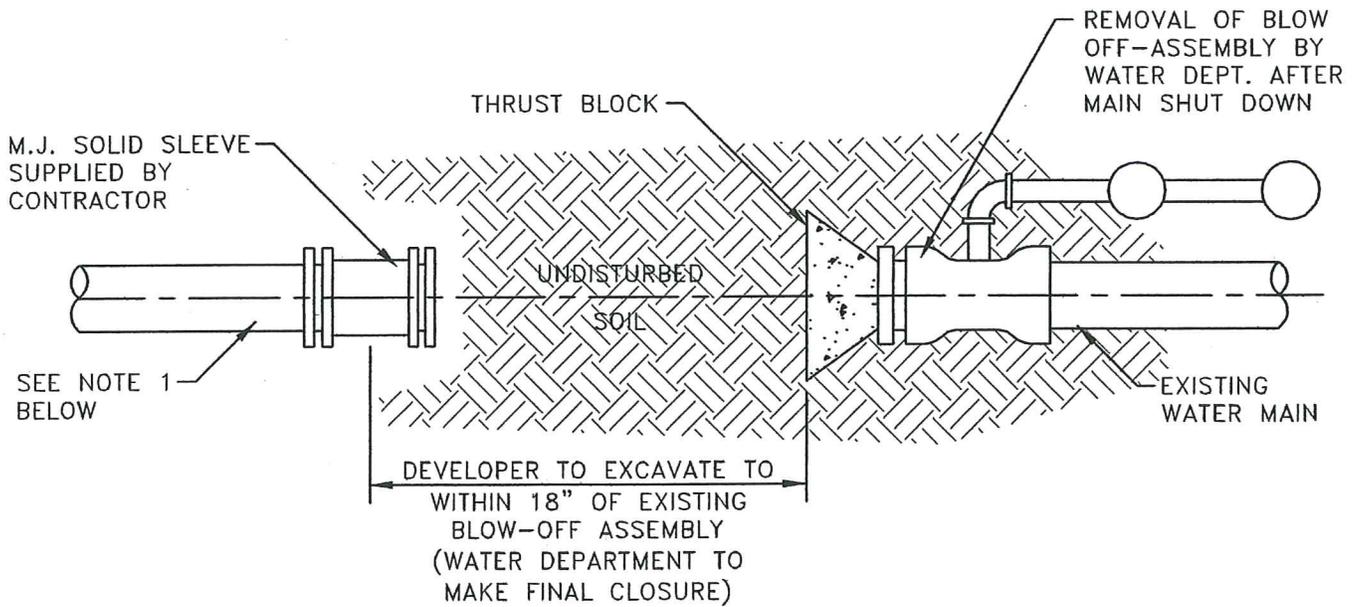
APPROVED BY: R.V.

DRAWN BY: SDH.

DATE: 3/20/89

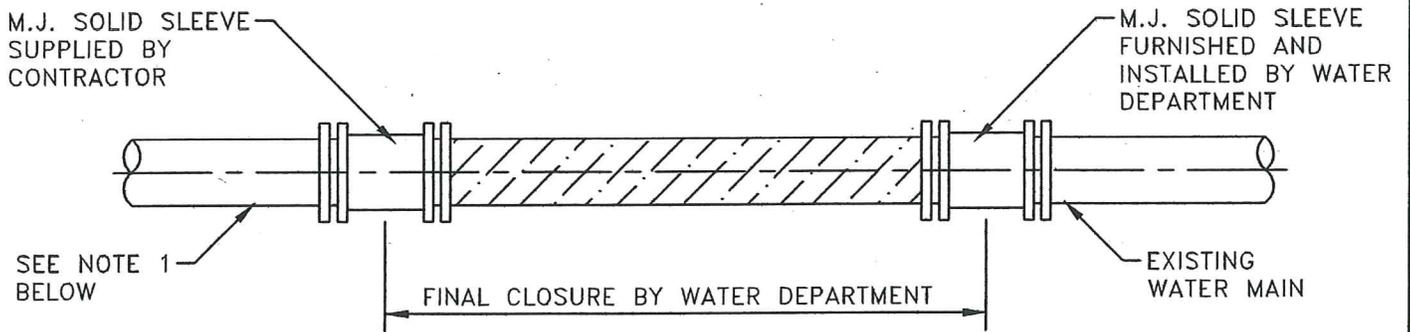
CD-16

# INDEPENDENCE WATER DEPARTMENT



## BEFORE REMOVAL OF BLOW-OFF ASSEMBLY

**NOTE:**  
CONTRACTOR RESPONSIBLE FOR HORIZONTAL AND VERTICAL ALIGNMENT WITH EXISTING WATER MAIN



## AFTER REMOVAL OF BLOW-OFF ASSEMBLY

**NOTES:**

1. CONTRACTOR RESPONSIBLE FOR HORIZONTAL AND VERTICAL ALIGNMENT WITH EXISTING WATER MAIN.

### TYPICAL BLOW-OFF CONNECTION

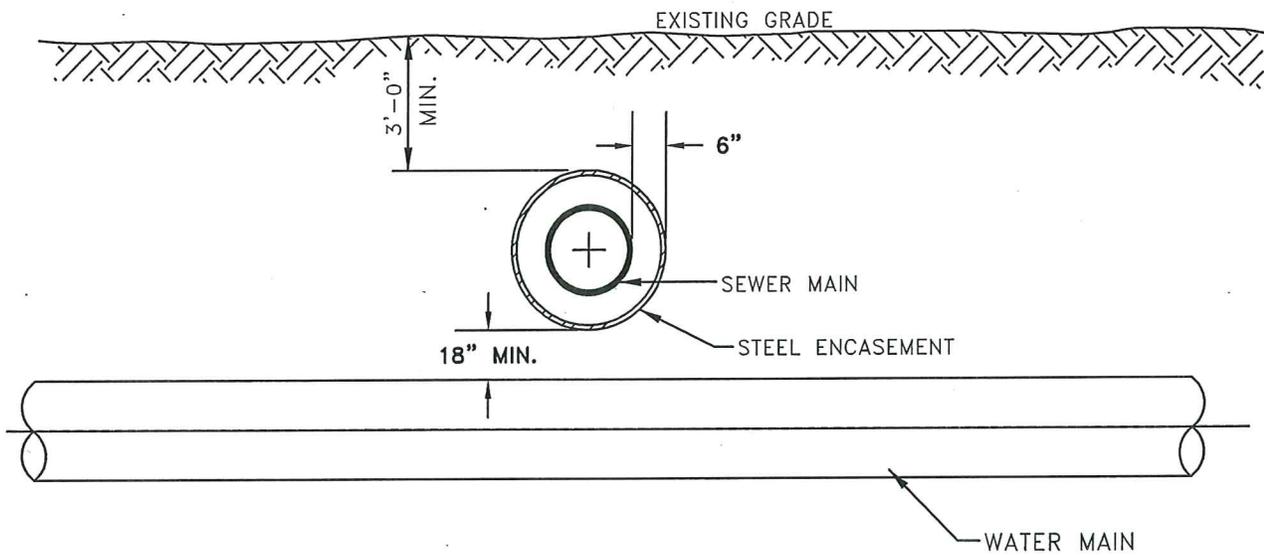
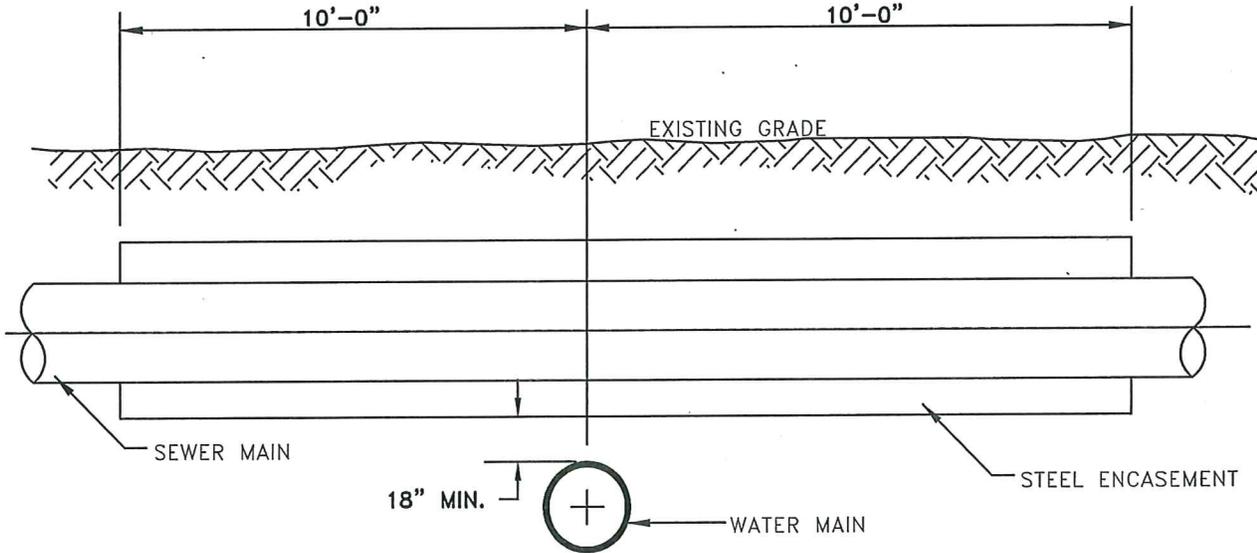
WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 17

APPROVED BY: R.V.

DRAWN BY: SDH.                      DATE: 3/20/89

**CD-17**

# INDEPENDENCE WATER DEPARTMENT



### TYPICAL SANITARY OR STORM SEWER MAIN CROSSING WATER MAIN

**Note: Concrete Encasement is no longer an acceptable encasement – per MODNR Dec. 10, 2013, Section 8.6 Separation of Water Mains and Sewers**

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 18

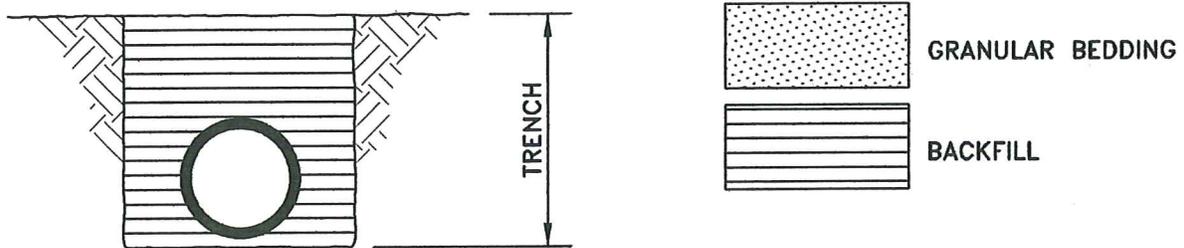
APPROVED BY: SH

DRAWN BY: CJ

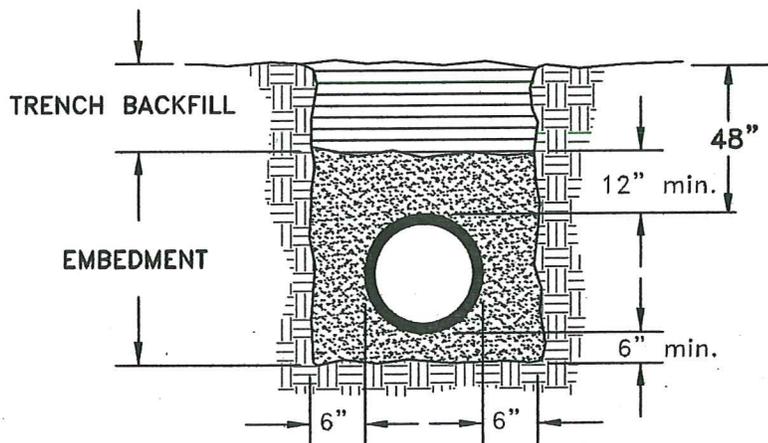
DATE: 12/9/2014

CD-18

INDEPENDENCE WATER DEPARTMENT



**FLAT BOTTOM DITCH IN EARTH**  
 NORMAL EMBEDMENT FOR 12"  
 OR SMALLER D.I.P.



**FLAT BOTTOM IN ROCK**  
 NORMAL EMBEDMENT FOR 12"  
 OR SMALLER D.I.P.

**STANDARD LAYING CONDITIONS FOR DUCTILE IRON PIPE**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 19

APPROVED BY: R.V.

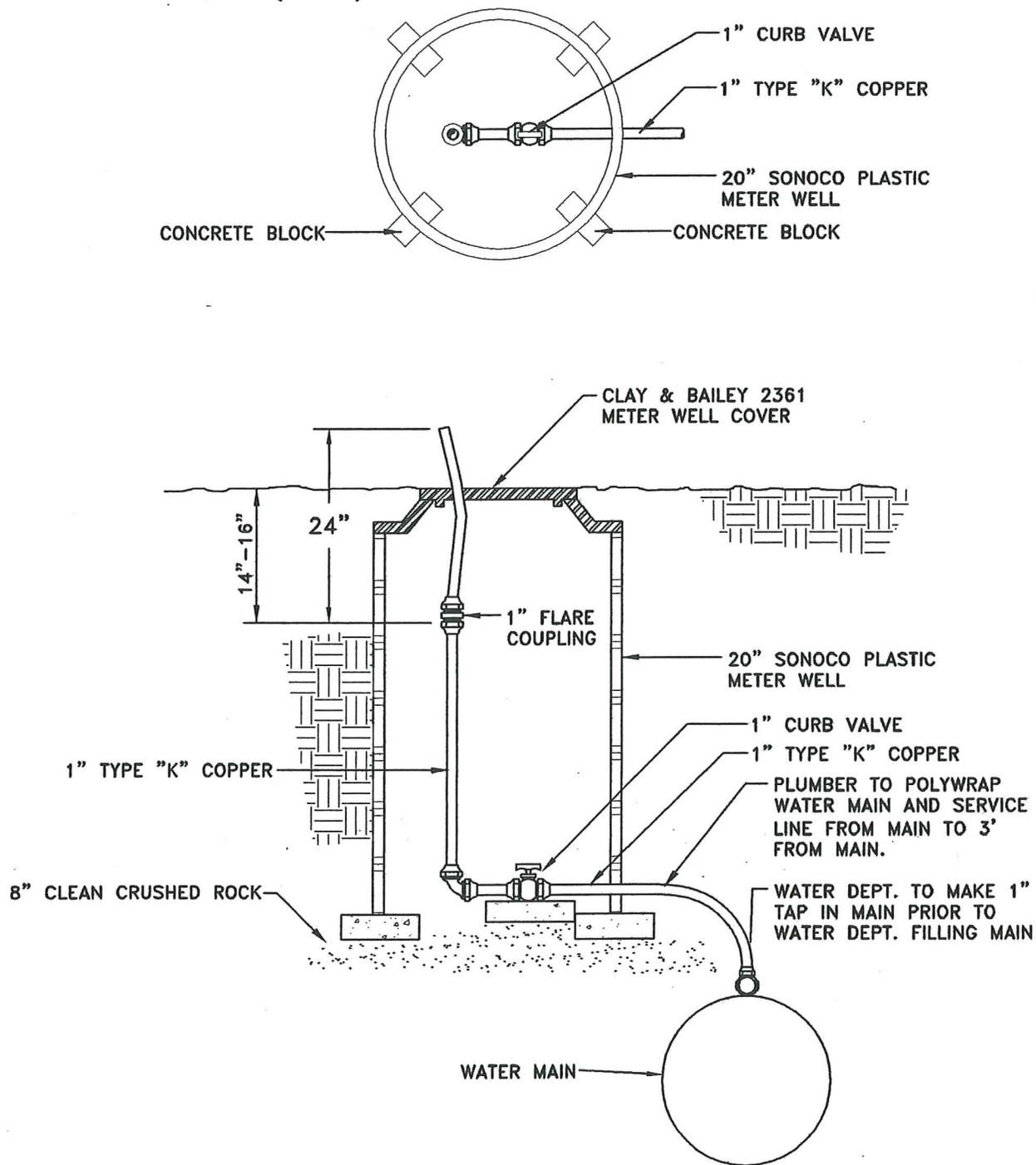
DRAWN BY: CJ

DATE: 07/20/2011

**CD-19**

# INDEPENDENCE WATER DEPARTMENT

STEEL MARKER POST   
MAY BE REQUIRED (TYPICAL)



## TYPICAL AIR RELEASE PIT

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 20

APPROVED BY: D.R.

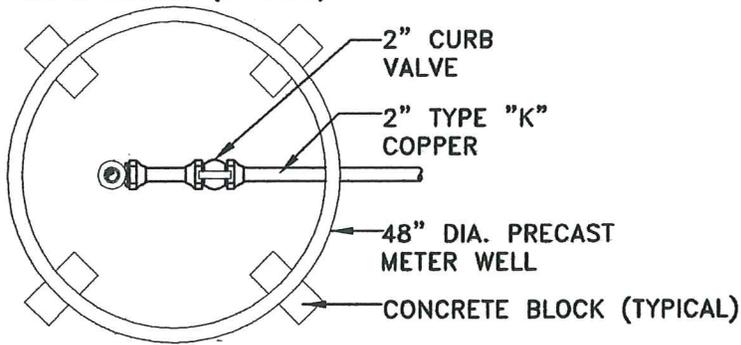
DRAWN BY: S.D.H.

DATE: 07/03/2007

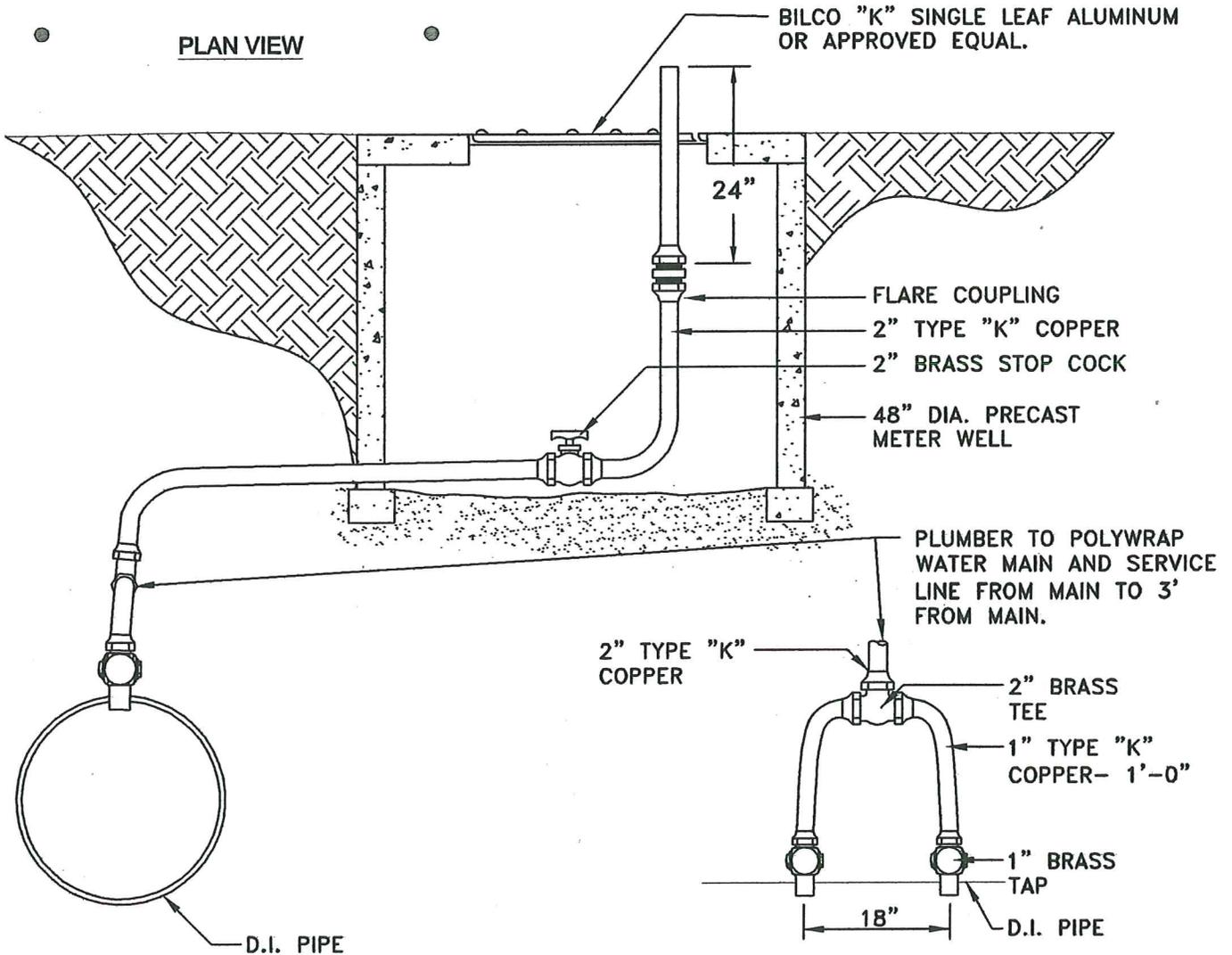
CD-20

# INDEPENDENCE WATER DEPARTMENT

● — STEEL MARKER POST MAY BE REQUIRED (TYPICAL)



PLAN VIEW



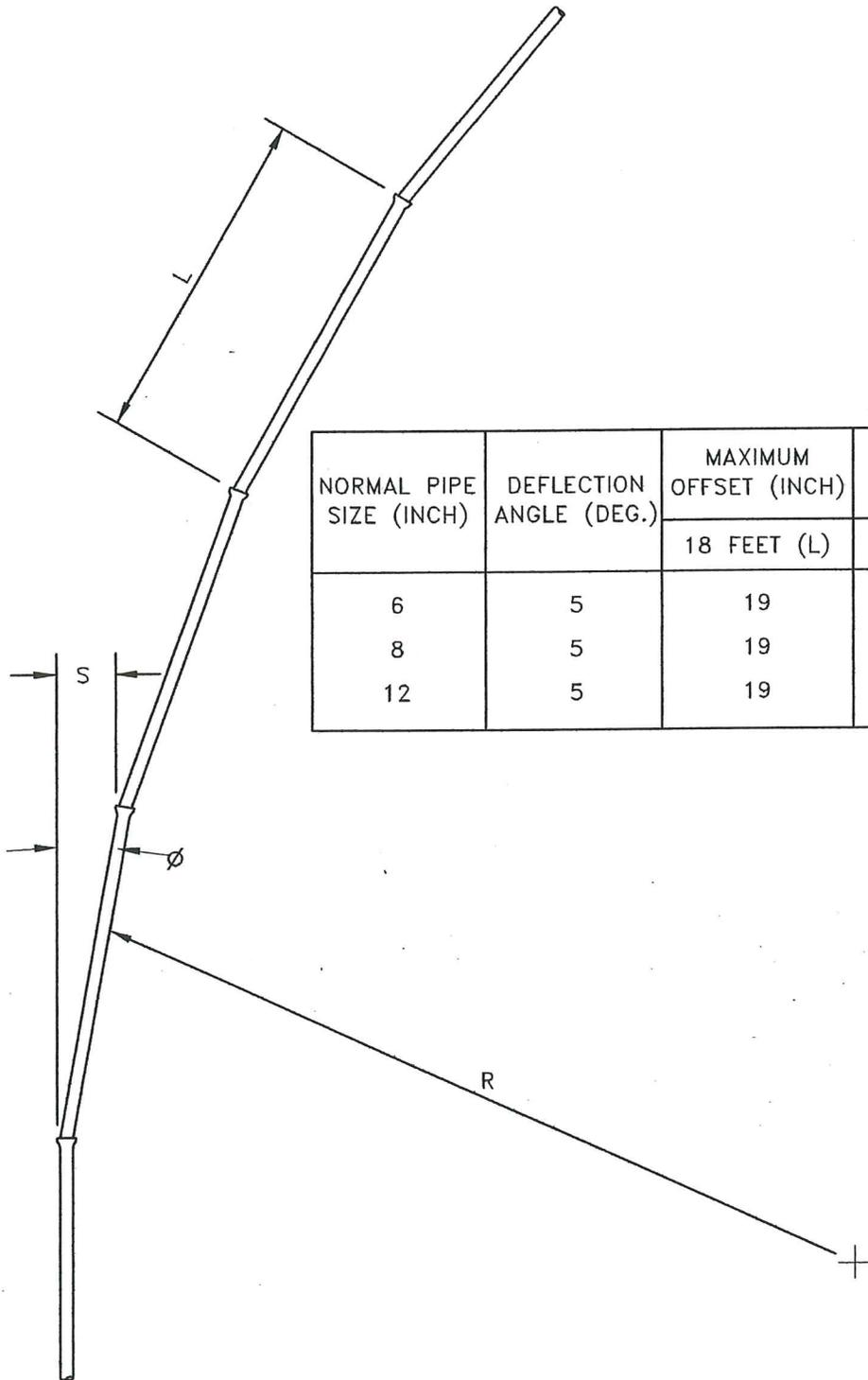
## TYPICAL 2" AIR RELEASE PIT

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 20A

DRAWN BY: SDH.                      APPROVED BY: DR.  
DATE: 01/03/2007

**CD-20A**

# INDEPENDENCE WATER DEPARTMENT



NORMAL PIPE SIZE (INCH)	DEFLECTION ANGLE (DEG.)	MAXIMUM OFFSET (INCH)	APPROX. RADIUS OF CURVE PRODUCT BY SUCCESSION OF JOINTS (FEET)
		18 FEET (L)	18 FEET (L)
6	5	19	205
8	5	19	205
12	5	19	205

$\phi$  = DEFLECTION ANGLE  
 S = JOINT DEFLECTION OFFSET  
 L = LAYING LENGTH  
 R = RADIUS OF CURVE  
 $R = \frac{L}{2 \tan \phi / 2}$

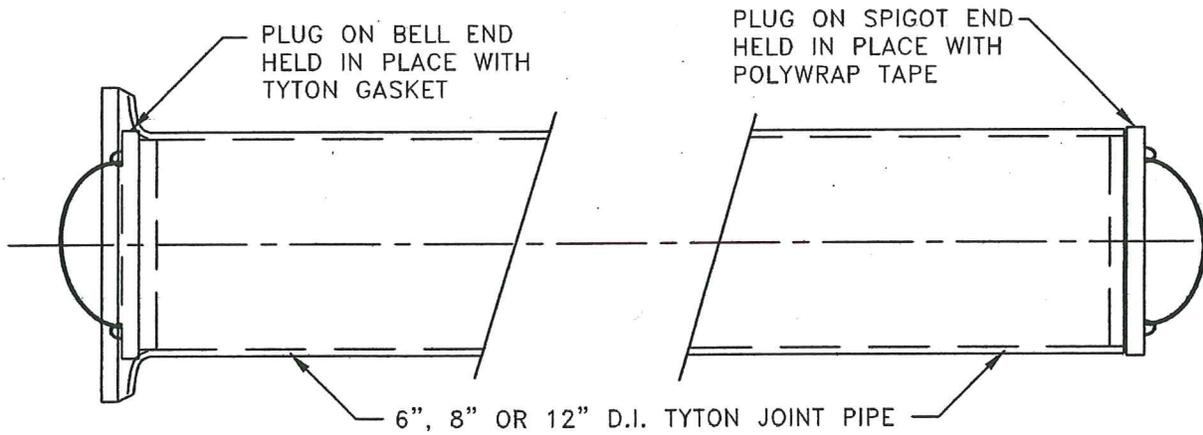
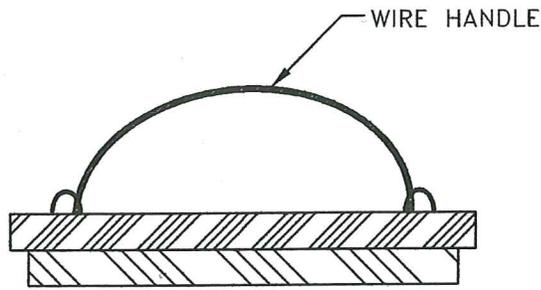
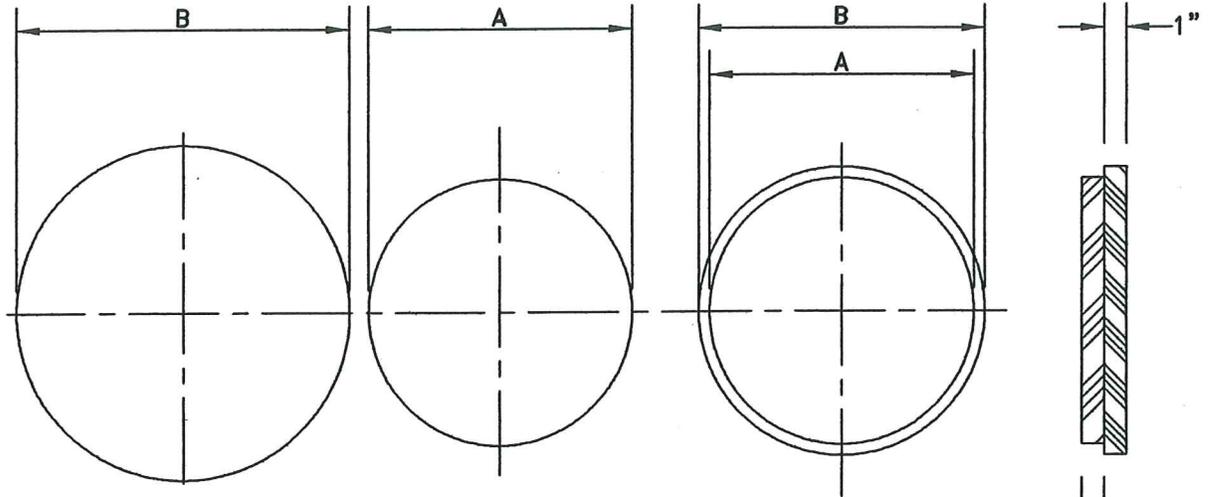
## JOINT DEFLECTION FOR DUCTILE IRON PIPE

WATER DEPARTMENT                      CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 21

DRAWN BY: SDH                      APPROVED BY: R.V.  
 DATE: 3/20/89

**CD-21**

INDEPENDENCE WATER DEPARTMENT



	A	B
6"	5.5"	6.7"
8"	7.5"	8.8"
12"	11.5"	13"
20"	19.75"	21.5"
30"	30.5"	32"
36"	36.5"	38"

**NIGHT PLUG FOR DUCTILE IRON PIPE**

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 22

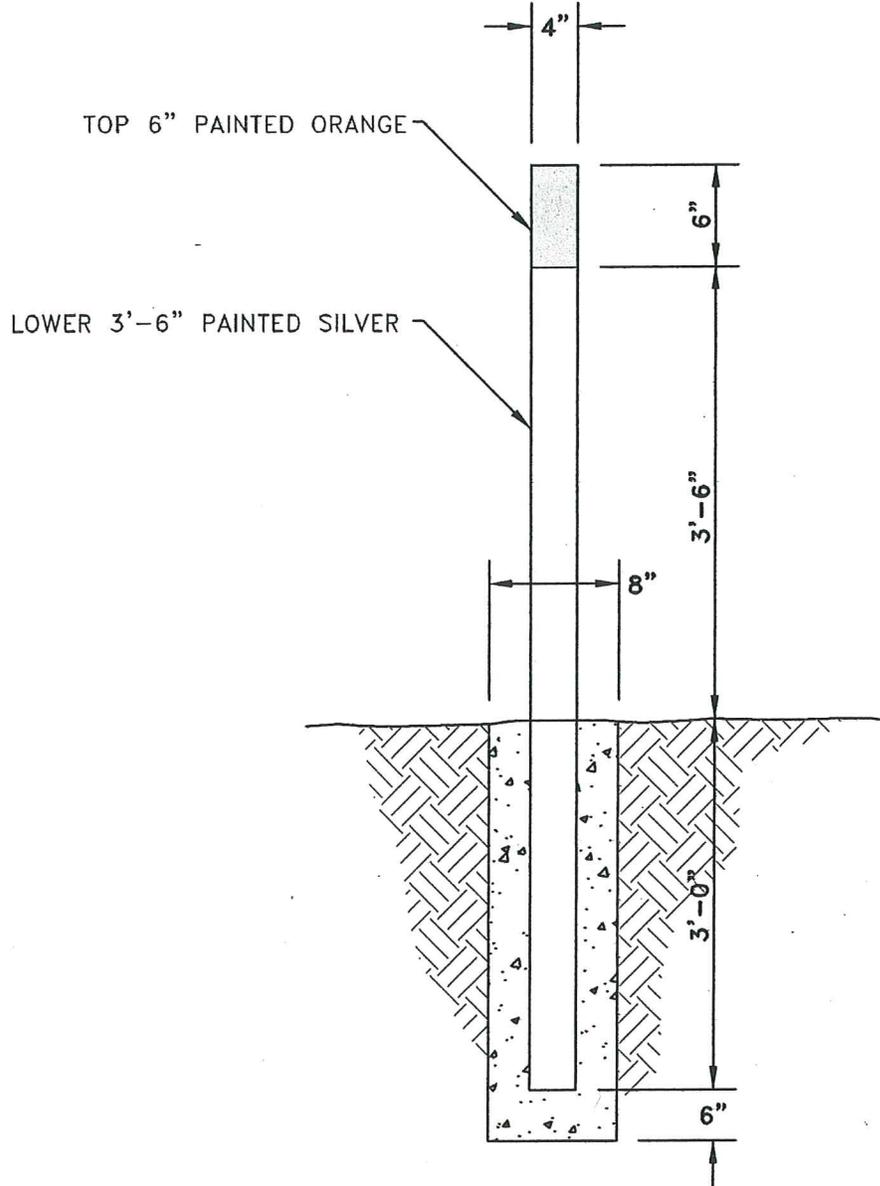
APPROVED BY: SH.

DRAWN BY: C.J.

DATE: 4/26/01

CD-22

INDEPENDENCE WATER DEPARTMENT



4" STEEL MARKER POST

MARKER POST DETAIL

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 23

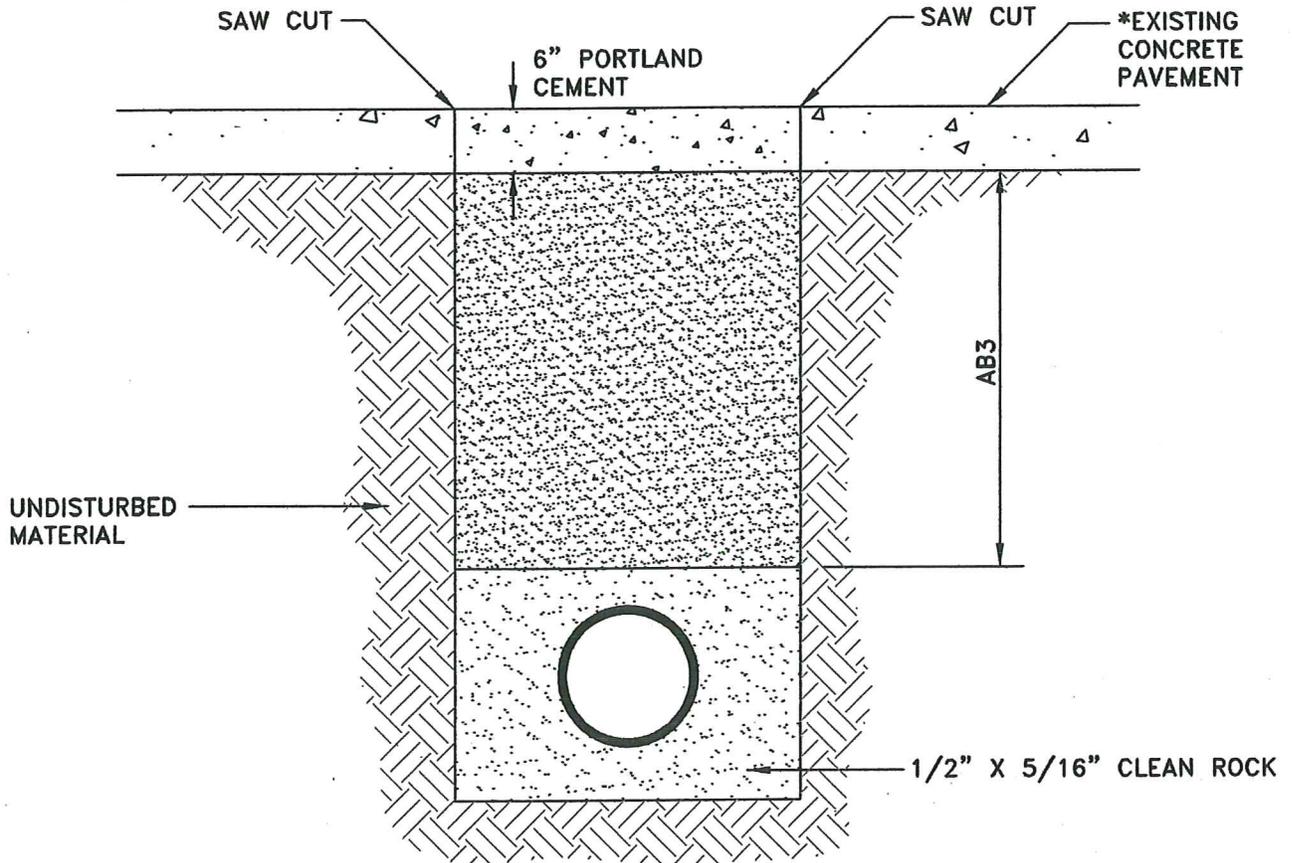
APPROVED BY: SH.

DRAWN BY: C.J.

DATE: 12/16/04

CD-23

INDEPENDENCE WATER DEPARTMENT



\*EXISTING CONCRETE DRIVE THICKNESS MAY VARY

CONCRETE DRIVE REPLACEMENT

WATER DEPARTMENT

CITY OF INDEPENDENCE, MISSOURI

CONSTRUCTION DETAIL NUMBER 24

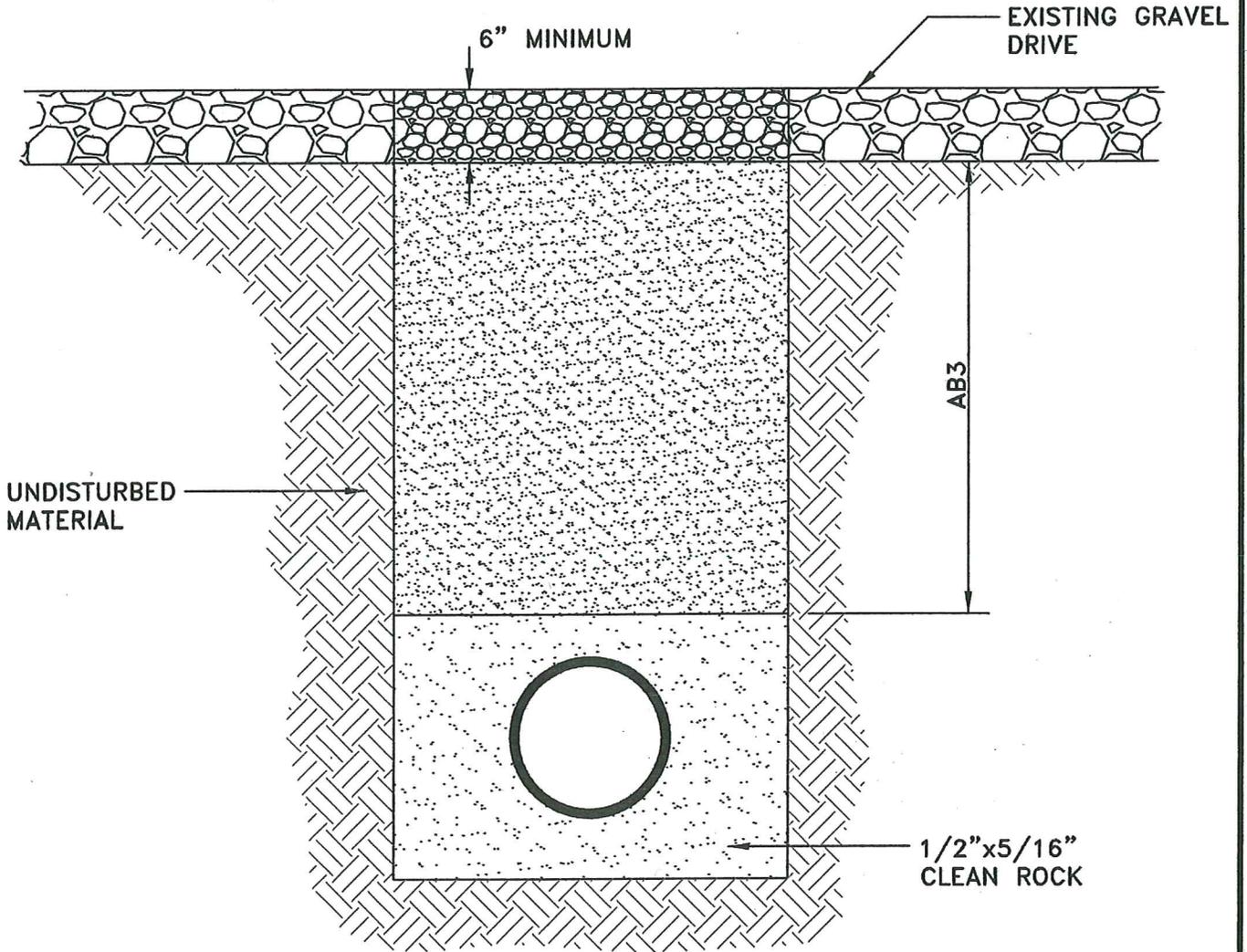
APPROVED BY: SH.

DRAWN BY: C.J.

DATE: 12/16/04

CD-24

INDEPENDENCE WATER DEPARTMENT



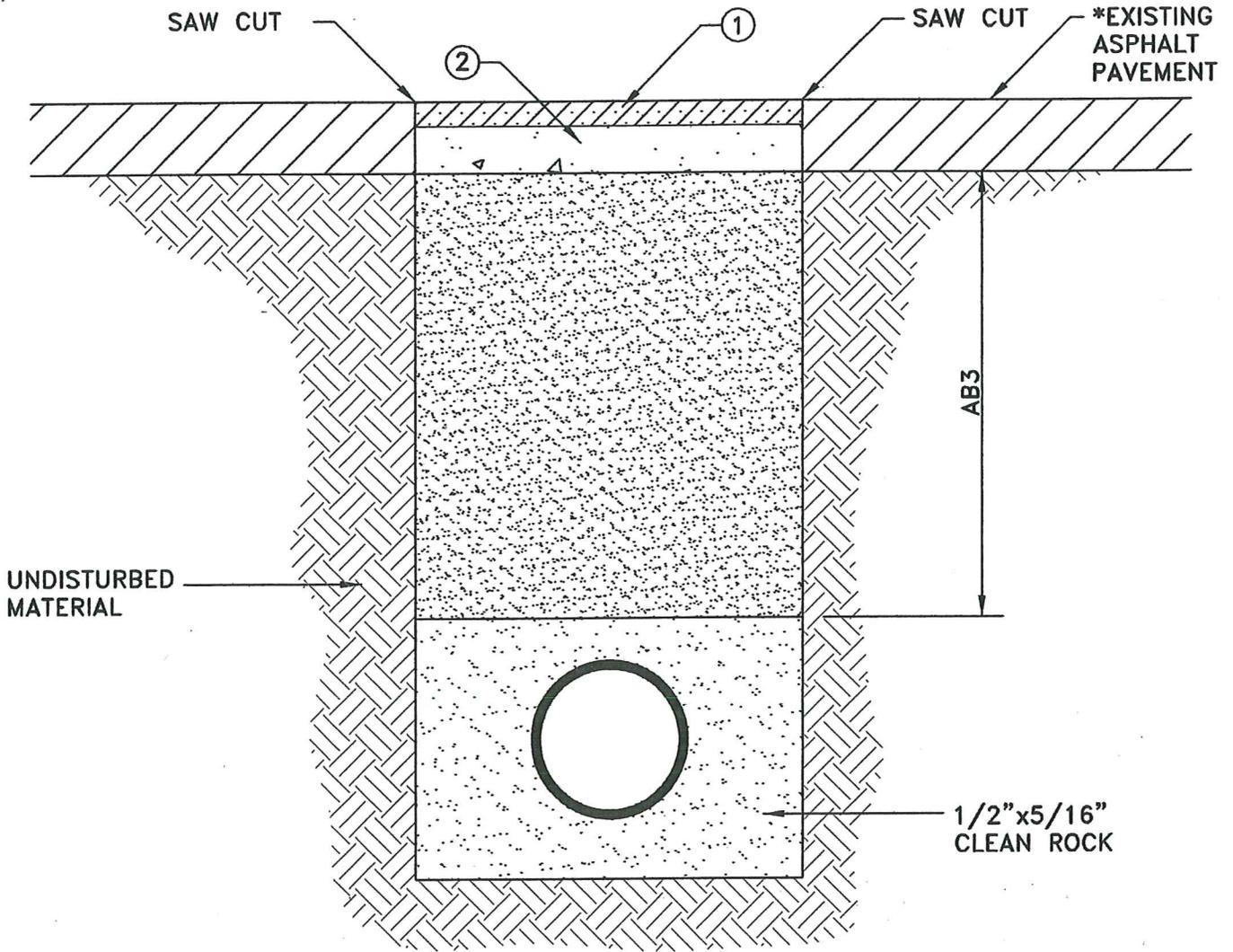
**GRAVEL DRIVE REPLACEMENT**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 25

APPROVED BY: SH.  
DRAWN BY: C.J. DATE: 12/16/04

CD-25

INDEPENDENCE WATER DEPARTMENT



- ① TWO (2) INCH ASPHALTIC CONCRETE SURFACE.
- ② FOUR (4) INCH MINIMUM PORTLAND CEMENT CONCRETE BASE

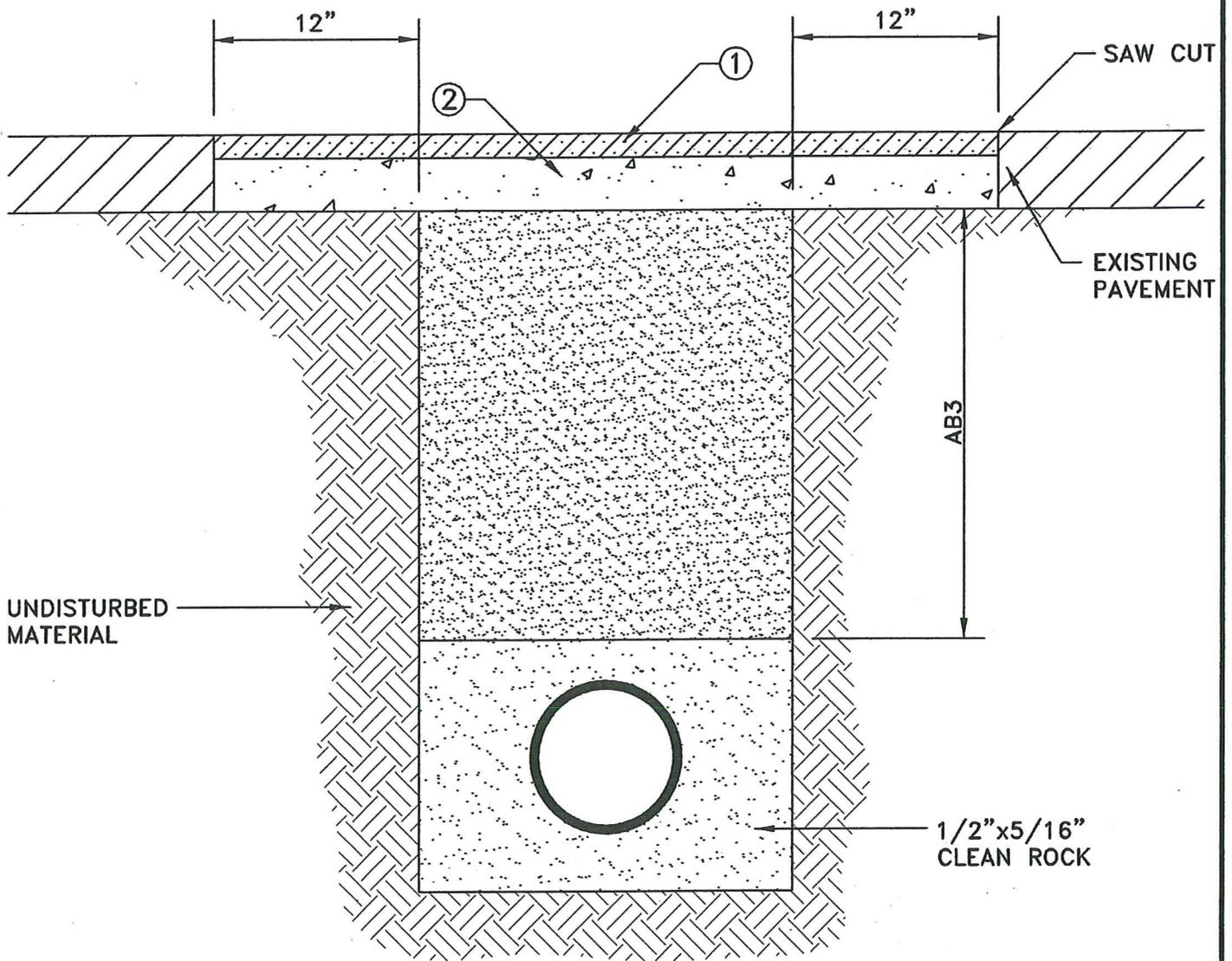
\*EXISTING ASPHALT DRIVE THICKNESS MAY VARY

ASPHALT DRIVE REPLACEMENT

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 26  
APPROVED BY: SH.  
DRAWN BY: C.J. DATE: 12/16/04

CD-26

INDEPENDENCE WATER DEPARTMENT



- ① TWO (2) INCH ASPHALTIC CONCRETE SURFACE.
- ② EIGHT (8) INCH MINIMUM PORTLAND CEMENT CONCRETE BASE OR SIX (6) INCH MINIMUM ASPHALTIC CONCRETE BASE (FOR LARGE AREA PATCHING ONLY) IF APPROVED BY THE DIRECTOR OF PUBLIC WORKS. FOUR (4) INCH ASPHALTIC CONCRETE BASE WILL BE PERMITTED IN RESIDENTIAL ASPHALT DRIVEWAYS.

**NOTE:**

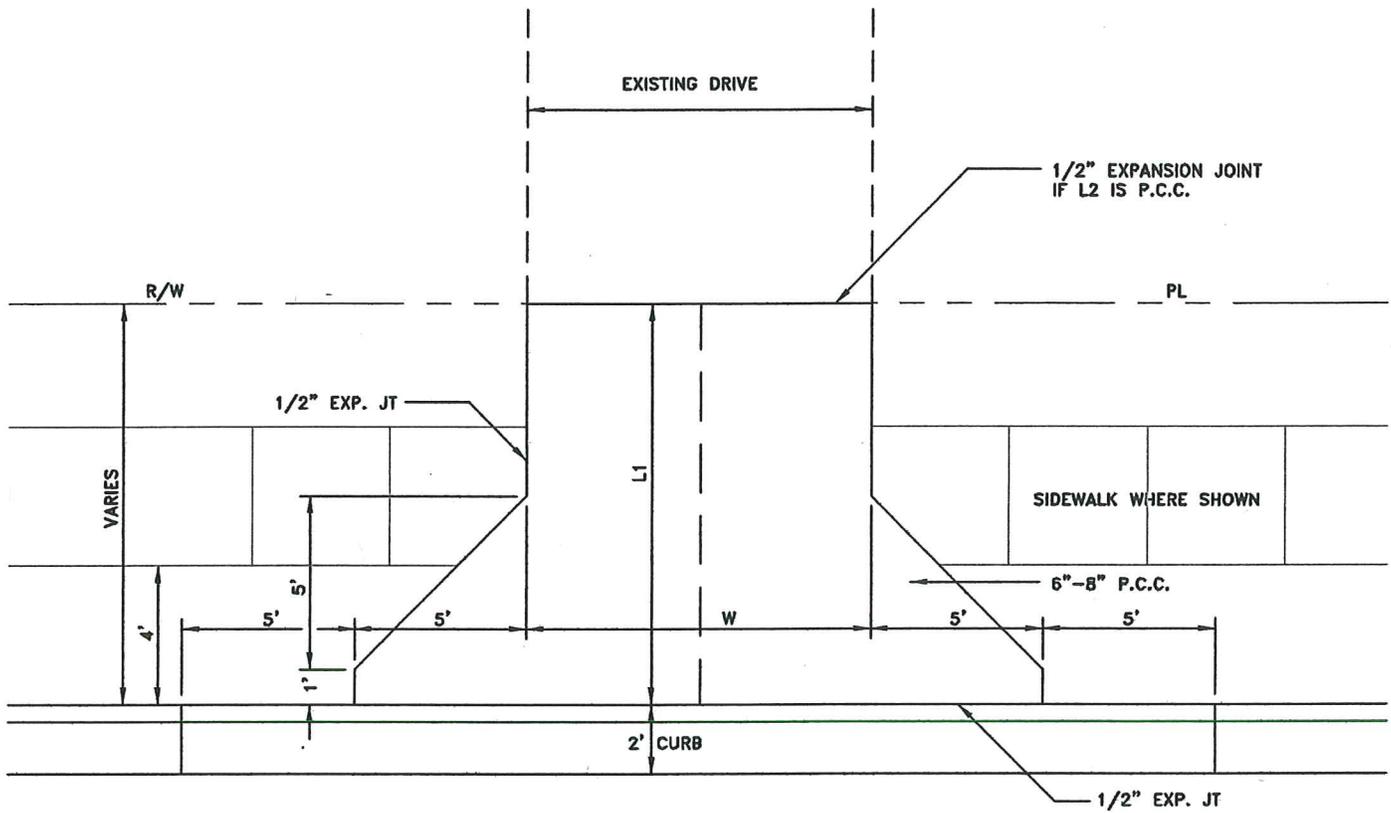
THE TWELVE (12) INCH OVERCUT WILL NOT BE REQUIRED FOR CUTS NOT EXCEEDING EIGHT (8) INCHES IN WIDTH.

**CITY STREET CUT REPLACEMENT**

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 27  
 APPROVED BY: Stt.  
 DRAWN BY: C.J. DATE: 12/16/04

**CD-27**

# INDEPENDENCE WATER DEPARTMENT



## EXISTING STREET

### NOTES:

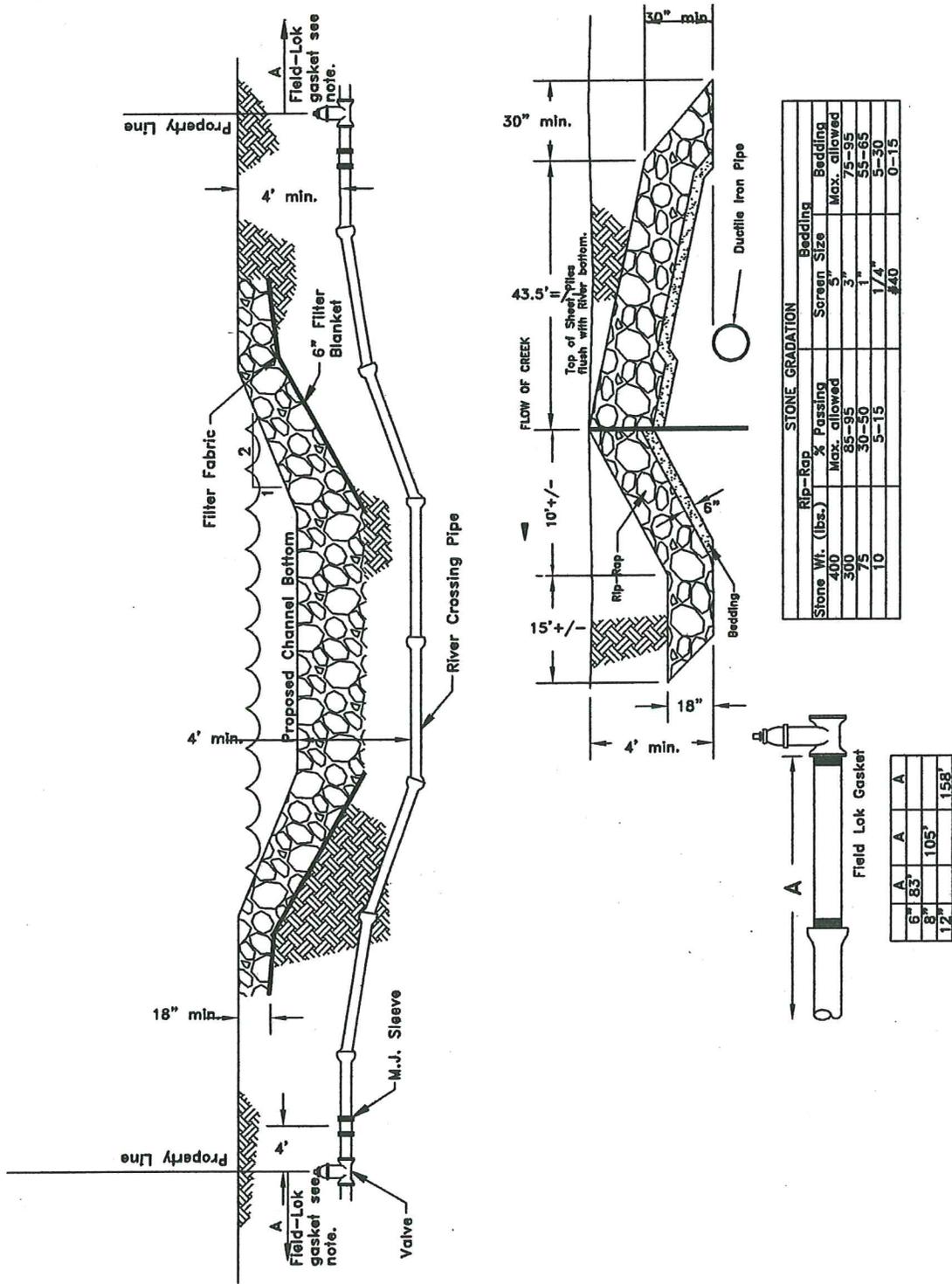
1. REPLACE EXISTING DRIVE WITH MATERIAL NOTED IN SCHEDULE.
2. WHERE "W" EXCEEDS 14', CONSTRUCT CONTRACTION JOINT AT CENTERLINE.

### TYPICAL DRIVEWAY PLAN

WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NUMBER 28  
APPROVED BY: SH.  
DRAWN BY: LW. DATE: 4/18/05

CD-28

# INDEPENDENCE WATER DEPARTMENT



## TYPICAL RIVER/CREEK CROSSING

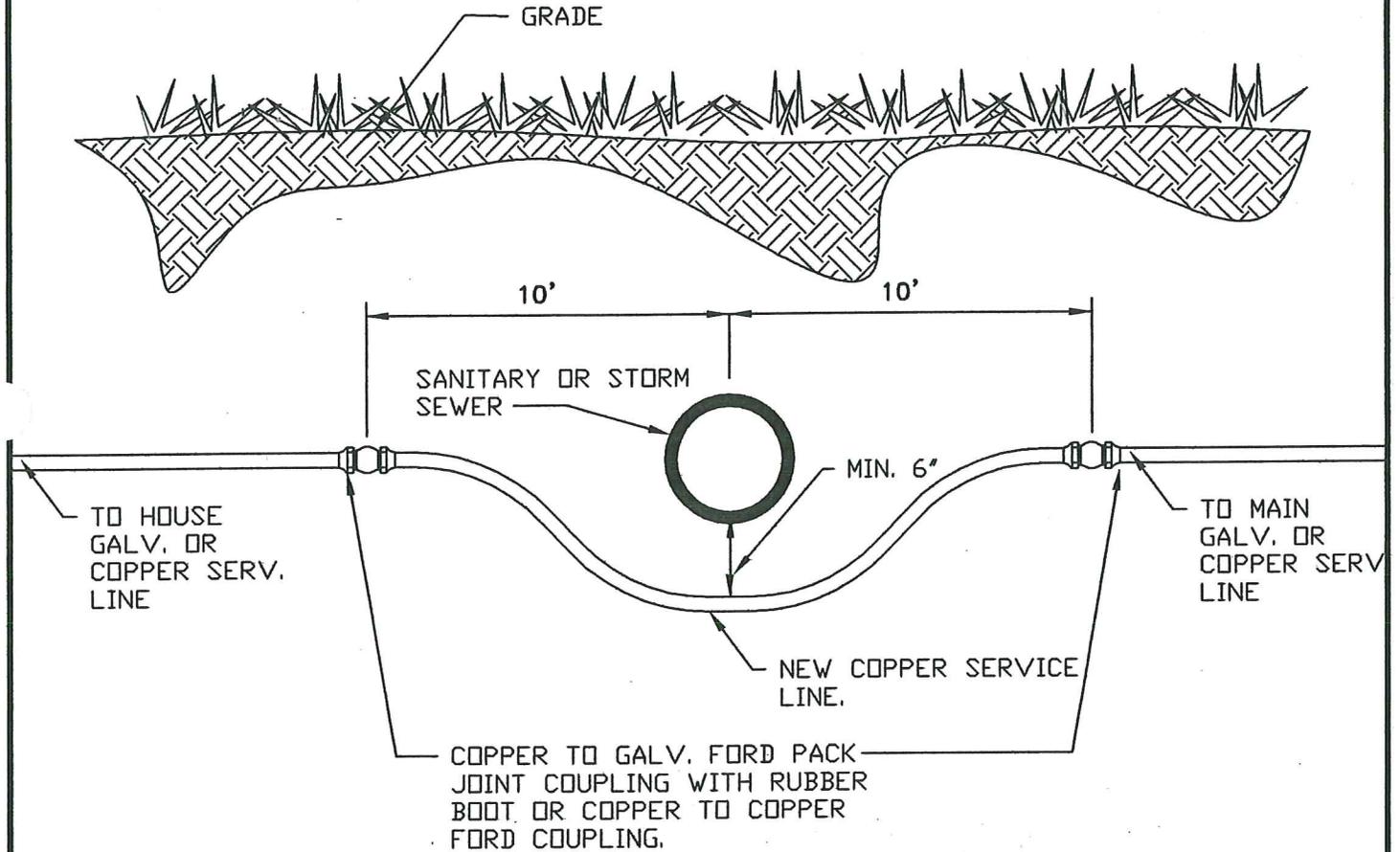
WATER DEPARTMENT  
 CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NUMBER 29

DRAWN BY: CJ    DATE: 9/12/08    APPROVED: SH

CD-29

Subject to change without notice

INDEPENDENCE WATER DEPARTMENT



SERVICE UNDER STORM OR SANITARY SEWER

NO SCALE

NOTE:

IF SERVICE MUST GO UNDER SANITARY SEWER  
THE SANITARY SEWER MUST BE ENCASED IN  
CONCRETE.

SERVICE UNDER STORM OR SANITARY SEWER

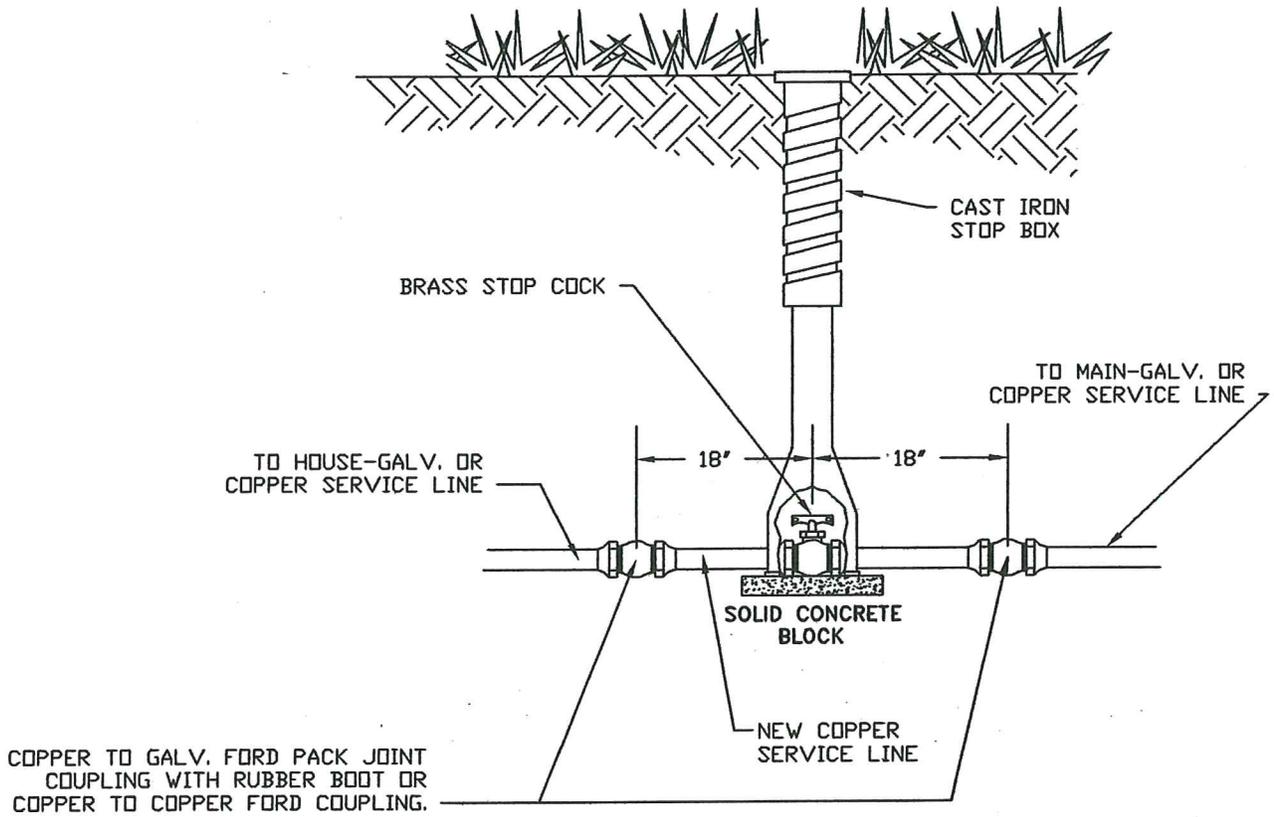
WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NO. 30

Approved by SDH  
Date 4-3-2007

Drawn by MJF

CD-30

INDEPENDENCE WATER DEPARTMENT



CUTTING IN A CURB VALVE

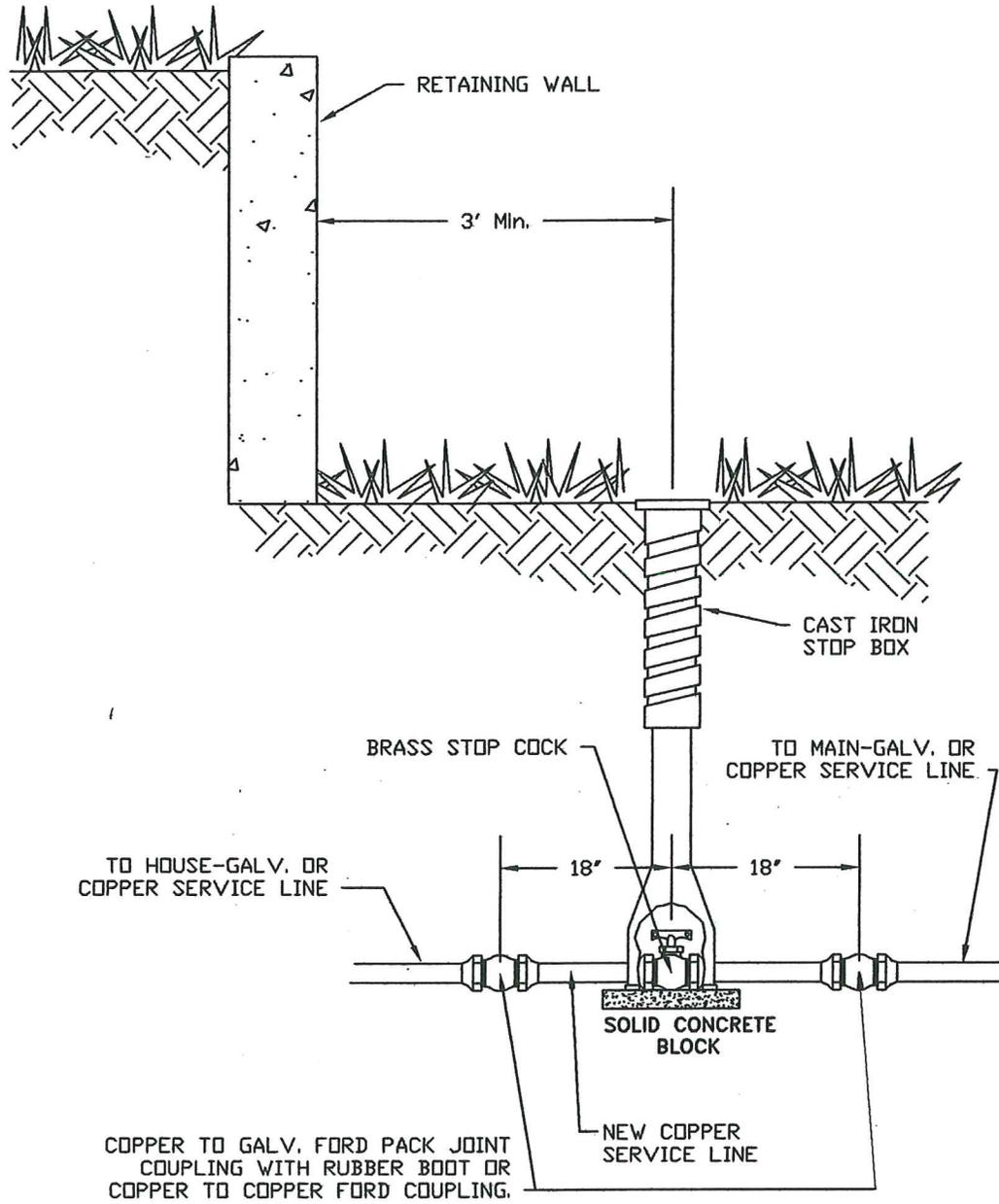
WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NO. 32

Drawn by CJ

Approved by SDH  
Date 4-28-2011

CD-31

INDEPENDENCE WATER DEPARTMENT

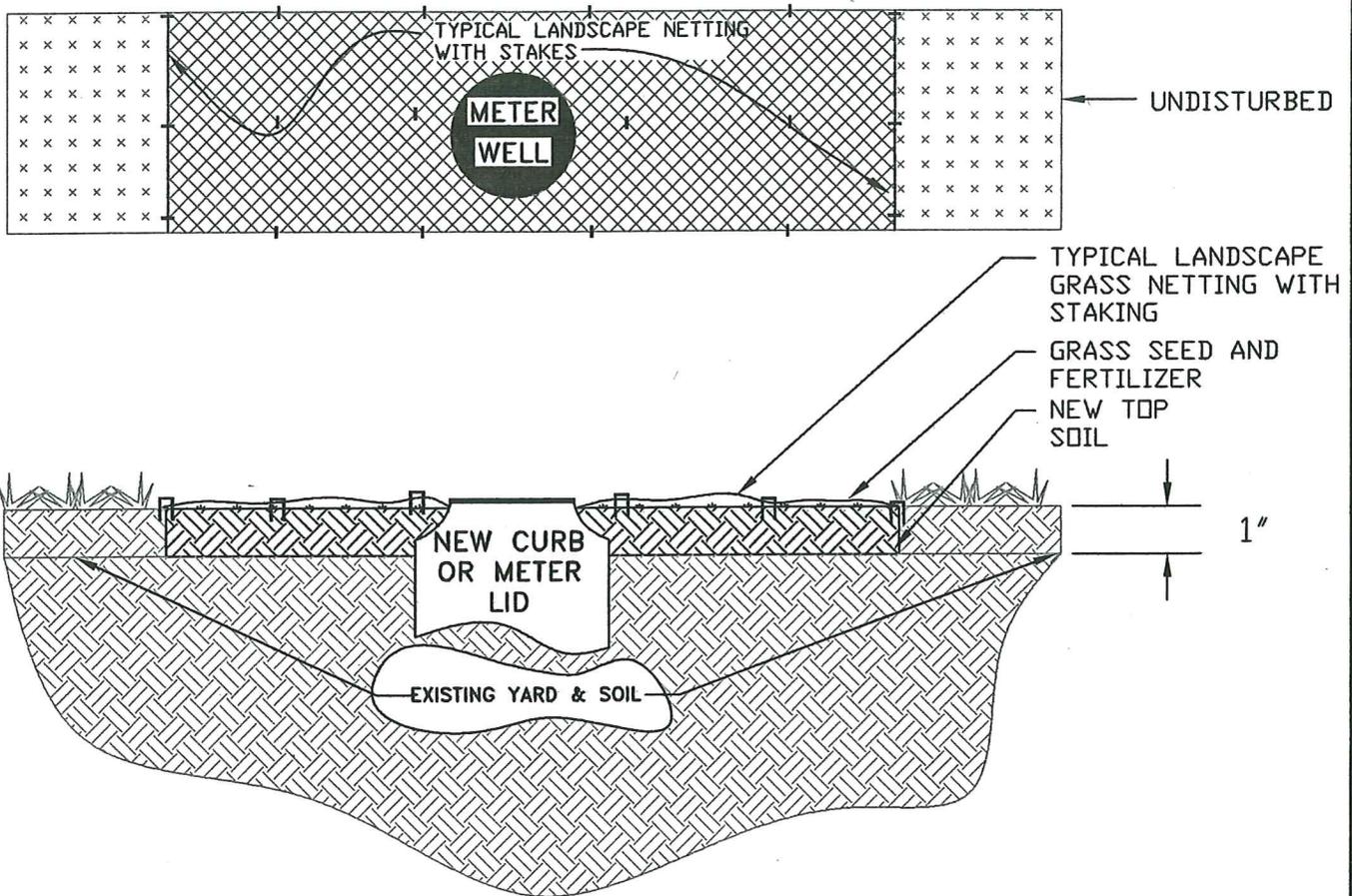


CUTTING IN A CURB VALVE  
WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
CONSTRUCTION DETAIL NO. 32

Approved by SDH  
Date 4-28-2011

Drawn by CJ

CD-31A



## GRASS SEED PLACEMENT AND CARE

NOT TO SCALE

### NOTES:

- 1) CONTRACTOR WILL CLEANLY CUT THE AREA TO BE SEEDED TO A DEPTH OF 1", REMOVE EXISTING DIRT AND REPLACE WITH TOP SOIL.
- 2) CONTRACTOR WILL SPREAD SEED AND STARTER FERTILIZER IN DISTURBED AREAS ONLY EITHER FROM CONSTRUCTION OR TRAFFIC AREA OF CONTRACTORS EQUIPMENT.
- 3) CONTRACTOR WILL CONTACT PROPERTY OWNERS FOR OWNERS APPROVAL.
- 4) TYPICAL LANDSCAPE GRASS NETTING WILL BE PLACED AND STAKED DOWN ON DISTURBED AREAS. THE STAKES SHALL BE PLACED THROUGH OUT THE NETTING EDGE AND MIDDLE. STAKE SPACING WILL VARY FROM AREA TO AREA.
- 5) ALL CURB AND METER LIDS IN SEEDED AREA ARE TO BE RAISED TO BE GROUND LEVEL. NO CURB OR METER LIDS ARE TO BE UNDER THE TOP SOIL.

TYPICAL GRASS SEED & FERTILIZER PLACEMENT & CARE  
 WATER DEPARTMENT CITY OF INDEPENDENCE, MISSOURI  
 CONSTRUCTION DETAIL NO. 29

Approved by: SDH  
 Date: 4-26-2007

Drawn by: MJF

CD-32

