

DIVISION IV MATERIALS**Section 400 Approval of Materials**

This section of specifications sets up the requirements governing the quality of the various materials specified for use in construction water systems in Keedysville.

All pipe, fittings and other related materials used in construction of water systems, shall be approved by the Town and be in compliance with the specifications and standards of the Town of Keedysville as set forth herein.

Contractor is to not purchase any materials for the contract until the proper documentation describing the materials has been submitted to and approved by the Town. Use standard detail W-47.

Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.

Representative samples of materials, intended for incorporation in the work, shall be submitted, when indicated or directed, for examination and/or test. Quantities of such samples shall be as herein indicated.

Whenever reference is made to the requirements of the A.S.T.M. (American Society for Testing Materials), A.W.W.A. (American Water Works Association), A.S.A. (American Standards Association) or other standard specifications or codes, the latest modifications or revisions of such specifications shall be applicable for use.

On certain types of materials, the contractor must purchase so called "proprietary materials" meaning that only style or one brand and model number is acceptable. This requirement is necessary to assure certain functional and inventory control requirements. Some of the components of Keedysville's water system must be identical to the components used by the Town of Boonsboro unless stated otherwise in the paragraph for a particular material or component, whenever a manufacturer's name is used in these standard specifications, it is used to designate a standard of quality. The use of said manufacturer's name does not eliminate other manufacturer's equipment and materials equally as good and efficient and that can perform the same function, fit in the same situation, and can be readily serviced and maintained.

Section 401 Water Main Pipe and Fittings

New water mains shall be ductile iron pipe (dip.). New water service piping shall be type "k" copper.

Ductile iron pipe (dip.) - 4" and larger type "k" copper - 3/4" to 2"

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The contractor shall furnish to the Town sworn statements that the inspections and all specified tests have been made and the results thereof comply with the requirements of these specifications.

The contractor shall furnish without charge, necessary labor and equipment to assist in performing an inspection of pipe and fittings after delivery to job site. All pipe and fittings shall be subject to reasonable tests as to strength and other characteristics and the contractor shall furnish without charge, specimens for test as specified in the section entitled "tests".

A. Ductile Iron Pipe (D.I.P.)

1. Ductile iron pipe shall be manufactured in accordance with the requirements of AWWA/ANSI C151/A21.50-02. Push-on joints for such pipe shall be in accordance with AWWA/ANSI C-111/A21.11-07. Pressure class of pipe is to be 350 PSI and thickness class of pipe is to be class 52, in accordance with AWWA/ANSI C-150/A21.50-02. Pipe interior wall shall have cement mortar lining and seal coating in accordance with AWWA/ANSI C104/A21.4-03. Laying length of pipe shall be 18 or 20 feet.

B. D.I.P. Fittings

1. Fittings for use with ductile iron pipe shall be of the compact style and meet the requirements of AWWA /ANSI C-153/A21.53-06. Fittings shall have mechanical style joints and shall be rubber-gasketed in accordance with AWWA/ANSI C-111/A21.11.00. Fitting interior wall shall have a cement mortar lining and seal coating in accordance with AWWA/ANSI C104/A21.3-03.

Fittings shall be coated with asphaltic material on the outside surface and cement-mortar lining on the inside. Fusion-bonded epoxy on the inside lining and outside is permitted

2. No more than ten percent (10%) of the pipe laid shall be less than ten feet (10') laying lengths.

C. Cast-iron mechanical joint pipe fittings (existing cast iron pipe)

1. All cast-iron fittings shall be class 250 standard mechanical joint fittings conforming with AWWA C110-03) titled "American Standard for Cast-Iron Fittings, 2 inch through 48 inch for water and other liquids, with mechanical standard for rubber gasket joints for cast-iron pressure pipe and fittings".

2. Fittings shall be complete with bolts, nuts, glands and plain rubber gaskets, and shall be cement-mortar lined in accordance with ANSI A21.41964 (AWWA C104-03).

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Section 402 Gate Valves

Gate valves shall be iron body resilient seated with nonrising stem and mechanical joint ends and shall conform to ANSI/AWWA C-509-01.

The sealing mechanism shall provide zero leakage at working pressures up to 200 PSI against line flow from either direction.

The stem and stem nut shall be of high strength bronze conforming to copper development association (CDA) alloy specifications. The stem nut shall be independent of the gate to prevent twisting or angling of the stem.

The stem shall be sealed by two O-rings above the stem collar and one o-ring underneath the stem collar to seal bearing surfaces. The area between the O-rings shall be filled with lubricant.

All internal and external surfaces of the valve including the interior of the gate shall be coated with epoxy prior to assembly.

Valves shall open left, counter-clockwise. Valves shall be as manufactured by American Darling or approved equal.

Section 403 Roadway Valve Boxes

A. Valve 3/4" through 2-1/2" shall be cast iron roadway valves boxes. The boxes shall be a two piece screw-type adjustable. The bottoms shall be arched, made of gray cast iron, and shall have a coal tar epoxy coating. The boxes shall be 3 to 4 foot long with 41/411 shaft, with one adjustment. Mid box extensions may be required for grater depths.

B. Valves boxes 3" and larger shall be cast iron roadway valve boxes. The boxes shall be two piece screw-type adjustable. The bottoms shall be round, made of gray cast iron, and shall have a coal tar epoxy coating. The boxes shall be 3 to 4 feet long with s-1/411 shaft, with one adjustment. Mid box extensions may be required for greater depths.

Boxes must have large diameter bell so that the diameter of the opening of the bell prevents the bell from sitting on either the valve body or the main pipe. The static weight of the valve box and dynamic weight from vehicular traffic must not transfer downward force to the valve body or main pipe. See W-9.

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C. Valve box lids

Valve box lids shall fit the appropriate valve boxes. They shall be cast iron and shall have a coal tar epoxy coating. They shall be drop lid, which is compatible with the tops of the various valve boxes and shall be marked "water". All boxes shall be Mueller Company NO. H-10360 or approved equal.

Section 404 Tapping Sleeves and Tapping Valve

Tapping sleeves shall be standard mechanical joint, full circle, two (2) closure gaskets length of sleeve, 200 PSI working pressure with recess outlet flange conforming to 125 lbs. ANSI B16.1 standard, American Darling & Mfg. Co., and A.P. Smith company, or dresser style 1174, or equal.

Tapping valve shall conform to the same specifications as gate valves herein described, except that one connecting end shall be flanged with recess to match the tapping sleeve. American darling

Valve & Mfg. Co., A.P. Smith Company, dresser/M&H style 751. Or equal.

Cut-in sleeves shall be Mueller type H-840 or equal. Cut-in valves shall meet the requirements specified hereinbefore for gate valves and shall be Mueller type 862 or equal. Gaskets shall be as recommended by the manufacturer.

Section 405 Fire Hydrants

Fire hydrants shall comply with AWWA standard C-502-05. It shall be designed for 300 PSI test pressure and 150 PSI operating pressure. It shall be 5-1/4 inch in diameter with 2" - 2-1/2" hose connections and 1" - 4-1/2" pumper truck (steamer) connection. Nozzle threads shall comply with national standard dimensions. Hydrant valves shall open left. Nozzle height above the ground shall be 18 inches (minimum). The hydrants shall be equipped with a mechanical joint shoe outlet and automatic drain valves. Nozzle caps with attachment chains shall be attached. It shall be a "break-away" type hydrant equipped with "quick-fix" bolts. The main hydrant valve, controlling flow into the barrel, shall remain closed if the hydrant bonnet is broken off. Hydrants shall be the B-84-B by American Darling Valve and Manufacturing Company.

The hydrant shall connect to the main line by a main line tee, (hydrant) valve, 6" dip., and megalugs or all-thread rod to the tee.

Hydrant markers are specified as "hydra-flag," figure a, five feet (5') in length, made by Rodon Corporation.

Section 406 **Mechanical Joint Restraints**

A. Ductile iron pipe, 4 to 12-inch diameter sizes

1. Megalugs by Ebba Iron Sales, Inc.

Restraints shall be manufactured of ductile iron conforming to ASTM A536. The restraint devices shall be coated using mega-bond.

Restraints shall hold with a wedge action and be rated for a minimum working pressure of 300 PSI.

A. Megalug series 1100, for new pipe installations

B. Megalug series 1100sd, for existing installations

C. Megalug series 1100sdb, mid-span restraint

D. Megalug series 1700, restraint harness for push-on joints, new installations

E. Megalug series 1100hd, restraint for existing push-on joints

2. Uni-flanges by Ford Meter Box Co., Inc.

Wedge action retainers shall be made of ductile iron in accordance with ASTM A536. Retainers shall be rated for a minimum working pressure of 300 PSI.

A. Uni-flange, series 1400-da, for mechanical joint fittings

B. Uni-flange, series 1450, for push-on joints, new installations

Section 407 **Service Saddles**

Service saddles shall be a single unit. The upper and lower castings are permanently hinged together with a stainless steel pin and a stainless steel bolt. The lower casting is tapped to accept the screw so that no nuts are required. Body shall be of ample width to provide greater distribution or clamping pressures to avoid

Crushing the pipe. Body and strap shall be 85-5-5-5 brass per ASTM-B-62 and AWWA C-800. Bolt shall be slotted hex head 18-8 stainless steel. Gasket shall be buna-n rubber "O" ring gasket. Service saddles shall be Ford Model S-90 or approved equal.

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Section 408 Service Connection Piping

A. Type "k" copper

Copper service piping shall be in conformance with the requirements as set forth in ASTM B-88, for seamless type K copper.

B. Service Fittings

Service fittings shall use pack joint, compression type joints consisting of a compression nut sealed by a beveled buna gasket locked in place by a stainless steel set screw. The compression nut shall have machined grooves in a split clamping devise for gripping tubing and a tap for the set screw.

Section 409 Corporation Stops

Only components made by Ford and specified below are acceptable.

A. 3/4-inch size tubing, Ford FL000-3

B. 1-inch tubing, Ford FL000-4

Section 410 Meter Settings—5/8 X 3/4 Size

Only components made by ford and specified below are acceptable.

A. Single Meter Settings

1. Angle yoke key valve, 3/4-inch size: av94-323-w
2. Angle yoke key valve, 1-inch size: av94-324-w

B. Double Meter Settings

1. Angle yoke key valve: av91-323-w
2. U-branch piece: u48-43 with 7.5-inch spacing

Note: Angle yoke key valve fittings are installed at the inlet side of the meter

C. Common to Both Single and Double Meter Settings

1. Expansion Connection: EC-23
2. Iron yoke bar: Y502
3. Dual check valves: HHCA94-323D

Note: Dual check valves are installed at the outlet side of the meter.

Section 411 Water Meters

A. All meters of 5/8 x 3/4-inch size must be obtained from the Town Office

Section 412 Meter Enclosures

A. Grassy Areas Only--Round Meter Enclosure

1. Single Meter Settings: Mid-States MS 18 x 30 (18-inch diameter by 30 inches tall)
2. Double Meter Settings: Mid-States MS 24 x 30

B. Paved and traffic areas

Precast meter round enclosure of size in A. above. Vault is made of a pipe section in accordance with ASTM C-141, light-weight aggregate concrete having a 28-day strength of not less than 3500 PSI.

C. Enclosure Box Cover: Ford A-32

D. Meter lid: obtain from Keedysville Town Office. Lids must be compatible with Town's electronic meter reading equipment.

E. Vault Extension Rings--Double Meter Settings Ford EXT-1
(adapts 18-inch covers to 24-inch vaults)

F. Enclosure Risers (raise cover & lid to higher grade elevation)
Ford: ER25AW (raises 2.5 inches Ford: ER4AW (raises 4 inches)
Mid-States: 18-inch dia x 3-inch rise
Mid-States: 18-inch dia x 6 inch rise

Section 413 PVC Casing Pipe—For Services

All service piping crossing under the full width of paved surfaces shall be installed in SCH. 40 PVC casing pipe with approved end seals as specified herein. See std. Detail W-13.

Solvent cement joint pressure pipe shall comply with ASTM D-2241 (SDR-21) specifications. Bell-end pipe shall meet the requirements of ASTM D-2672. Solvent cement shall be from the same supplier as the Pipe, and shall meet the requirements of ASTM D-2564. PVC couplings for jointing spigot end pipe shall be extruded type having a beveled entrance.

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An approved PVC cement shall be used where piping is to be joined. PVC cement shall be manufactured in accordance with the standards of ASTM D-2564 and have a NSF rating. Solvent cleaner shall be used in conjunction with PVC cement and shall be by same manufacturer as approved PVC cement. PVC solvent shall be rectorseal bill solvent primer and PVC cement shall be rectorseal hurricane homer solvent primer and PVC cement shall be rectorseal hurricane homer solvent cement, or compatible approved equals.

Section 414 Blank**Section 415 Blank****Section 416 Blank****Section 417 Blank****Section 418 Blank****Section 419 Concrete**

All classes of concrete shall conform to the Maryland State Highway Specifications and the ASTM specifications for Portland Cement, ASTM C-150, and aggregates, ASTM C-33, and shall be acceptable to the Town.

A. Cement

1. Type I Portland cement shall be used in general concrete construction when the special properties specified for type II is not required and/or as shown on the standard detail drawings herein, or as directed by the Town.

2. Type II Portland cement shall be used in general concrete construction exposed to moderate heat of hydration is required and/or as shown on the standard detail drawings herein or as directed by the Town.

B. Aggregates

1. Fine aggregate shall consist of natural sand, manufactured sand or a combination thereof.

2. All other aggregate shall consist of graded crushed limestone material.

3. Concrete bonding agent

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Where directed by the Town a bonding agent shall be applied to bond new concrete to existing concrete and shall be Weldcrete as manufactured by Larsen Products Company, Perma-Lok as manufactured by Sinclair Paint Company or other approved equal. Surface preparation, application and curing shall be in strict accordance with the manufacturer's recommendations.

Section 420 **Mortar**

Mortar for laying masonry shall conform to the requirements of ASTM designation C-270 specifications and shall be composed of the following: cement - ASTM C-175, type IIA, masonry cement (if specified - C-91, type II, aggregates - C-144 and water.

Mortar conforming to the proportioned specifications shall be proportioned by volume and shall be one part cement, two parts fine aggregate and water.

Water used in mixing mortar shall be fresh, clean and free from injurious amount of oil, acid, alkali or organic matter or other deleterious substances.

The ingredients must be in proportions that can be controlled and accurately maintained by measurement and not by estimation. All cementitious materials and aggregates shall be mixed for a minimum period of three (3) minutes, with the amount of water required to produce the desired workability, in a drumtype batch mixer. Hand mixing of mortar will be permitted on small jobs with approval from Town representative.

No greater quantity of mortar shall be prepared than is required for immediate use, and any mortar that has set shall not be retempered or used in any way, mortar which has been mixed more than one (1) hour shall not be used.

Special and approved precautions shall be taken in the moving and use of mortar during freezing weather.

Section 421 **Non-Shrink Grout**

Grout for anchoring or patching shall consist of a quality controlled hydraulic cement which, when mixed with specific amounts of water will provide a homogeneous mixture to provide a Quick Setting, Non-Shrinking, Non-Metallic, Controlled Expansion Cement. Non-shrink grout shall be Preco, Thorgrip or Watergrip or Waterplug as manufactured by THOR system products, Blend-Crete as manufactured by Chesco Creative Products, or other approved equal. Installation shall be in strict accordance with the manufacturer's recommendations.

Section 422 **Brick**

Brick intended for use in structures associated with water line construction shall conform to the requirements of ASTM designation C-32 grade ma.

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Brick shall conform to one set of the following dimensions based on their availability in the area of the project in the size specified.

4" x 8-1/2" x 2-1/2" (3" or 3-1/2") 3-3/4" x 8" x 2-1/2"

Lugged paving brick, cored brick, or brick having recesses or openings extending through the body of the brick shall not be used. Brick shall be culled after delivery and no culls shall be used except as may be allowed by the Town.

Section 423 **Concrete Grade Rings--Blank**

Section 424 **Manhole Sections - Precast--Blank**

Section 425 **Manholes Bases - Precast And Cast-In-Place--Blank**

Section 426 **Manhole Steps--Blank**

Section 427 **Pipe To Manhole Seals**

Flexible seals through which pipes are inserted into the wall of a precast base and riser section, shall be elastomeric material conforming to the physical requirements for natural rubber, synthetic rubber, or a blend of both, as specified in ASTM C-361 specifications for reinforced concrete low head pressure pipe. Alternatively, the flexible seals may be manufactured from poly vinyl chloride material or neoprene material conforming to the physical material, Specification of the Maryland Specification for Materials, Highways, Bridges, and Incidental Structures. The contractor shall submit shop drawings of the flexible seals proposed for use to the Town for approval. The shop drawings shall name the material from which the flexible seal is manufactured, shall indicate the depth of embedment of the flexible seal, and shall give the size of the annular space between the wall of the precast base and the wall of the pip. The drawings shall show these dimensions for accommodating pipe of various materials.

Flexible or water stop seals shall be installed where pipes are inserted into the walls of cast-in-place manhole bases, and the specifications shall depend upon the type pipe material being installed, and shall conform to the details as shown on standards for manhole pipe connections. Deviations from the standard details must have the approval of the Town representative.

Section 428 **Manhole Frames and Covers--Blank**

Section 429 **Anchor Bolts For Manhole Frames & Covers--Blank**

Section 430 **Bitumastic Protective Coating**

When indicated on the plans and specifications or directed by the Town, some materials shall be given a bitumastic protective coating. This coating shall consist of one (1) or more coats of bitumastic super service black, as manufactured by Koppers Company, Inc., or marine foundation as manufactured by Carboline Company or approved equal. The bitumastic material may be applied by brush or spraying. If sprayed, it must be applied at 70 square feet per gallon per coat. Each coat shall have a dry film thickness of 0.016 inches (16 mil).

Section 431 **Stone Aggregates**

All stone aggregate used in water line construction under these specifications shall be a quality limestone material graded to the size designations and other specifications of the Maryland State Highway Administration.

A. Below Sub-Grade Aggregate

Below sub-grade aggregate shall be Maryland State Highway #2 stone, CR-6 stone or as directed by the Town.

B. Sub-Grade/Pipe Encasement Aggregate

Sub-grade aggregate and pipe encasement aggregate to one foot above the pipe for water mains shall be CR-6 crusher run. Service piping shall be encased in Silica sand.

C. Select Backfill Aggregate

Select backfill material shall be CDR (dirty crusher run) stone. CRD is defined as granular material having from sixty (60) to seventy-five (75) percent limestone aggregate graded 1.5 inches (minus) with the remainder being soils. It shall have an optimum moisture content. No topsoil or organic material will be permitted, all material shall pass through a 1.5 inch screen.

Section 432 **Warning Tape**

Composition of warning and detectable tape shall consist of .50 mil thick, solid core, encased in a reinforced protective plastic jacket that is resistant to alkalis, acids and other destructive elements commonly found in soil. Over all thickness shall be 4.5 mil nominal and a width of 2 inches. Color shall be bright blue with printed black letters on one side stating:

CAUTION -- WATER LINE BURIED BELOW

Tape shall be Allen detectable as manufactured by Allen System. Tape shall be installed in conjunction with all water line mains, including service connections.

Section 433 Pipeline Insulators And Casing End Seals

Where permits from the Maryland State Highway Administration or Washington County Engineering Department allow for open cutting the pipeline trench (within a paved right-of-way), the contractor shall install a steel casing pipe to serve as a conduit for the water carrier pipe. Insulators shall be installed on the carrier pipe and end seals on the casing pipe.

Standard detail drawing W-28, details the use of end seals on the casing, spacing of the insulators and cavity seal (between the inside diameter of the casing and the outside diameter of the water line).

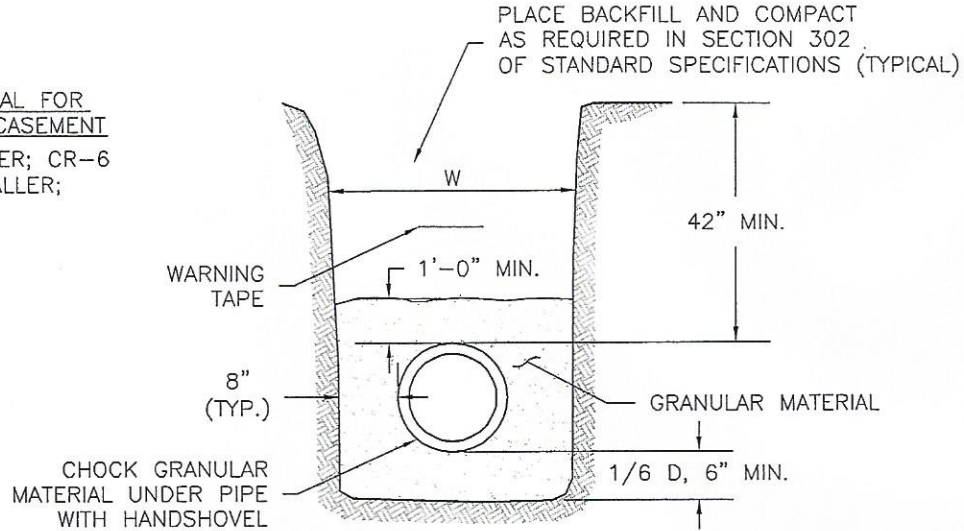
Casing insulators and end seals shall conform in design to model 60 Insulators and Multiflex molded end seals as Manufactured by Maloney Pipeline Products Company, T.D. Williamson, Inc. or an approved equal.

Section 434 Air Release Valve--Blank

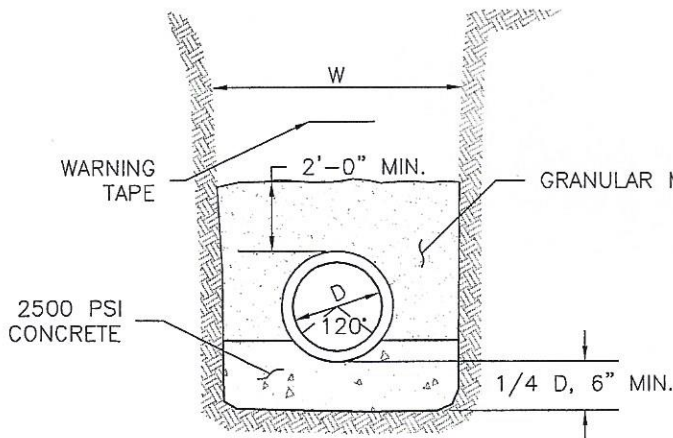
Section 435 Blow-Offs -- Blank

GRANULAR MATERIAL FOR
BEDDING AND ENCASEMENT

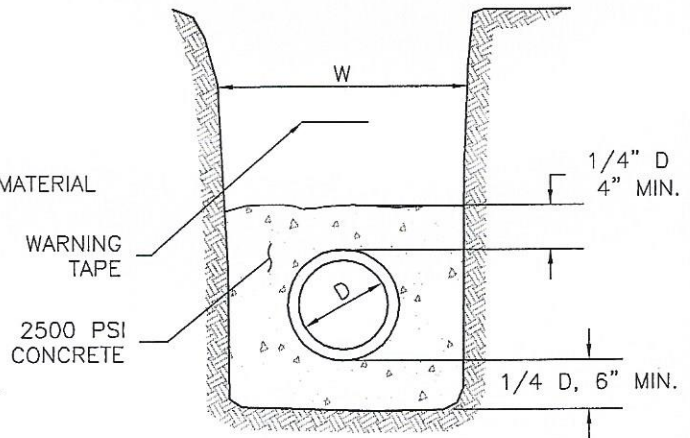
4" PIPE AND LARGER; CR-6
3" PIPE AND SMALLER;
SILICA SAND
SEE W-12



GRANULAR BEDDING & BACKFILL



LOW CRADLE



CONCRETE ENCASEMENT

**TOWN OF
KEEDYSVILLE**

**TRENCHING ENCASEMENT
AND CRADLE DETAILS**

JUNE 2008

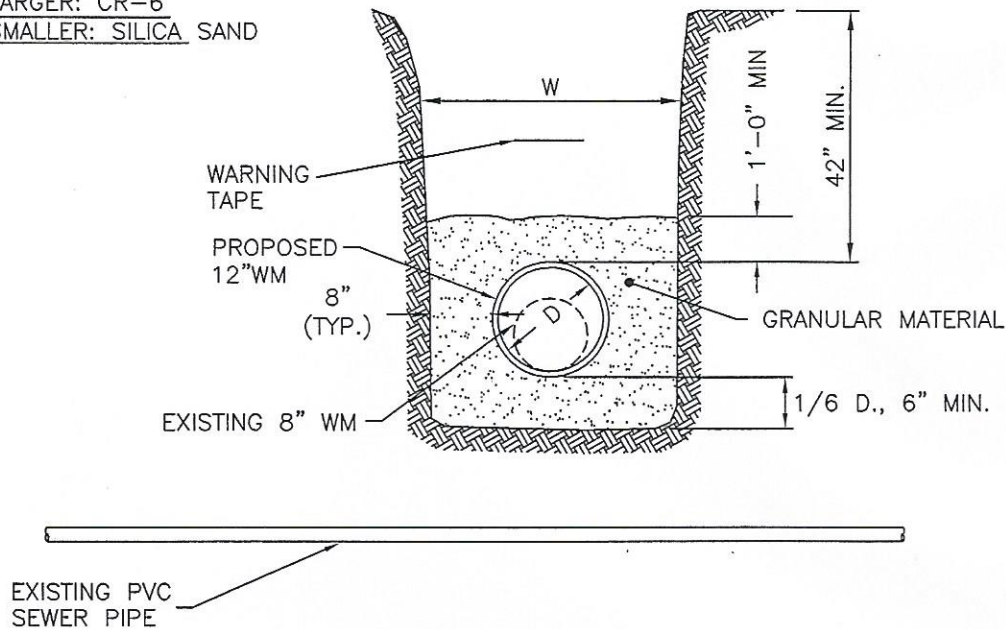
W-1

**GRANULAR MATERIAL FOR
BEDDING AND ENCASEMENT**

4" PIPE AND LARGER: CR-6

3" PIPE AND SMALLER: SILICA SAND

SEE W-12



GRANULAR BEDDING & BACKFILL

NOTE:

1. BEDDING UNDERNEATH PIPE IS TO BE 6" MINIMUM. IN THE EVENT THAT THE EXISTING TRENCH IS NOT DEEP ENOUGH TO ACCOMMODATE 6" OF BEDDING AND 42" OF MINIMUM COVER, THE THICKNESS OF BEDDING CAN BE REDUCED TO AS LITTLE AS 1.5".
2. IN THE EVENT THAT THE TRENCH IS STILL NOT DEEP ENOUGH, TEST PIT THE EXISTING PVC SEWER UNDERNEATH TRENCH AND EXCAVATE THE TRENCH BOTTOM DEEPER TO ACHIEVE THE MINIMUM 1.5" OF BEDDING AND 42" OF MINIMUM COVER
3. PLACE BACKFILL AS REQUIRED IN SECTION 302 OF STANDARD SPECIFICATION AND THE SHA PERMIT.

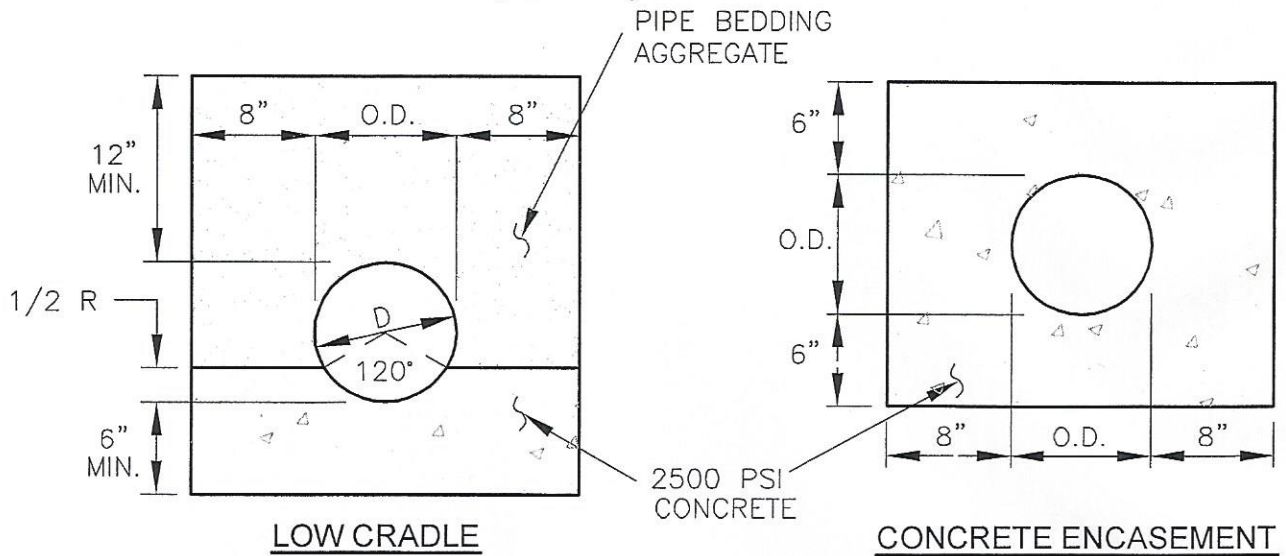
MAIN STREET-MODIFIED W-1

**TOWN OF
KEEDYSVILLE**

**MODIFIED
TRENCHING DETAILS**

JUNE 2008

W-1M



STANDARD BEDDING QUANTITIES SEE

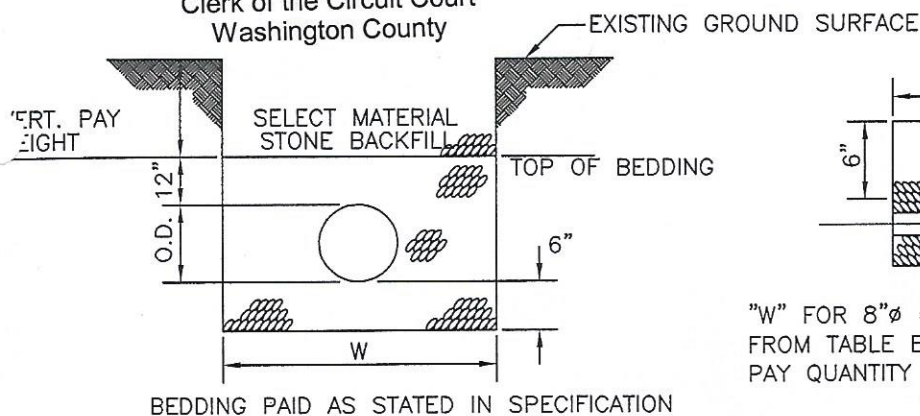
		CRADLE		ENCASEMENT
PIPE I.D.	NOMINAL O.D. FEET	CONCRETE C.Y. PER L.F.	BEDDING C.Y. PER L.F.	CONCRETE C.Y. PER L.F.
1-1/2"	0.159	.030	.061	.063
2"	0.198	.031	.064	.067
2-1/2"	0.240	.032	.067	.070
3"	0.292	.034	.071	.075
4"	0.372	.037	.077	.082
6	0.604	.045	.096	.104
8	0.792	.051	.111	.123
10	0.979	.058	.126	.141
12	1.170	.066	.142	.161
15	1.458	.077	.166	.192
18	1.753	.090	.192	.225
21	2.047	.103	.219	.259
24	2.333	.116	.246	.294
27	2.630	.130	.274	.331
30	2.917	.145	.302	.369
33	3.192	.159	.330	.406
36	3.458	.174	.357	.443

**TOWN OF
KEEDYSVILLE**

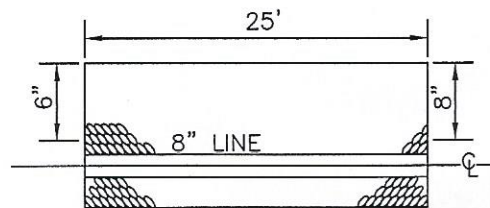
**CONCRETE CRADLES AND
ENCASEMENT QUANTITIES**

JUNE 2008

W-2



SECTION



"W" FOR 8"Ø = 2.1
FROM TABLE BELOW, PAY QUANTITY IS V.F./L.F.
PAY QUANTITY = 0.078 C.Y. x (6+8)/2 V.F. x 25 L.F.
= 13.65 C.Y.

EXAMPLE

NOTES:

- WATER MAIN VERTICAL HEIGHT SHALL ASSUME FOUR (4) FEET FOR PAYMENT. NO ADDITIONAL PAYMENT WILL BE MADE FOR EXTRA DEPTH.
- PAYMENT TO BE PAID PER VERTICAL FOOT PER LINEAR FOOT OF PIPE ACCORDING TO PAY QUANTITY TABLE SHOWN.
- VERTICAL PAYMENT HEIGHT TO BE MEASURED FROM THE TOP OF BEDDING TO THE GROUND SURFACE.
- VOLUME OF CRUSHED STONE TO BE CALCULATED AT AVERAGE STATION DEPTH & STANDARD STATION LENGTHS AS SHOWN ON GRADE SHEET.
- NO ADDITIONAL PAYMENT WILL BE MADE FOR EXTRA WIDTH OF MANHOLE RISERS OR OTHER APPURTENANCES.
- MEASUREMENT OF LENGTH TO BE PER GRADE SHEET OR CENTERLINE OF MAIN TO END OF LATERALS. MEASUREMENT OF LENGTH SAME AS PIPE.
- WATER MAIN AND LATERALS SHALL MEASURED ON A LINEAR FOOT BASIS OVER FOR ALL DEPTHS. NO ADDITIONAL PAYMENT WILL BE MADE FOR EXTRA DEPTH.

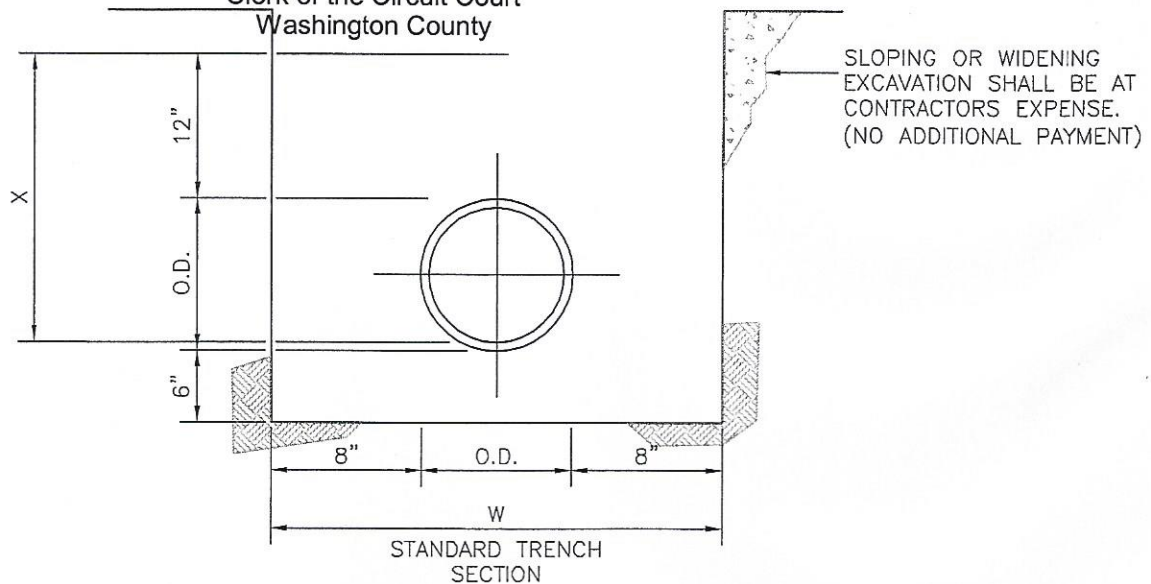
PAY LIMITS			
W (FT.)	C.Y. PER VERT. FT. PER L.F.	W (FT.)	C.Y. PER VERT. FT. PER L.F.
1.47	0.054	4.6	0.170
1.49	0.055	4.7	0.174
1.53	0.057	4.8	0.178
1.63	0.060	4.9	0.185
1.7	0.063	5.0	0.185
2.0	0.074	5.1	0.189
2.1	0.078	5.2	0.193
2.2	0.081	5.3	0.196
2.3	0.085	5.4	0.200
2.5	0.093	5.6	0.207
2.6	0.096	5.7	0.211
2.8	0.104	6.2	0.230
2.9	0.107	6.7	0.248
3.1	0.115	7.3	0.270
3.2	0.119	7.4	0.274
3.3	0.122	7.6	0.281
3.4	0.126	7.9	0.293
3.5	0.130	8.0	0.296
3.6	0.133	8.1	0.300
3.7	0.137	8.5	0.315
3.8	0.141	8.6	0.319
4.0	0.148	9.1	0.337
4.4	0.163	9.6	0.356

**TOWN OF
KEEDYSVILLE**

**SELECT MATERIAL BACKFILL
PAY QUANTITIES**

JUNE 2008

W-3



NOMINAL PIPE DIAMETER	AVERAGE O.D.	MAXIMUM PAY WIDTH FOR CONTINGENT ITEMS IN TRENCH	MINIMUM HEIGHT FOR ALL TYPE OF PIPE MATERIAL
		W	X
3/4"			1.01'
1"			1.02'
1-1/2"	0.159'	1.49' (MIN.)	1.15'
2"	0.198'	1.53' "	1.19'
2-1/2"	0.240'	1.57' "	1.23'
3"	0.372'	1.66'	1.48'
4"	0.372'	1.70'	1.40'
6"	0.604'	2.00'	1.60'
8"	0.792'	2.10'	1.70'
10"	0.979'	2.30'	1.90'
12"	1.170'	2.50'	2.10'
14"	1.362'	2.70'	
15"	1.458'	2.80'	2.40'
16"	1.590'	2.90'	
18"	1.753'	3.10'	
20"	1.949'	3.30'	
21"	2.047'	3.40'	
24"	2.333'	3.70'	

NOTES:

THE AVERAGE OUTSIDE DIAMETER (O.D.) SHALL
BE USED FOR ALL TYPES OF PIPE MATERIALS.

COST OF SPECIFIED BEDDING SHALL BE INCLUDED IN
THE UNIT PRICE PER LINEAR FOOT OF EXCAVATION
BACKFILL.

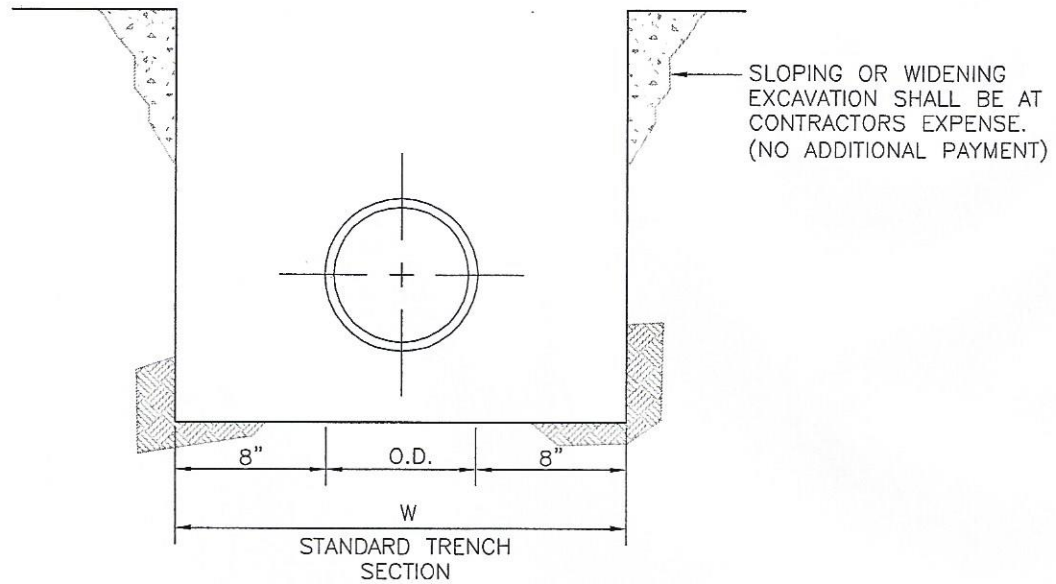
**TOWN OF
KEEDYSVILLE**

**STANDARD TRENCH DETAILS
PAYMENT WIDTH AND
STONE BEDDING**

JUNE 2008

W-4

Acts, Ordinances,
Resolutions - Towns
~~Clerk of the Circuit Court~~
Washington County

[illegible]

NOTES:

THE AVERAGE OUTSIDE DIAMETER (O.D.) SHALL BE USED FOR ALL TYPES OF PIPE MATERIALS.

TOWN OF
KEEDYSVILLE

STANDARD TRENCH DETAILS WIDTH FOR PAYMENT AND ESTIMATION

JUNE 2008

W-5

MINIMUM RESTRAINED LENGTH IN FEET

MEGALUGS OR UNIFLANGES - DUCTILE IRON PIPE

HORIZONTAL BEND - DIP

DIA	90	45	22.5	11.25
4	15	6	3	2
6	21	9	5	2
8	27	11	6	3
10	32	13	7	4
12	37	16	8	4

VERTICAL BEND - DIP (HUMP)

DIA	45	22.5	11.25
4	13	7	4
6	18	9	5
8	24	12	6
10	29	14	7
12	34	16	8

VERTICAL BEND - DIP (VALLEY)

DIA	45	22.5	11.25
4	3	3	2
6	8	4	2
8	10	5	3
10	12	6	3
12	14	7	4

TEE - DIP (with 5 feet restrained each side of main run)

12 x 12	57
12 x 10	39
12 x 8	20
12 x 6	1
12 x 4	1

REDUCER - DIP

12 x 10	24
12 x 8	43
12 x 6	59

DEAD ENDS - DIP

12	80
10	68
8	57
6	44
4	31

NOTES

1. SOIL WELL GRADED GRAVEL
2. SAFETY FACTOR 2 TO 1
3. TRENCH -- TYPE 4, PIPE BEDDED IN GRAVEL,
BACKFILL COMPACTED TO TOP OF PIPE
4. DEPTH OF BURY 3.5 FEET
5. TEST PRESSURE 200 PSI

CALCULATED 7-27-07

SEE INSTRUCTIONS SECTION
310 OF KEEDYSVILLE STANDARDS

**TOWN OF
KEEDYSVILLE**

**MECHANICAL JOINT RESTRAINTS
KEEDYSVILLE WATER PRESSURE**

DECEMBER 2008

W-6A

MINIMUM RESTRAINED LENGTH IN FEET

MEGALUGS OR UNIFLANGES - DUCTILE IRON PIPE

HORIZONTAL BEND - DIP

DIA	90	45	22.5	11.25
4	15	6	3	2
6	21	9	5	2
8	27	11	6	3
10	32	13	7	4
12	37	16	8	4

VERTICAL BEND - DIP (HUMP)

DIA	45	22.5	11.25
4	13	7	4
6	18	9	5
8	24	12	6
10	29	14	7
12	34	16	8

VERTICAL BEND - DIP (VALLEY)

DIA	45	22.5	11.25
4	3	3	2
6	8	4	2
8	10	5	3
10	12	6	3
12	14	7	4

TEE (with 5 feet restrained each side of main run) DIP

12 x 12	57
12 x 10	39
12 x 8	20
12 X 6	1
12 X 4	1

REDUCER - DIP

12 X 10	24
12 X 8	43
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DEAD ENDS - DIP

12	80
10	68
8	57
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NOTES

1. SOIL WELL GRADED GRAVEL
2. SAFETY FACTOR 2 TO 1
3. TRENCH --- TYPE 4, PIPE BEDDED IN GRAVEL, BACKFILL
COMPACTED TO TOP OF PIPE
4. DEPTH OF BURY 3.5 FEET
5. TEST PRESSURE 200 PSI

CALCULATED 7-27-07

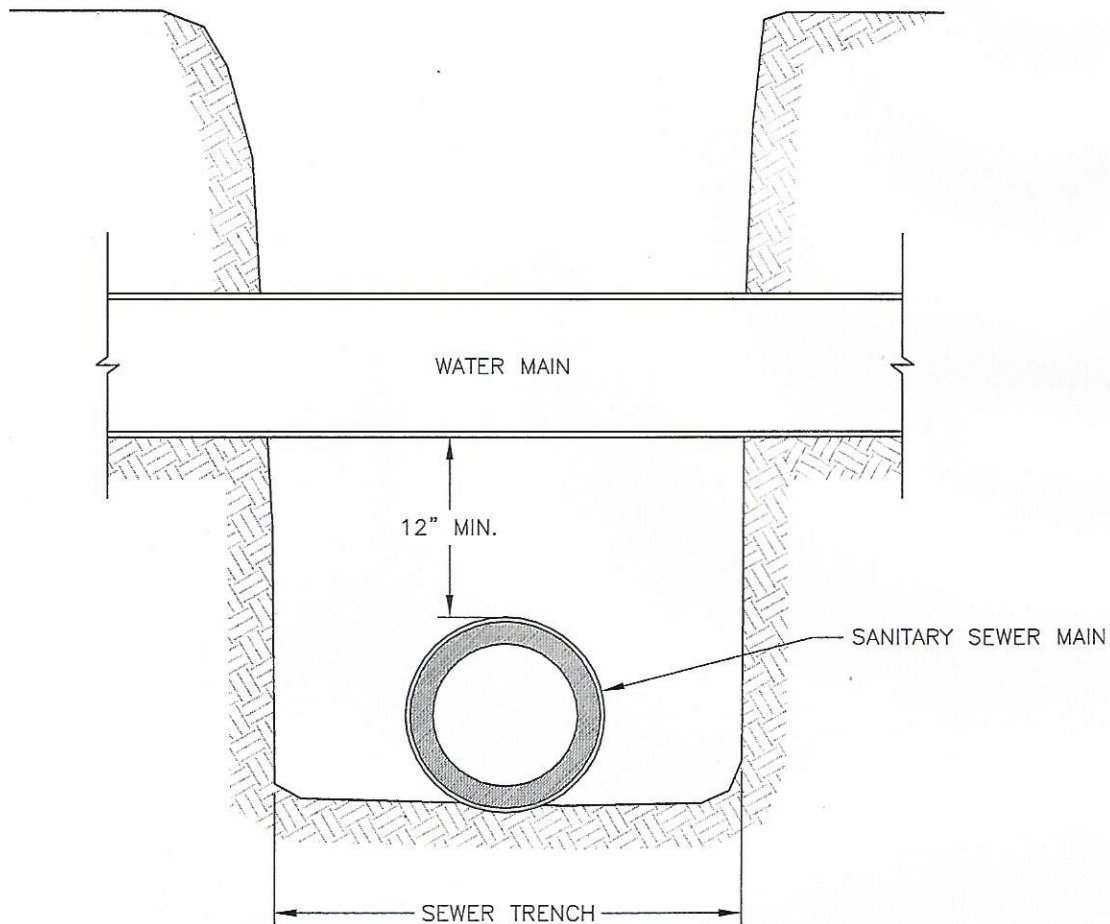
SEE INSTRUCTIONS SECTION
310 OF KEEDYSVILLE STANDARDS

**TOWN OF
KEEDYSVILLE**

**MECHANICAL JOINT RESTRAINTS
BOONSBORO WATER PRESSURE**

JUNE 2008

W-6B



SECTION

NOTES:

1. IF CLEARANCE IS LESS THAN 12" - ENCASE SEWER OR WATER LINE IN CONCRETE 10 FT MINIMUM EACH SIDE OF CROSSING. CONCRETE SHALL EXTEND TO THE FACE OF BELLS AT BOTH ENDS OF EASEMENT.
2. IF JOINT ON EXPOSED EXISTING WATER MAIN IS WITHIN THE LIMITS OF NEWLY CONSTRUCTED SEWER TRENCH, A BELL JOINT CLAMP SHALL BE PROVIDED ON THE WATER MAIN JOINT.
3. IF WATER MAIN IS BELOW SANITARY SEWER LINE, ENCASEMENT IS REQUIRED AS PER NOTE NO.1 ABOVE, REGARDLESS OF CLEARANCE. AN ALTERNATIVE TO THE ABOVE ENCASEMENT IS THE USE OF 20 FT LENGTHS OF PIPE SO THAT NO JOINT IS WITHIN 10 FT OF THE CROSSING.

**TOWN OF
KEEDYSVILLE**

**WATER AND SEWER
LINE CROSSING**

JUNE 2008

W-7

MECHANICAL JOINT PIPE

NOMINAL PIPE SIZE	DEFLECTION—INCHES		MINIMUM RADIUS (FT)	
	18FT LENGTH	20FT LENGTH	18FT LENGTH	20FT LENGTH
4	31	35	125	140
6	27	30	145	160
8	20	22	195	220
10	20	22	195	220
12	20	22	195	220
16	13.5	15	285	320
18	11	12	340	380
20	11	12	340	380
24	9	10	450	500

TYPE JOINT PIPE

NOMINAL PIPE SIZE	DEFLECTION—INCHES		MINIMUM RADIUS (FT)	
	18FT LENGTH	20FT LENGTH	18FT LENGTH	20FT LENGTH
4	19	21	205	230
6	19	21	205	230
8	19	21	205	230
10	19	21	205	230
12	19	21	205	230
16	11	12	340	380
18	11	12	340	380
20	11	12	340	380
24	11	12	340	380

NOTE: THE ABOVE CHARTS ARE IN ACCORDANCE WITH AWWA C-600.

**TOWN OF
KEEDYSVILLE**

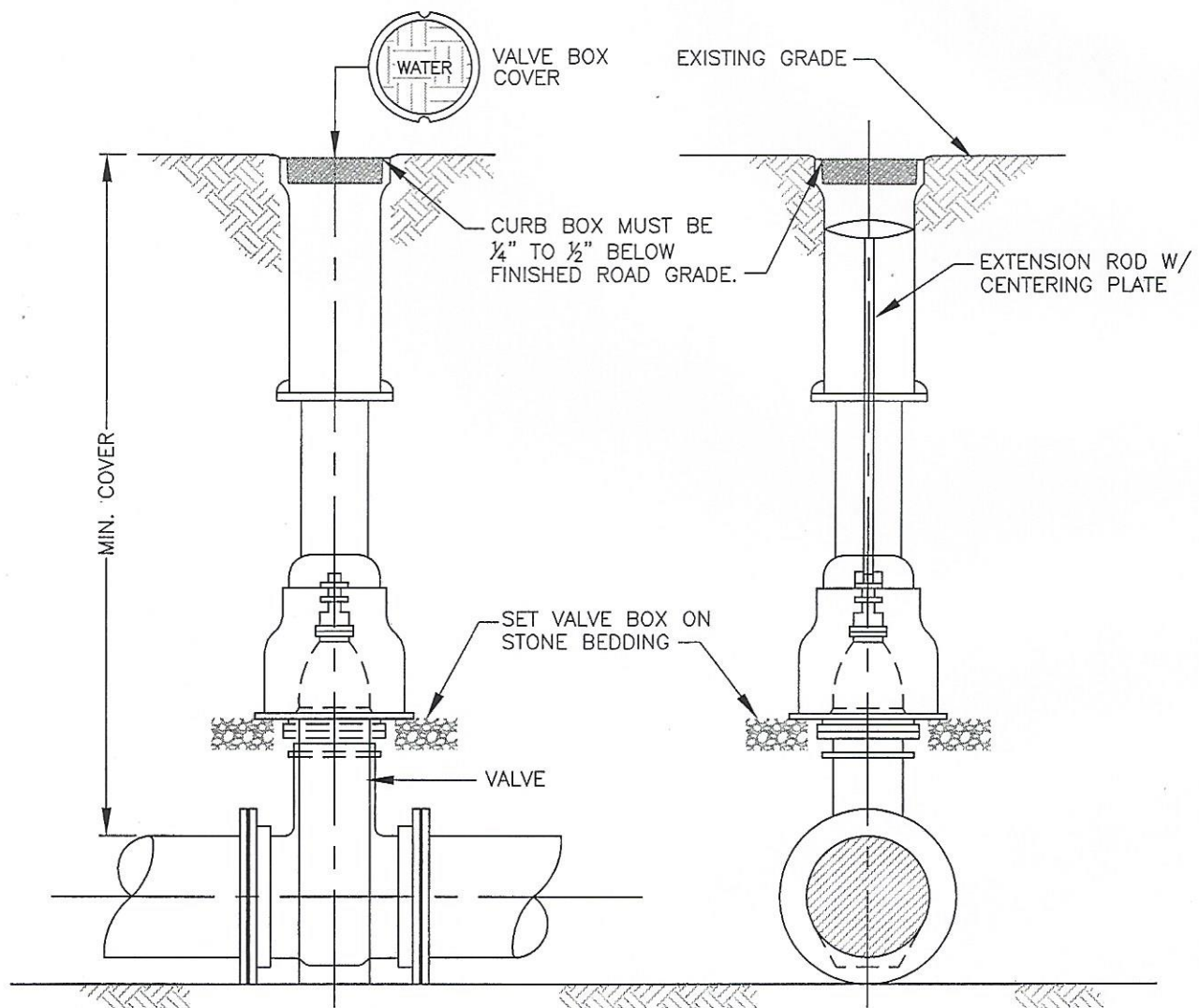
**CURVATURE OF
WATER MAINS**

JUNE 2008

W-8

NOTES:

1. VALVE BOX BASES SHALL BE SIZED AND INSTALLED SO THAT VALVE BOX CAN NOT TRANSFER LOADS TO VALVES. PLACE BASE ON STONE BEDDING.
2. VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADE TO ALLOW FUTURE 6" ADJUSTMENT UP OR DOWN.
3. VALVE BOXES SHALL BE CAST IRON OR COMBINATION OF P.V.C. AND CAST IRON SCREW TYPE.
4. THE FOLLOWING STD. IS TO BE ADHERED TO WHEN THE DISTANCE FROM THE FINISHED GRADE TO THE TOP OF THE OPERATING NUT OF VALVE EXCEEDS 5'-6".
 - A. EXTENSION STEM SHALL BE SECURELY WELDED TO GATE VALVE KEY.
 - B. SCREWS SECURING VALVE KEY TO VALVE NUT TO BE FLUSH WITH VALVE KEY.
 - C. LENGTH OF STEM TO BE SET TO THAT OPERATING NUT WILL BE LOCATED AS PRESCRIBED ABOVE.
5. PAINT ALL EXPOSED STEEL SURFACES WITH 2 COATS OF APPROVED BITUMINOUS PAINT.

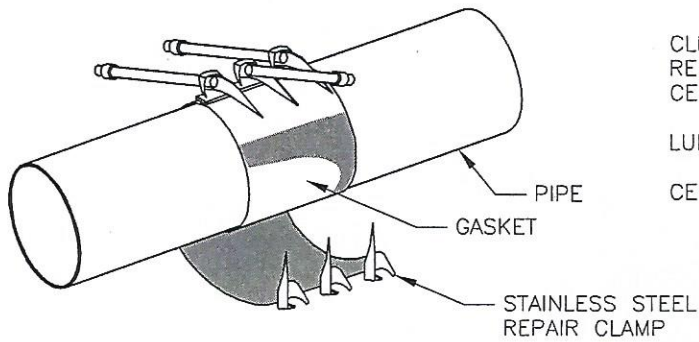


**TOWN OF
KEEDYSVILLE**

**VALVE & BOX
INSTALLATION**

JUNE 2008

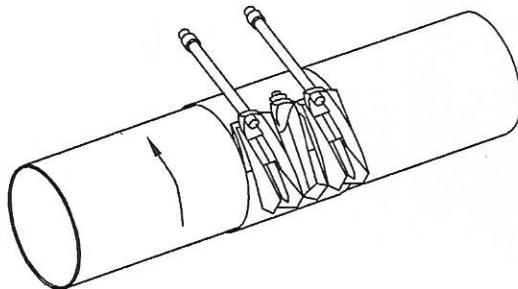
W-9



CLEAN PIPE AND MARK FOR POSITION WHERE REPAIR CLAMP IS TO BE INSTALLED FOR CENTERING OVER BREAK.

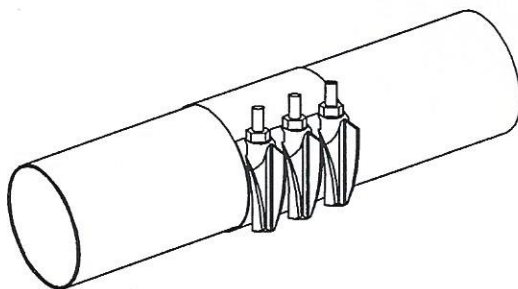
LUBRICATE PIPE WITH SOAP SOLUTION.

CENTER CLAMP OVER DAMAGED AREA.



TUCK TAPERED GASKET FLAP IN PLACE AND MASH LUG FINGERS. THEN ENGAGE CENTER BOLT AND TIGHTEN FINGER TIGHT.

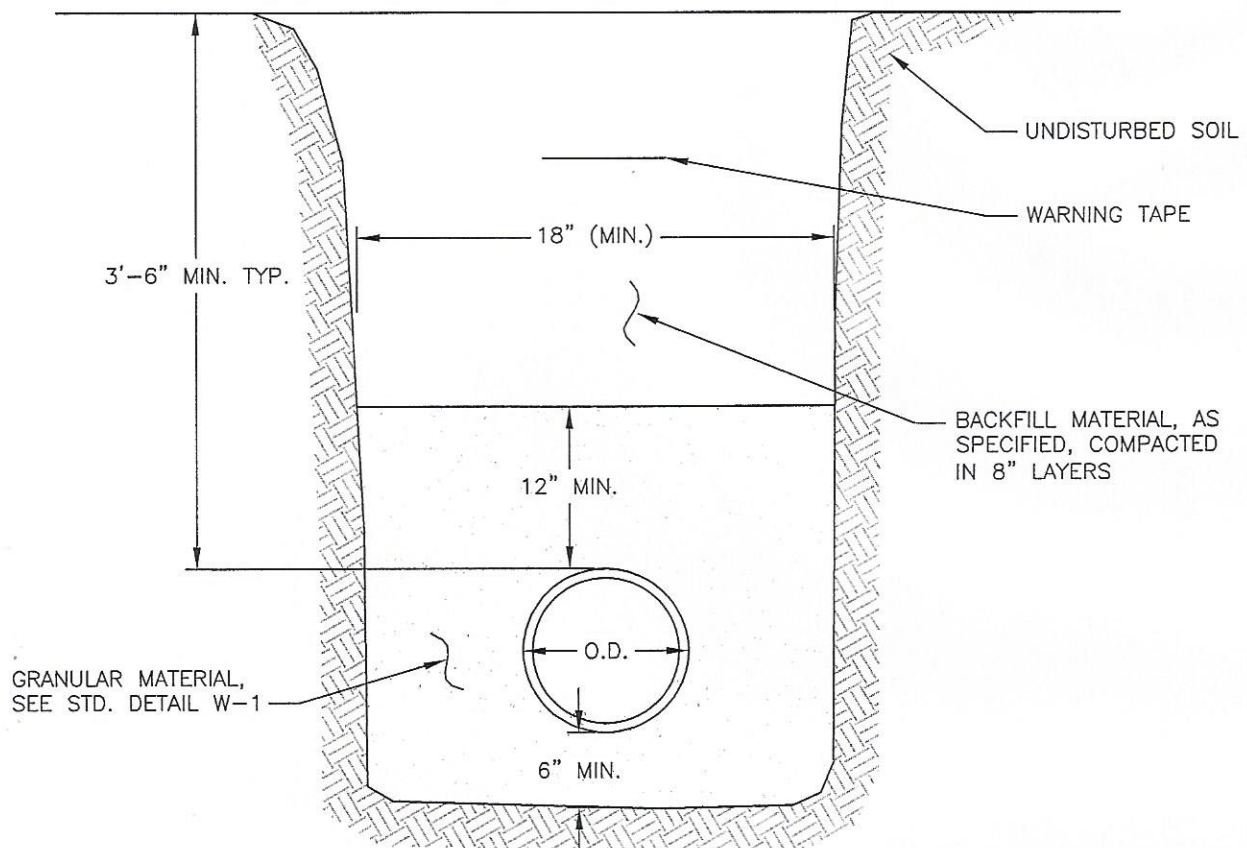
ROTATE CLAMP ON PIPE IN THE DIRECTION INDICATED BY ARROW TO SEAT GASKET FLAP SMOOTHLY ON THE PIPE.



ENGAGE REMAINING BOLTS AND TIGHTEN ALL EVENLY WITH A TORQUE WRENCH. ALL $\frac{5}{8}$ " BOLTS SHALL BE TORQUED TO 60-65 FT LB. AND ALL $\frac{3}{4}$ " BOLTS SHALL BE TORQUED TO 80-85 FT LB.

ON MULTI-BAND UNITS, EQUALIZE GAPS BETWEEN BANDS.

CONTRACTOR SHALL PROVIDE ROCKWELL FULL CIRCLE REPAIR CLAMP NOS. 226 OR 228 OR APPROVED EQUAL AT NO EXTRA COST TO TOWN OF KEEDYSVILLE.



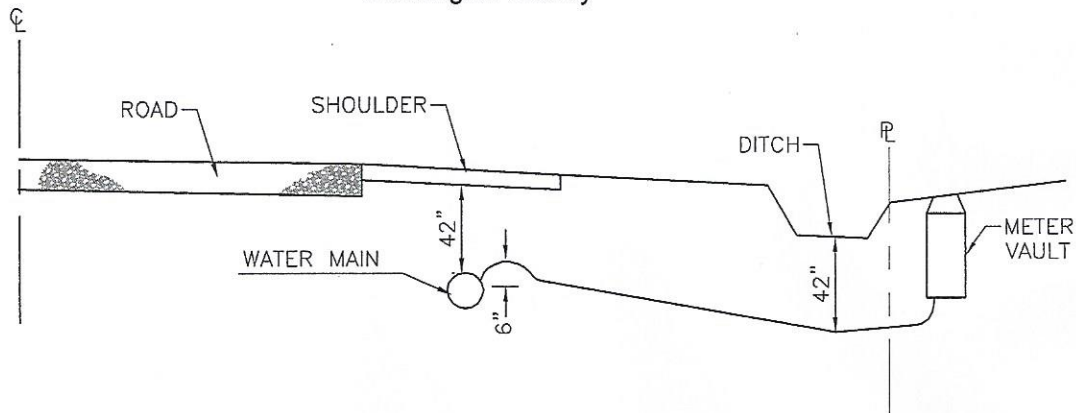
1. TRENCH WALLS SHALL BE VERTICAL 18" ABOVE TOP OF PIPE.
2. ALL BACKFILL IN STABILIZED AREAS COMPACTED TO 95% MAX. DENSITY PER AASHTO T-180 METHOD D.

**TOWN OF
KEEDYSVILLE**

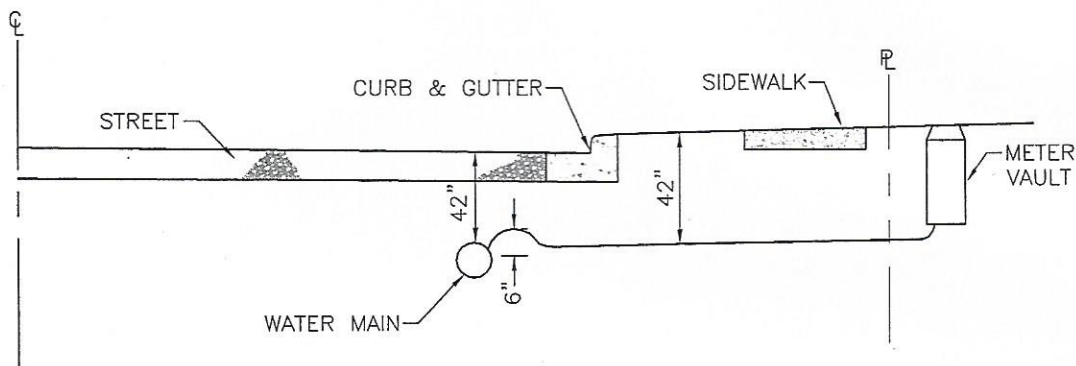
**SERVICE CONNECTION
TYPICAL TRENCH DETAIL**

JUNE 2008

W-12



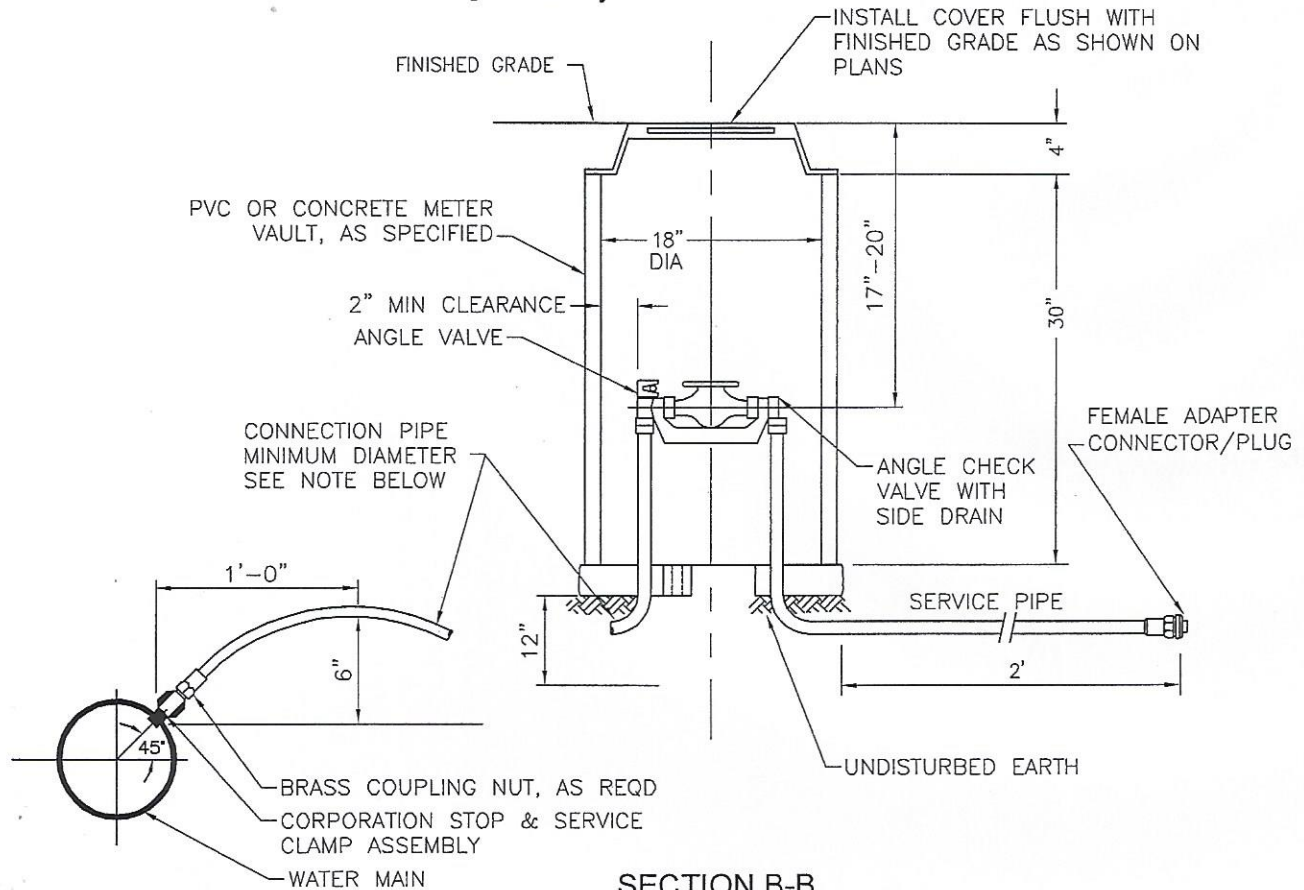
ROAD - DRAINAGE DITCH



STREET-CURB GUTTER

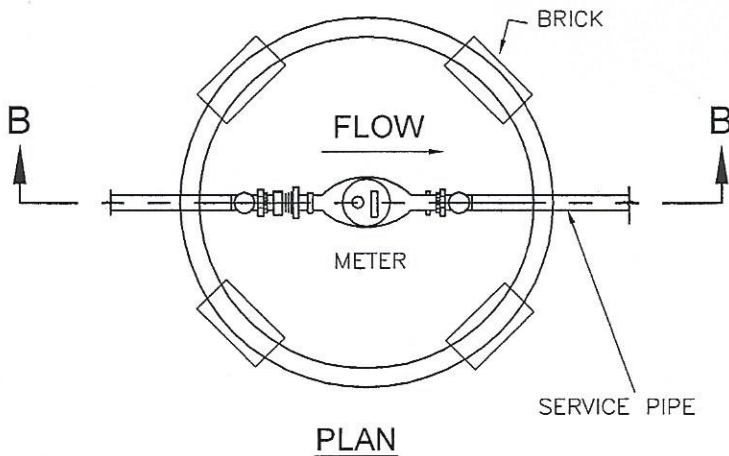
NOTE:

1. METER VAULTS SHALL BE PLACED AT OR NEAR THE PROPERTY LINE.
2. METER VAULTS SHALL IN NO CASE BE PLACE IN A STEEP SLOPE, EXPOSING THE FRONT OF THE METER VAULT, NOR SHALL THEY BE INSTALLED IN STEEP SLOPES AT A SHARP ANGLE.
3. CORPORATION STOP TO BE LEFT ON, ANGLE VALVE OFF.
4. TAP AT 2 O'CLOCK POSITION.
5. SERVICE CONNECTION PIPING TO BE INSTALLED UNDER FULL WIDTH OF PAVED R.O.W. OR DRIVEWAY, SHALL BE INSTALLED INSIDE A 4" SCHEDULE 40 PVC PIPE.
6. DO NOT SET METER IN SWALES OR DRIVEWAYS.



SECTION B-B

NOTE:
CONNECTION PIPE FOR SINGLE
METER INSTALLATION SERVING LOTS
AT OR BELOW 430 FEET FINISHED
GRADE ELEVATION, MINIMUM DIAMETER
IS 3/4-INCH. FOR LOTS ABOVE 430
FEET FINISHED GRADE ELEVATION,
MINIMUM DIAMETER IS 1-INCH.



SERVICE PIPE DIAMETER	METER SIZE	VAULT SIZE (DIA)
3/4"	5/8"	18"
1"	3/4"	24"
1 1/4"	1"	36"
2"	1 1/2"	36"

**TOWN OF
KEEDYSVILLE**

**METERED DOMESTIC SERVICE
INSTALLATION**

JUNE 2008

W-14

DELETED, DELETE METER YOKE,
 L FORD CUSTOMSETTERS,
 PROVED EQUALS.

FINISHED GRADE
 INSTALL DOUBLE COVER FLUSH
 WITH SURROUNDING SURFACE
 PVC OR CONCRETE METER
 VAULT, AS SPECIFIED
 24" DIA
 17" - 20"
 30"
 2" MIN CLEARANCE
 ANGLE VALVE
 PRONGED METER YOKE
 METER SUPPORTS TO BE
 USED WITH P.E. C.T.S.
 CONNECTION PIPE MINIMUM
 DIAMETER SEE NOTE BELOW
 ANGLE CHECK VALVE
 WITH SIDE DRAIN
 SERVICE PIPE
 FEMALE ADAPTER
 CONNECTOR/PLUG
 1'-0"
 6"
 45°
 BRASS COUPLING NUT, AS REQD
 CORPORATION STOP &
 SERVICE CLAMP ASSEMBLY
 WATER MAIN
 12"
 2'-0"
 UNDISTURBED EARTH

Diagram illustrating the plan view of a manhole structure. The structure is circular, lined with brick, and contains two meters. The components and labels are as follows:

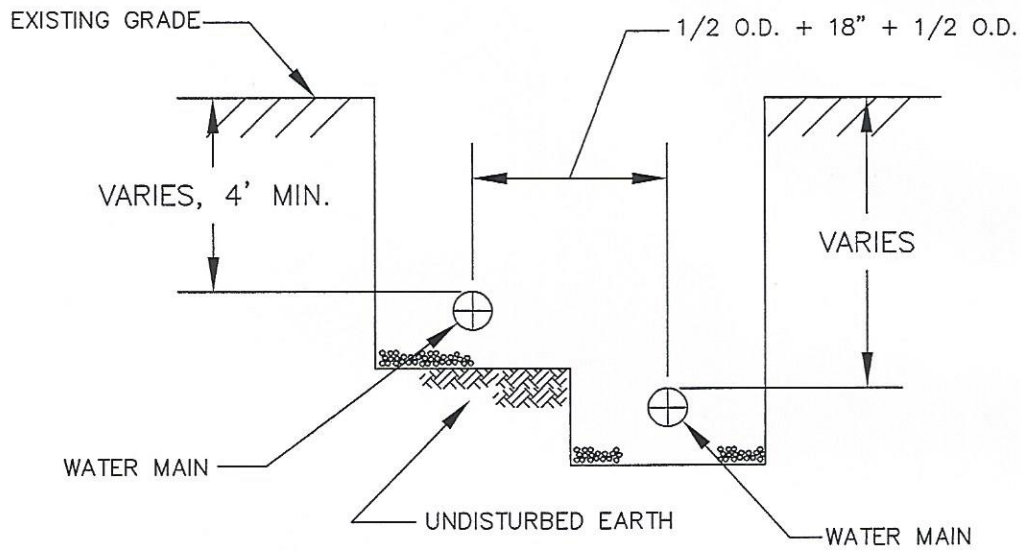
- BRICK**: Points to the circular lining of the manhole.
- 1" OR 3/4" SERVICE PIPE**: Points to the service pipe entering from the left.
- 3/4" SERVICE PIPE**: Points to the service pipe exiting to the right.
- 5/8" OR 3/4" METERS**: Points to the two circular meter structures inside the manhole.
- 3/4" SERVICE PIPE**: Points to the service pipe exiting to the right.
- SERVICE PIPE**: Points to the main horizontal service pipe at the bottom.
- PLAN**: The title of the diagram.

TOWN OF
KEEDYSVILLE

METERED DOMESTIC SERVICE TWIN SETTING

JUNE 2008

W-15

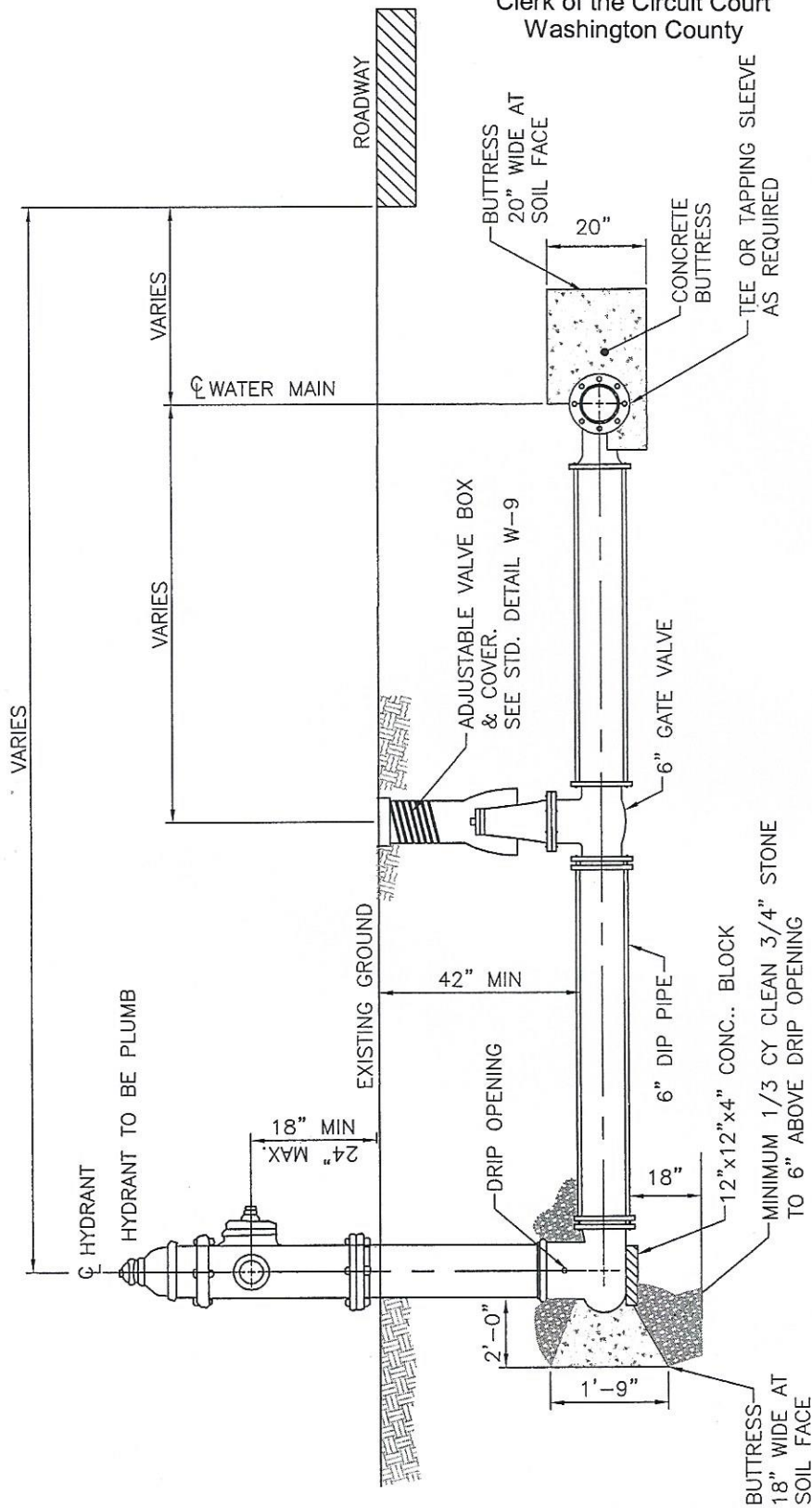


**TOWN OF
KEEDYSVILLE**

**TRENCH DETAIL
PARALLEL LINES**

JUNE 2008

W-16



NOTE:

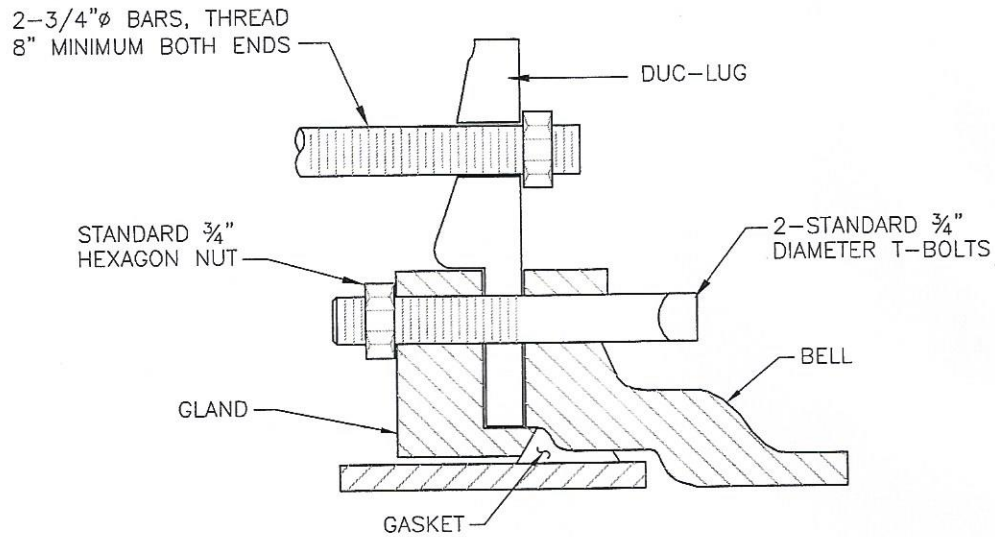
1. ALL JOINTS RESTRAINED WITH MEGALUGS 6" PIPE.
2. SET HYDRANT A MINIMUM OF 2' BEHIND EXISTING OR PROPOSED CURB. IF SIDEWALK ABUTS CURB, SET HYDRANT 2' BEHIND SIDEWALK WITHIN GRASSY AREA.
3. ALL JOINTS IN MAIN WITHIN 5 FEET OF TEE MUST BE RESTRAINED.
4. MINIMUM GROUND COVER FOR 6" PIPE UNDER SWALES IS 42".
5. DO NOT SET HYDRANT IN SWALE.

TOWN OF
KEEDYSVILLE

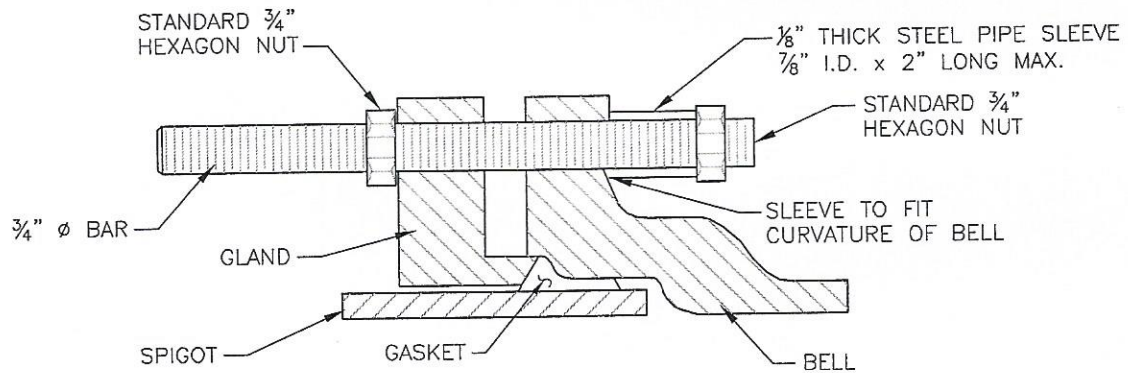
TYPICAL HYDRANT SETTING

JUNE 2008

W-17



ALT. TIE ROD CONNECTION TO PIPE JOINT



TIE ROD CONNECTION TO PIPE JOINT

- USE MECHANICAL JOINT FITTINGS ONLY
- PAINT ALL STEEL WITH 2 COATS OF BITUMINOUS PAINT

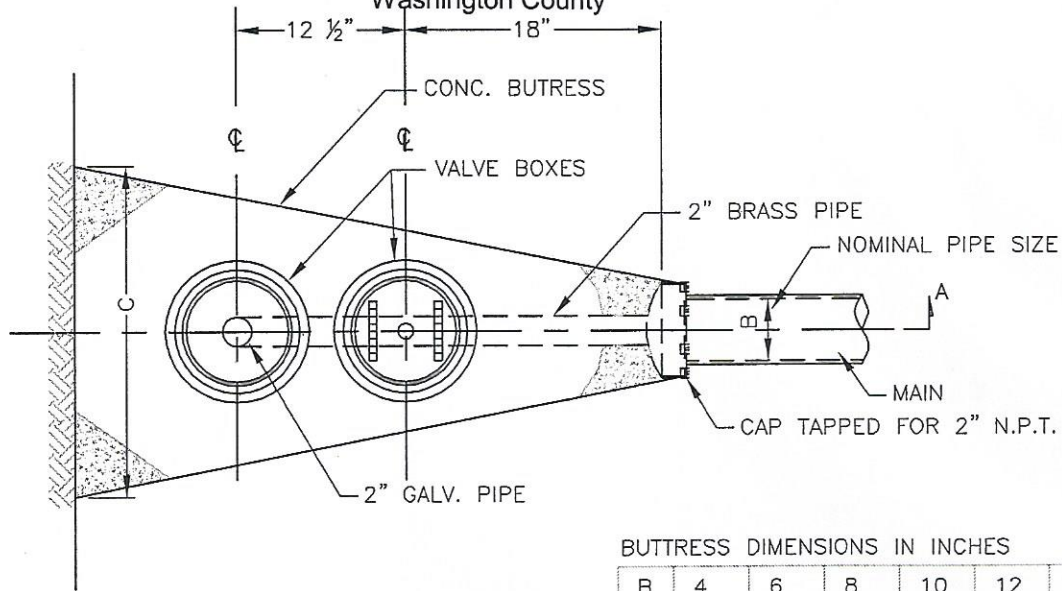
**TOWN OF
KEEDYSVILLE**

**TIE ROD CONNECTION
TO PIPE JOINT**

JUNE 2008

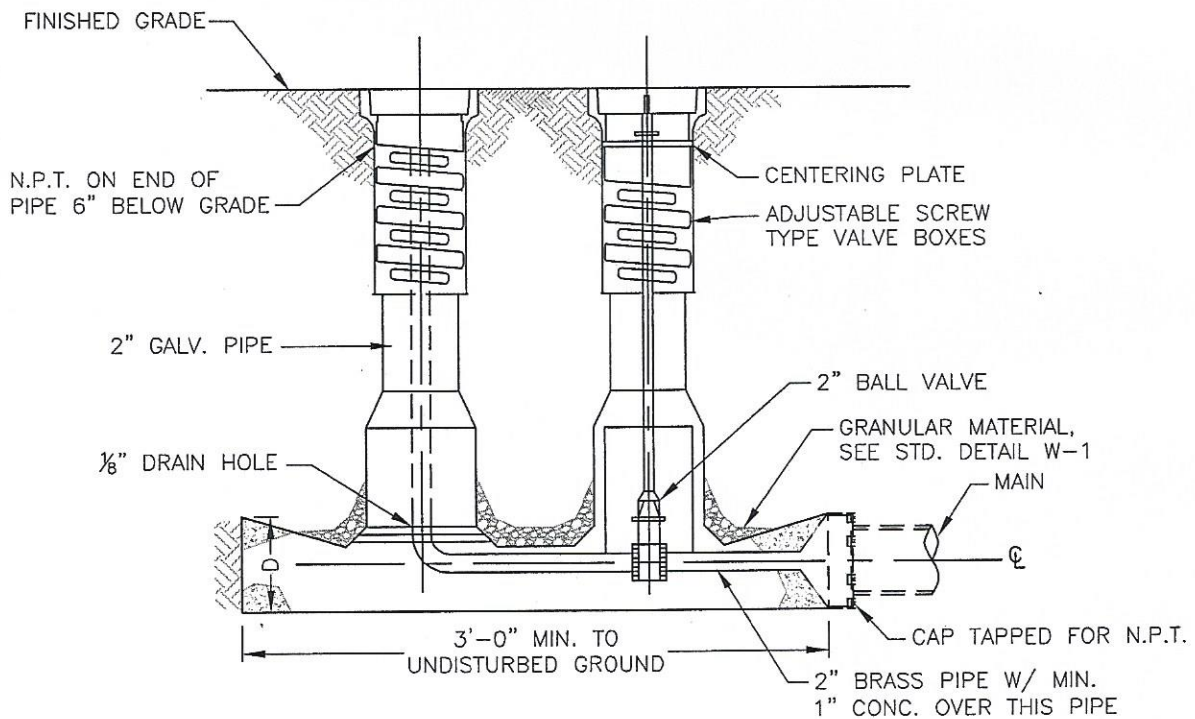
W-18

Acts, Ordinances,
Resolutions - Towns
Clerk of the Circuit Court
Washington County



BUTTRESS DIMENSIONS IN INCHES

B	4	6	8	10	12	16
C	17	17	23	29	34	45
D	10	12	16	20	24	32



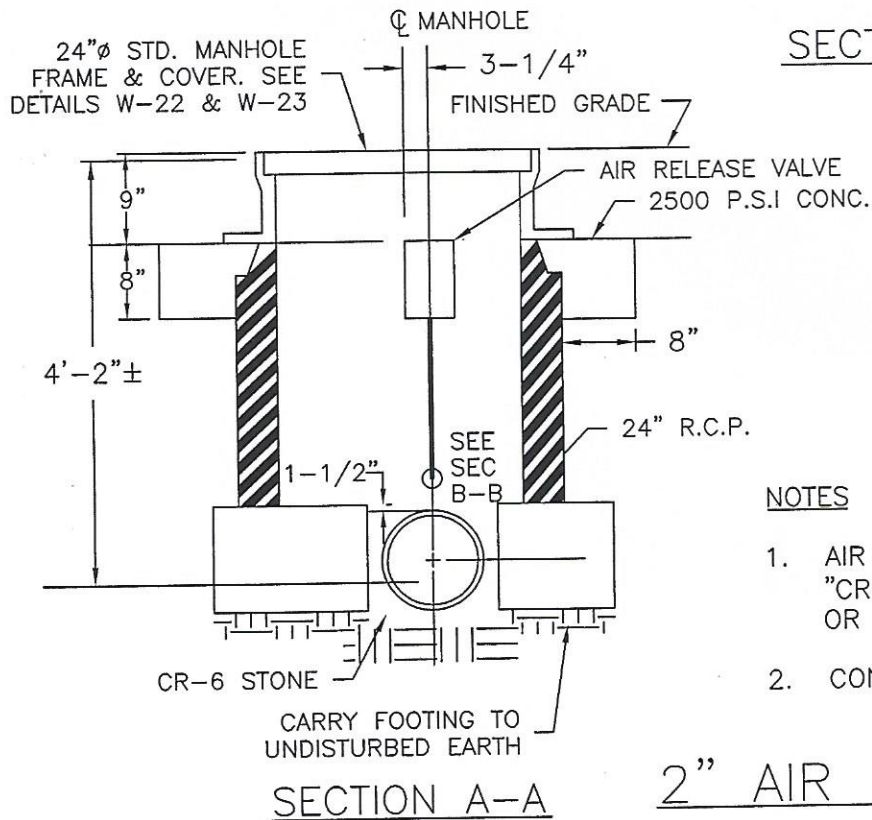
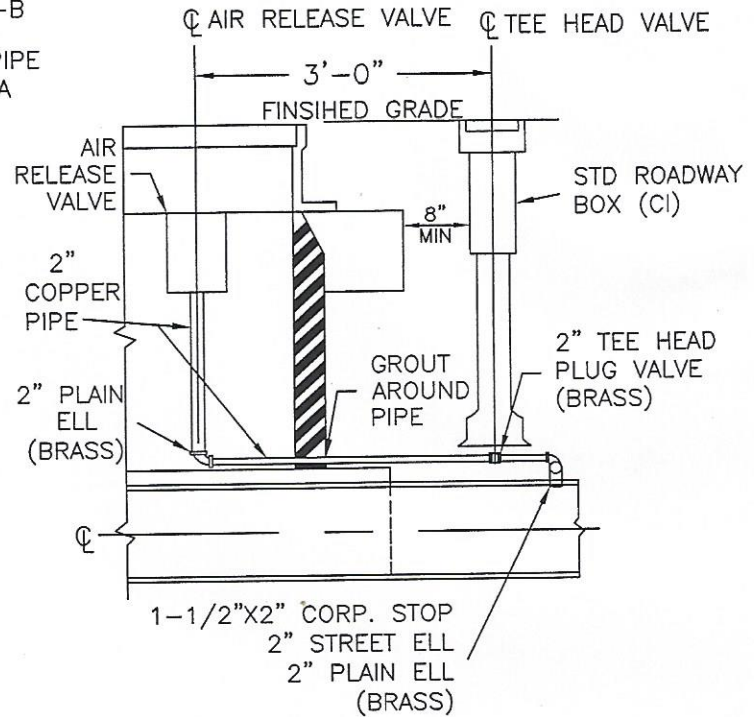
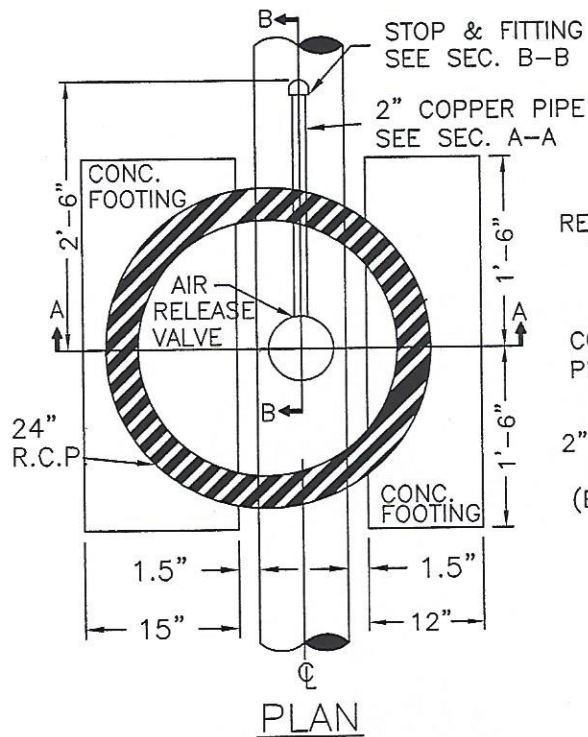
SECTION 'A-A'

TOWN OF
KEEDYSVILLE

2" BLOW OFF ASSEMBLY

JUNE 2008

W-19



NOTES

1. AIR RELEASE VALVE SHALL BE "CRISPIN AIR AND VACUUM VALVE" OR APPROVED EQUAL.
2. CONCRETE TO BE 2,500 P.S.I.

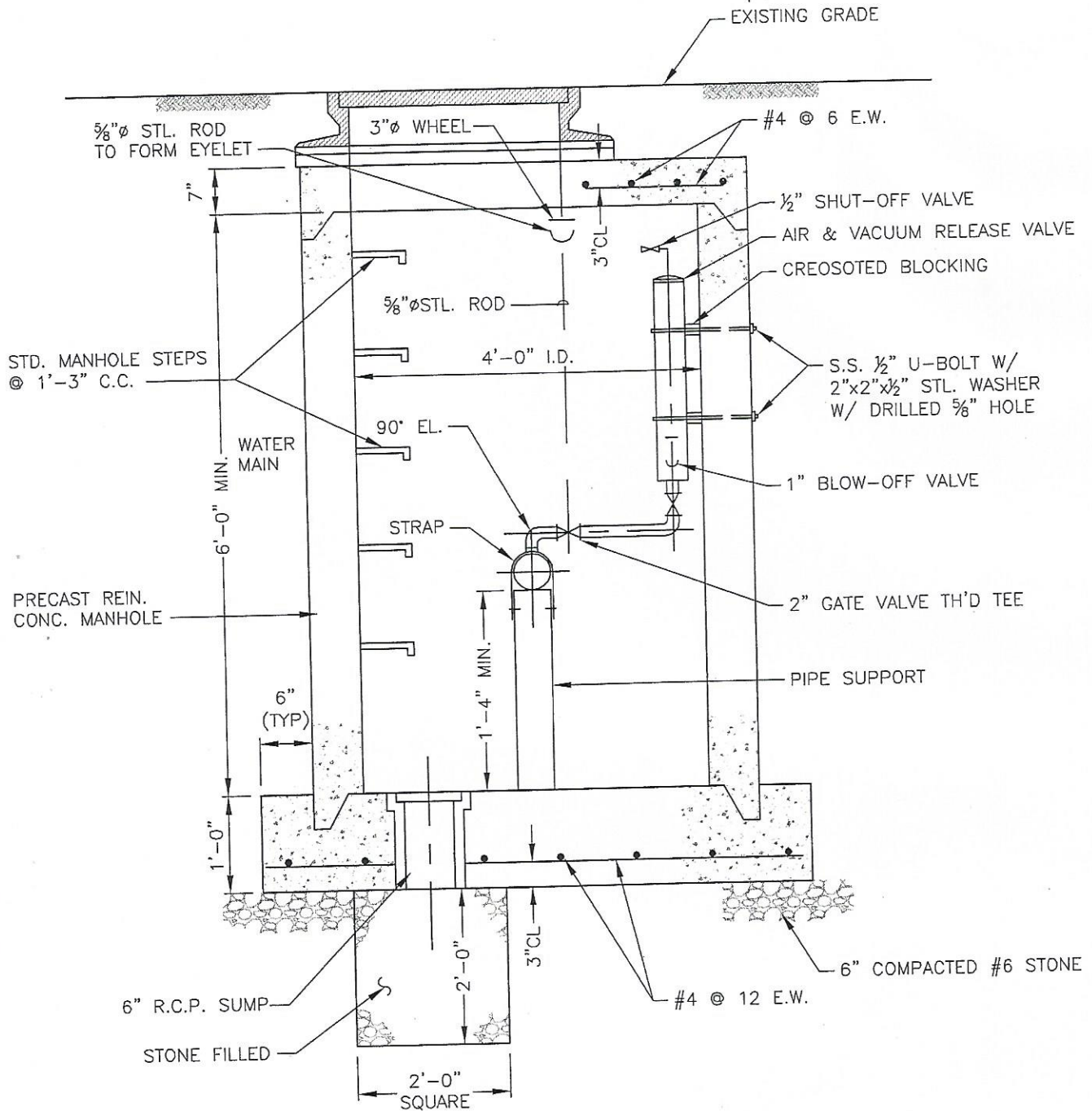
2" AIR RELEASE VALVE

TOWN OF
KEEDYSVILLE

AIR RELEASE
VALVE PIT DETAIL

OCTOBER 2008

W-20



SECTION 1-1
NO SCALE

TOWN OF
KEEDYSVILLE

AIR RELEASE & VACUUM
VALVE PIT - SECTION 1-1

JUNE 2008

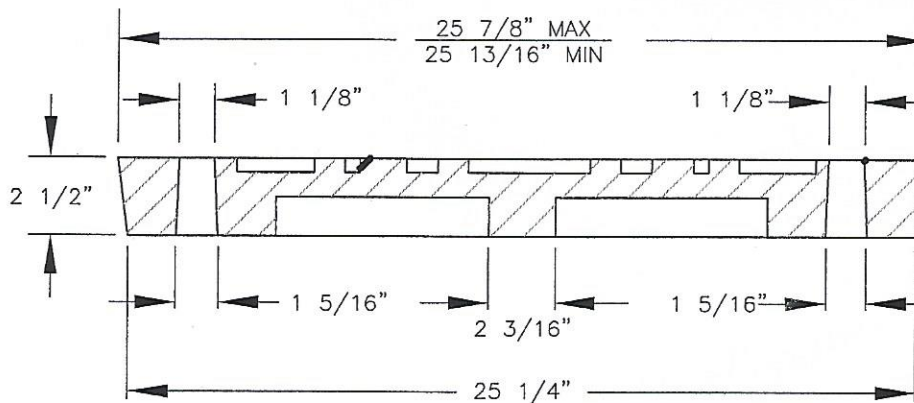
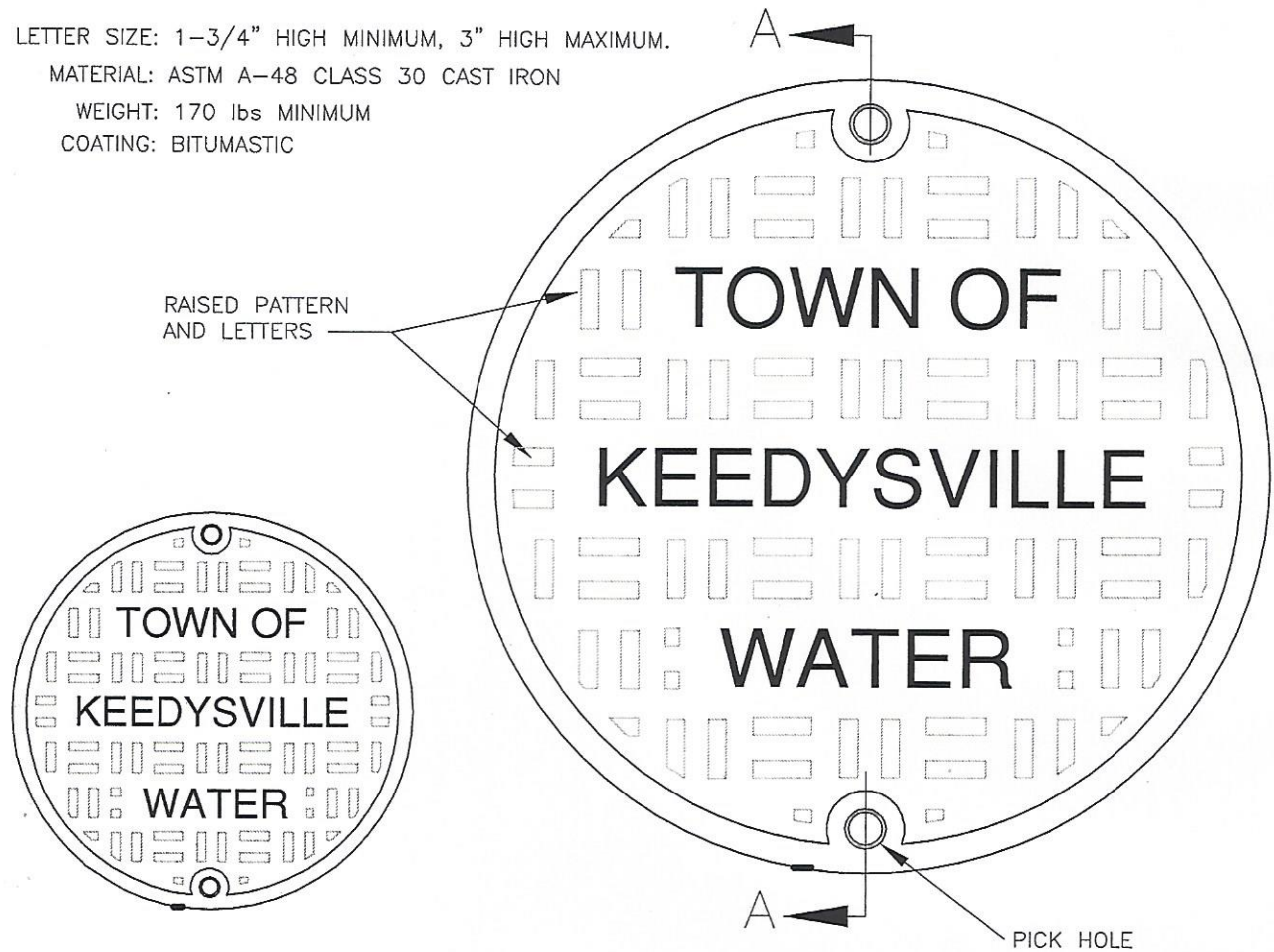
W-21

LETTER SIZE: 1-3/4" HIGH MINIMUM, 3" HIGH MAXIMUM.

MATERIAL: ASTM A-48 CLASS 30 CAST IRON

WEIGHT: 170 lbs MINIMUM

COATING: BITUMASTIC



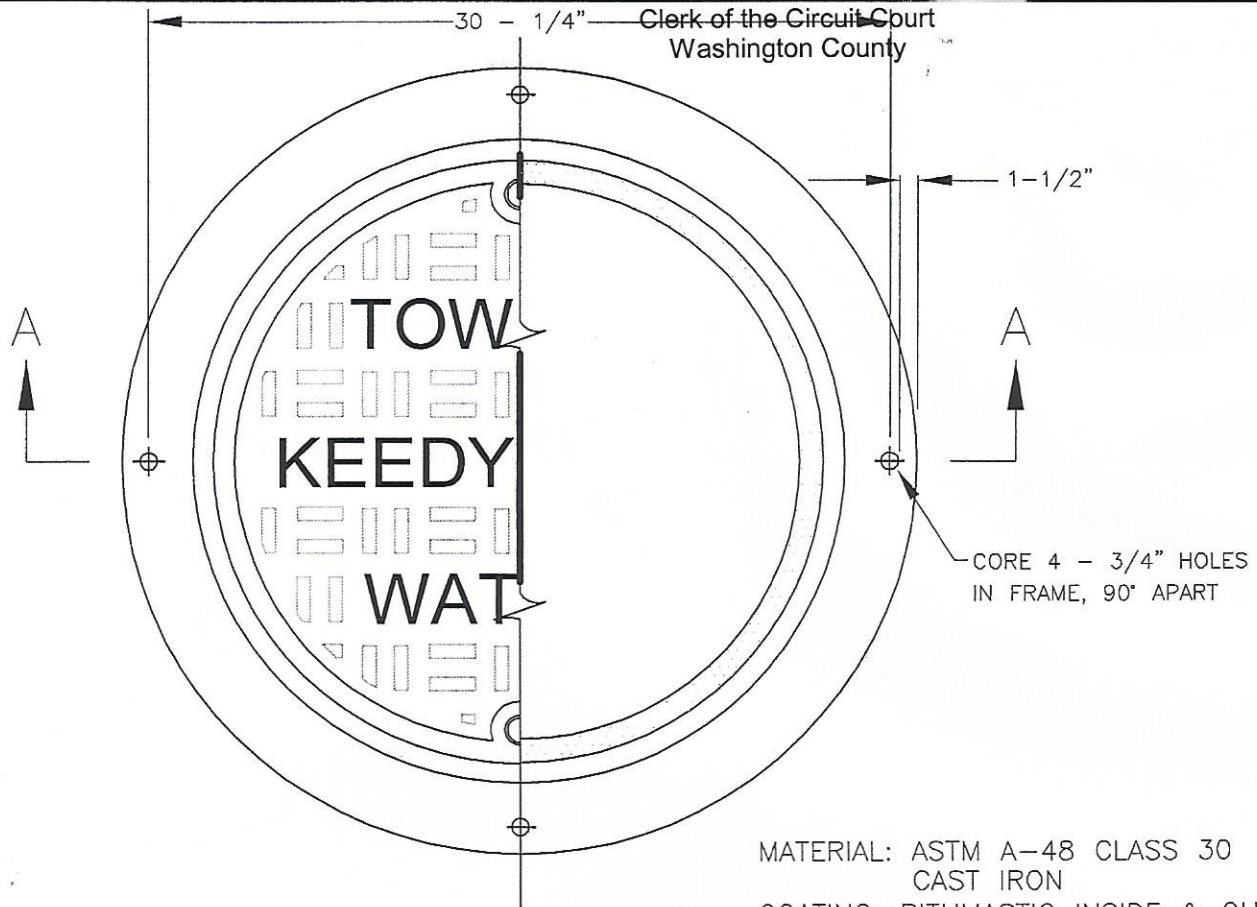
SECTION A-A
NO SCALE

**TOWN OF
KEEDYSVILLE**

**STANDARD MANHOLE
COVER**

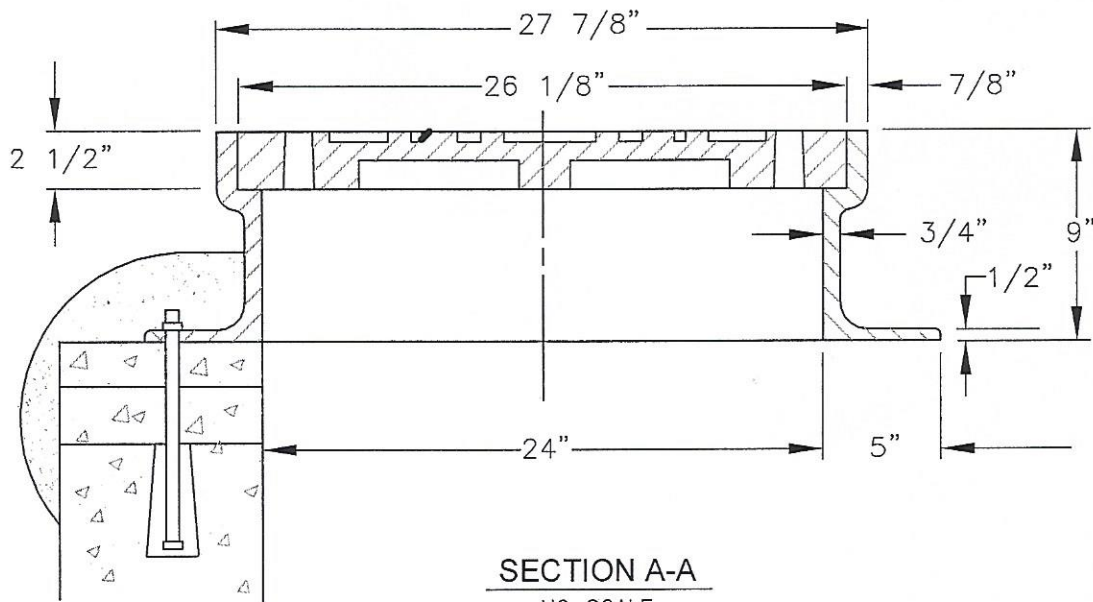
JUNE 2008

W-22



MATERIAL: ASTM A-48 CLASS 30
CAST IRON
COATING: BITUMASTIC INSIDE & OUT
APPROX. WEIGHT: 250# MIN

PLAN



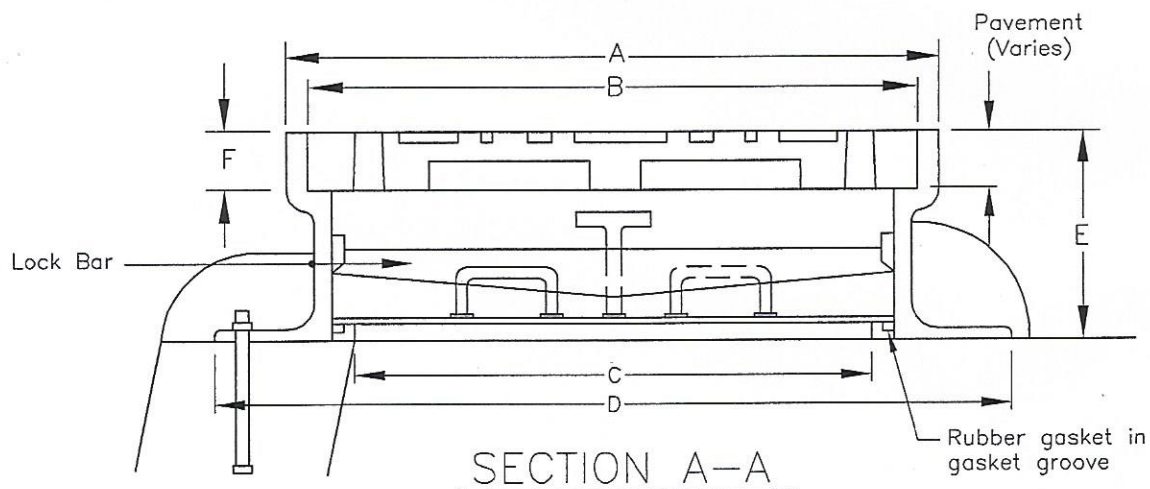
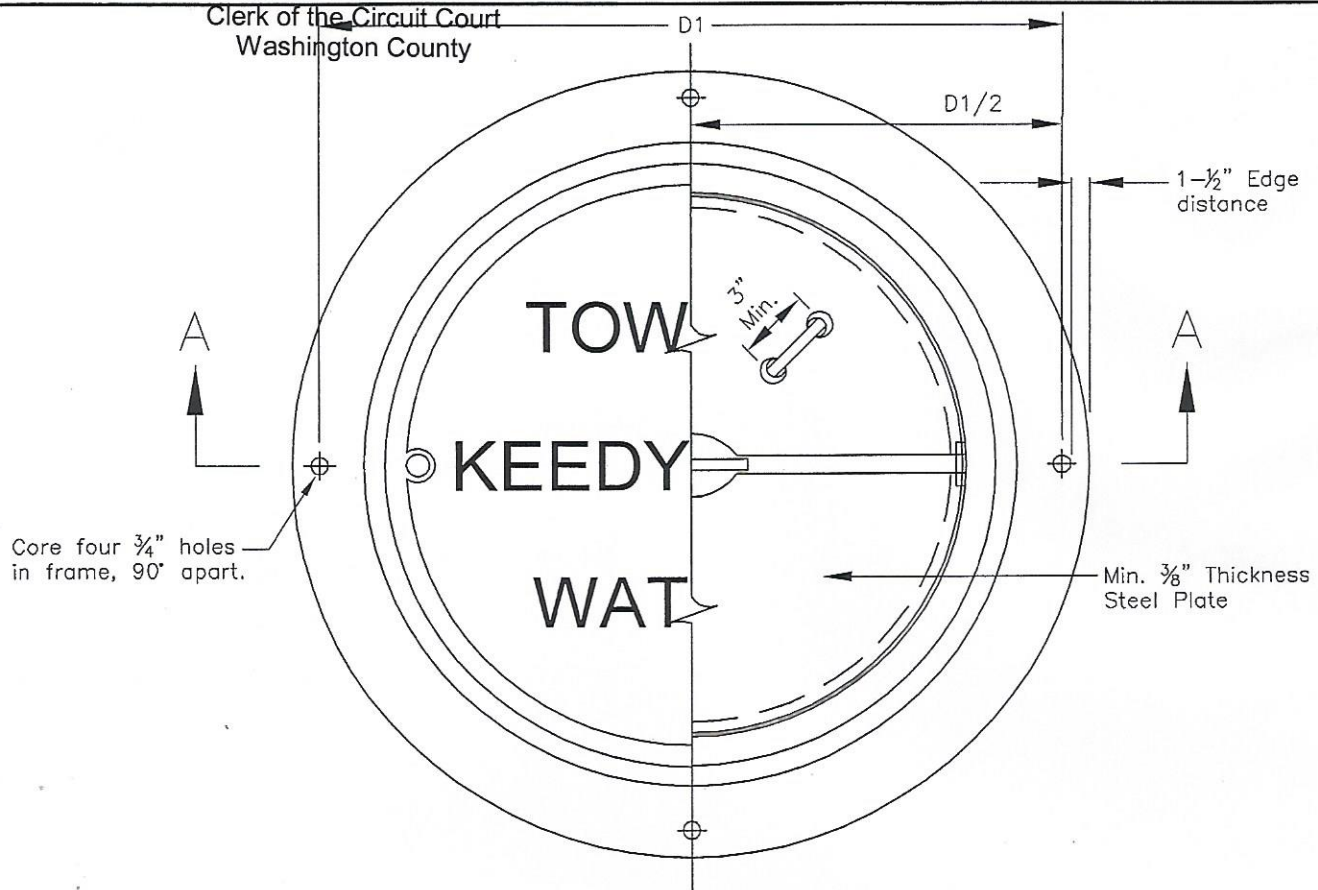
SECTION A-A
NO SCALE

**TOWN OF
KEEDYSVILLE**

**STANDARD MANHOLE
FRAME**

JUNE 2008

W-23



Dim.	A	B	C	D	D1	E	F	Weight
24" F&C	27- $\frac{15}{16}$ "	25- $\frac{7}{8}$ "	21- $\frac{1}{2}$ "	34"	30- $\frac{1}{4}$ "	9"	2- $\frac{1}{2}$ "	485 lbs.
30" F&C	33- $\frac{5}{8}$ "	31- $\frac{1}{2}$ "	27"	40"	36- $\frac{1}{4}$ "	9"	2- $\frac{1}{2}$ "	740 lbs.

**TOWN OF
KEEDYSVILLE**

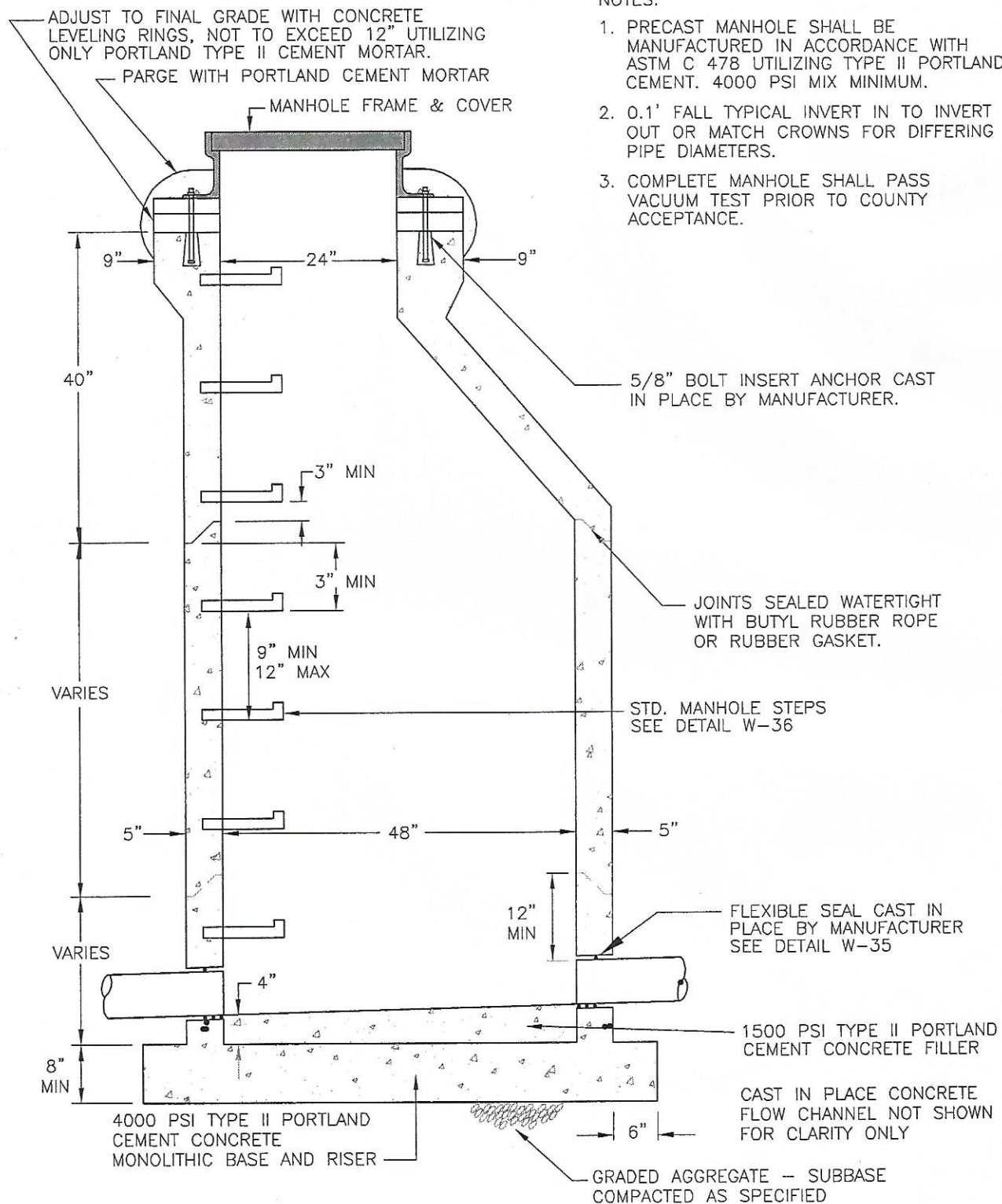
**WATERTIGHT MANHOLE
FRAME & COVER**

JUNE 2008

W-24

NOTES:

1. PRECAST MANHOLE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478 UTILIZING TYPE II PORTLAND CEMENT. 4000 PSI MIX MINIMUM.
2. 0.1' FALL TYPICAL INVERT IN TO INVERT OUT OR MATCH CROWNS FOR DIFFERING PIPE DIAMETERS.
3. COMPLETE MANHOLE SHALL PASS VACUUM TEST PRIOR TO COUNTY ACCEPTANCE.



TOWN OF
KEEDYSVILLE

STANDARD PRECAST MANHOLE

JUNE 2008

W-25

PUMP GROUT BETWEEN SLEEVE
& EXCAVATION IF REQUIRED
PROVIDE GROUT HOLES

3" x 1/4" STEEL STRAP WITH 3/4"
TURNBUCKLE. TWO STRAPS ON
EACH LENGTH OF PIPE.

STEEL STRAP (TYP.)

OVER EXCAVATION

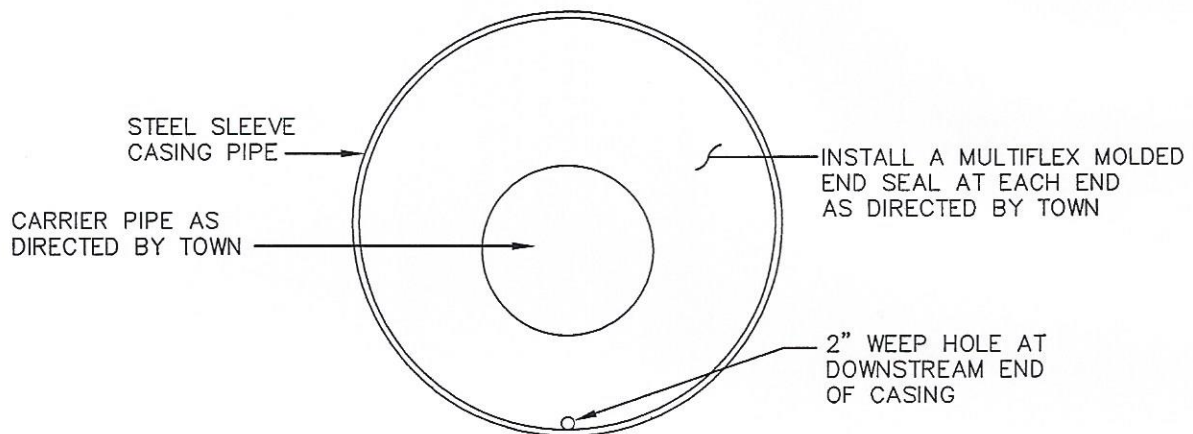
30" OR 36" Ø STEEL
SLEEVE CASING PIPE

CARRIER PIPE AS
DIRECTED BY TOWN

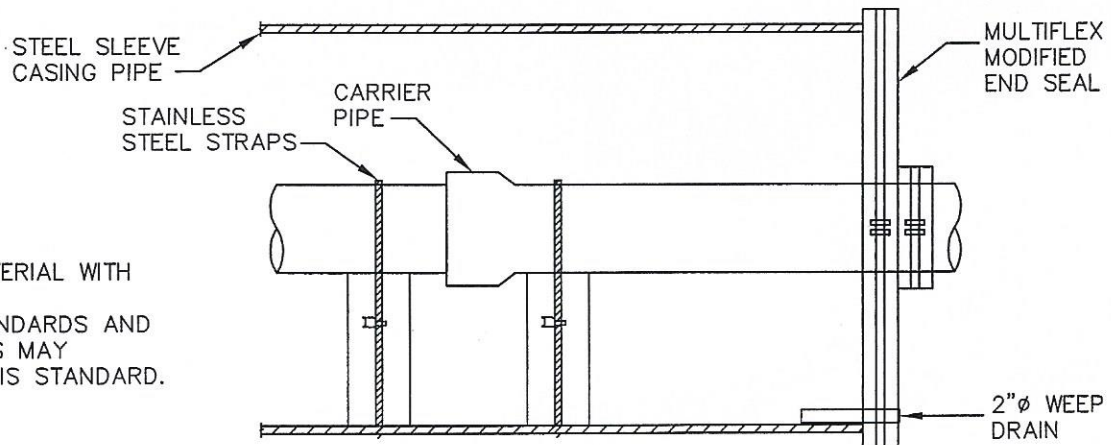
WELD TO STEEL (TYP.)

4"x4" TIMBER SKIDS, W/
2"x6" BRACE, CREOSOTED

HIGHWAY OR RAILROAD CROSSING DETAIL



END SEAL - END VIEW



END SEAL - SIDE VIEW

NOTES:

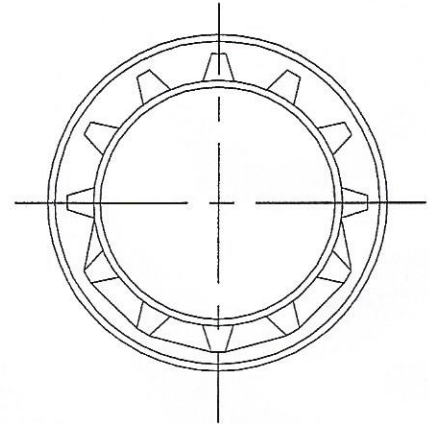
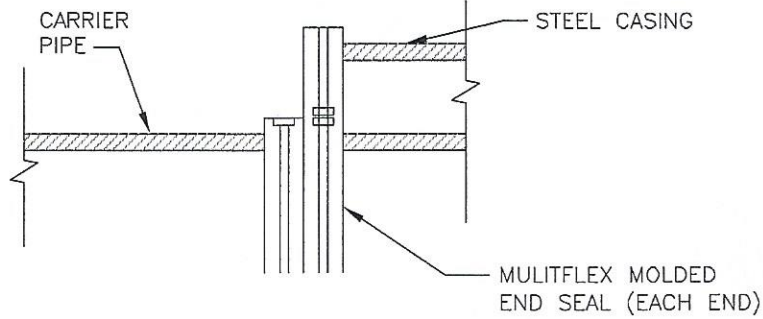
- COAT ALL MATERIAL WITH BITUMASTIC.
- RAILROAD STANDARDS AND SPECIFICATIONS MAY SUPERCEDE THIS STANDARD.

TOWN OF
KEEDYSVILLE

HIGHWAY OR RAILROAD
CROSSING

JUNE 2008

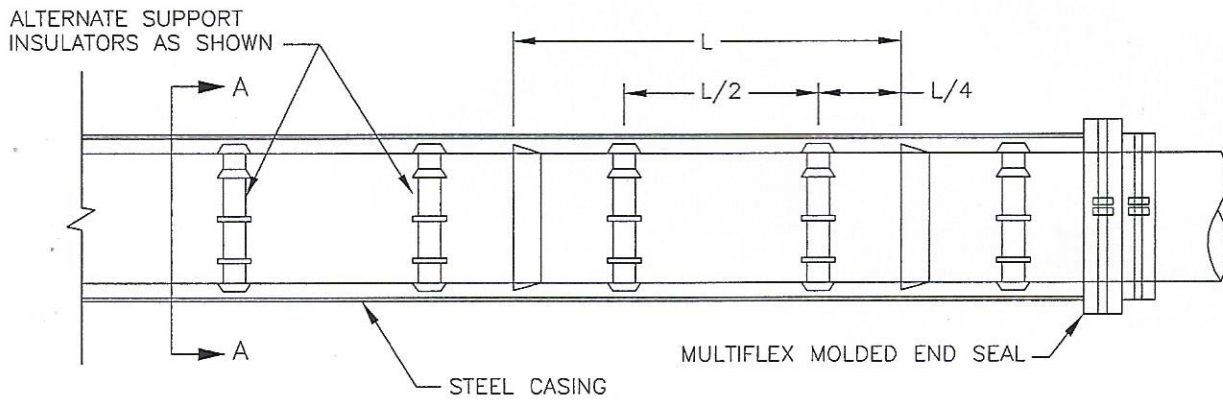
W-27



- FILL VOID BETWEEN CASING PIPE AND CARRIER PIPE PRIOR TO INSTALLATION OF END SEAL.

END SEAL INSTALLATION

SECTION A-A



LOCATION OF INSULATORS

NOMINAL DIAMETER IN INCHES		
MAIN	CASING	WALL THICKNESS
IN	IN	IN
4	12	0.251
6	18	0.313
8	18	0.313
10	18	0.313
12	24	0.407

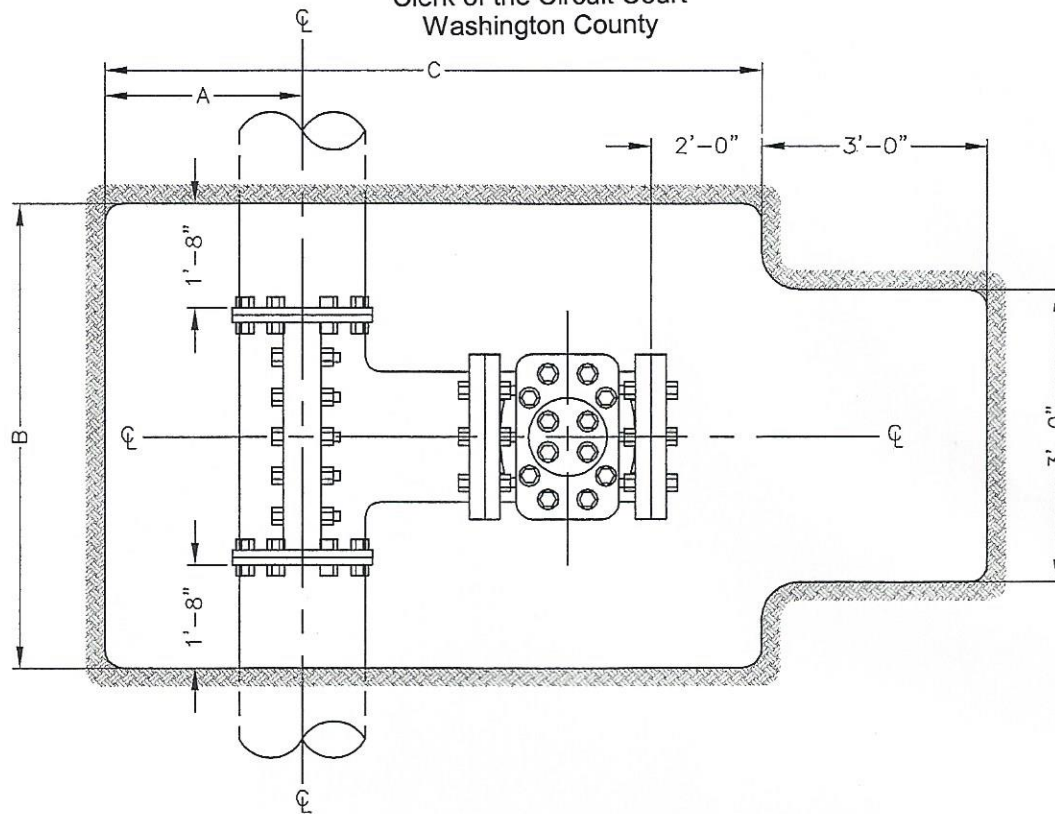
- CONCENTRATE SUPPORT INSULATORS BY MALONEY PIPE LINE PRODUCTS, T.D. WILLIAMSON, INC., OR APPROVED EQUAL.
- FILL VOID WITH SAND AFTER CARRIER PIPE IS INSTALLED.

**TOWN OF
KEEDYSVILLE**

**CASING FOR MAIN
UNDER HIGHWAYS**

JUNE 2008

W-28



NOTE: ALL DIMENSIONS ARE MINIMUM REQUIRED.

EXCAVATION DIMENSION

MAIN	TAP	A	B	C
4"	4"	1'-3"	4'-9"	4'-10"
6"	4"	1'-4"	4'-9"	4'-11"
6"	6"	1'-4"	4'-10"	5'-4"
8"	4"	1'-5"	4'-11"	5'-2"
8"	6"	1'-5"	4'-11"	5'-6"
8"	8"	1'-5"	5'-1"	5'-7"
10"	4"	1'-6"	4'-11"	5'-5"
10"	6"	1'-6"	4'-11"	5'-8"
10"	8"	1'-6"	5'-3"	5'-9"
10"	10"	1'-6"	5'-3"	5'-10"

EXCAVATION DIMENSION

MAIN	TAP	A	B	C
12"	4"	1'-7"	4'-11"	5'-7"
12"	6"	1'-7"	4'-11"	5'-10"
12"	8"	1'-7"	5'-1"	5'-11"
12"	10"	1'-7"	5'-5"	6'-1"
12"	12"	1'-7"	5'-5"	6'-2"
16"	4"	1'-9"	4'-11"	6'-2"
16"	6"	1'-9"	4'-11"	6'-3"
16"	8"	1'-9"	5'-3"	6'-3"
16"	10"	1'-9"	5'-5"	6'-4"
16"	12"	1'-9"	5'-6"	6'-4"
16"	16"	1'-9"	5'-6"	6'-8"

EXCAVATION DIMENSION

MAIN	TAP	A	B	C
20"	4"	1'-11"	4'-11"	6'-3"
20"	6"	1'-11"	5'-2"	6'-6"
20"	8"	1'-11"	5'-4"	6'-7"
20"	10"	1'-11"	5'-8"	6'-8"
20"	12"	1'-11"	5'-8"	6'-8"
20"	16"	1'-11"	6'-0"	7'-1"
20"	20"	1'-11"	6'-0"	7'-6"
24"	4"	2'-1"	5'-2"	6'-0"
24"	6"	2'-1"	5'-2"	6'-10"
24"	8"	2'-1"	5'-4"	7'-0"
24"	10"	2'-1"	5'-8"	7'-0"
24"	12"	2'-1"	5'-8"	7'-1"
24"	16"	2'-1"	6'-0"	7'-5"
24"	20"	2'-1"	6'-0"	7'-9"

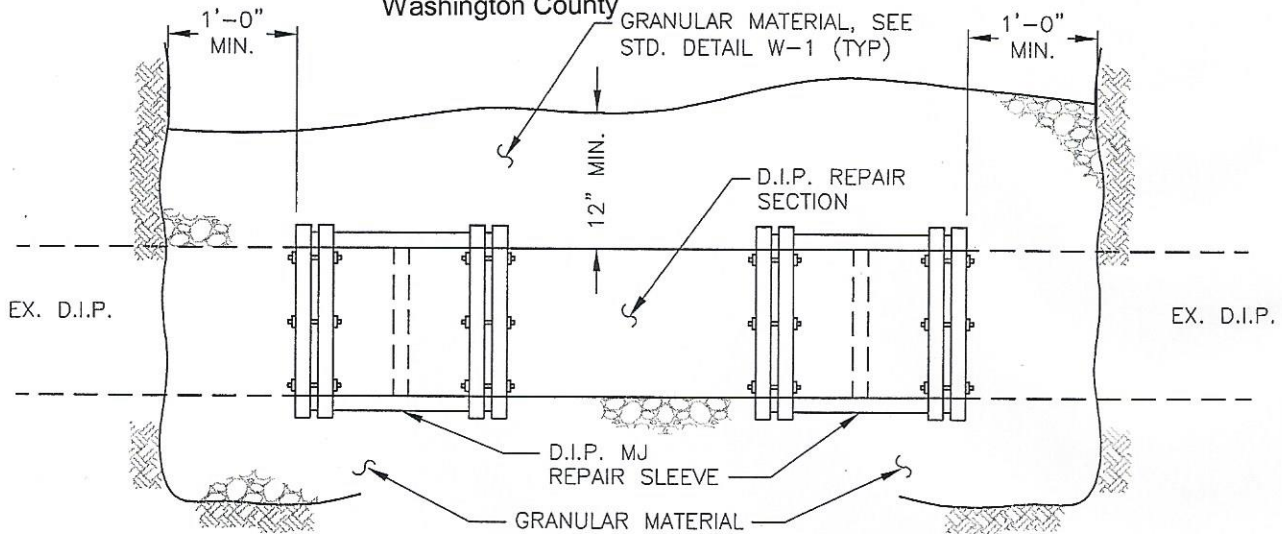
**TOWN OF
KEEDYSVILLE**

TAPPING SLEEVE & VALVE

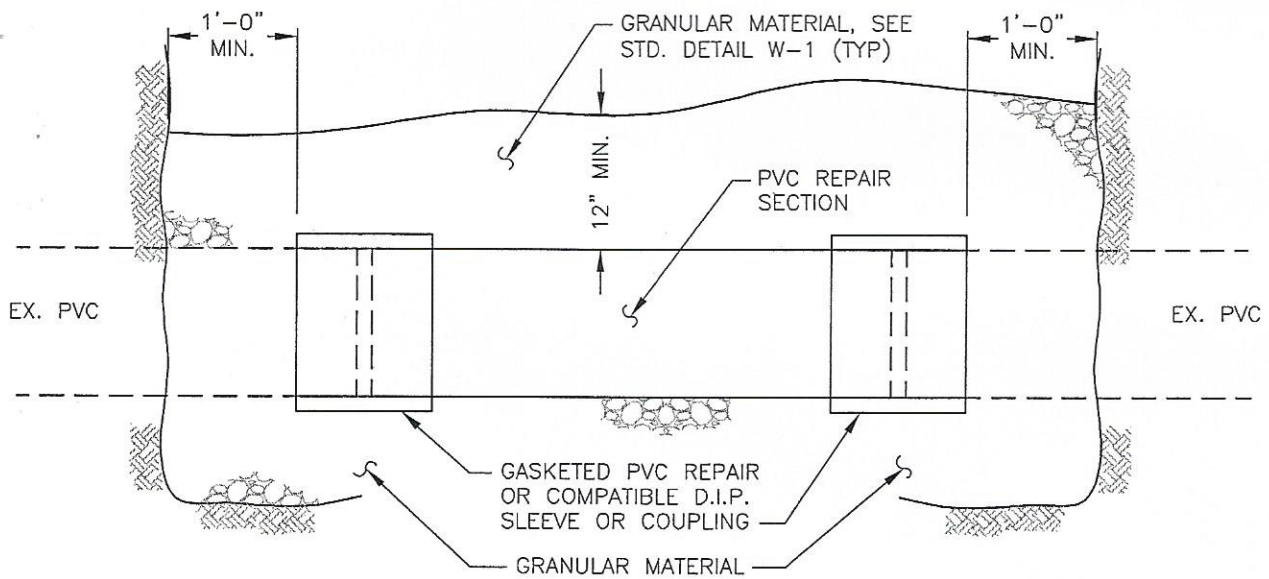
JUNE 2008

W-29

Acts, Ordinances,
Resolutions - Towns
Clerk of the Circuit Court
Washington County



EXISTING DUCTILE IRON PIPE REPAIR



EXISTING PVC PIPE REPAIR

NOTES:

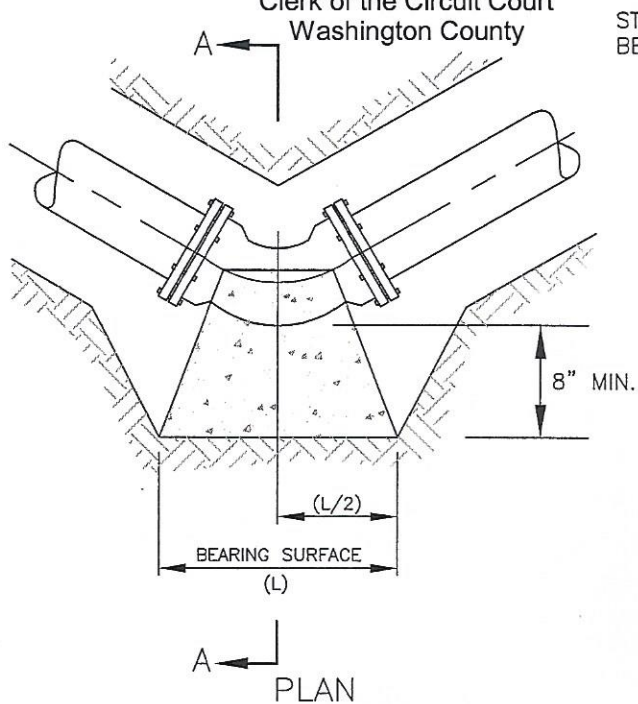
- FIELD CUTTING OF PIPE SHALL BE DONE IN A SATISFACTORY MANNER WHICH WILL LEAVE A SMOOTH END AT RIGHT ANGLES TO THE AXIS OF THE PIPE.
- PIPE LENGTH BEING INSTALLED SHALL ABUT AGAINST THE NEXT IN SUCH A MANNER THAT THERE SHALL BE NO SHOULDER OR UNEVENNESS OF ANY KIND ALONG THE INSIDE OF THE PIPE.

TOWN OF
KEEDYSVILLE

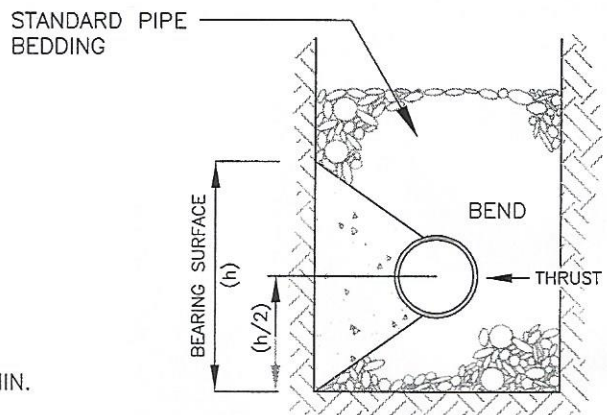
REPAIR OF EXISTING
WATER MAINS

JUNE 2008

W-30



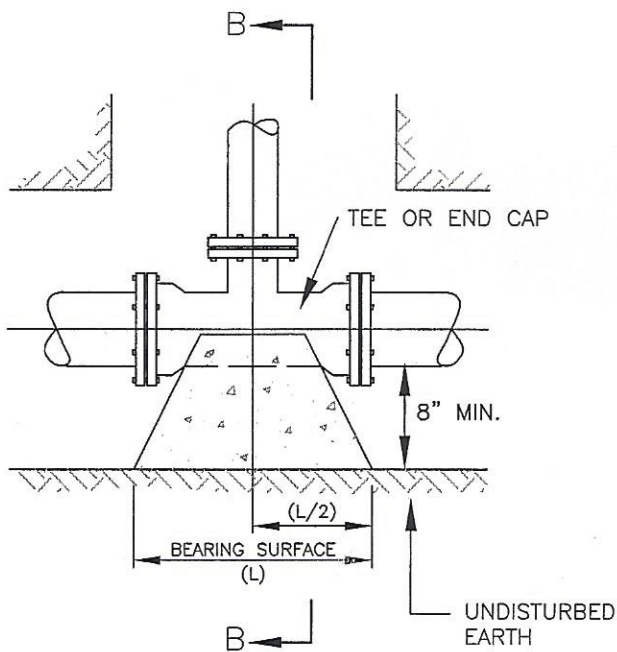
HORIZONTAL & VERTICAL DOWN BENDS



SECTION A-A

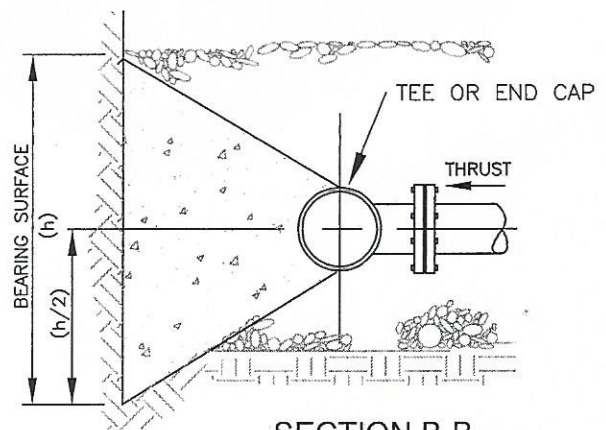
NOTES:

1. CONCRETE SHALL HAVE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 2500 PSI.
2. SEE STANDARD DETAILS W-32 & 34 FOR REQUIRED BEARING AREA. BEARING AREA (SF) = L X h. BEARING SURFACE SHALL BE UNDISTURBED EARTH.
3. PLACE A POLYETHYLENE SHEET BETWEEN THE PIPE FITTING AND CONCRETE.
4. CRADLE PIPE FITTING WITH CONCRETE TO THE SPRING LINE KEEPING CONCRETE CLEAR OF PIPE JOINTS.



PLAN

TEE & DEAD END



SECTION B-B

NO SCALE

TOWN OF
KEEDYSVILLE

HORIZONTAL AND VERTICAL
DOWN THRUST BLOCKING

JUNE 2008

W-31

**HORIZONTAL AND VERTICAL DOWNWARD THRUST BLOCKING
MINIMUM BEARING SURFACE AREA IN SQUARE FEET**

BEARING MATERIAL ALLOWABLE LOAD	1-1/2" TO 2-1/2" DIA DEGREE BEND				3" DIA - DEGREE BEND				4" DIA - DEGREE BEND				6" DIA - DEGREE BEND			
	11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90
1 SILT / CLAY 1000 LB / SF	0.5	0.5	1.0	1.5	0.5	0.7	1.5	2.5	1.0	1.0	2.0	4.0	1.0	2.5	5.0	9.0
2 SANDY SILT / CLAY 2000 LB / SF	0.5	0.5	0.5	0.7	0.5	0.5	0.7	1.5	1.0	1.0	1.0	2.0	1.0	1.0	2.5	4.5
3 SILTY / CLAYEY GRAVELS 3000 LB / SF	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	1.0	1.0	1.0	1.5	1.0	1.0	1.5	3.0
4 POOR GRADE GRAV/SAND 4000 LB / SF	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
5 WELL GRADED GRAVEL 5000 LB / SF	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
R ROCK 10,000 LB / SF	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

8" DIA - DEGREE BEND				10" DIA - DEGREE BEND				12" DIA - DEGREE BEND				14" DIA - DEGREE BEND				16" DIA - DEGREE BEND			
11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90	11-1/4	22-1/2	45	90
1 2.0	4.5	8.5	16.0	3.5	7.0	13.5	25.0	5.0	10.0	19.5	36.0	7.0	13.5	26.5	49.0	9.0	17.5	34.5	64.0
2 1.0	2.0	4.5	8.0	2.0	3.5	7.0	12.5	2.5	5.0	10.0	18.0	3.5	7.0	13.5	24.5	4.5	9.0	17.5	32.0
3 1.0	1.5	3.0	5.5	1.0	2.5	4.5	8.5	1.5	3.5	6.5	12.0	2.5	4.5	9.0	16.5	3.0	6.0	11.5	21.5
4 1.0	1.0	2.0	4.0	1.0	1.5	3.5	6.0	1.0	2.5	5.0	9.0	1.5	3.5	6.5	12.0	2.0	4.5	8.5	16.0
5 1.0	1.0	2.0	3.0	1.0	1.5	2.5	5.0	1.0	2.0	4.0	7.0	1.5	2.5	5.5	10.0	2.0	3.5	7.0	13.0
R 1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0

NOTES:

1. THE ABOVE ALLOWABLE BEARING VALUES GENERALLY RELATE TO THE BEARING MATERIALS LISTED. THE CONTRACTOR SHALL PROVIDE ACCURATE SOIL IDENTIFICATION AND EVALUATION UNLESS THE NEXT HIGHER CATEGORY IS SELECTED AS APPROVED BY THE TOWN.
2. BEARING SURFACE SHALL BE UNDISTURBED EARTH OR EMBANKMENT COMPACTED TO 90% OF MAXIMUM DENSITY.
3. 150 PSI WORKING PRESSURE AND SAFETY FACTOR = 1.5

**TOWN OF
KEEDYSVILLE**

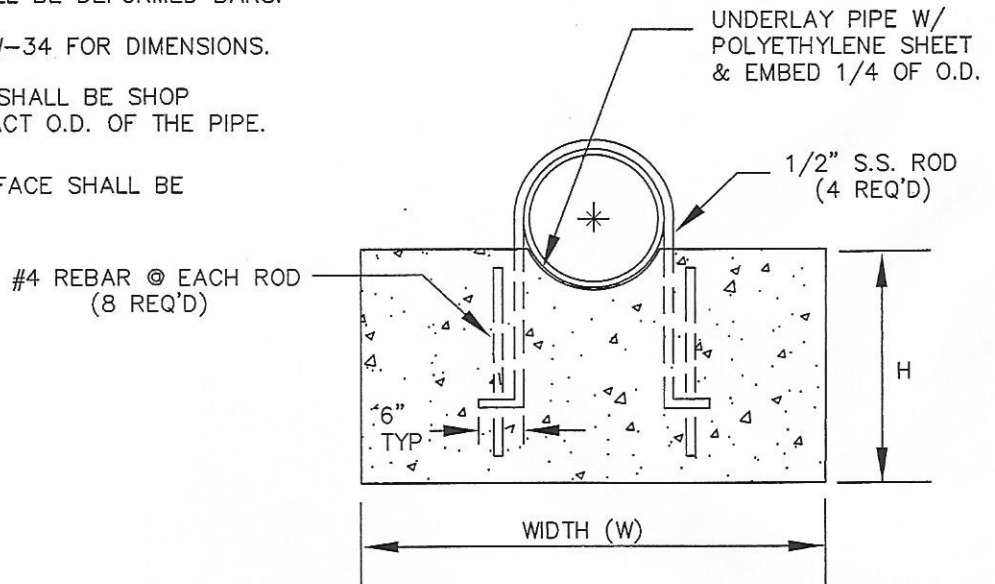
**THRUST BLOCKING
BEARING AREA - BENDS**

JUNE 2008

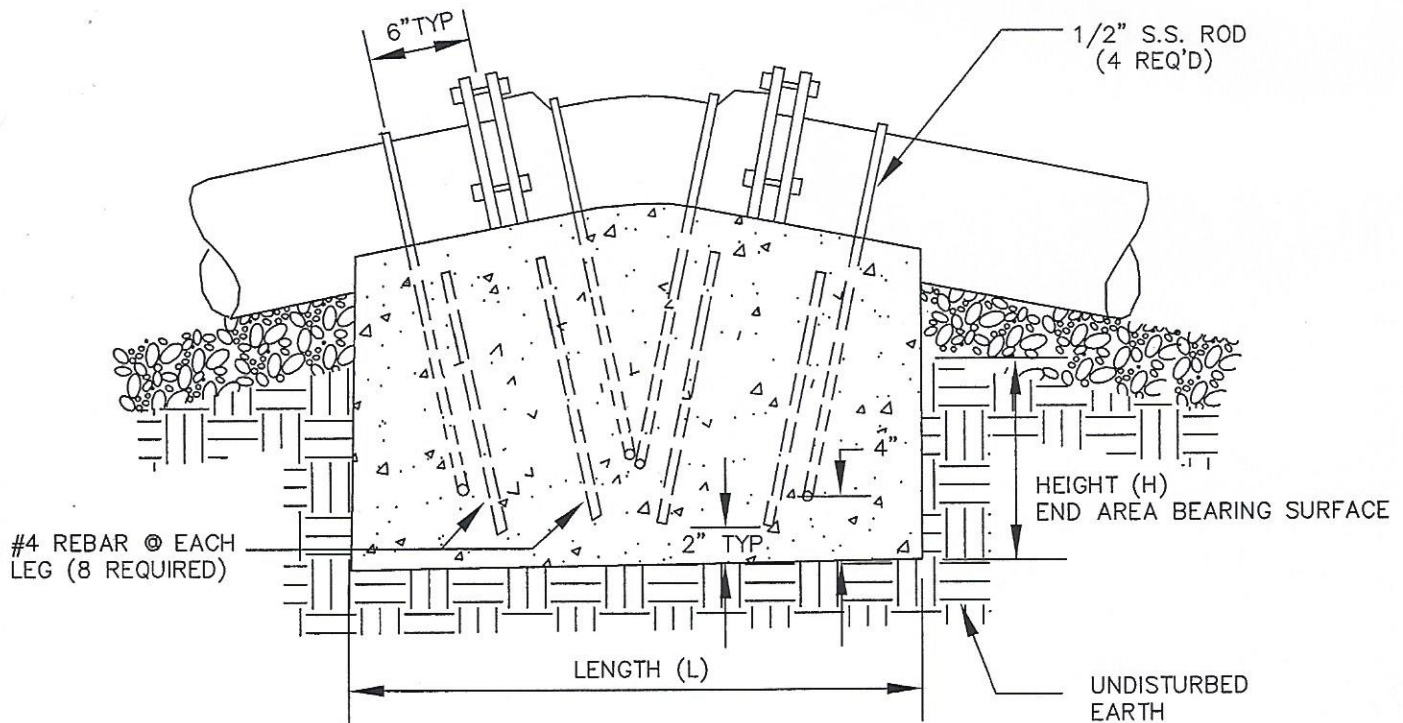
W-32

NOTES:

1. CONCRETE SHALL HAVE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 2500 PSI.
2. REINFORCING STEEL SHALL BE DEFORMED BARS.
3. SEE STANDARD DETAIL W-34 FOR DIMENSIONS.
4. STAINLESS STEEL RODS SHALL BE SHOP FABRICATED TO THE EXACT O.D. OF THE PIPE.
5. END AREA BEARING SURFACE SHALL BE UNDISTURBED EARTH.



CROSS SECTION



PROFILE

TOWN OF
KEEDYSVILLE

VERTICAL UPWARDS
THRUST BLOCKING

JUNE 2008

W-33

Acts, Ordinances,
Resolutions - Towns
Clerk of the Circuit Court
Washington County

**VERTICAL UPWARDS THRUST BLOCKING
MINIMUM VOLUME, BEARING SURFACE & DIMENSIONS**

PIPE SIZE	MIN VOL (CF)	MIN END AREA (SF)	11-1/4" VERTICAL THRUST UPWARDS L X W X H	MIN VOL (CF)	MIN END AREA (SF)	22-1/2" VERTICAL THRUST UPWARDS L X W X H	MIN VOL (CF)	MIN END AREA (SF)	45" VERTICAL THRUST UPWARDS L X W X H
<3" DIA	1.5	0.5	1.5 X 1.0 X 1.0	2.8	0.5	2.8 X 1.0 X 1.0	5.2	1.0	2.5 X 1.5 X 1.5
3" DIA	2.1	0.5	2.1 X 1.0 X 1.0	4.1	1.0	2.0 X 1.5 X 1.5	7.5	1.0	2.0 X 2.0 X 2.0
4" DIA	3.7	1.0	3.5 X 1.0 X 1.0	7.2	1.0	4.0 X 1.5 X 1.5	13.4	1.0	4.0 X 2.0 X 2.0
6" DIA	8.3	1.0	4.0 X 1.5 X 1.5	16.2	1.0	4.0 X 2.0 X 2.0	30.0	1.9	4.0 X 3.0 X 3.0
8" DIA	14.7	1.0	4.0 X 2.0 X 2.0	28.9	1.0	4.0 X 2.5 X 2.5	53.3	3.3	4.0 X 4.0 X 4.0
10" DIA	23.0	1.0	4.0 X 2.5 X 2.5	45.1	1.4	4.0 X 3.5 X 3.5	83.3	5.2	5.0 X 4.0 X 4.0
12" DIA	33.1	1.0	4.0 X 3.0 X 3.0	64.9	2.0	4.0 X 4.0 X 4.0	120.0	7.5	5.0 X 5.0 X 5.0
14" DIA	45.0	1.0	4.0 X 3.5 X 3.5	88.4	2.7	5.0 X 4.0 X 4.0	163.3	10.2	6.0 X 5.0 X 5.0
16" DIA	58.8	1.0	4.0 X 4.0 X 4.0	115.4	3.5	6.0 X 4.5 X 4.5	213.3	13.3	8.0 X 5.0 X 5.0

**TEE & DEAD END THRUST BLOCKING
MINIMUM BEARING SURFACE IN SQUARE FEET**

BEARING MATERIAL ALLOWABLE LOAD	<3" DIA	3" DIA	4" DIA	6" DIA	8" DIA	10" DIA	12" DIA	14" DIA	16" DIA
SILT / CLAY 1000 LB / SF	1.5	1.5	3.0	6.5	11.5	18.0	25.5	35.0	45.5
SANDY SILT / CLAY 2000 LB / SF	0.7	1.0	1.5	3.0	6.0	9.0	13.0	17.5	22.5
SILTY / CLAYEY GRAVELS 3000 LB / SF	0.5	0.5	1.0	2.0	4.0	6.0	8.5	11.5	15.0
POOR GRADE GRAV/SAND 4000 LB / SF	0.5	0.5	1.0	1.5	3.0	4.5	6.5	9.0	11.5
WELL GRADED GRAVEL 5000 LB / SF	0.5	0.5	1.0	1.5	2.5	3.5	5.0	7.0	9.0
ROCK 10,000 LB / SF	0.5	0.5	1.0	1.0	1.0	2.0	2.5	3.5	4.5

NOTES:

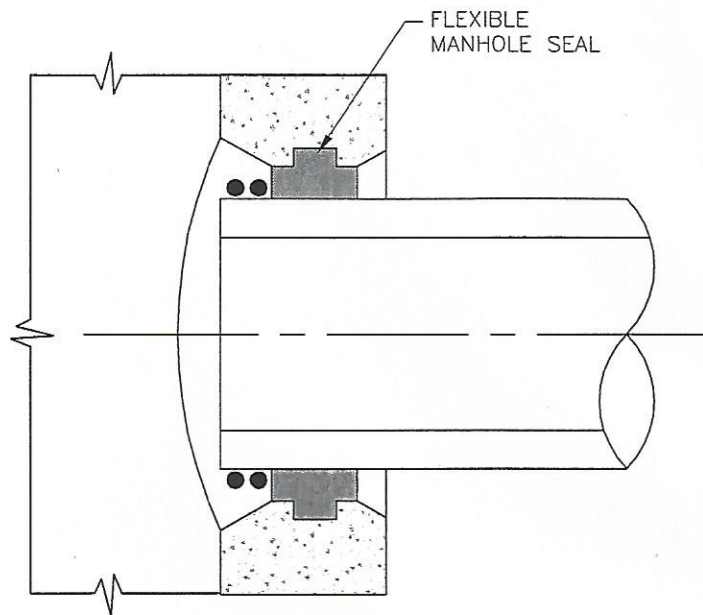
1. THE ABOVE ALLOWABLE BEARING VALUES GENERALLY RELATE TO THE BEARING MATERIALS LISTED. THE CONTRACTOR SHALL PROVIDE ACCURATE SOIL IDENTIFICATION AND EVALUATION UNLESS THE NEXT HIGHER CATEGORY IS SELECTED AS APPROVED BY THE TOWN.
2. BEARING SURFACE SHALL BE UNDISTURBED EARTH OR EMBANKMENT COMPACTED TO 90% OF MAXIMUM DENSITY.
3. 150 PSI WORKING PRESSURE AND SAFETY FACTOR = 1.5

**TOWN OF
KEEDYSVILLE**

**THRUST BLOCKING BEARING AREA -
TEES, ENDS & VERTICAL UPWARDS**

JUNE 2008

W-34



PRECAST BASE WITH PIPE TO MANHOLE SEAL

TOWN OF
KEEDYSVILLE

MANHOLE PIPE
CONNECTIONS

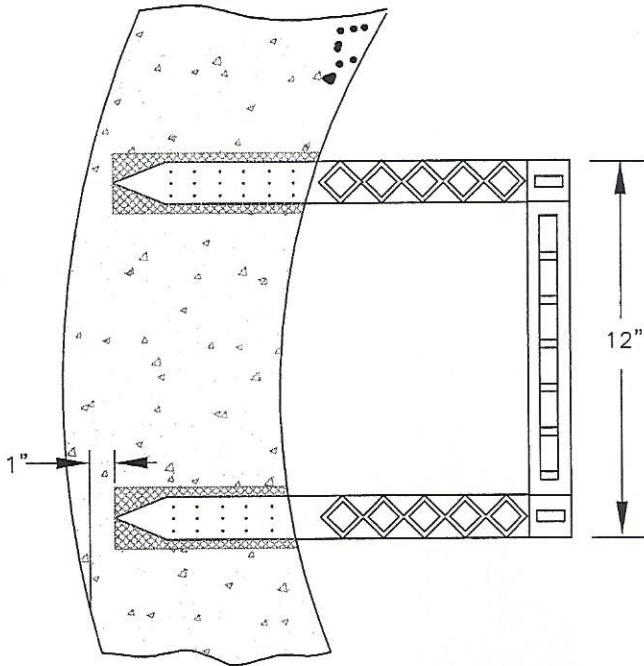
JUNE 2008

W-35

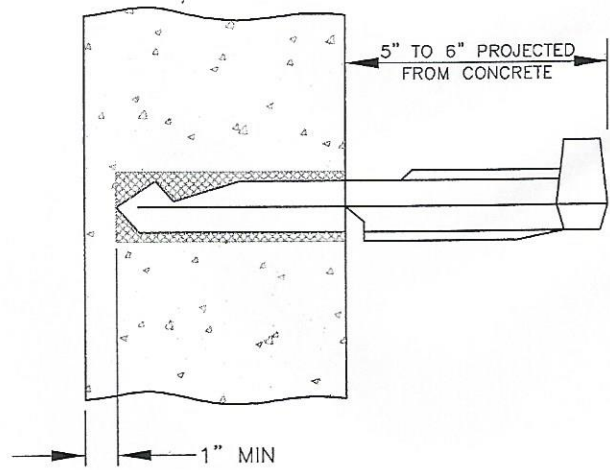
Acts, Ordinances,
Resolutions - Towns
Clerk of the Circuit Court
Washington County

NOTE:

STEPS OR APPROVED INSERT SHALL BE BUILT INTO MANHOLE AT POINT OF MANUFACTURE.

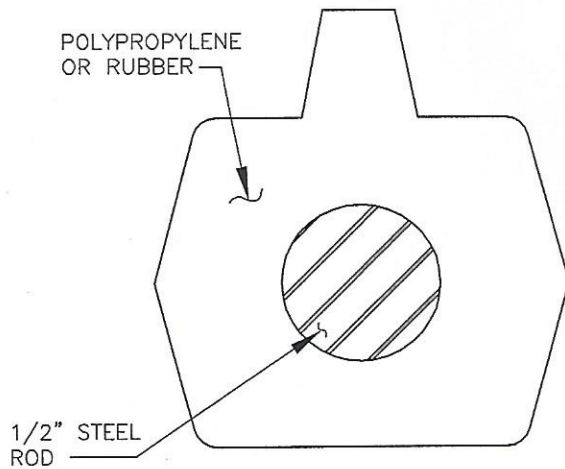


PLAN

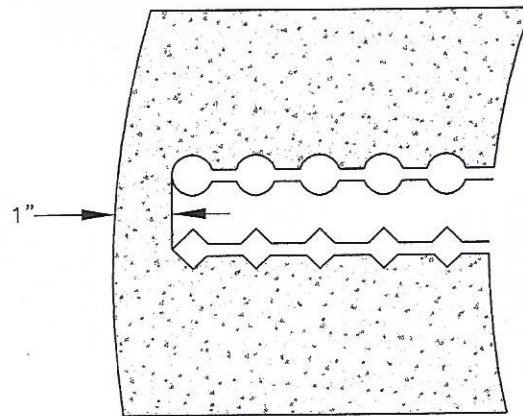


PROFILE

COATED STEP



SECTION



INSERT

NOTE:

WHEN STEPS ARE TO BE INSTALLED ON SITE, MANHOLE SECTIONS SHALL HAVE AN APPROVED INSERT INSTALLED BY THE MANUFACTURER.

**TOWN OF
KEEDYSVILLE**

**STANDARD MANHOLE
STEPS**

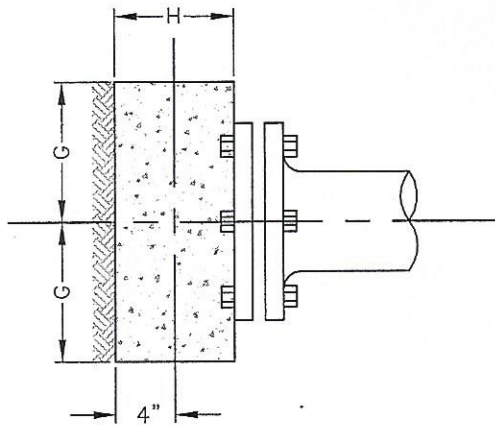
JUNE 2008

W-36

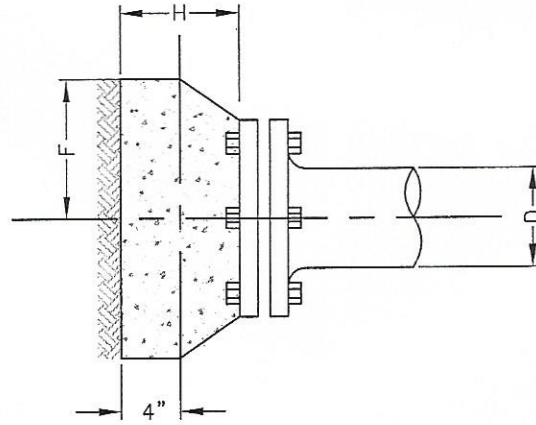
Liber 11 Folio 0377

Acts, Ordinances,
Resolutions - Towns
Clerk of the Circuit Court
Washington County

D	F	G	H
4"	6"	6"	8"
6	10"	9"	8"
8"	10"	13"	9"
10"	16"	11"	12"



ELEV.



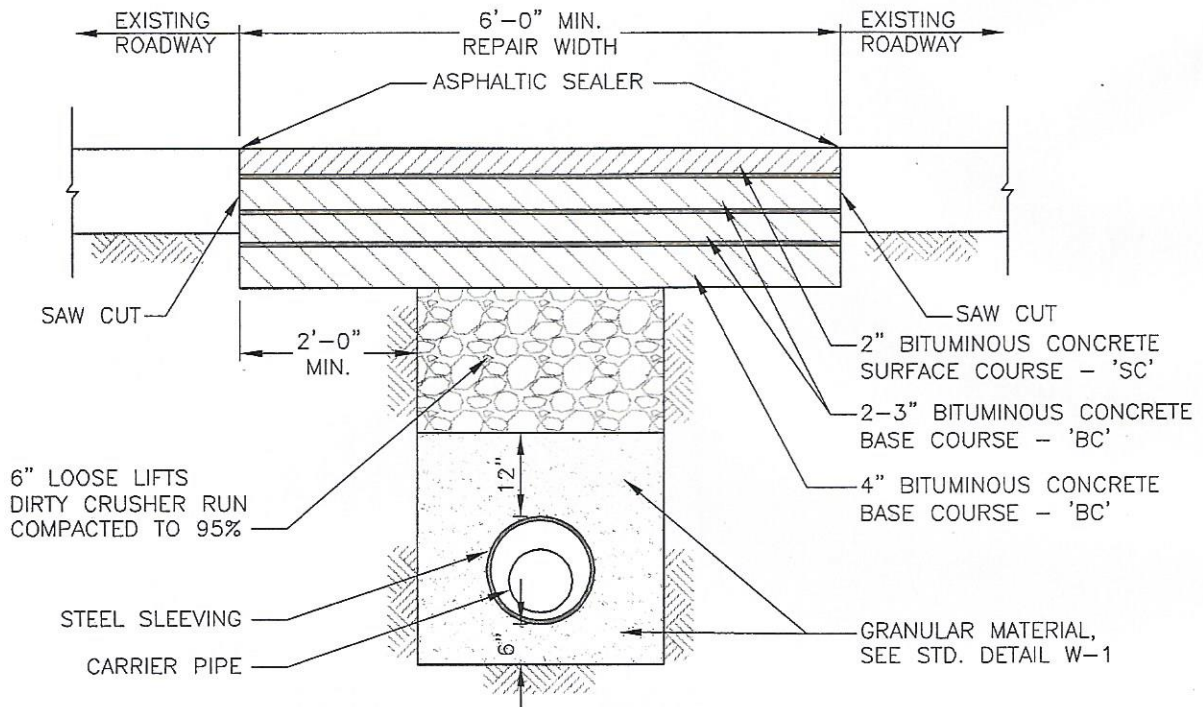
PLAN

TOWN OF
KEEDYSVILLE

BUTTRESS FOR
PLUGS & CAPS

JUNE 2008

W-37

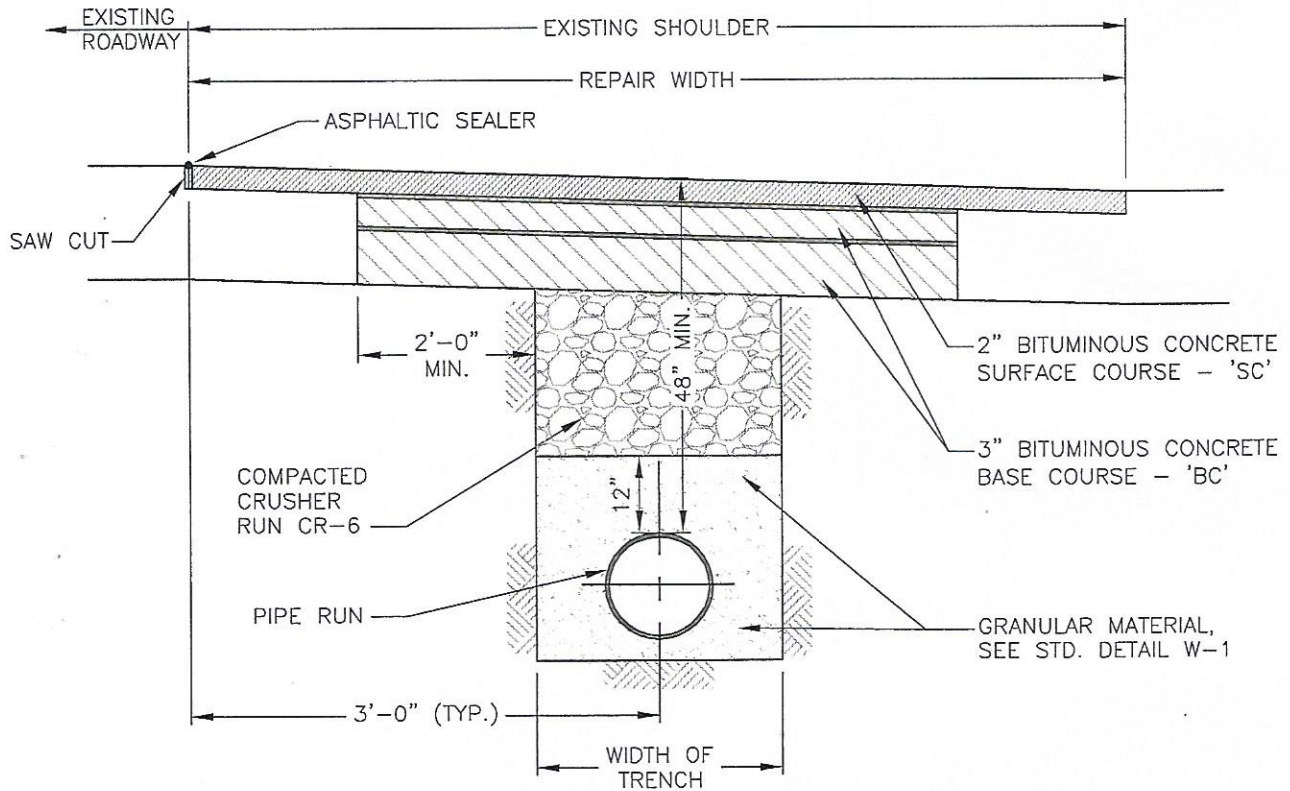


**TOWN OF
KEEDYSVILLE**

**TYPICAL PAVEMENT REPAIR
IN STATE HIGHWAY ROUTES**

JUNE 2008

W-38

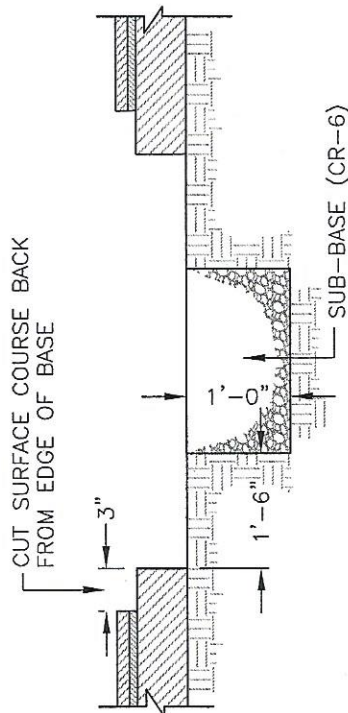
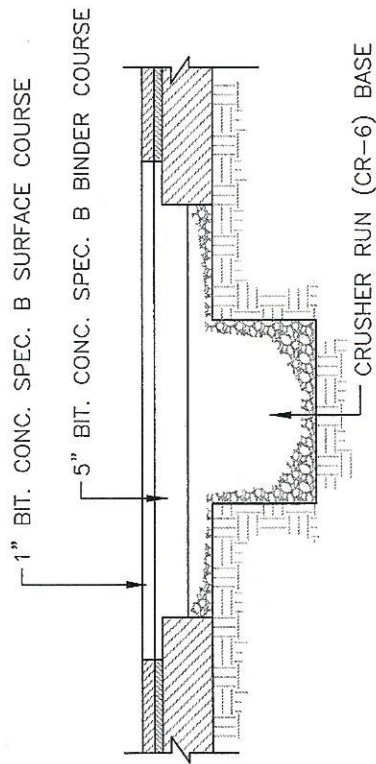


**TOWN OF
KEEDYSVILLE**

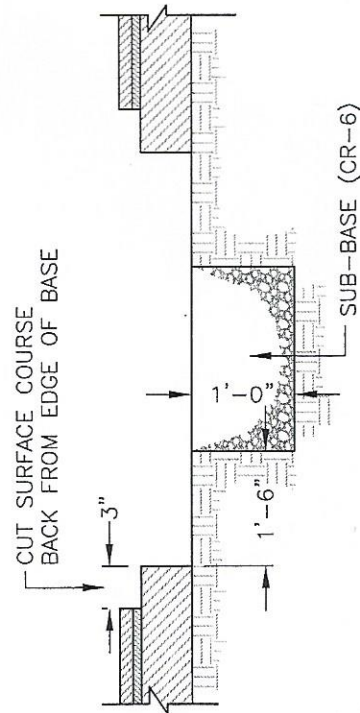
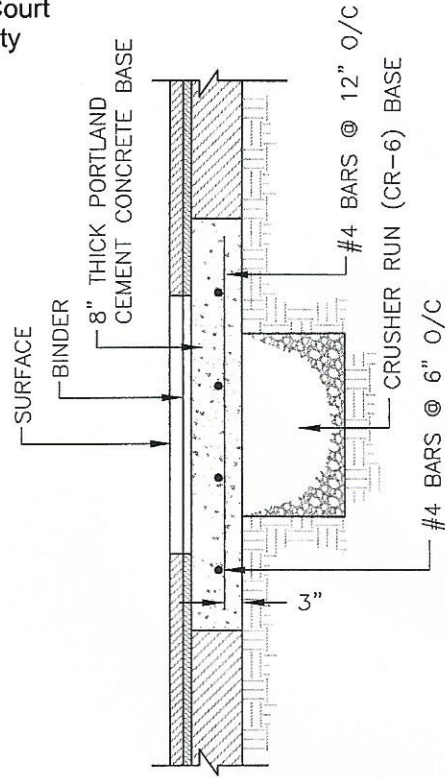
**TYPICAL SHOULDER REPAIR
ALONG MARYLAND STATE
HIGHWAYS**

JUNE 2008

W-39



ROADWAY CUT PARALLEL TO CENTERLINE OF ROADWAY



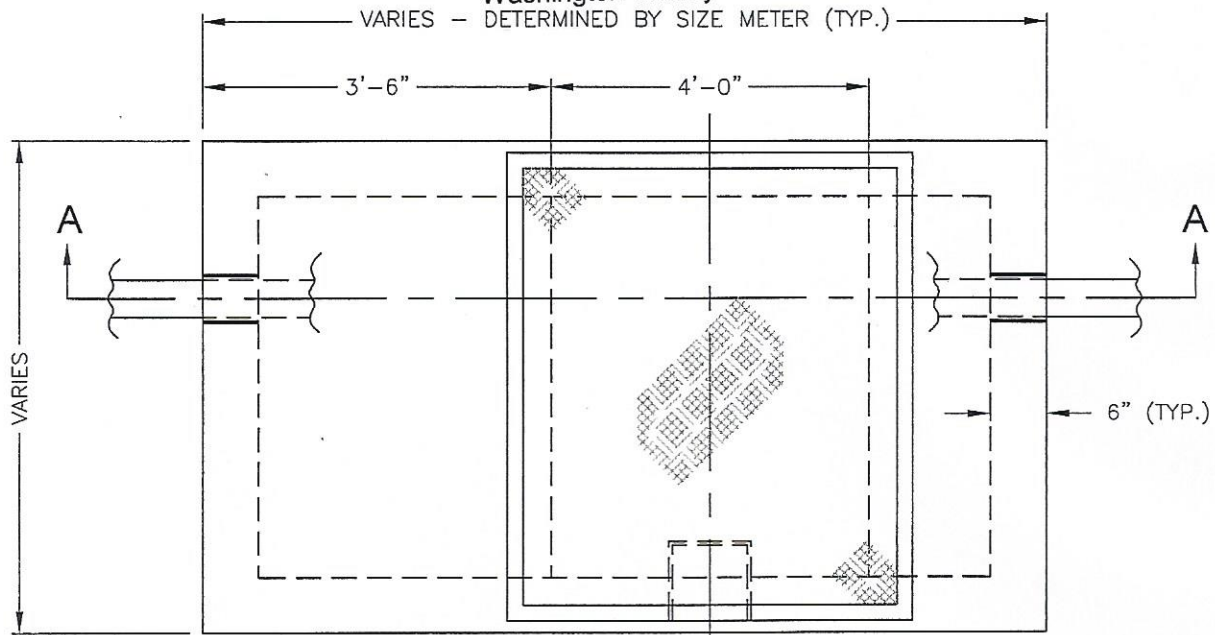
ROADWAY CUT PERPENDICULAR TO CENTERLINE OF ROADWAY

TOWN OF
KEEDYSVILLE

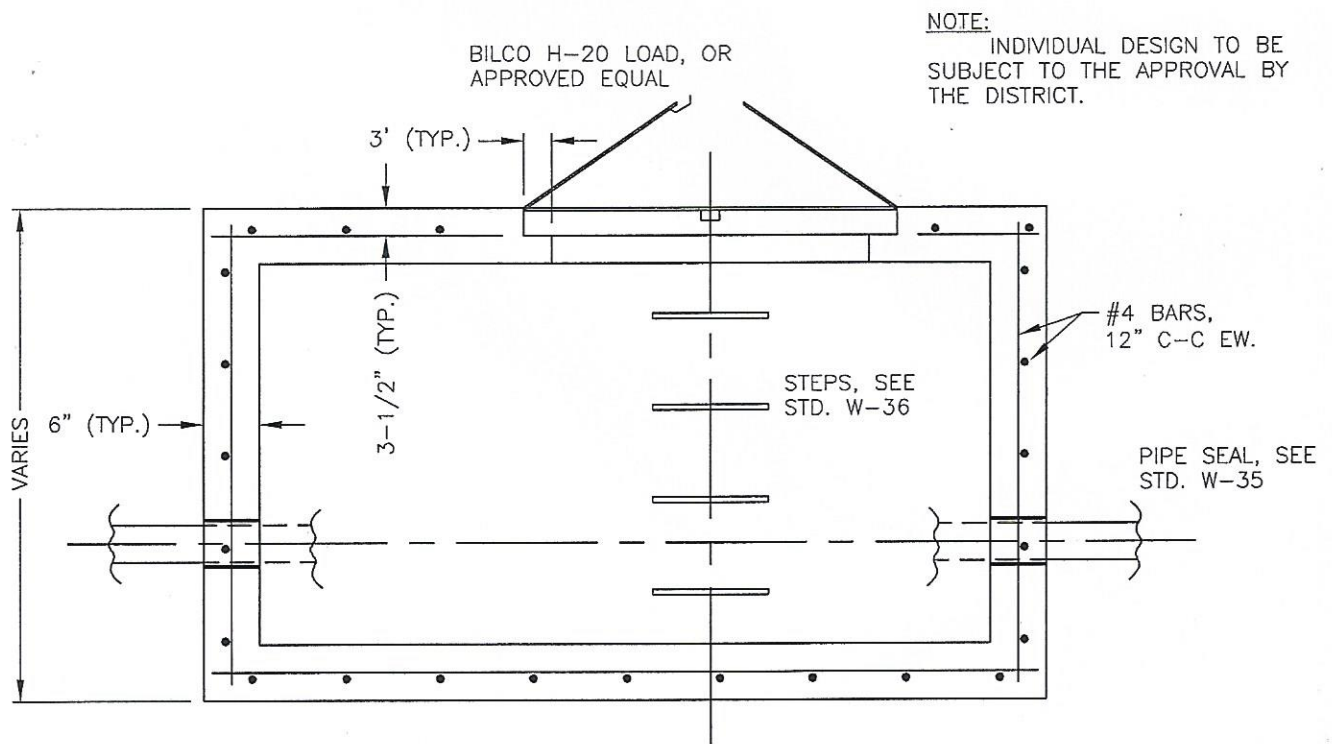
CUTTING & REPAIRING OF
OPENINGS IN COUNTY
ROADWAYS

JUNE 2008

W-40



PLAN



NOTE:

INDIVIDUAL DESIGN TO BE
SUBJECT TO THE APPROVAL BY
THE DISTRICT.

PROFILE

**TOWN OF
KEEDYSVILLE**

**TYPICAL METER VAULT
(2" METERS AND LARGER)**

JUNE 2008

W-41

Liber 11 Folio 0382

Acts, Ordinances,
Resolutions - Towns
~~Clerk of the Circuit Court~~
Washington County

PROJECT: Clerk of the Circuit Court PROJECT NO.: _____

CONTRACTOR: Washington County SHEET NO.:

PREPARED BY: _____ PHONE NO: _____ DATE: _____

DRAWING REFERENCE : _____ REVISION DATE: _____

LOCATION: _____ PIPE SIZE: _____

TYPE/CLASS: _____

BENCH MARK : _____ FILE NAME: _____

[illegible]

TOWN OF
KEEDYSVILLE

STAKEOUT REFERENCE SHEET

JUNE 2008

W-42

Liber 11 Folio 0383

Acts, Ordinances,

~~Resolutions~~ ~~Towns~~

Clerk of the Circuit Court

Washington County

PROJECT: _____ PROJECT NO.: _____

DRAWING REFERENCE: _____ DATE: _____

CONTRACTOR: _____

FROM STATION: _____ TO STATION: _____

TYPE OF MAIN PIPE BEING TESTED _____

SIZE OF MAIN BEING TESTED _____ TOTAL L.F. _____

REFERENCE: AWWA C-600-05

CAUTION: TEST PROCEDURES

HERE ARE ONLY TO BE USED

WITH KEEDYSVILLE WATER SYSTEM.

HYDROSTATIC TEST PRESSURE REFER TO SECTION 306, PARAGRAPH 306.04

1. TEST PRESSURE AT THE PUMP SHALL BE SUFFICIENT TO CAUSE THE PRESSURE IN THE SEGMENT OF MAIN UNDER TEST TO BE 50 PSI ABOVE THE NORMAL WORKING PRESSURE IN THE MAIN.
2. WORKING PRESSURE AT A POINT IS CALCULATED BY TAKING THE ELEVATION OF THE POINT AND SUBTRACTING IT FROM 592 FEET AND MULTIPLYING THE RESULT TIMES 0.43 FOR EXAMPLE, AT A TAP IN A MAIN AT 410 FEET ELEVATION, THE WORKING PRESSURE IS 592 FT MINUS 410 FT EQUALS 182 FT TIMES 0.43 EQUALS 78 PSI.
3. REQUIRED TEST PRESSURE AT THE TAP FOR THE PUMP IS CALCULATED BY TAKING THE ELEVATION OF THE TAP AND SUBTRACTING IT FROM 708 FEET AND MULTIPLYING THE RESULT TIMES 0.43. FOR EXAMPLE, AT A TAP IN THE MAIN AT 410 FEET ELEVATION, 708 FEET MINUS 410 FEET EQUALS 298 FEET TIMES 0.43 EQUALS 128 PSI TEST PRESSURE REQUIRED.
4. MAINTAIN THE TEST PRESSURE FOR AT LEAST THREE (3) HOURS AFTER EXPULSION OF ALL AIR. ONCE TEST IS STARTED, THE TEST PRESSURE MUST NOT BE ALLOWED TO VARY BY MORE THAN 5 PSI. IF OR WHEN THE TEST PRESSURE DROPS BY 3 OR 4 PSI, THE OPERATOR MUST ADD MAKE UP WATER TO BOOST THE PRESSURE BACK UP TO THE TEST PRESSURE. THE AMOUNT OF MAKE UP WATER SUPPLIED DURING THE TEST MUST BE MEASURED BY AN APPROPRIATE METER OR AN APPROVED CALIBRATED CYLINDRICAL WALL BUCKET.

DETERMINE ALLOWABLE LEAKAGE IN GALLONS PER HOUR

1. CALCULATION: $L = (S) \times (D) \times (\text{SQUARE ROOT OF } P) \text{ DIVIDED BY } 148,000$. (FOR DUCTILE IRON PIPE)
L = ALLOWABLE LEAKAGE IN GALLONS PER HOUR, S = LENGTH OF MAIN IN FEET, P = TEST PRESSURE IN PSI
EXAMPLE: FOR 900 FEET OF 8-INCH PIPE AT 95 PSI, THE ALLOWABLE LEAKAGE RATE IS 0.47 GPH

2. USING TABLE BELOW

ALLOWABLE LEAKAGE PER 1000 FEET OF MAIN

PRESSURE (P)	100	150	200
DIAMETER (D) INCHES	ALLOWABLE LEAKAGE PER 1000 FEET OF MAIN (L) U.S. GALLONS PER HOUR		
4"	0.27	0.33	0.38
6"	0.41	0.50	0.57
8"	0.54	0.66	0.76
10"	0.68	0.83	0.96
12"	0.81	0.99	1.15

BEGIN: _____ A.M. P.M.

END: _____ A.M.P.M.

TEST PERIOD: _____ HOURS

TEST PRESSURE: _____

WATER USED: _____ GALLONS

3. NOTE: IF MORE THAN ONE DIAMETER OF PIPE IS UNDER TEST, FILL OUT THIS FORM FOR EACH SIZE

4. NOTE: ALL VISIBLE LEAKS MUST BE REPAIRED

5. HOW MANY TESTS WERE REQUIRED TO ACHIEVE ACCEPTANCE? _____

TEST CONDUCTED BY: _____

INSPECTOR

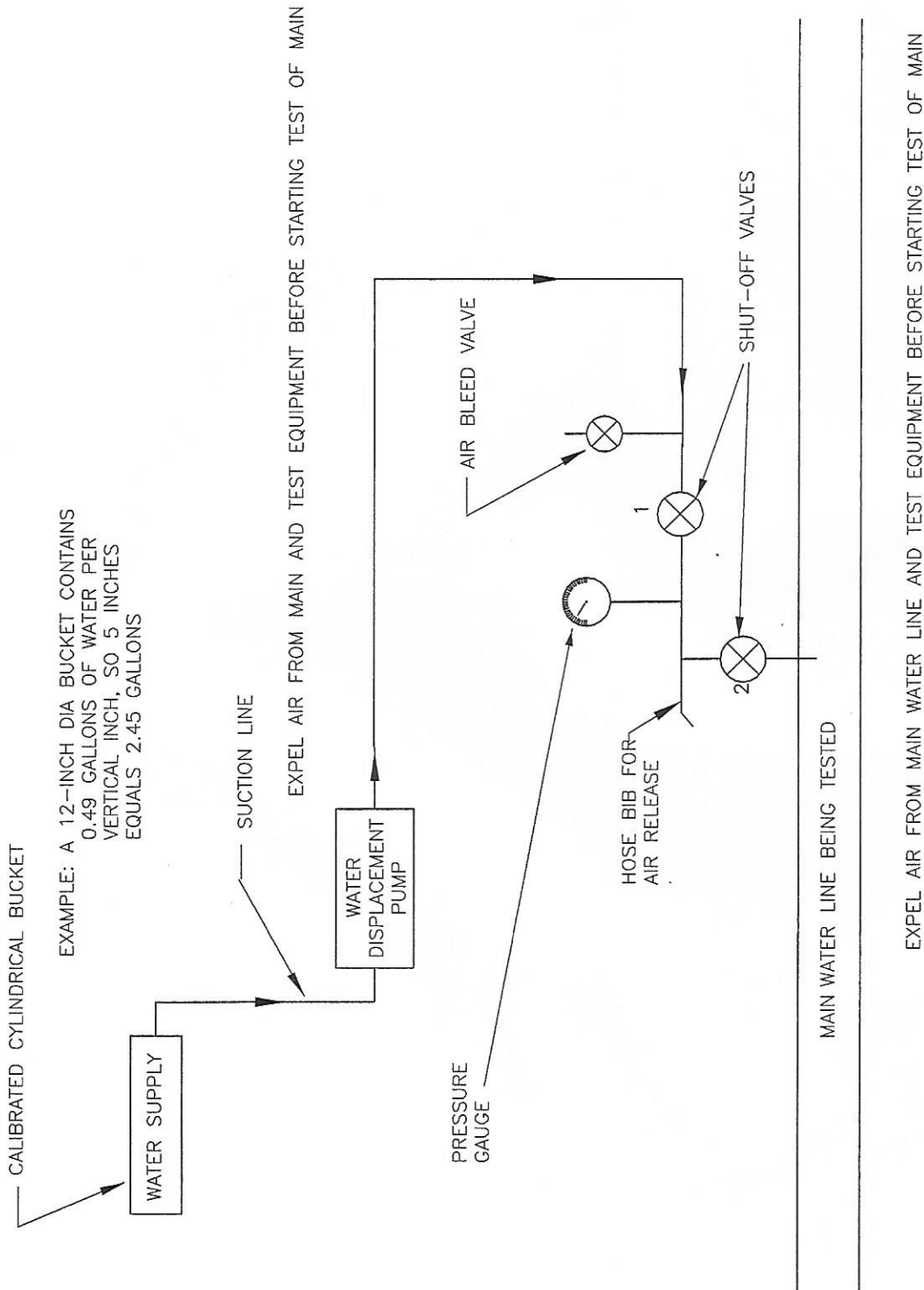
CONTRACTOR'S REPRESENTATIVE

TOWN OF
KEEDYSVILLE

HYDROSTATIC AND
LEAKAGE TEST

JUNE 2008

W-44



TOWN OF
KEEDYSVILLE

PRESSURE TEST SYSTEM

JUNE 2008

W-45

PROJECT: _____ PROJECT NO.: _____

CONTRACTOR: _____ SLUMP: _____

SUPPLIER: _____ AIR CONTENT: _____

TRUCK NO.: _____ TEMP. AIR: _____

TICKET NO.: _____ CONC.: _____

LOCATION: _____ REQUIRED STRENGTH _____ P.S.I.
AT _____ DAYS

SAMPLES MOLDED BY: _____ DATE: _____

TESTED BY: _____

[illegible]

BY: _____

TOWN OF
KEEDYSVILLE

CONCRETE TEST DATA

JUNE 2008

W-46

Liber 11 Folio 0386

Acts, Ordinances,
~~Resolutions - Towns~~
Clerk of the Circuit Court
Washington County

SECTION I: TO BE COMPLETED BY CONTRACTOR (ATTACH TO EACH COPY OF SUBMITTAL)

PROJECT: _____ PROJECT NO.: _____

SUBMITTAL NO.: _____
CONTRACTOR: _____ DATE: _____
ADDRESS: _____ SHEET 1 OF _____

CONTACT PERSON: _____ PHONE: () _____
SPECIFICATION REFERENCE: _____
DRAWING(S) REFERENCE: _____
SPECIFIC APPLICATION/USE: _____

PRODUCT NAME: _____
MODEL/TYPE/SERIES: _____ FOR SIZE(S): _____
MODEL/TYPE/SERIES: _____ FOR SIZE(S): _____
MANUF.: _____ SUPPLIER: _____
PHONE: () _____ PHONE: () _____

SECTION II: TO BE COMPLETED BY KEEDYSVILLE CONSTRUCTION MANAGEMENT

COMMENTS: _____

APPROVED

APPROVED AS NOTED

REVISE & RESUBMIT

NOT AS SPECIFIED

BY: _____ DATE: _____

TOWN OF
KEEDYSVILLE

SHOP DRAWING
COVER SHEET

JUNE 2008

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