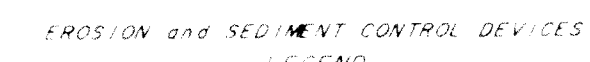


Approval of these plans will be based on specifications and standards in effect at the time of approval and will be subject, until completion of the roadway and acceptance by the Department, to future revisions, of the Specifications and Standards.

Owner & Developer

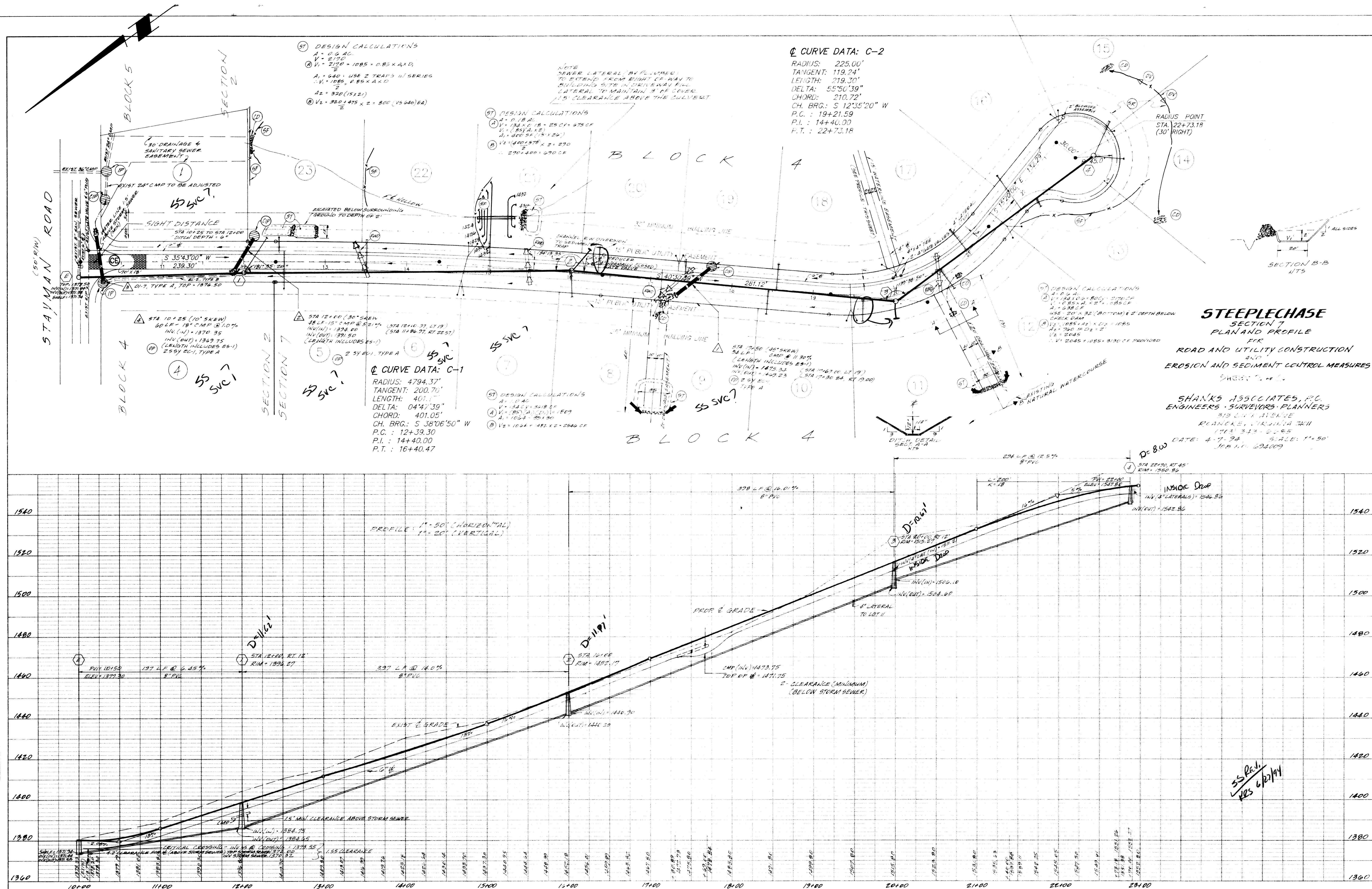


- MS-17. Construction Access Routes

- MS-17. Construction Access Routes
- Where construction vehicle access routes intersect paved public roads, provisions shall be made to minimize the disruption of traffic. Sediment tracking onto a public road surface, the road shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roadway by hosing/sweeping or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner. A provision shall be made to prevent sediment from entering as well as to larger and disturbing activities.
- MS-18. Temporary Erosion & Sediment Control Measure Removal
- All temporary erosion and sediment control measures shall be removed within 60 days of final site stabilization or after temporary measures are no longer needed, unless otherwise authorized by the local program administrator.
- MS-19. Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage, and shall be in a suitable condition and peak runoff level of stormwater runoff. Construction shall be responsible for obtaining copies of approved Erosion and Sediment Control Handbook and Narrative. The Virginia Erosion and Sediment Control Handbook shall be used in addition to the approved narrative and plan.

SHEET NUMBER		STEEPLCHASE SECTION - 7 COVER SHEET	DATE	REVISION DESCRIPTION
JOB NUMBER			DATE	
1 OF 6			04/01/94	
694009			DRAWN BY:	
			DESIGNED BY:	
		C E G		
		F O S		
		CHECKED BY:		
		F O S		
		SCALE:		
		As Noted		

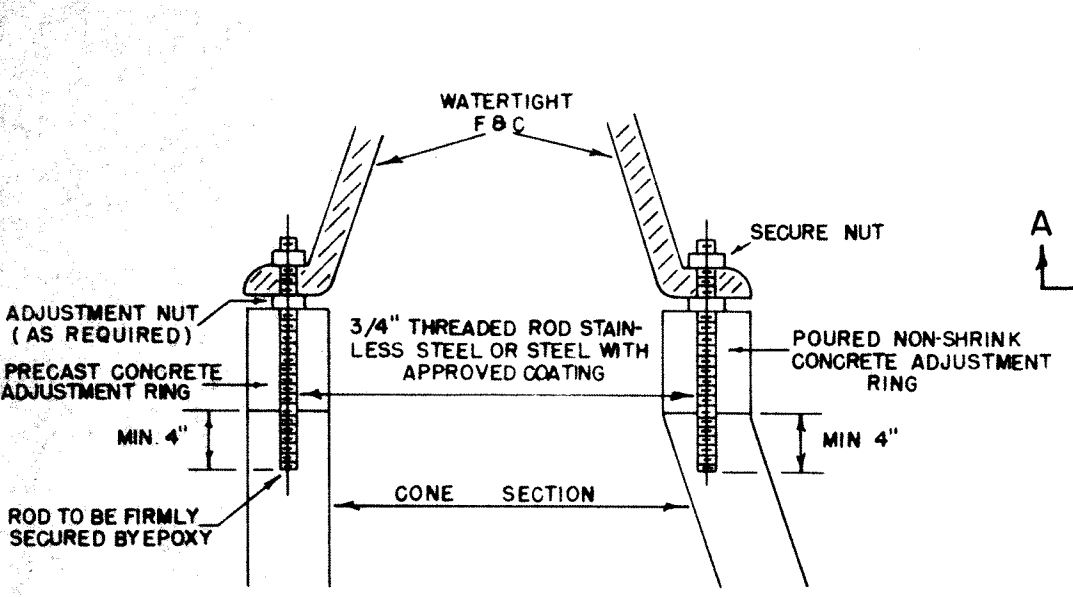
PROFILE		BY	DATE
NOTE BOOK	SURVIVED		
	PLOTTED		
	GRADES CHECKED		
	B.M.'s NOTED		
NO.	STRUCTURE NOTATIONS CHECKED		



MH-RCR-3000 EC	MH-RCR-3000 W
300 lbs. FRAME	262 lbs. FRAME
170 lbs. COVER	170 lbs. COVER
470 lbs. TOTAL *	432 lbs. TOTAL *
* MINIMUM AVERAGE WEIGHTS	

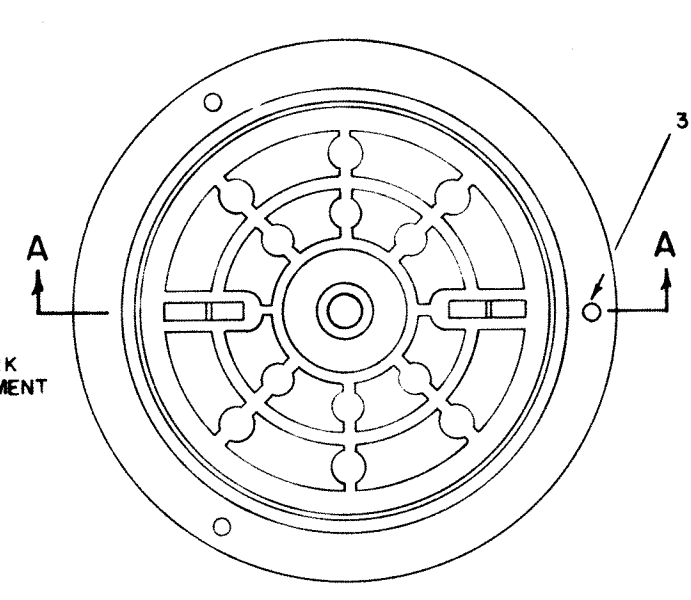
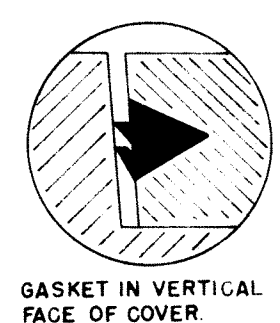
MANHOLE FRAME AND COVER

DEWEY BROTHERS, INC. MH-RCR-3000 EC OR EQUIVALENT
 DEWEY BROTHERS, INC. MH-RCR-3000 W OR EQUIVALENT
 (where watertight specified)

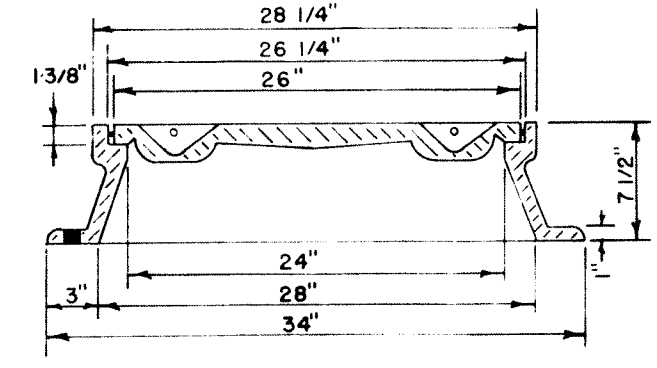


NOTE: APPROVED WATER SEALANT REQUIRED AT ALL JOINTS AND EXTERIOR OF POURED CONCRETE.

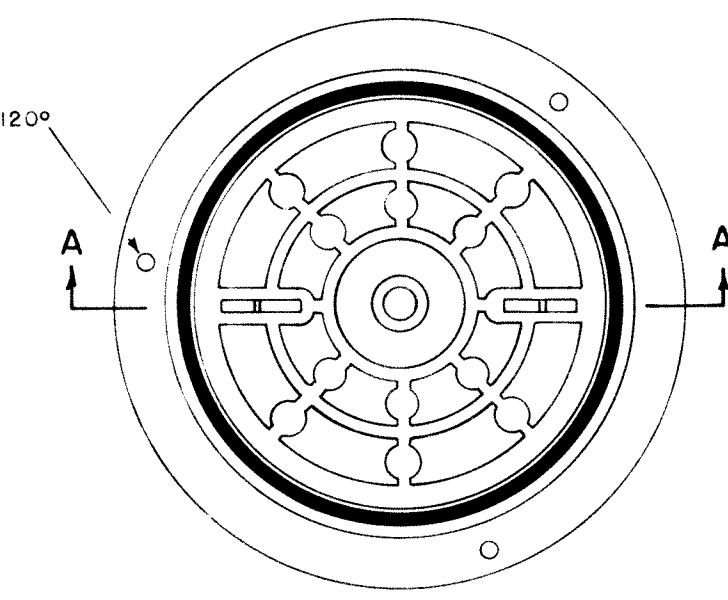
SECTION



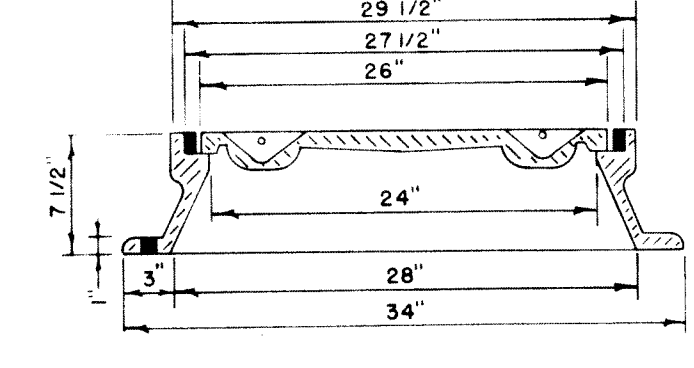
PLAN



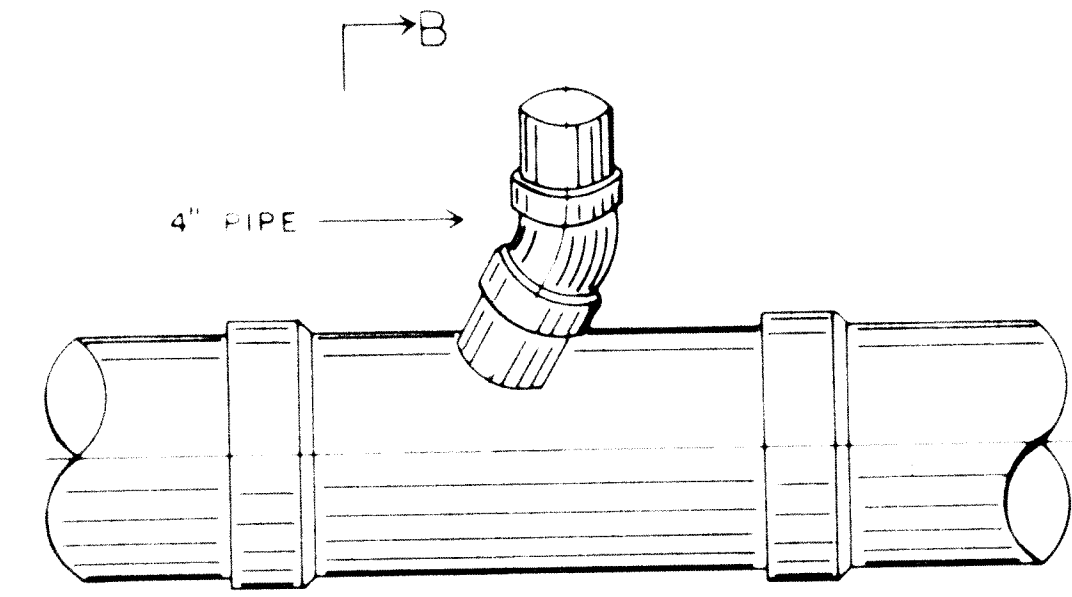
SECTION A-A



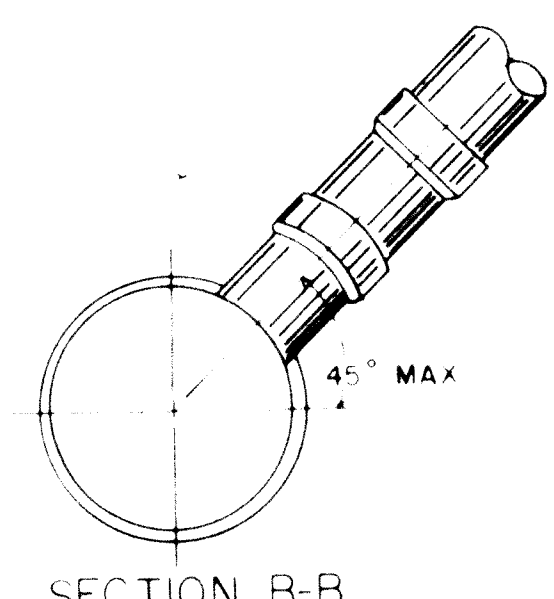
PLAN



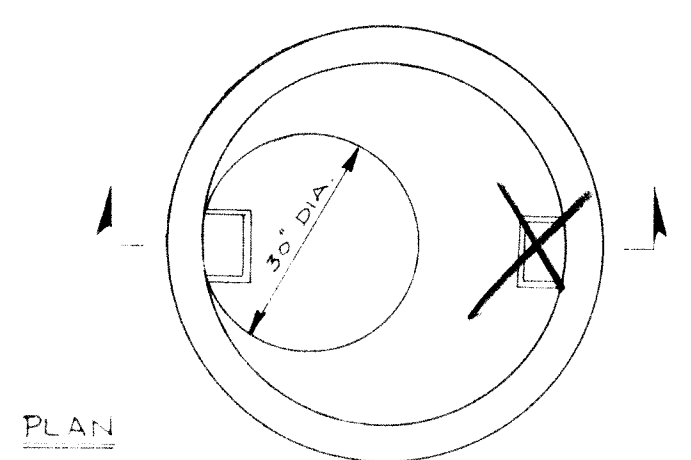
SECTION A-A



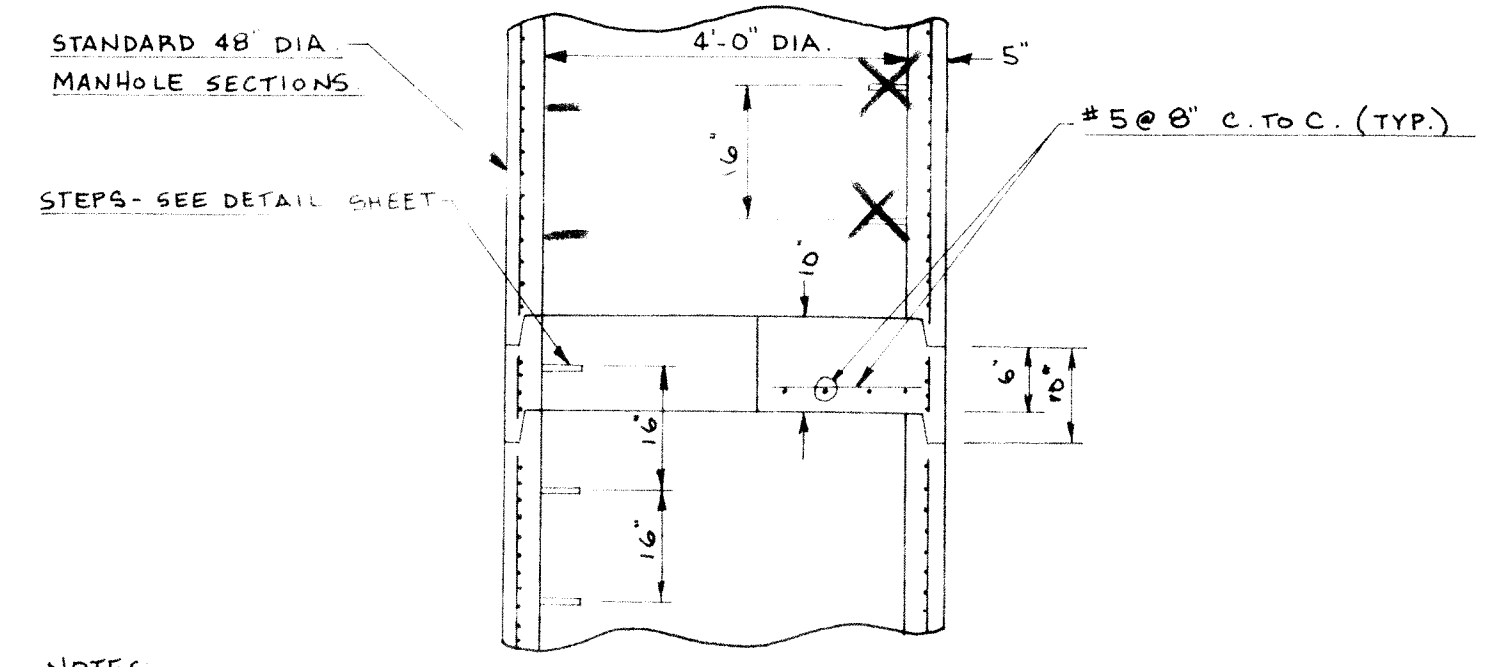
SERVICE CONNECTION "WYE"



SECTION B-B

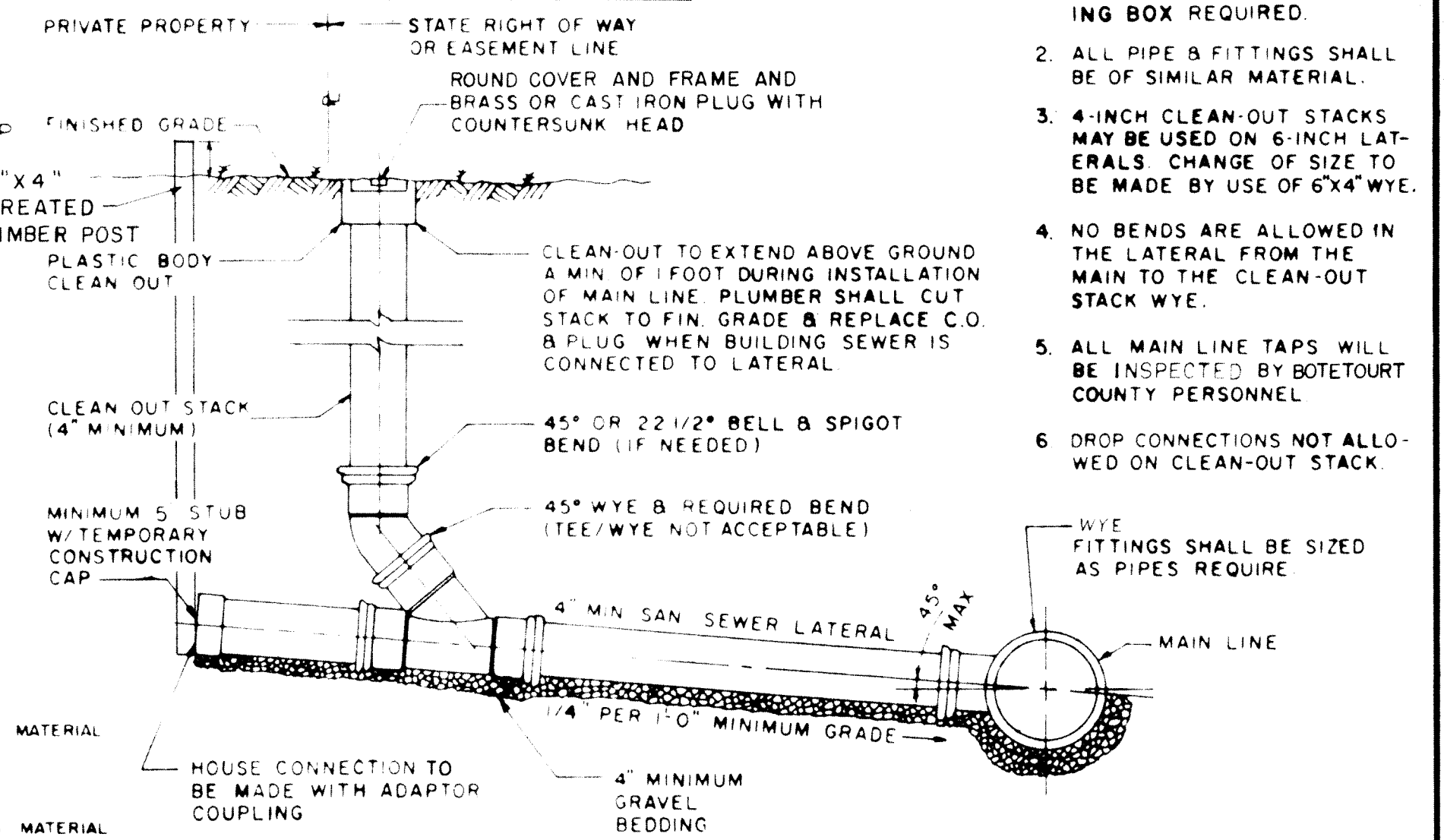


PLAN



NOTES:
 1) 4000 PSI CONCRETE
 2) GRADE 60 STEEL
 3) SAFETY SLAB TO BE USED PER CONTRACT DOCUMENTS

SAFETY SLAB

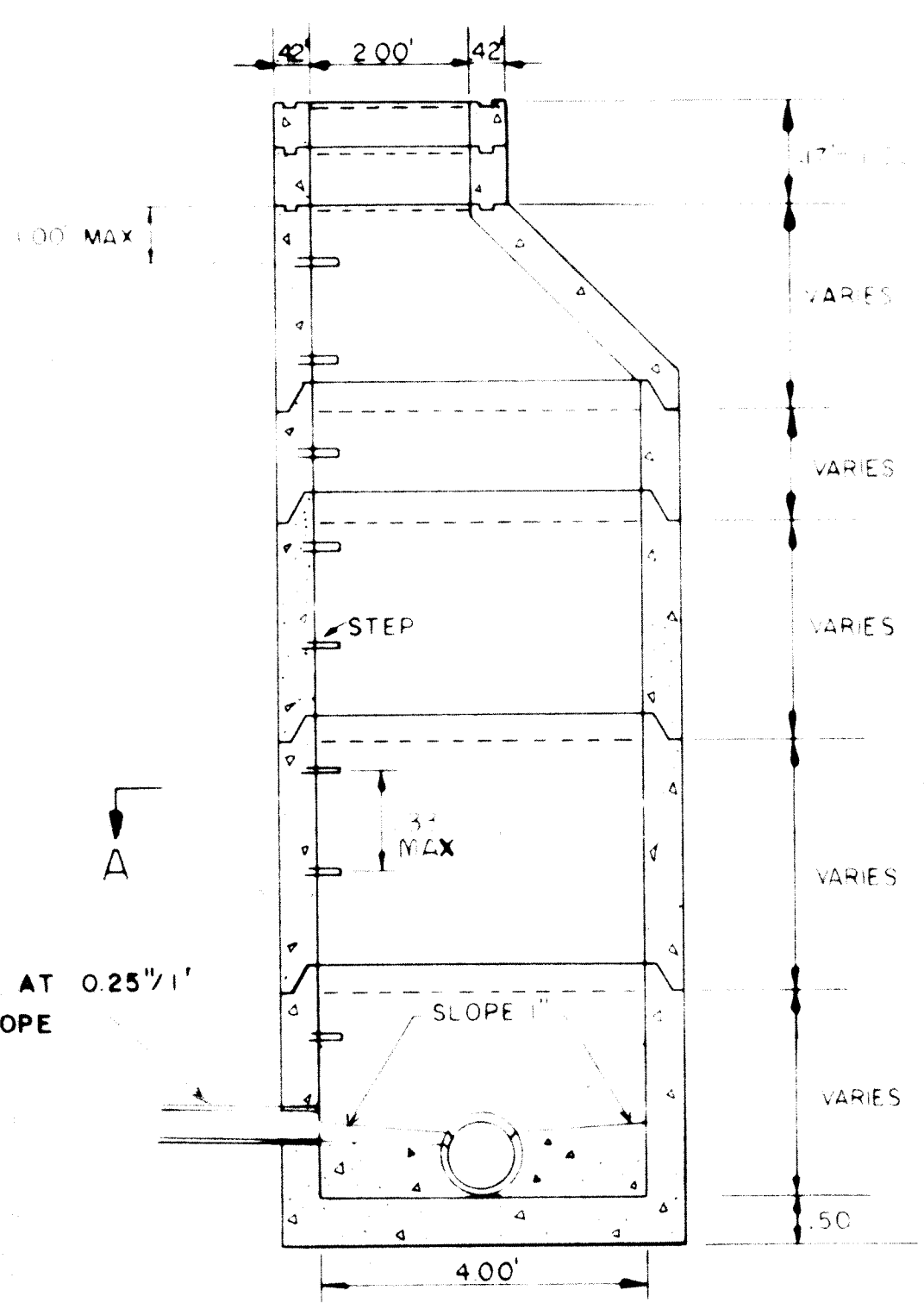


SANITARY SEWER LATERAL

SCALE 1"=1'-0"

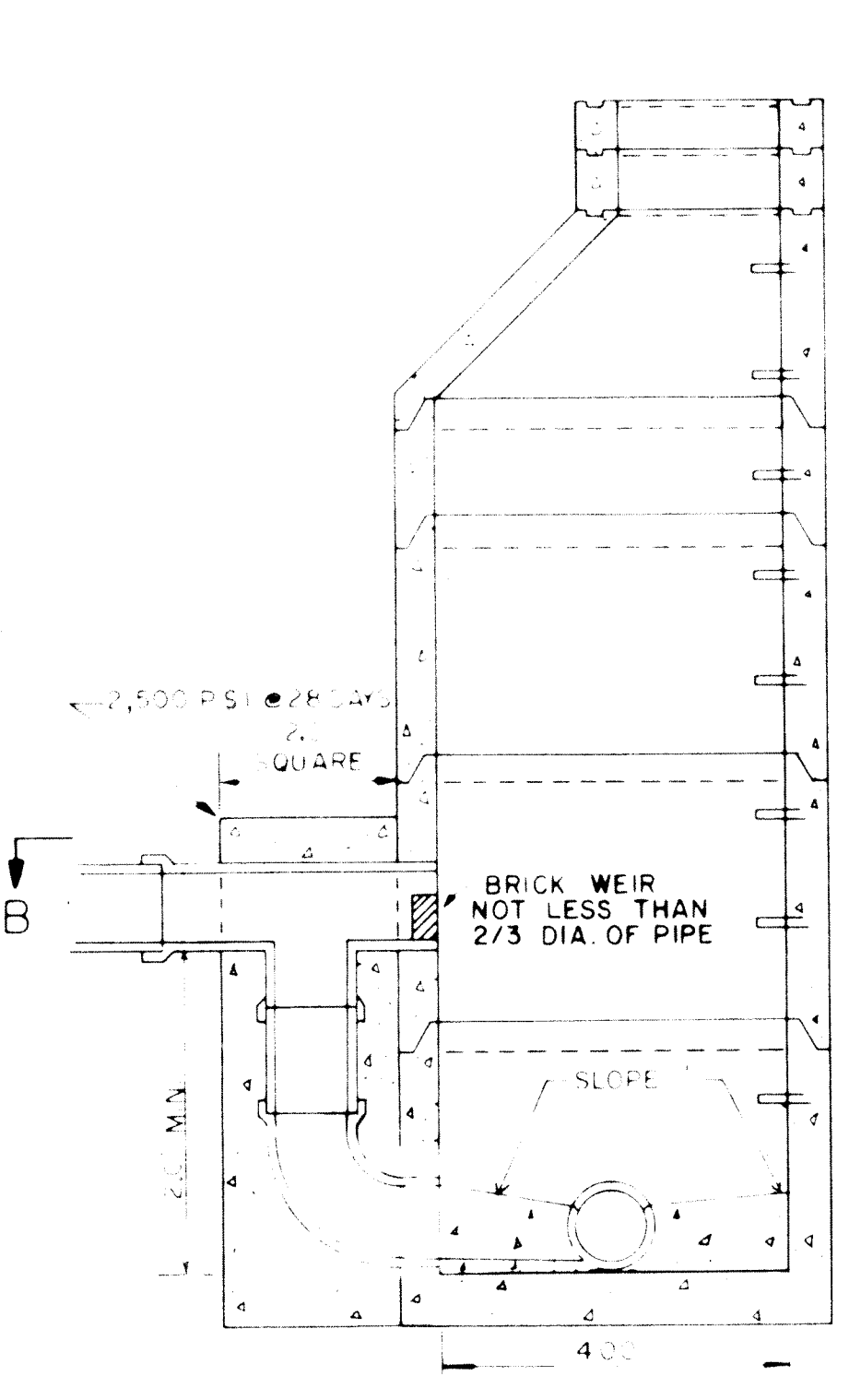
NOTES:
 1. IN TRAFFIC AREAS INSTALLATION OF A TRAFFIC BEARING BOX REQUIRED.
 2. ALL PIPE & FITTINGS SHALL BE OF SIMILAR MATERIAL.
 3. 4-INCH CLEAN-OUT STACKS MAY BE USED ON 6-INCH LATERALS. CHANGE OF SIZE TO BE MADE BY USE OF 6"x4" WYE.
 4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN-OUT STACK WYE.
 5. ALL MAIN LINE TAPS WILL BE INSPECTED BY BOTETOURT COUNTY PERSONNEL.
 6. DROP CONNECTIONS NOT ALLOWED ON CLEAN-OUT STACK.

SECTION A-A STANDARD MANHOLE

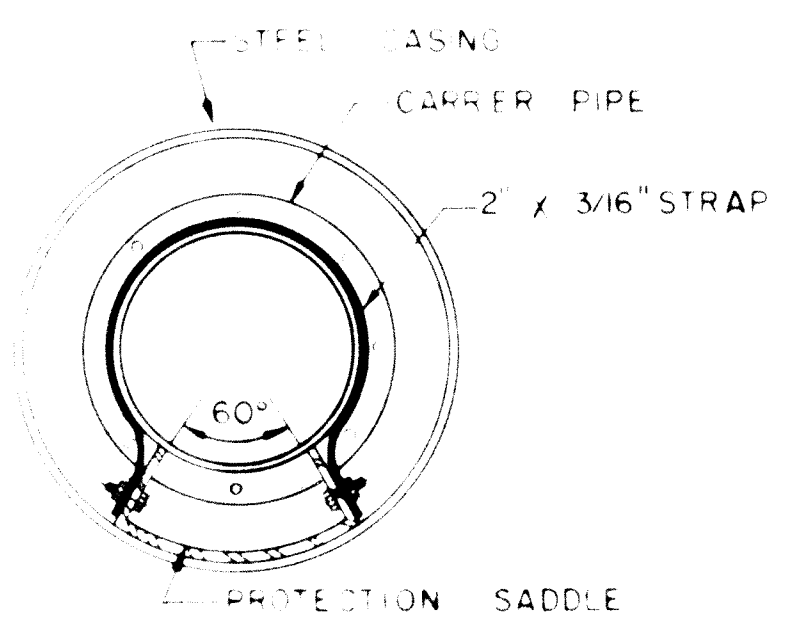


STANDARD MANHOLE

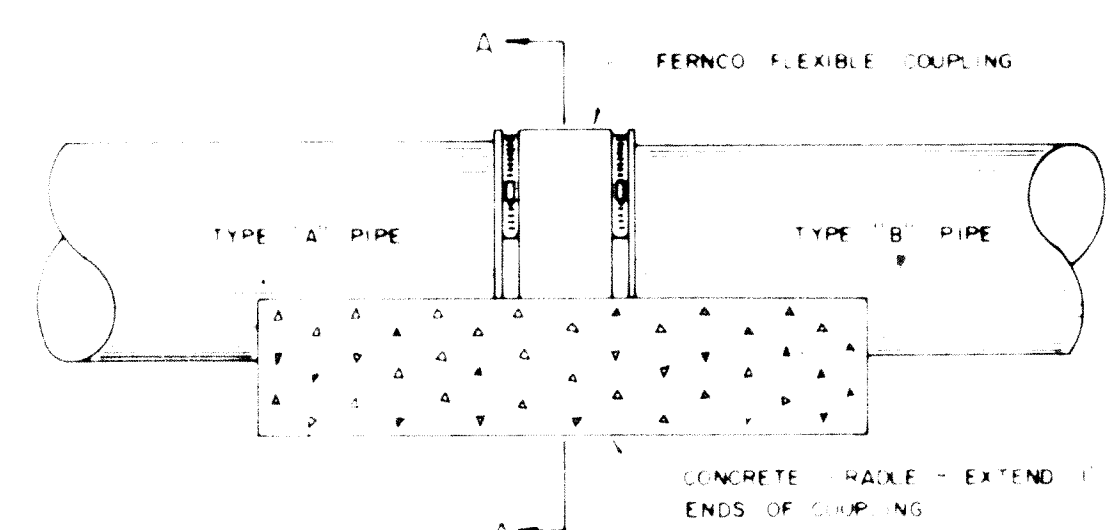
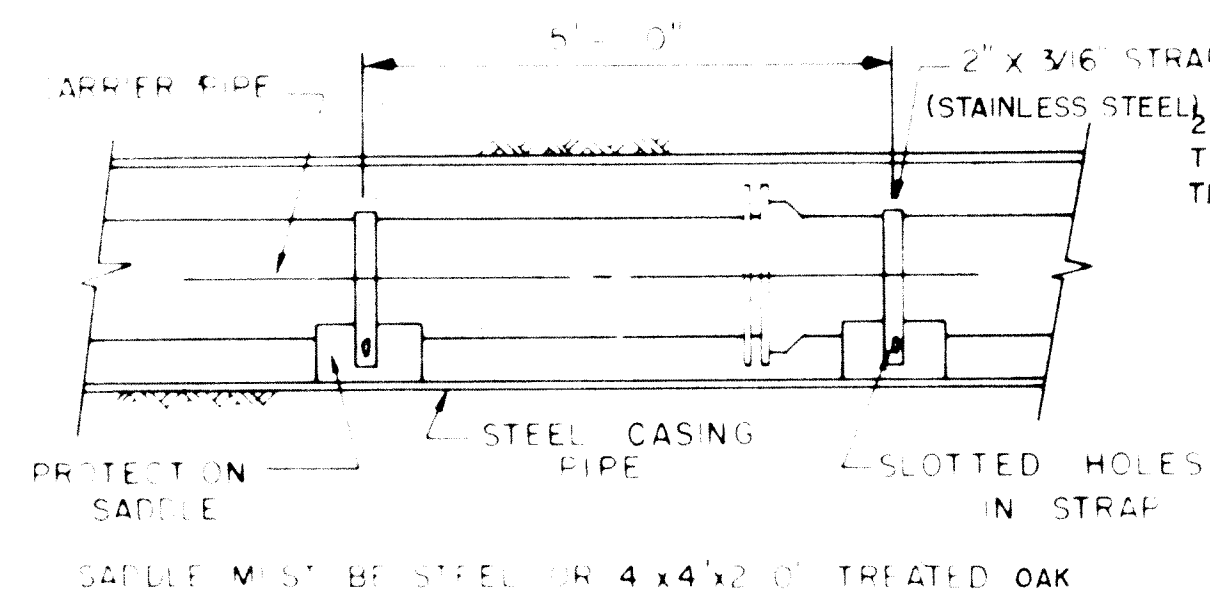
SECTION B-B DROP MANHOLE



DROP MANHOLE

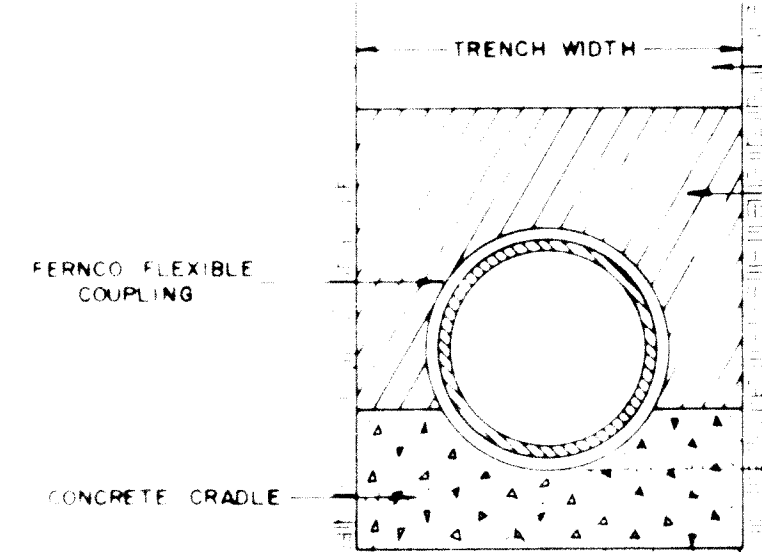


BORING AND CASING

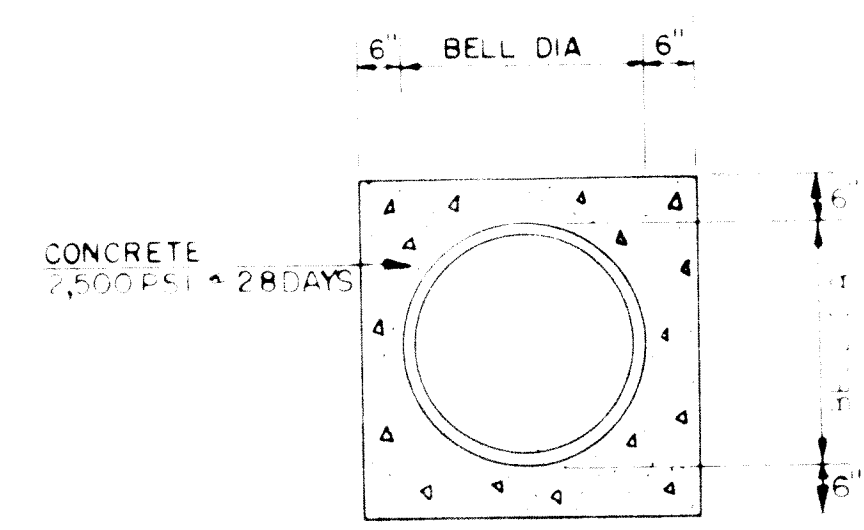


JOINING DISSIMILAR PIPE

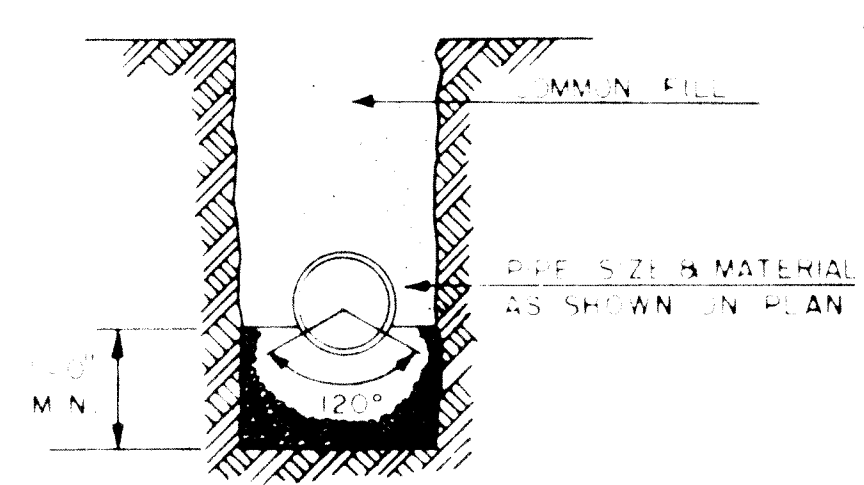
SIDE VIEW



SECTION A-A



CONCRETE ENCASED PIPE

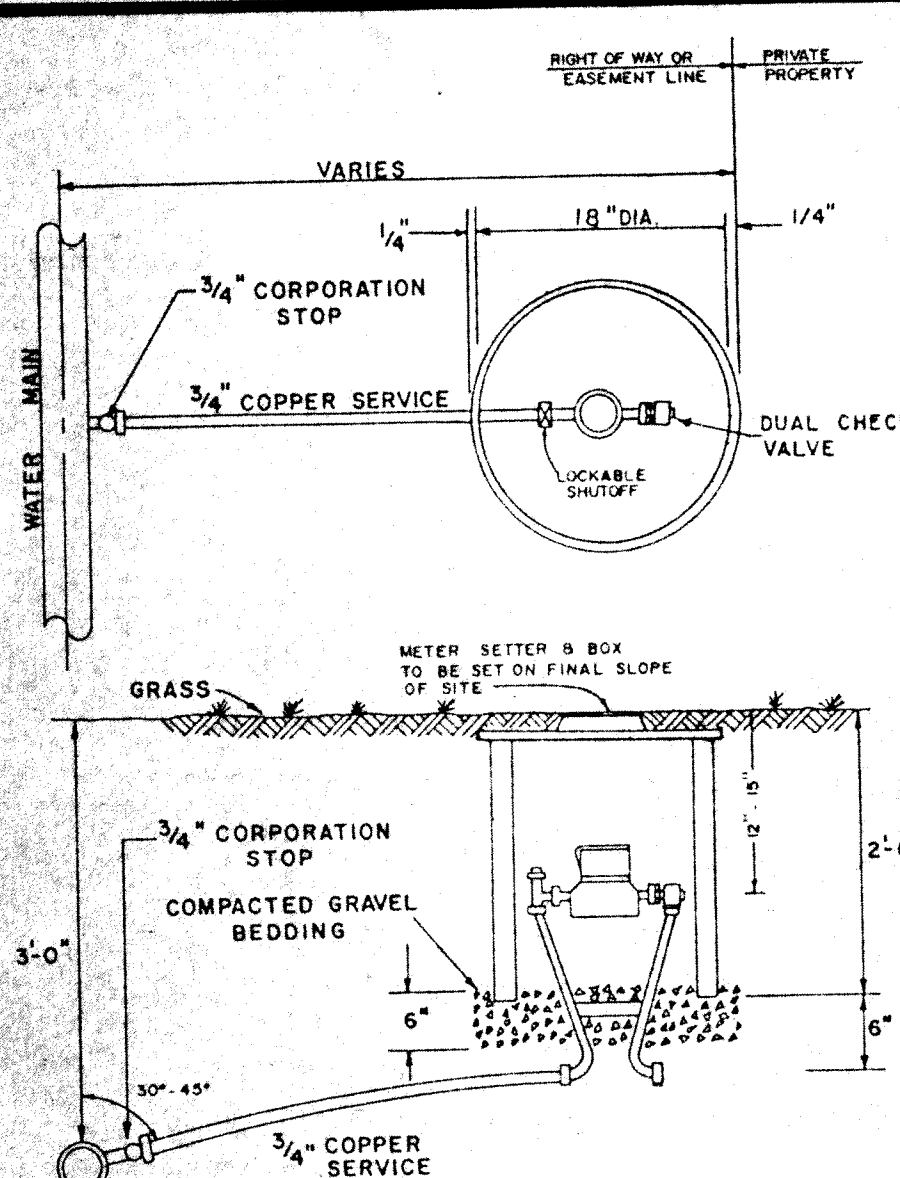


STONE CRADLE

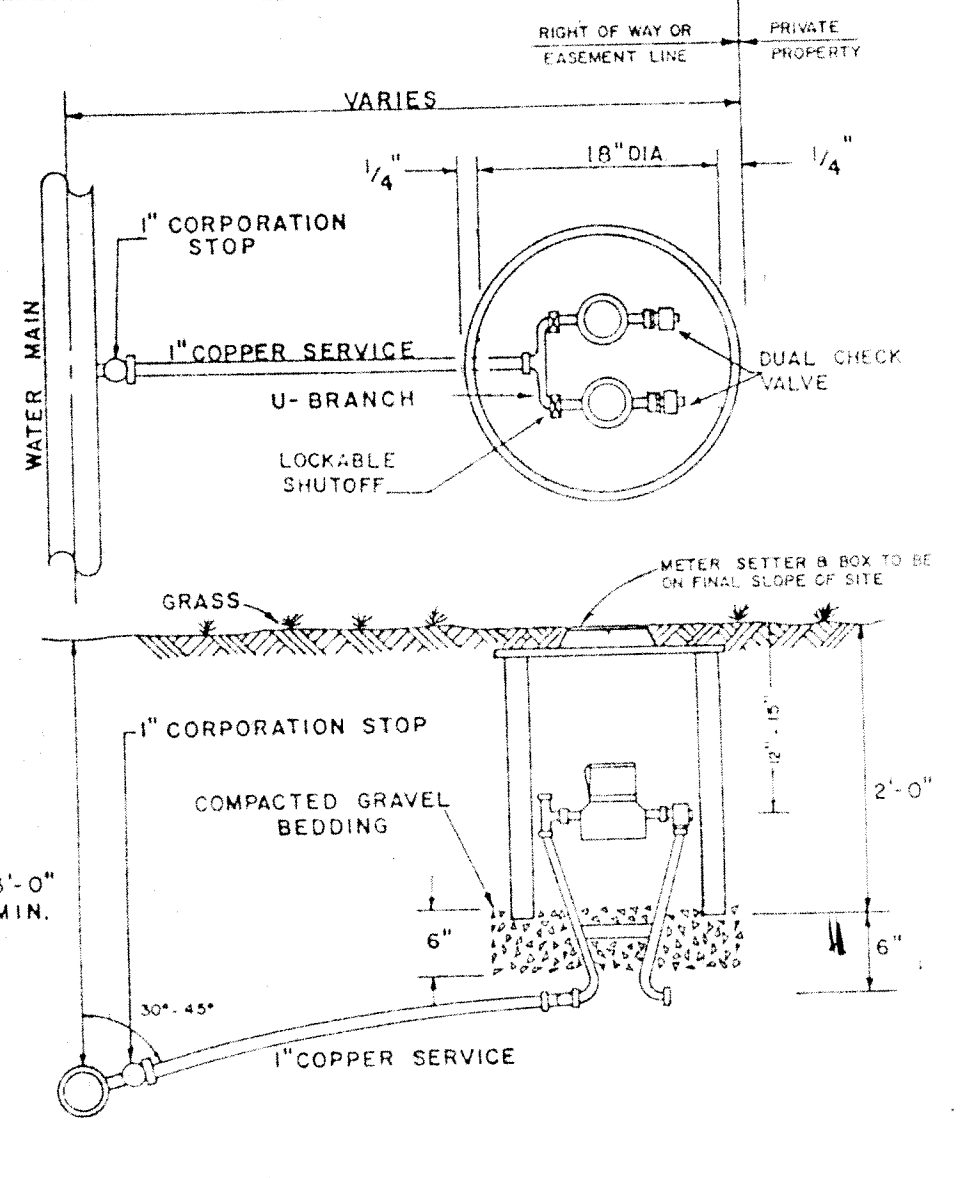
ANCHOR BLOCK

SCALE 1"=1'-0"

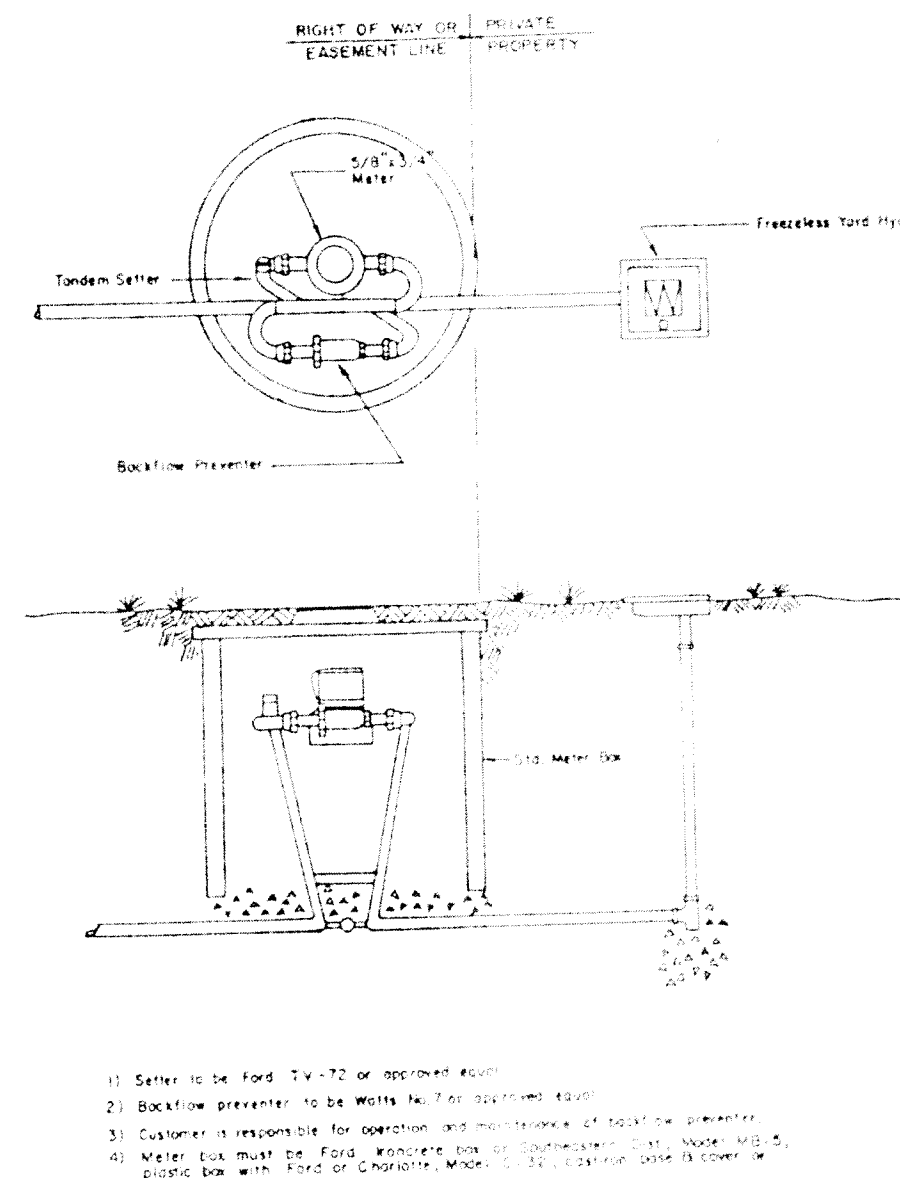
SANITARY SEWER DETAILS
SHANKS ASSOCIATES, P.C.
 ENGINEERS · SURVEYORS · PLANNERS
 313 LUCK AVENUE ROANOKE, VIRGINIA 24011
 (703) 343-6685



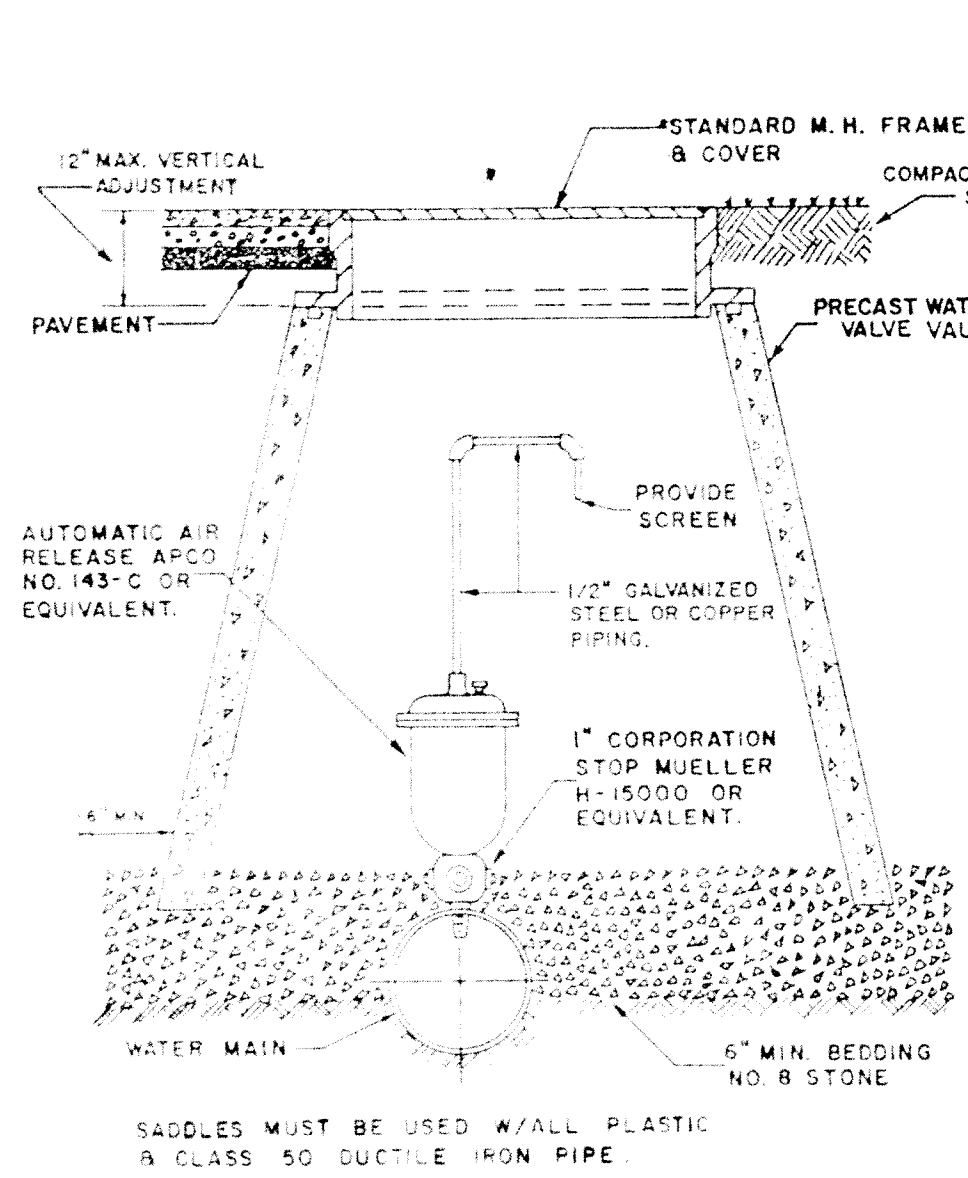
SINGLE RESIDENTIAL WATER SERVICE



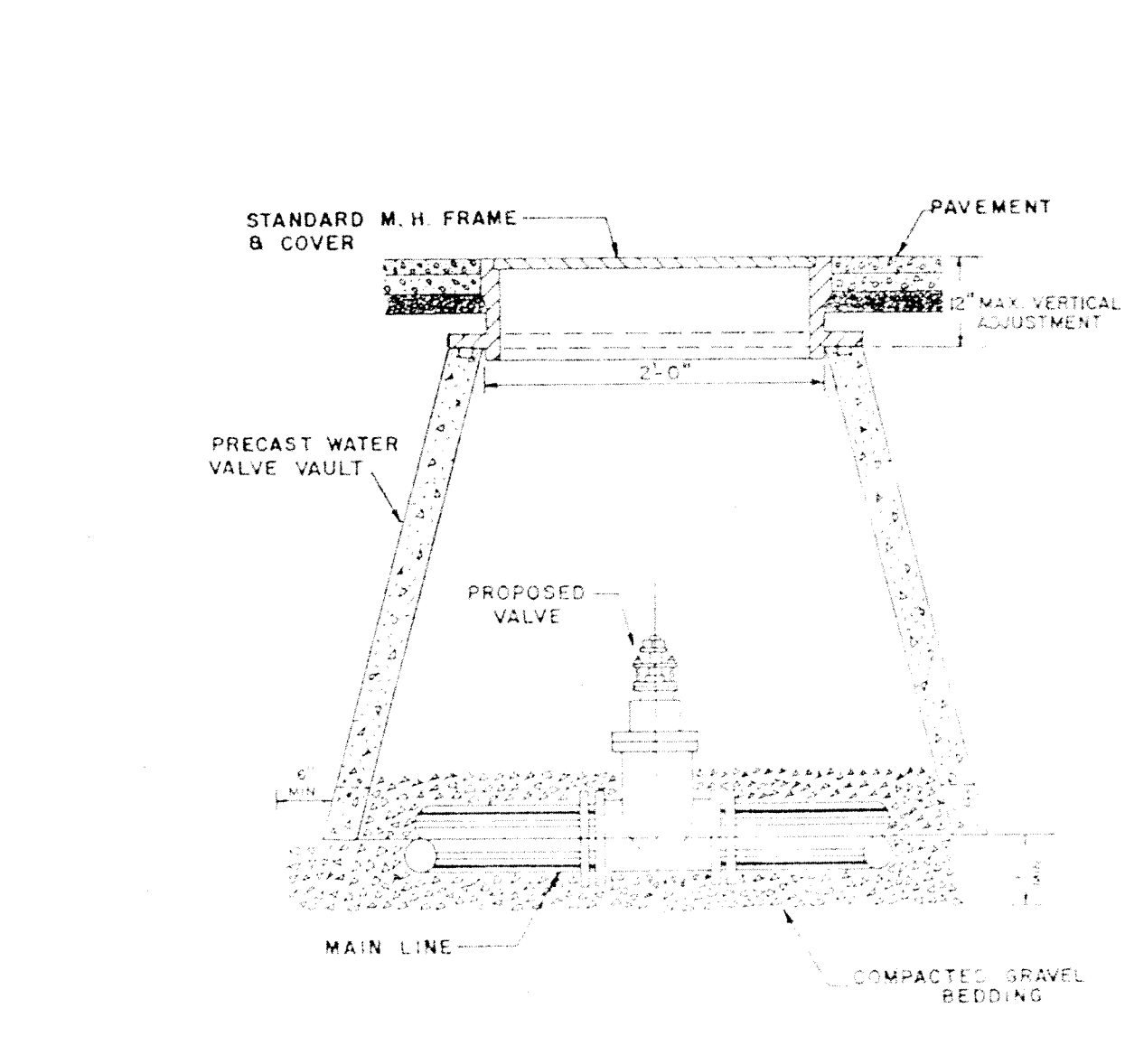
DOUBLE RESIDENTIAL WATER SERVICE



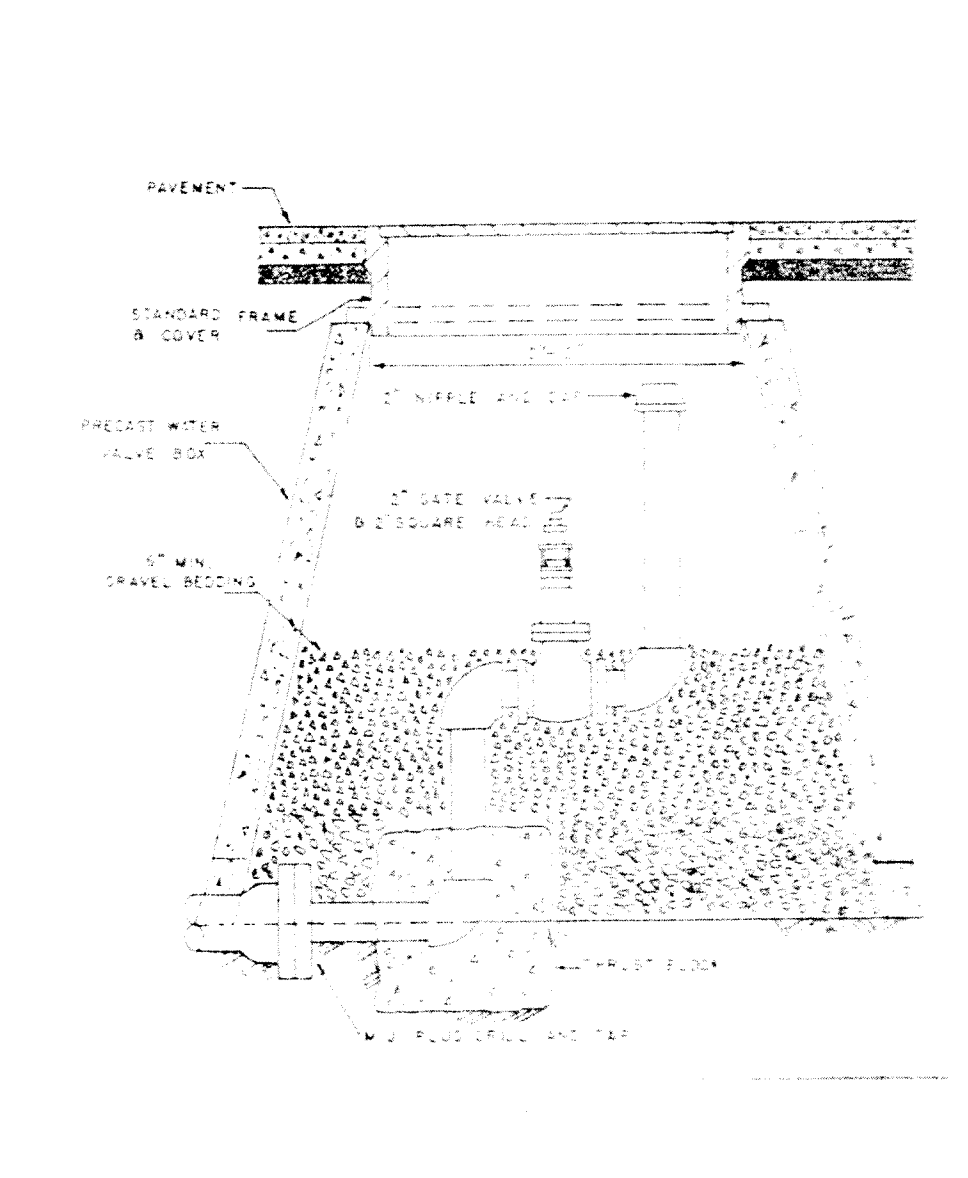
TYPICAL SPRINKLER SERVICE



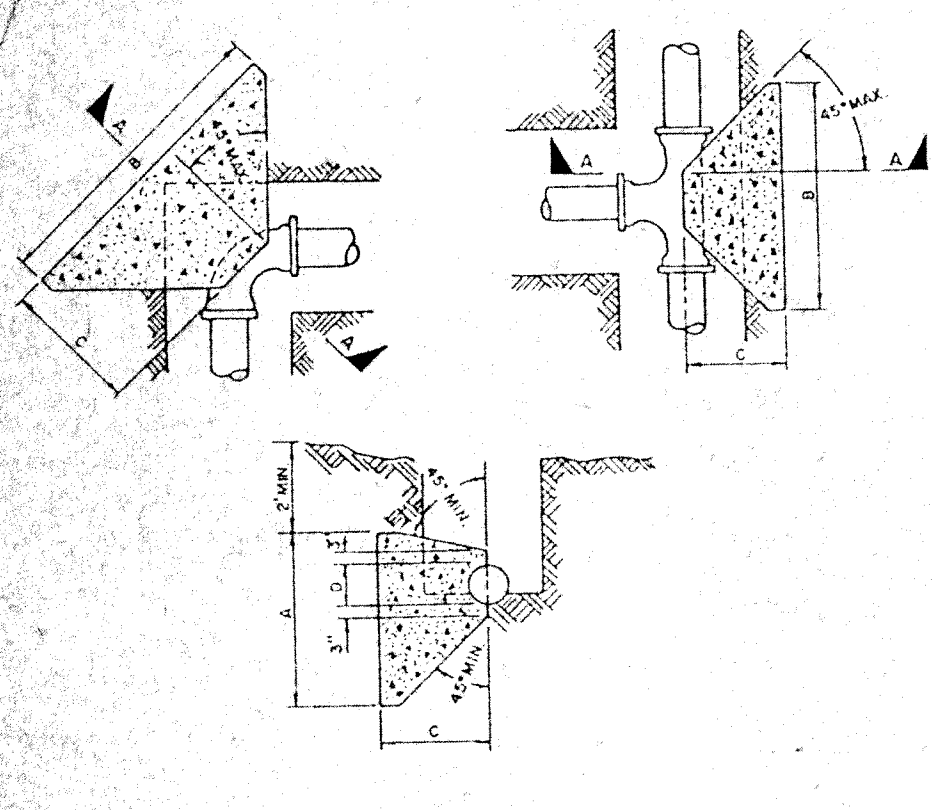
AUTOMATIC AIR RELEASE ASSEMBLY



WATER LINE VALVE INSTALLATION



PERMANENT END OF LINE

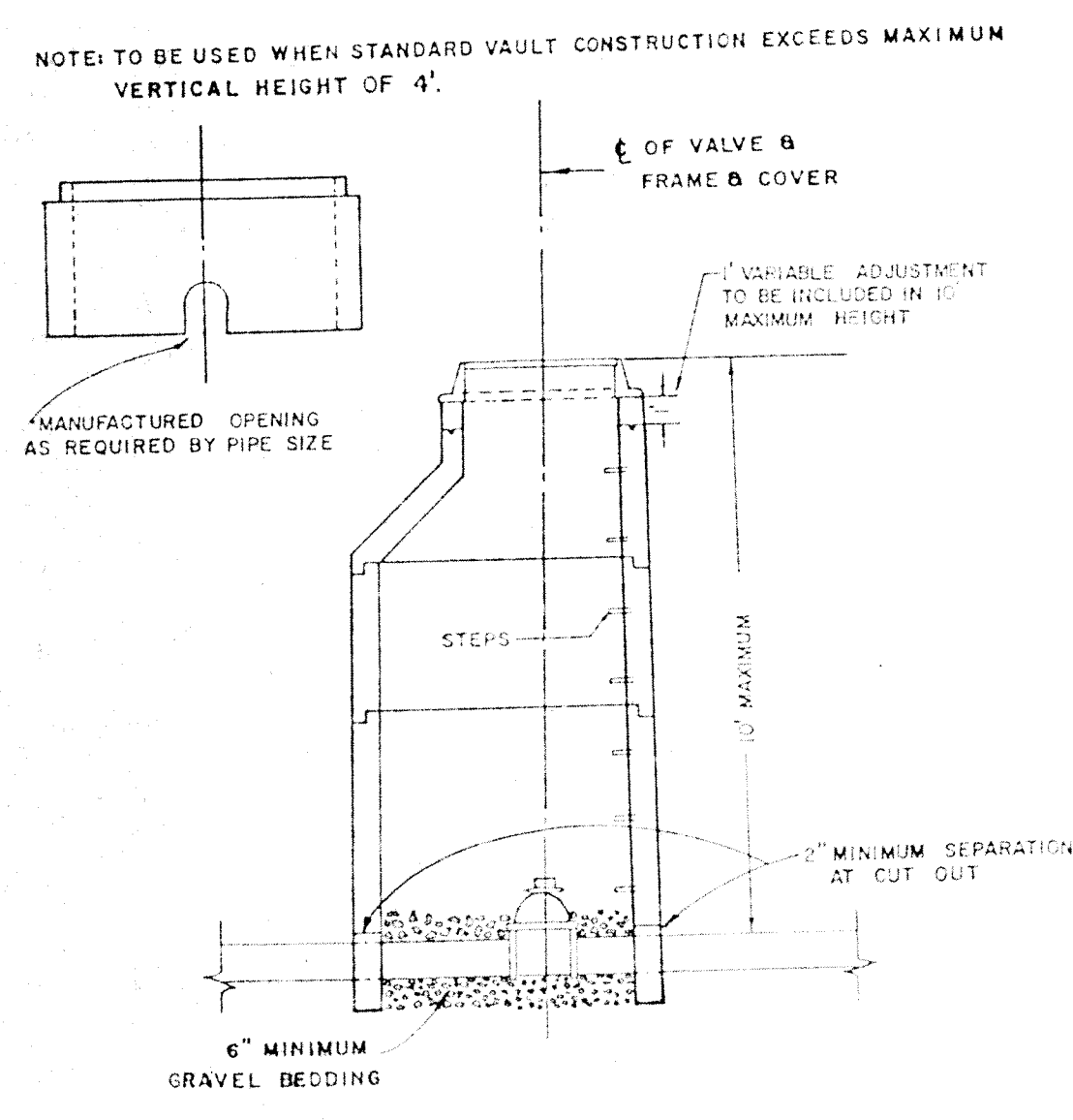


SECTION A-A

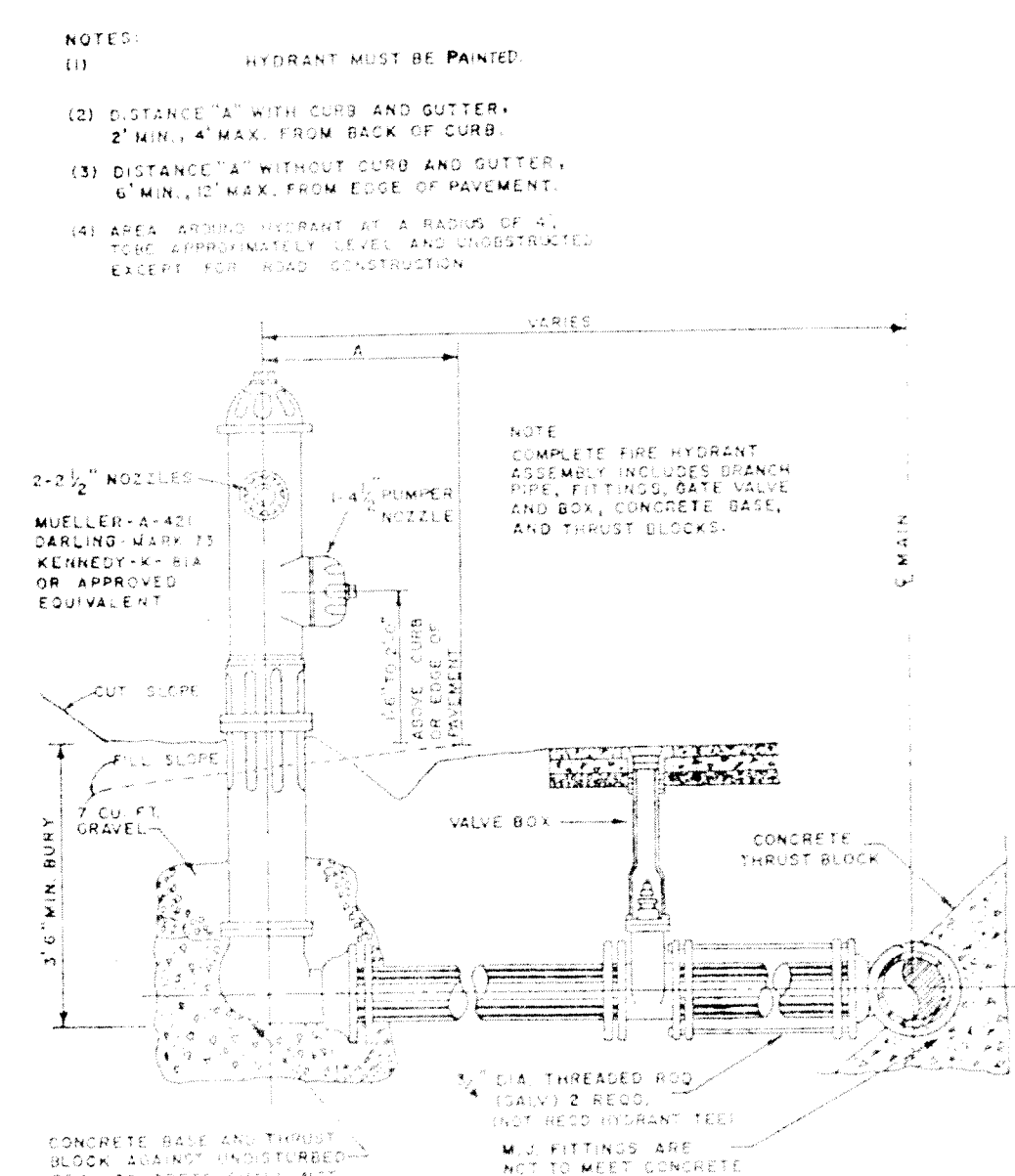
Pipe Size	2" Bend	4" Bend	6" Bend	8" Bend	10" Bend	12" Bend	14" Bend	16" Bend	18" Bend	20" Bend	22" Bend	24" Bend	26" Bend	28" Bend	30" Bend
2"	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4"	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6"	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
8"	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
10"	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
12"	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
14"	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
16"	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
18"	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
20"	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
22"	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
24"	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
26"	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
28"	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
30"	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

NOTES:
1. The above noted dimensions are minimum based on concrete and/or steel extending to undisturbed soil. Water pressure not to exceed 100 psi and minimum soil bearing capacity of 2,000 p.s.f. per square foot.
2. Concrete shall not be poured on soils or boulders.
3. Concrete to be minimum 4,000 psi - 28 day compression strength.

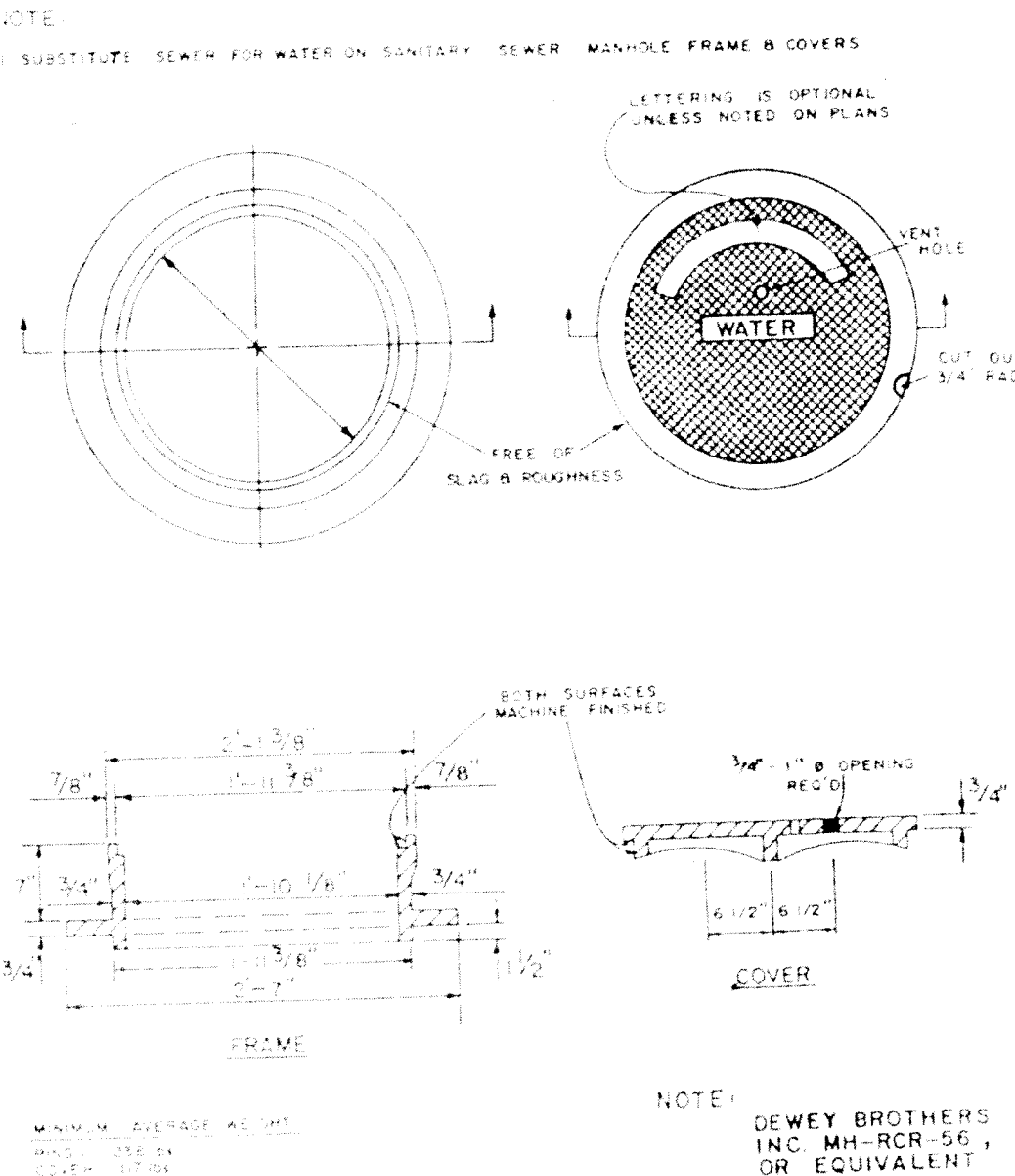
THRUST BLOCK FOR HORIZONTAL & LOWER VERTICAL BENDS



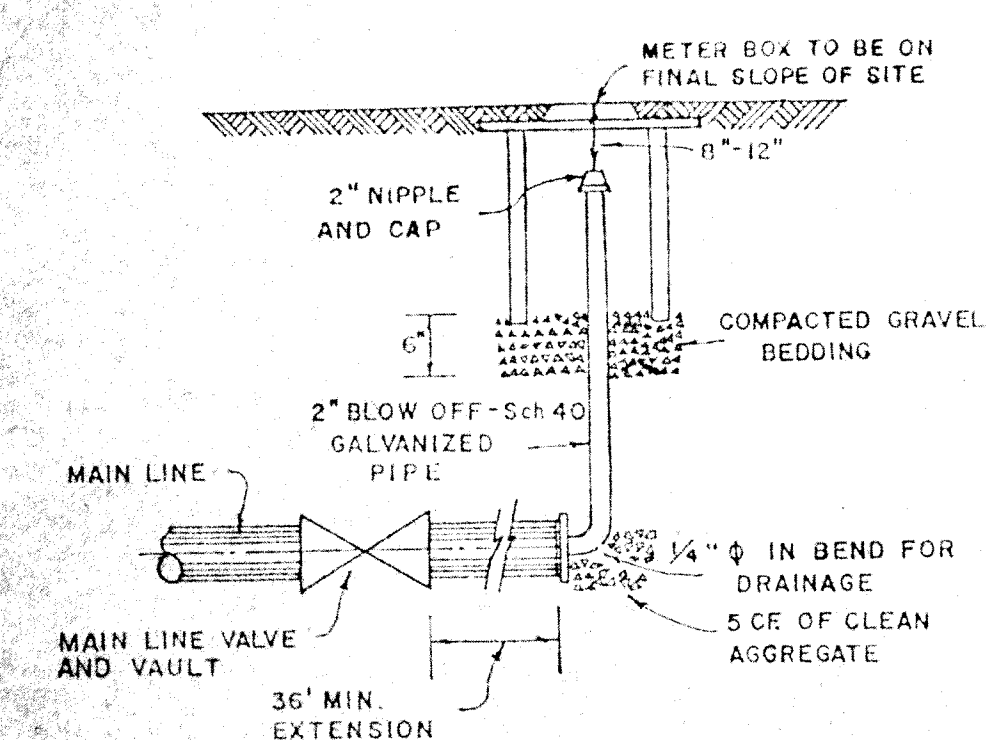
ALTERNATE VALVE VAULT (MANHOLE)



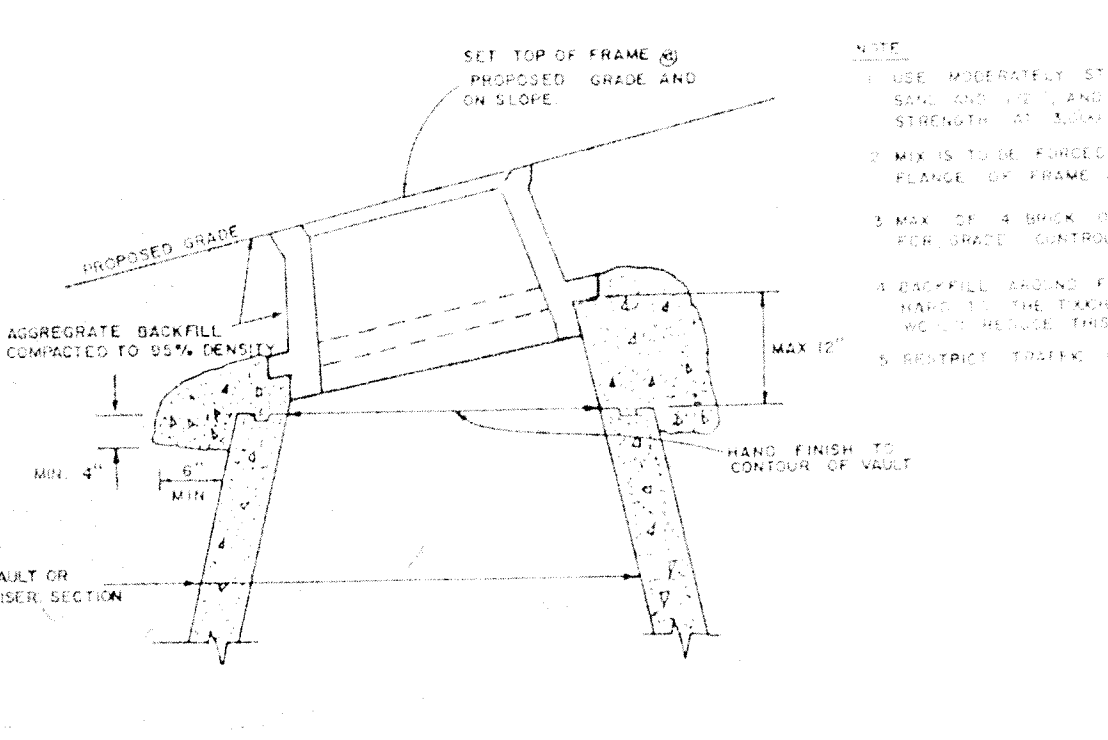
FIRE HYDRANT SETTING



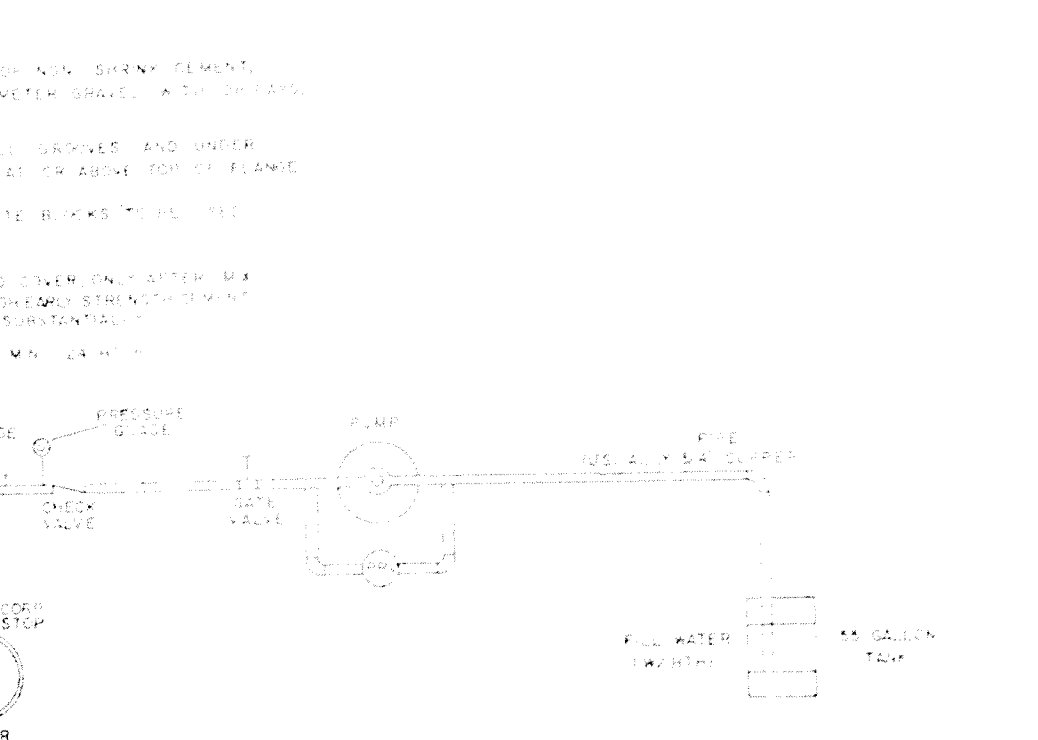
MANHOLE FRAME AND COVER



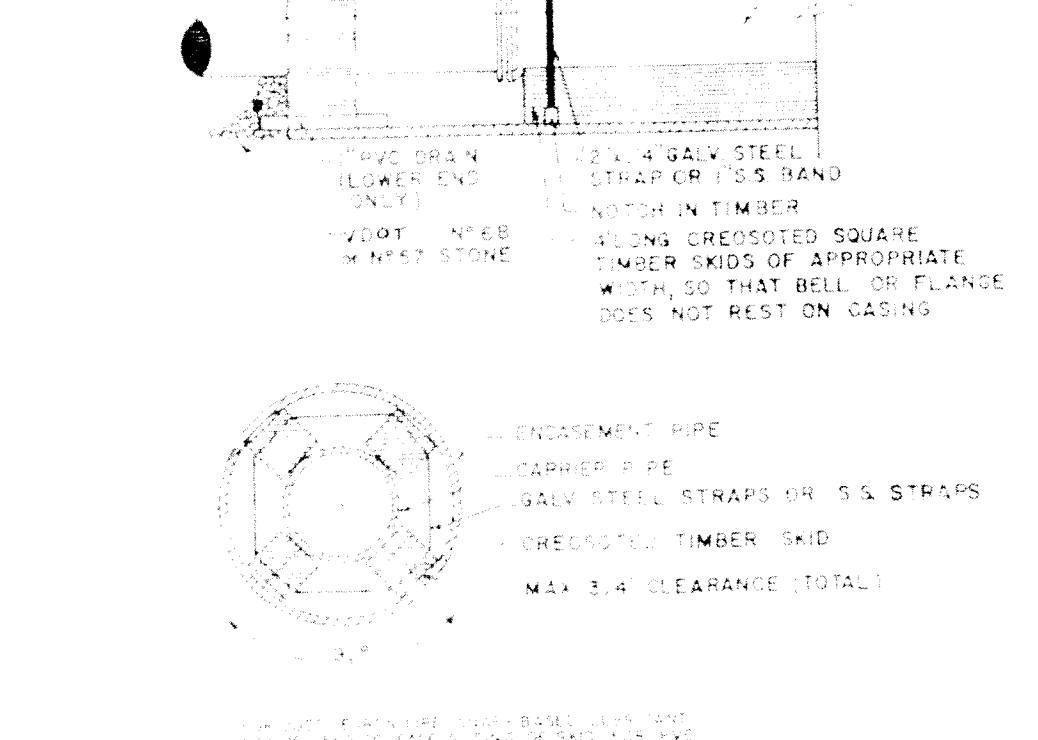
BLOW OFF ASSEMBLY FOR MAIN LINE TEMPORARY TERMINATION



MANHOLE FRAME & COVER ADJUSTMENT



TYPICAL WATER PRESSURE TEST RIG



PIPE SUPPORT IN CASING PIPE

No 33 Review

WATER DETAILS
SHEET 4 OF 7
JOB # 694009
DATE 4-7-94
SHEET 4 OF 6

GENERAL CONDITIONS

The Contractor shall be responsible for notifying the County of at least 48 hours prior to starting any work on this project. All work shall be subject to inspection by County Inspectors and design engineer. The Contractor shall obtain all necessary permits.

The Contractor shall include in applicable bid price the cost of installing and uncovering all sewer manholes and all valve boxes after surface treatment of roads and adjusting them to final road grades. If necessary, the Contractor shall be responsible for the cost of any other work required.

The location of existing utilities across or along the line of proposed work is not necessarily shown in the plans and where shown, is approximate. The Contractor shall, on his own initiative and at no extra cost, locate all underground lines and structures as necessary. The Contractor shall be responsible for any damage to underground lines and structures. The Contractor shall comply with the State Water Works Regulations, Section 12.05.03 where lines cross.

Contractor shall call "Miss Utility" at 1-800-552-7201 prior to construction.

Power lines and poles, telephone lines and poles, and gas lines shall be protected from damage in accordance with the utility owner's instructions. The Contractor is responsible for contacting the utility owners, obtaining the proper protective measures for each individual construction location and for protecting utilities from damage. Any damage caused by the Contractor or the Contractor's construction operations shall be corrected by the Contractor at his expense.

Existing roads, shoulders, and ditches shall be protected from damage. Damage resulting from operations under this contract shall be repaired or replaced by the Contractor at his own expense.

All trenches within existing or future Virginia Department of Transportation right-of-way shall be compacted in six inch layers.

Minimum cover over top of pipe shall be three (3) feet.

The Contractor shall notify the County of any field revisions or corrections to the approved plans prior to such construction.

All lines to be staked prior to construction.

Contractor to coordinate with engineer to provide As-Built Plans.

All construction shall be in accordance with approved construction practices of the applicable code. Unless otherwise specified herein, all construction shall be in accordance with the latest edition of AWWA standards.

EROSION CONTROL

Utility construction is subject to all provisions set forth in the approved Erosion and Sediment Control Plan. The Contractor is responsible for obtaining a copy of the Plan, including the Narrative Report prior to construction.

Throughout construction, temporary measures shall control erosion and minimize siltation of adjacent properties, streets, and drainage ways.

Construction and personal vehicles shall be cleaned of mud and debris prior to leaving the site.

Failure of the Contractor to control erosion and siltation may cause the owner to take actions necessary to accommodate the requirements of the County. The cost of such action, including engineering fees, will be deducted from monies due the Contractor for other work.

EXCAVATION, STABILIZATION & BEDDING

TRENCHING

The Contractor shall comply with the latest revisions of the Virginia Occupational Safety and Health Division and the Construction Industry as adopted by the Safety and Health Codes Commission of Virginia.

The materials and methods of construction required for trench stabilization and pipe bedding shall be in accordance with the latest revisions of the applicable Virginia Department of Transportation and American Society for Testing Materials standards.

The Contractor shall excavate all materials encountered to the lines and grades indicated and the trenches and ditches detailed on the drawings along the alignments shown.

Excavation, unless otherwise specified, shall be open cut. The Contractor shall open no more than two hundred (200) feet of trench in advance of the laying of pipe unless approved by the Engineer. Any water that accumulates in the trenches shall be removed promptly.

Trenches shall be excavated in straight lines and shall be accurately graded in order to establish a true elevation for the invert of the pipe.

The width of trenches, from existing grade to one (1) foot above the top of the pipe shall be of sufficient width to permit the proper installation of bracing, shoring or shelling.

The sides of the trenches shall be excavated as vertical as practical.

Excavation for structures shall be sufficient to leave at least twelve (12) inches clearance between the structure and the sides of the trench or any required bracing, shoring, or shelling.

The trench bottom shall be excavated to provide a firm, stable, and uniform support for the full length of pipe. Any part of the trench bottom excavated below the required grade shall be backfilled to grade and compacted to provide firm pipe support. Large rock, boulders, and large stones shall be removed to provide six (6) inches of soil cushion or improved bedding on all sides of the pipe, including the bottom, and on all sides of accessories. When an unacceptable subgrade material is encountered which will provide inadequate pipe support, additional trench depth shall be excavated and refilled with trench stabilization material.

The bottom of trenches for gravity pipelines shall be excavated to a minimum overdepth of four (4) inches below the bottom of the pipe to provide for improved pipe bedding material for the entire length of the pipeline, including service connections, except in rock, where bedding shall be six inches deep. The bedding shall be shaped so that the bottom quadrant of the pipe lies on the bed.

Excavated materials suitable for backfill shall be stockpiled in an orderly manner at a sufficient distance from the sides of the trench in order to avoid overloading the banks of the trench and to prevent slides or cave-ins.

Unless otherwise directed by the owner or engineer, surplus excavated material shall be removed from the site and disposed of by the Contractor, at his own expense.

TRENCH STABILIZATION

Trench stabilization material shall be #2 coarse aggregate as specified in Section 203 of the 1997 Virginia Department of Transportation (VDOT) Road and Bridge Specifications.

Wherever excessively wet or unsuitable material is encountered in the trench bottom, such material shall be removed and backfilled with trench stabilization material, which shall be graded to allow for the compacted bedding material.

COMPACTED BEDDING MATERIAL

Bedding material shall be #57 coarse aggregate, or #55 or #56 crusher run aggregate, each as specified in Section 203 of the 1997 VDOT Road and Bridge Specifications.

PIPE, JOINTS, FITTINGS AND APPURTENANCES

GENERAL

All materials and appurtenances for this work new, top quality, and shall be furnished, delivered, erected, connected, and finished in every detail as specified or indicated. All materials found defective, regardless of the circumstances, shall be replaced with new material at the expense of the Contractor.

The materials specified shall comply with the latest revisions of the applicable American Society of Testing Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), and/or the Virginia Department of Transportation (VDOT).

OPTIONAL PIPE SELECTIONS

The Contractor shall install only one (1) type of pipe between structures. Where existing pipe is to be replaced or extended, the same type of pipe is to be installed. All pipe is to be installed in strict accordance with the recommendations of the manufacturer.

Water lines shall be either PVC AWWA C-900 OR 18 (min.) or ductile iron AWWA C151 Class 51 for 12" diameter or smaller and Class 51 for 16" diameter and larger, at the Contractor's option, unless specified or indicated otherwise.

Sanitary sewer lines shall be either PVC ASTM D-3034 PSM SDR 35 AWWA C100 Class 2, or Ductile Iron AWWA C151 Class 52 (min.), at the Contractor's option, unless specified or indicated otherwise.

JOINTS, COUPLINGS, AND APPURTENANCES

PVC pipes and fittings shall be bell and spigot joints. The bell and spigot joints shall be sealed with elastomeric gaskets conforming to ASTM D 3212. The joints shall be in strict accordance with the recommendation of the pipe manufacturer.

Ductile iron pipe and fittings shall be either mechanical or bell and spigot joints as specified or indicated. Fittings shall conform with AWWA C110 (ANSI 21.10). Joints shall be made with a single watertight rubber gasket manufactured in accordance with AWWA C110 (ANSI 21.10). The joints shall be in strict accordance with the recommendation of the pipe manufacturer. The pipe and fittings shall be bituminous coated and cement lined in accordance with AWWA C110 (ANSI 21.10).

Gate valves shall be iron-body, bronze-mounted, double-disc, parallel-seal, overhead seated, installed screw, non-lifting stem, with 2 inch square operating nut for valve vault service, all in accordance with AWWA Standard C500 (latest revision). Connections shall be suitable for the pipe with which it is used. The valve shall be suitable for 200 p.s.i., water working pressure and shall be tested at twice the rated working pressure. All gate valves shall be installed in valve vaults and equipped with a two inch square operating nut, marked with the word "OPEN" and an arrow and shall operate by turning clockwise.

Sanitary sewer service connections shall include all four (4) inch diameter pipe as specified or indicated.

All other materials and appurtenances are to be in accordance with the details shown on the plans and in strict accordance with the recommendation of the manufacturer.

SEPARATION OF POTABLE WATER AND SANITARY SEWER LINES

PARALLEL INSTALLATION

Water lines shall be laid at least ten (10) feet horizontally from a sewer or sewer manhole whenever possible. Horizontal separation shall be measured outside to outside. Where ten (10) feet of horizontal separation is not practical, the water line may be laid closer provided that: (1) The bottom of the water line shall be at least eighteen (18) inches above the outermost crown of the sewer; (2) The sewer shall be constructed of AWWA approved ductile iron water pipe pressure tested at 50 p.s.i., without leakage prior to backfilling and tested in place.

CROSSING

Water lines crossing sewers shall have a vertical separation of at least eighteen (18) inches, measured outside to outside, between the bottom of the water line and the top of the sewer line. Where fifteen (15) inches of vertical separation is not practical: (1) Sewers passing over or under water lines shall be constructed of ductile iron AWWA water pipe and (2) water lines passing under sewers shall be protected by providing: (a) an eighteen (18) inch vertical separation, measured outside to outside, between the bottom of the sewer pipe and the top of the water line and; (b) adequate structural support for the sewer to prevent excessive deflection of the joints and the settling and breaking of the water line; and (c) the joints for the water line be spaced at equal distance from the crossing point of the sewer.

The contractor shall comply with State Water Works Regulations, Section 12.05.03 where lines cross.

WATER MAIN INSTALLATION

The water mains shall be laid and maintained at the required depth and the existing pipe is to be replaced or extended, the same type of pipe is to be installed. All pipe is to be installed in strict accordance with the recommendations of the manufacturer.

Deflection of the line of pipe, either in the vertical or horizontal plane, shall not exceed either AWWA standards or the recommendations of the manufacturer.

All plugs, except mechanical joint plugs used at connection points for future lines, all test, all bend, and all fire hydrant assemblies shall be supported by thrust blocking as indicated. Valves for connection to future lines shall be anchored in the water main with rods.

DISINFECTION OF WATER MAINS

All pipe shall be disinfected, tested, and flushed in accordance with AWWA Standard C601 (latest revision).

Chemicals used to provide a materials, equipment, and necessary tools and the uniform material required for the disinfection, testing, and flushing of the water main.

No testing section of water line shall be approved to deliver water until a favorable laboratory report has been achieved. Any testing section failing to meet the specified requirements shall be repaired by the contractor and retested until the results are within accepted limits. The repairs and retesting shall be at the Contractor's expense.

The water main at valve cut section that has been completed and tested shall be disinfected, tested, and flushed.

After testing and before final inspection of the completed system, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specification C601 (latest revision). The water shall be disinfected at a minimum velocity of 2.0 feet per second.

Disinfection as described in AWWA C601 shall be used. Five (5) gram sodium hypochlorite tablets with 3.25 available chlorine per tablet shall be attached at the top of the pipe by an adhesive such as Permatex No. 1, or equal. The following number of tablets for the given pipe size shall be used for an initial dose of 25 mg/l: apply chlorine.

Pipe diameter Tablets per 18-20 ft. pipe section

6"	1
8"	2
10"	3
12"	4
16"	

Use of the continuous feed or slup method of disinfecting may only be used to trench or install a water pipe after the test disinfection has been completed. The rate of disinfection, the rate of filling must result in a velocity less than 1 ft./sec.

The disinfection solution shall remain in the pipe line for twenty-four (24) hours, after which time a chlorine residual of 10 ppm at all points of the pipe shall be required.

Following chlorine bath, the piping shall be thoroughly flushed and tested in accordance with the Virginia Waterworks Regulations, Section 7.17.03 and 12.11.04-12.11.04.05.

SANITARY SEWER INSTALLATION

The installation of the sanitary sewer system shall begin at the downstream manhole and proceed upstream. The downstream sections shall be completed, tested, and approved prior to allowing sanitary service into the system.

The pipe shall be installed in accordance with the pipe manufacturer's recommendations and as directed by the Engineer. The pipe shall be laid in true straight line with the bell ends upstream and with the insert of the pipe being the true elevation and grade of the system.

The Contractor shall be responsible for establishing and maintaining the horizontal and vertical alignment of the system. It is the responsibility of the Contractor to provide the information indicated in the plans.

The horizontal alignment of the pipe shall be maintained by a transit or theodolite plumbed over the center of the downstream manhole. The vertical alignment shall be maintained by an adjustable spirit level mounted at the invert of the downstream manhole with targets placed at the bell end of the pipe being laid.

DETECTION TAPE SHALL BE PLACED 18" - 24" ABOVE ALL SEWER MAINS & LATERALS

JOINTING

The sanitary sewer system shall be laid and joined complete-in-place in order that each length and section of pipe between the manholes have a smooth and uniform invert.

The previous joint shall have been completed and the entire length of pipe shall be well bedded and firmly backfilled before jointing another length of pipe. Bell holes shall be dug of sufficient size to insure proper jointing.

The Contractor shall not use excavation equipment to push the pipe into the home position, unless approved by the Engineer, and then only for one length of pipe at a time.

Joints for pipes of different materials shall either be made at manholes or with standard adapter fittings.

The Contractor shall join the pipe as recommended by the pipe manufacturer in order to obtain the degree of watertightness required. The use of lubricants, primers, adhesives, and similar materials shall be as recommended by the manufacturer.

The pipe shall be connected to manholes through precast openings and joined with either a flexible pad adapter or pipe seal gasket.

BACKFILLING

GENERAL

All material for the compaction of backfill shall be in accordance with the latest revisions of the applicable American Society of Testing Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and Virginia Department of Transportation (VDOT) standards.

The expense of obtaining and compacting earth backfill material shall be included in the Contractor's fee.

The Contractor shall comply with all Local and State erosion and sediment control ordinances and requirements and all approved Erosion and Sediment Control Plans and Reports pertaining to this project. It is the Contractor's responsibility to obtain copies of the approved plans.

Backfilling shall not be done in freezing weather and shall not be accomplished with frozen material. No fill shall be made where the material in the trench is already frozen.

The Contractor shall at all times during the construction, and at its completion for final inspection, keep the trench, excavation, or other parts of the work free from accumulated water.

JOB CONDITIONS

Prior to placing backfill, all organic material rubbish, debris, or other unsuitable material within the trench shall be removed. All concrete forms shall be removed. All shoring and sheeting shall be removed or cut off at the elevation stipulated by the Engineer.

Prior to placing backfill, the trench, the installed pipe, inlets, and manholes shall be visually inspected by the Engineer.

Backfill material shall be placed in uniform horizontal layers and thoroughly compacted with proper mechanical or hand operated tampers.

Backfill material shall be placed and compacted so as not to unevenly support, damage, or displace the alignment of the pipe, inlets, or manholes. Backfill material shall be worked under the sides of the pipe to provide satisfactory haunching.

Backfill shall not be placed or compacted against cast-in-place concrete until it has obtained sufficient strength to withstand the backfill pressure placed upon it.

Upon completion of backfilling, all excess soil, stones, and debris shall be disposed on site as directed by the Owner and at no additional expense.

BACKFILL MATERIAL

Materials for backfill shall be approved excavated material or approved subgrade material required from other sources. All material shall be approved by a Soils Engineer.

Material shall consist of durable natural granular material or granular aggregates free of organic material, loam, debris, silt, clays, and other deleterious materials. Backfilling shall be done in such a way to prevent dropping of material directly on the pipe. The Contractor shall be responsible for ensuring that the backfill is placed in layers not greater than three (3) feet and shall be deposited in horizontal layers. No particles with a diameter greater than two (2) inches shall be placed in the initial backfill from the top of the improved bedding to a point two (2) feet over the top of the pipe. No rock particles with a diameter greater than three (3) inches shall be placed in the remainder of the backfill. Excavated rock particles with a diameter or dimension greater than six (6) inches shall be considered unsuitable material.

Excessively wet excavated material shall not be used as backfill. Fresh material shall not be placed in the trench, nor shall approved backfill be placed upon frozen material.

Aggregate backfill material, where indicated for trenches below paved or surface treated streets or parking areas shall be VDOT standard size 25 or size 26 crusher run as specified in Section 206 of the VDOT Road and Bridge Specifications (latest revision). Aggregate backfill in such situation shall be placed in eight (8) inch lifts.

BACKFILL BELOW UNPAVED AREAS

Backfill from the top of the pipe bedding or bottom of the pipe trench to one (1) foot above the top of the pipe shall be free of stones larger than two (2) inches in diameter and shall be placed in layers not to exceed six (6) inches and compacted with hand operated tampers.

Backfill from one (1) foot above the top of pipe to the topsoil grade shall be free of stones larger than six (6) inches in diameter and shall be placed in layers not to exceed twelve (12) inches and compacted with mechanical tampers.

Final backfill in grassed areas shall be mounded three (3) inches above surrounding ground to allow for settlement.

BACKFILL BELOW PAVED AREAS

Backfill from the top of the pipe bedding or bottom of the pipe trench to one (1) foot above the top of the pipe shall be free of stones larger than two (2) inches in diameter and shall be placed in layers not to exceed six (6) inches and compacted with hand operated tampers.

Backfill from one (1) foot above the top of pipe to the topsoil grade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.

Final backfill in paved areas shall be mounded two inches and allowed to settle for thirty (30) days prior to pavement placement or replacement. The trench in paved areas shall be maintained daily, as required, to provide a smooth crossing for vehicles until such time as pavement is placed.

COMPACTION TESTS

Backfill shall be monitored or tested as required to provide the proper moisture content necessary to achieve the compaction specified herein.

Compaction by water, either natural or mechanical, shall not be permitted. Each layer shall be thoroughly tamped and compacted by hand or mechanical tamper or plate. Special care shall be taken in using mechanical tamper directly over the pipe.

Backfill material shall be placed and compacted to the following minimum percentages of maximum dry density as determined by ASTM D693:

Fill from the top of the pipe bedding or the bottom of pipe trench to one (1) foot above the top of the pipe, each layer shall be compacted 95 percent.

Fill below unpaved areas from one (1) foot above the top pipe to the topsoil subgrade and in drainage channels to the topsoil subgrade, each layer shall be compacted 90 percent.

Fill below paved areas or walks, each layer shall be compacted 95 percent.

Backfill shall be tested in accordance with ASTM D698 or ASTM D1557 and D2922.

Backfill that fails to meet the minimum percentages specified shall be reworked or replaced and retested all at the Contractor's expense.

RESTORATION

The Contractor shall at his own expense, clean all refuse, rubbish, scrap material, and debris caused by his operations such that at all times the site shall not be a source of litter and shall present a neat and workmanlike appearance. Immediately following the backfilling of the trench, the Contractor shall "stream" or otherwise clean the surface of paved streets. All surplus material shall be removed and disposed of.

Finish grading shall be done as required to establish the slopes indicated and to prevent low spots and pockets that do not drain.

Developed property, such as walks, steps, mailboxes, driveways, culverts and the like, displaced by the work, shall be restored or replaced to their original condition. Ditches shall be restored to their original shape and slope. All disturbed areas not covered by pavement or structures and/or areas disturbed by construction activity shall be fertilized, limed, and seeded in accordance with the rates specified in the Erosion and Sediment Control Plan and Reop.

Restoration of pavement shall be in accordance with the pavement details indicated.

Restoration of underground utilities shall be in accordance with the standards of the utility owner, with respect to labor, equipment, and materials.

INSPECTION AND TESTS

TESTING OF SANITARY SEWER

The Contractor shall repair or replace, at his expense, any length of pipe, manhole, structure, or any material that is found or tested to be defective or deficient during the work or within one (1) year after the work has been completed.

The Contractor shall prove watertightness of the sewer system or portions thereof by low pressure air testing. Test shall be made only in the presence of the City Engineer and the Engineer.

The Contractor shall furnish all labor and equipment required for the test and shall make repairs necessary until test results are satisfactory. The testing equipment, procedure, and results will be subject to compliance with ASTM designation C-828, current revision. The air test is to be conducted between two (2) consecutive manholes. The test equipment shall consist of two (2) plugs (one tamped and equipped for air inlet connection), a shut-off valve, a pressure regulating valve, a pressure reduction valve, a monitoring pressure gauge having a pressure range from 0 to 5 p.s.i., graduated in 0.1 p.s.i. with an accuracy of +/- .04 p.s.i. The test equipment shall be set up outside the manhole for easy access and reading. Air shall be supplied to the test slowly and shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 p.s.i. The pipeline shall be filled until a constant internal pressure shall be maintained at 3.5 p.s.i. or slightly above for a five minute stabilization period, after which time the internal pressure will be adjusted to 3.5 p.s.i. the air supply shut off and the test begun. For safety purposes, no person shall remain in the manhole while the pipe is being pressurized or throughout the test.

Should the pressure drop 1.0 p.s.i. in less time than that specified below, the sewer segment shall have failed. If the time required for the test is less than that specified, the test shall be repeated. A new segment shall have passed. For a more detailed description of the air test method, refer to ASTM designation C-828, current revision. An air pressure correction factor shall be shown. The prevailing groundwater is above the sewer line being tested and shall be calculated as follows:

(Groundwater Depth (ft) x 2.31) + 3.5 = starting test pressure

Ending test pressure = starting test pressure + 1.0 p.s.i.

AIR TEST TABLE

LENGTH OF TEST SEGMENT	PIPE DIAMETER	
	6"	8"
25	0.10	0.18
30	0.20	0.35
35	0.30	0.53
40	0.40	1.10
100	0.30	1.28
125	0.59	1.46
150	1.09	2.21
175	1.19	2.38
200	1.39	2.56
225	1.49	3.14
250	1.59	3.32
275	2.19	3.47
300	2.38	
350		
400		

TEST FOR DISPLACEMENTS OF BURIED SANITARY SEWERS: AFTER THE TRENCH HAS BEEN BACKFILLED AND COMPACTED AND COVER OVER THE PIPELINE HAS BEEN BROUGHT TO FINISHED GRADE, PIPELINES WILL BE TESTED AS FOLLOWS: LIGHT WILL BE FLASHED BETWEEN MANHOLES, OR, IF MANHOLES HAVE NOT YET BEEN CONSTRUCTED, BETWEEN THE LOCATIONS OF THE MANHOLES, BY MEANS OF A FLASHLIGHT OR BY REFLECTING SUNLIGHT WITH A MIRROR. FOR ALIGNMENT, DISPLACEMENT, SPHERE, OR PIN-TYPE GO/NO-GO DEVICE THROUGH THE PIPELINE. NO ADDITIONAL COST TO THE OWNER.

Manholes shall be tested by infiltration by plugging lines with inflatable stoppers and filling the manhole with water. The twelve hour soak period. Leakage shall not exceed one-half gallon per hour in the one hour test period following the soak period. An approved air test for manholes will also be considered.

TESTS FOR DEFLECTION SHALL BE MADE WITH A DEFLECTOMETER THAT PRODUCES A CONTINUOUS RECORDED OR PIPE DEFLECTION, OR BY PULLING A MANDREL, SPHERE, OR PIN-TYPE GO/NO-GO DEVICE THROUGH THE PIPELINE.

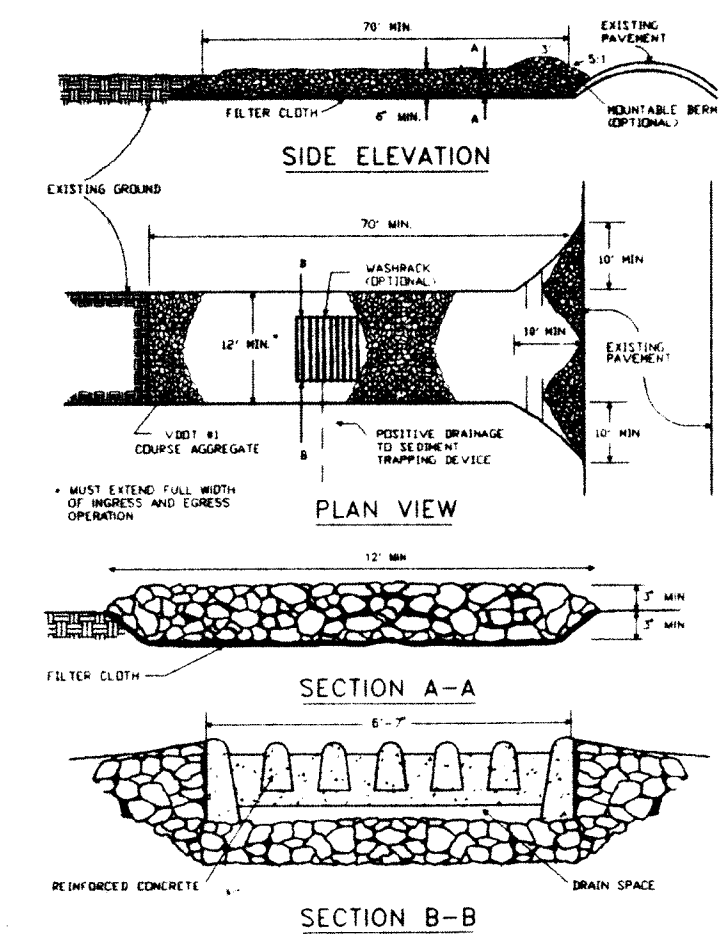
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STEEPLECHASE
SECTION 7

UTILITY SPECIFICATIONS

DATE: 7-94	REVISIONS:	JOB NO: 06-1-24
SCALE: N/A		SHEET
DESIGNED: FOS		
DRAWN: FOS		
CHECKED: FOS		5-11-04

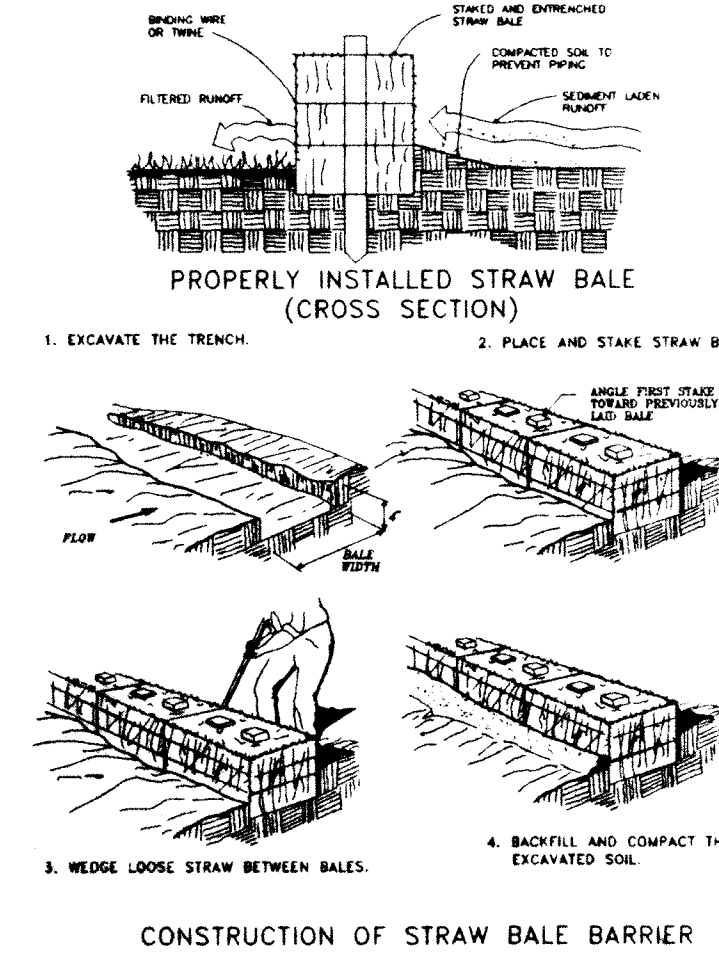
STONE CONSTRUCTION ENTRANCE



STD & SPEC 3.02

TEMPORARY STONE CONSTRUCTION ENTRANCE

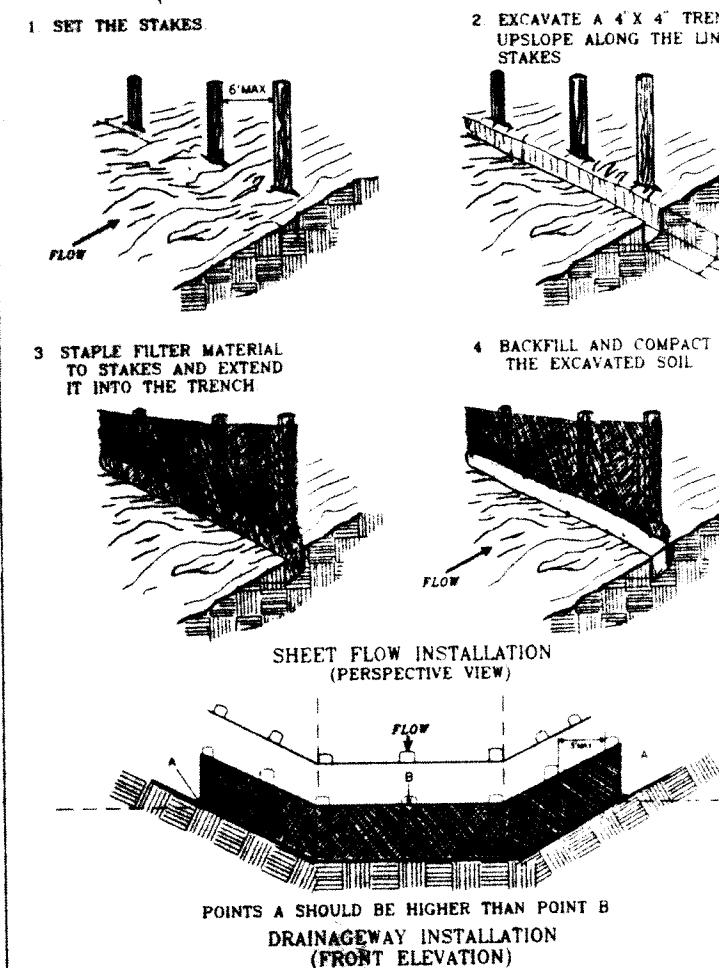
STRAW BALE BARRIER



STD & SPEC 3.04

STRAW BALE BARRIER

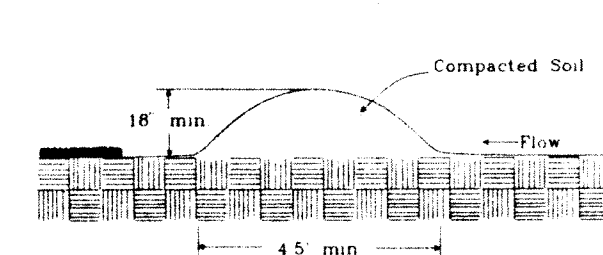
CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



STD & SPEC 3.05

SILT FENCE

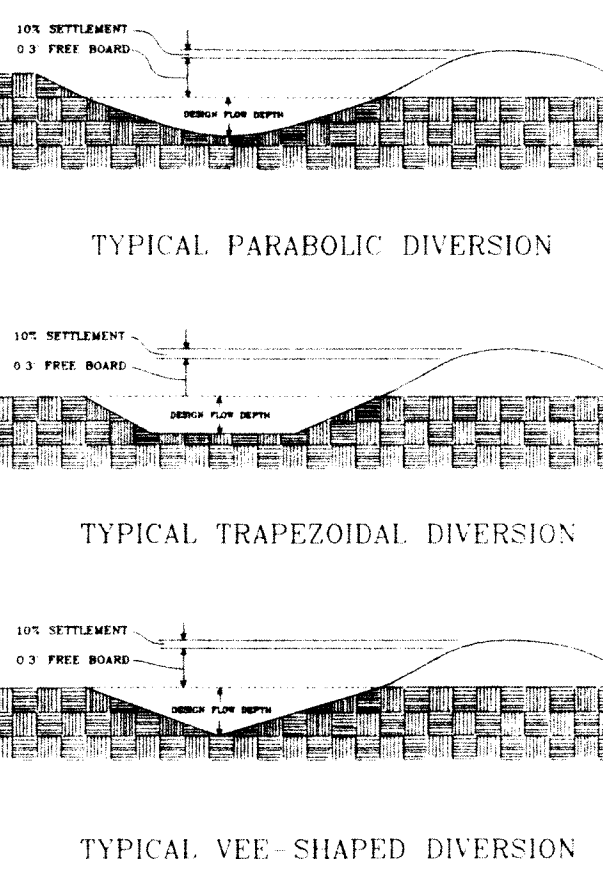
TEMPORARY DIVERSION DIKE



STD & SPEC 3.09

TEMPORARY DIVERSION DIKE

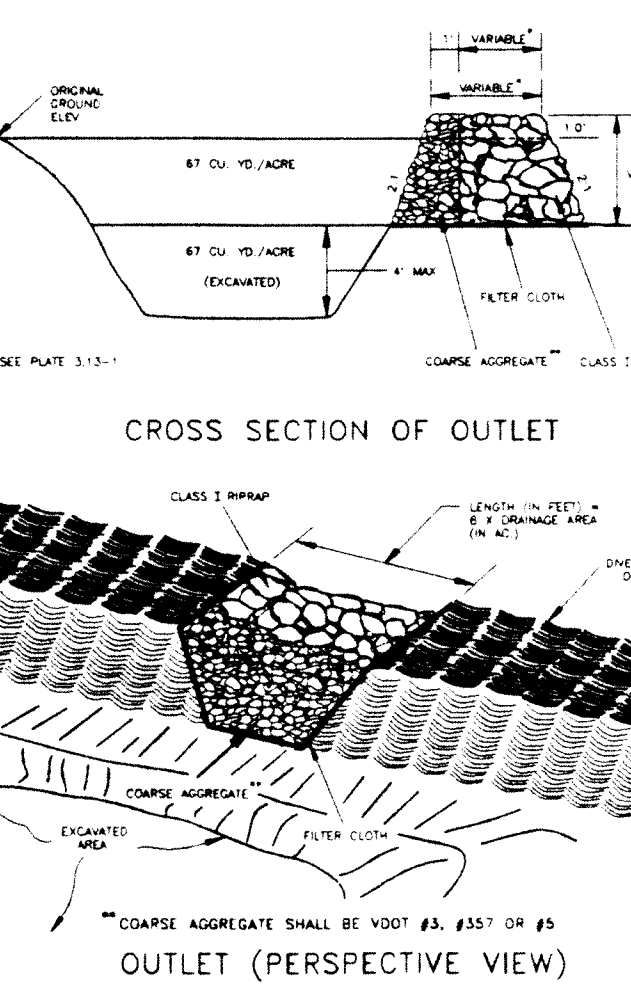
DIVERSIONS



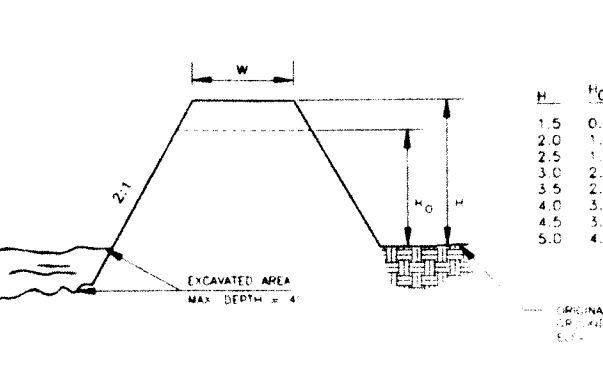
STD & SPEC 3.12

DIVERSION

TEMPORARY SEDIMENT TRAP



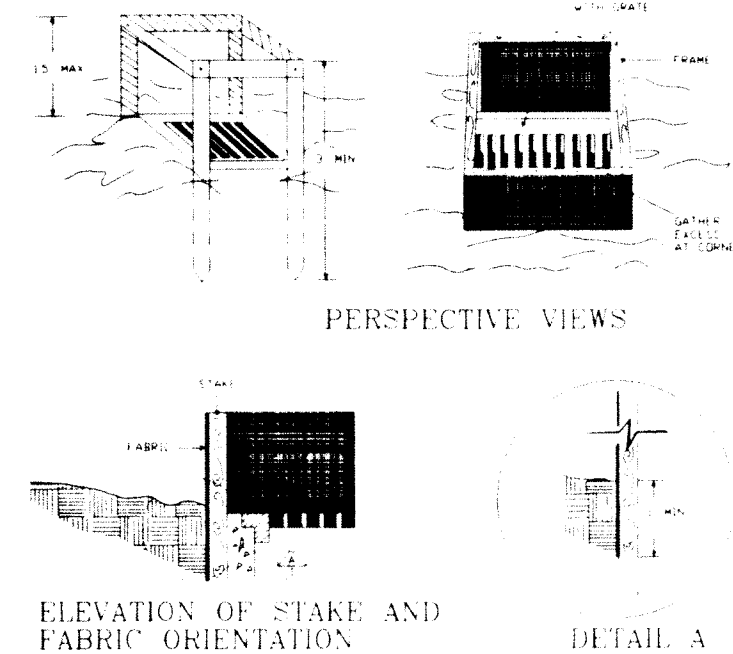
MINIMUM TOP WIDTH (W) REQUIRED FOR SEDIMENT TRAP EMBANKMENTS ACCORDING TO HEIGHT OF EMBANKMENT (FEET)



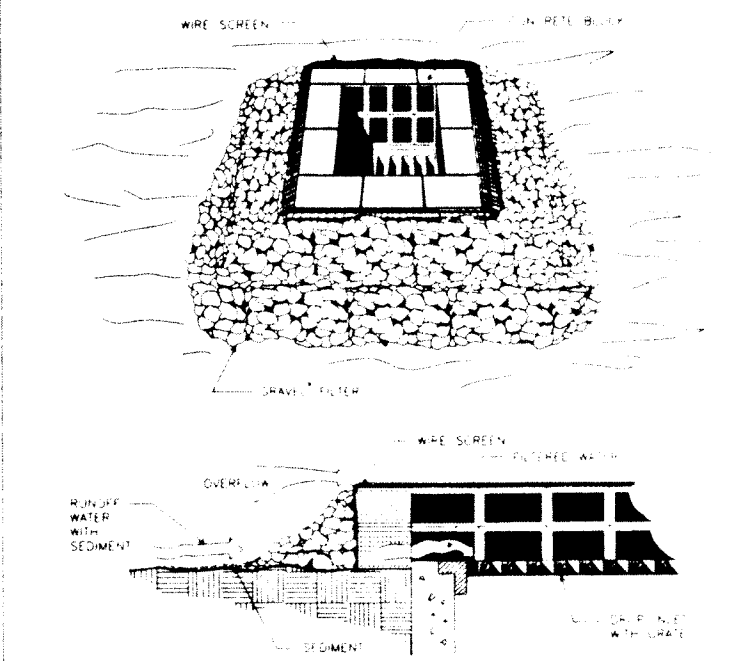
STD & SPEC 3.13

TEMPORARY SEDIMENT TRAP

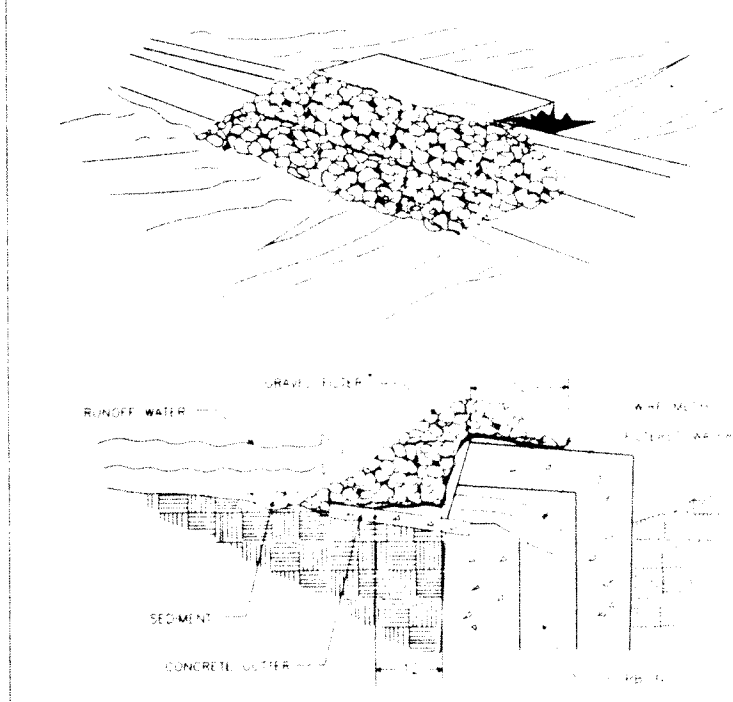
SILT FENCE DROP INLET PROTECTION



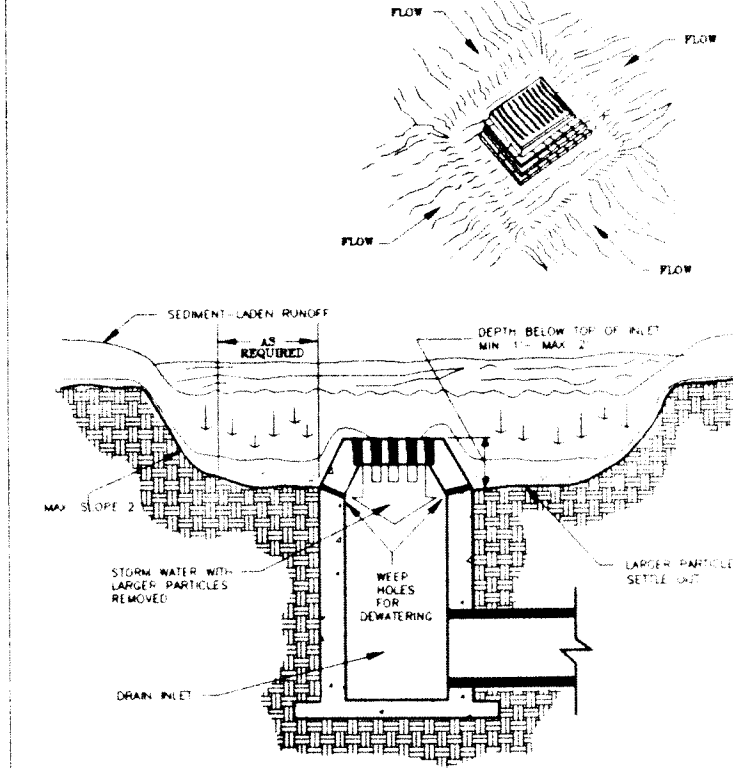
BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER



GRAVEL CURB INLET SEDIMENT FILTER



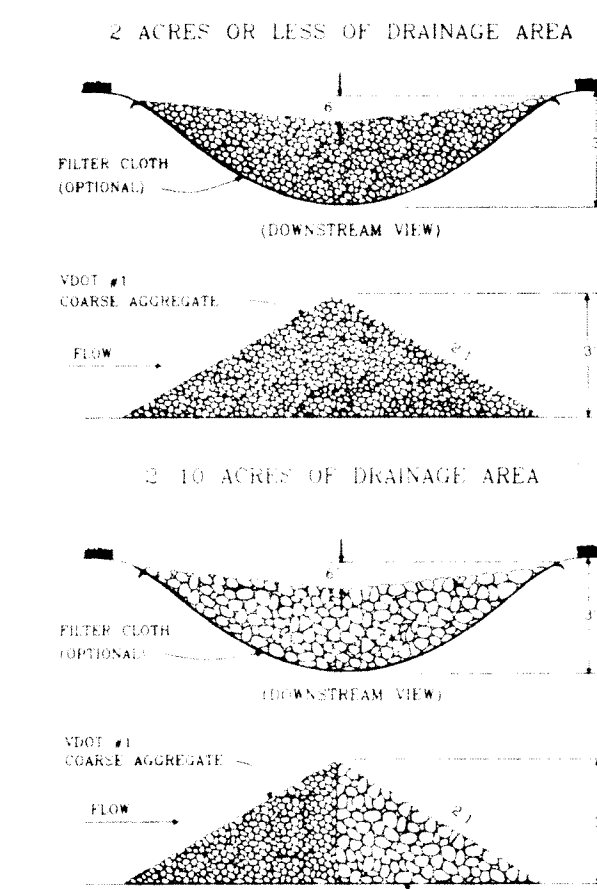
EXCAVATED DROP INLET SEDIMENT TRAP



STD & SPEC 3.07

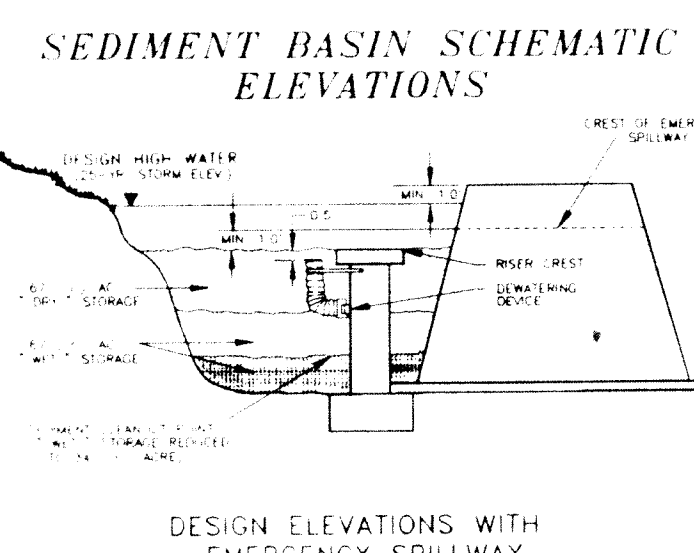
STORM DRAIN INLET PROTECTION

ROCK CHECK DAM

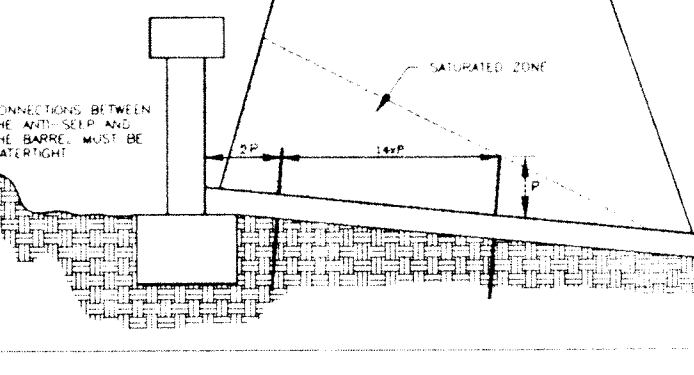


STD & SPEC 3.20

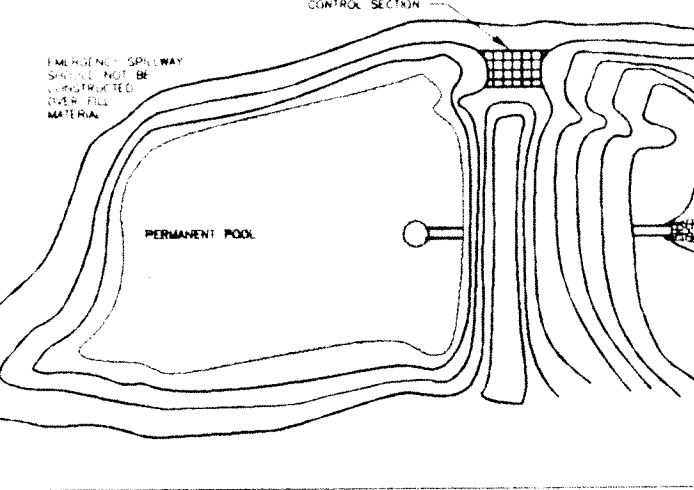
ROCK CHECK DAMS



ANTI-SEEP COLLAR



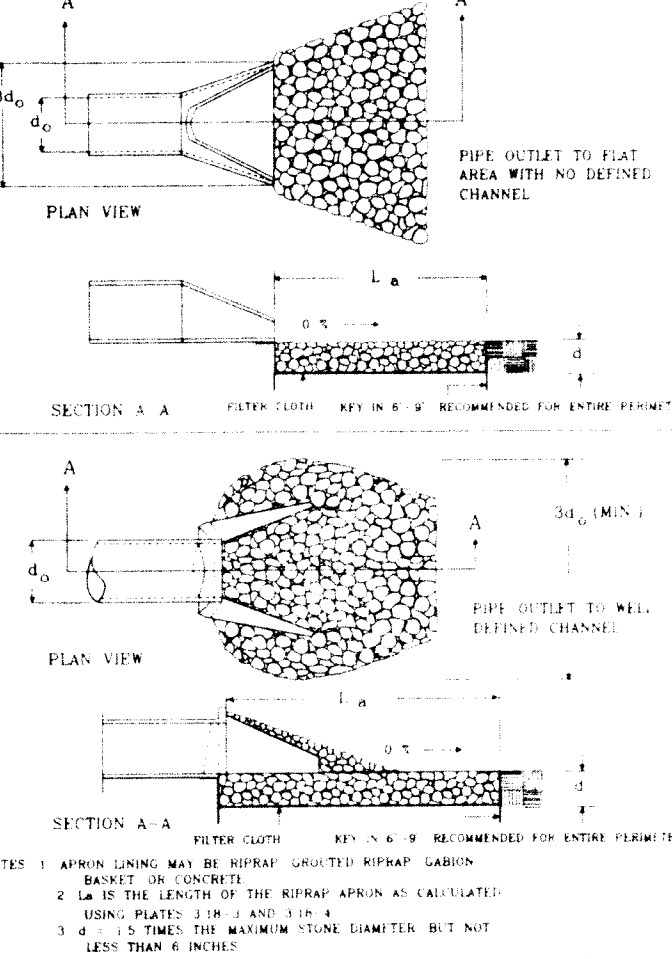
EMERGENCY SPILLWAY



STD & SPEC 3.14

TEMPORARY SEDIMENT BASIN

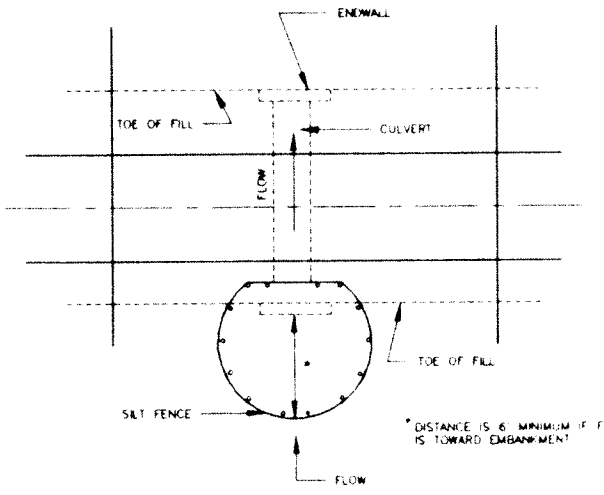
PIPE OUTLET CONDITIONS



STD & SPEC 3.18

OUTLET PROTECTION

SILT FENCE CULVERT INLET PROTECTION



STD & SPEC 3.08

CULVERT INLET PROTECTION

GENERAL NOTES

- All Erosion and Sediment Control Practices and Procedures shall be in accordance with the latest edition of the Virginia Erosion and Sediment Control Handbook.
- Owner/Developer grants Right of Entry to any personnel for the purpose of monitoring compliance with the Code of Virginia, Erosion and Sediment Control Law (Title 28, Chapter 1, Article 6).
- Building permits will not be issued until the Initial Erosion and Sediment Control measures reflected in the approved plans have been properly installed.
- Erosion and Sediment Control measures shall be inspected after each rainfall and daily during periods of prolonged rainfall. Maintenance is the responsibility of the developer.
- All Erosion and Sediment Controls shall be in place prior to clearing, stripping of topsoil, or grading.
- All details are from the Virginia Erosion and Sediment Control Handbook. The handbook shall supplant this sheet, should a discrepancy exist.
- Any necessary repairs or cleanup to maintain the effectiveness of the erosion control devices shall be made immediately by the contractor.

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EROSION AND SEDIMENT CONTROL DETAILS

PLAN NAME	SHANKS ASSOCIATES, P.C.
OWNER	SHANKS ASSOCIATES, P.C.
DEVELOPER	SHANKS ASSOCIATES, P.C.
ENGINEER	SHANKS ASSOCIATES, P.C.
ARCHITECT	SHANKS ASSOCIATES, P.C.
MAGISTERIAL DISTRICT	SHANKS ASSOCIATES, P.C.
DATE	11/1/14
SUB NO.	1
SHEET	6 of 6

No 55 P.C.
Res 4/2/14