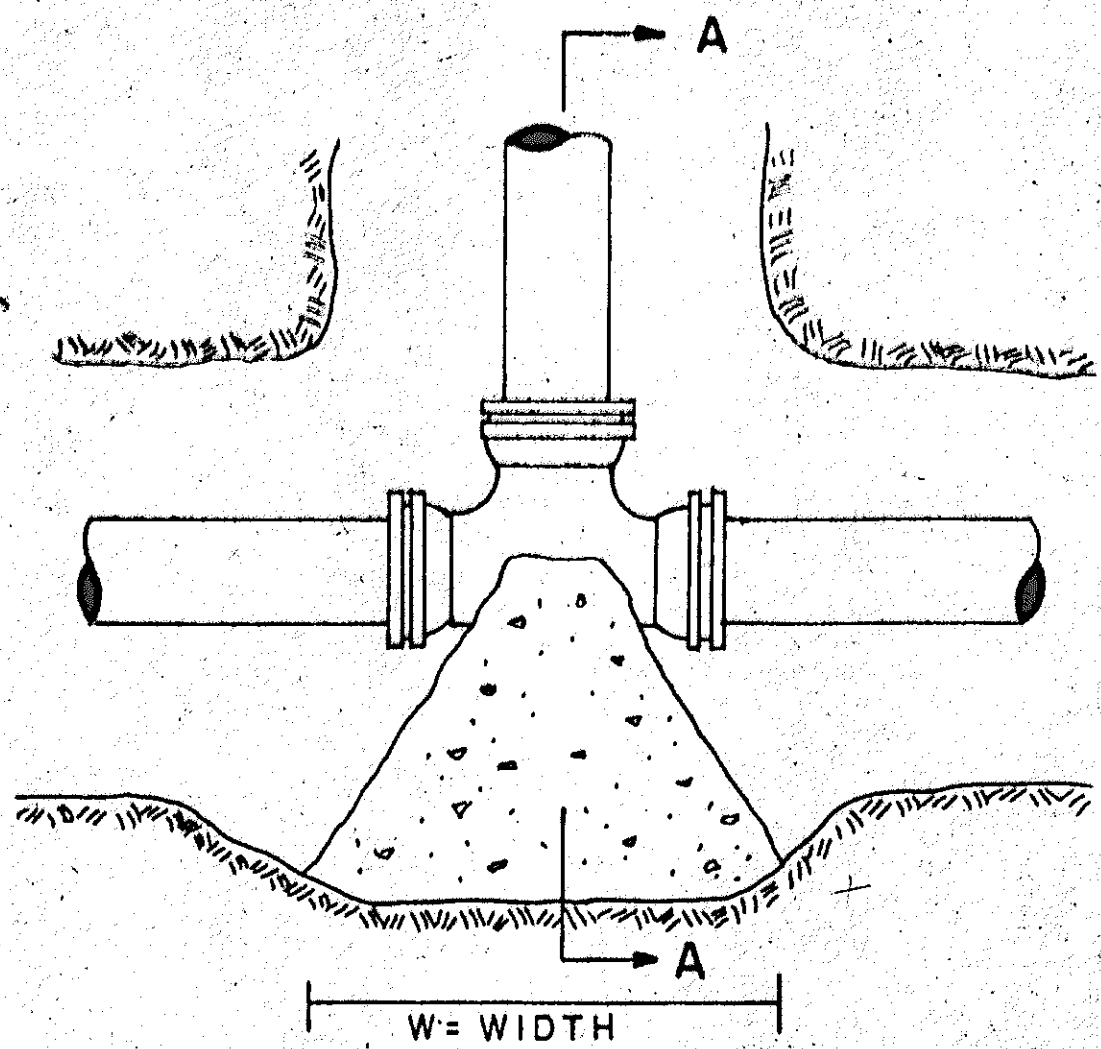
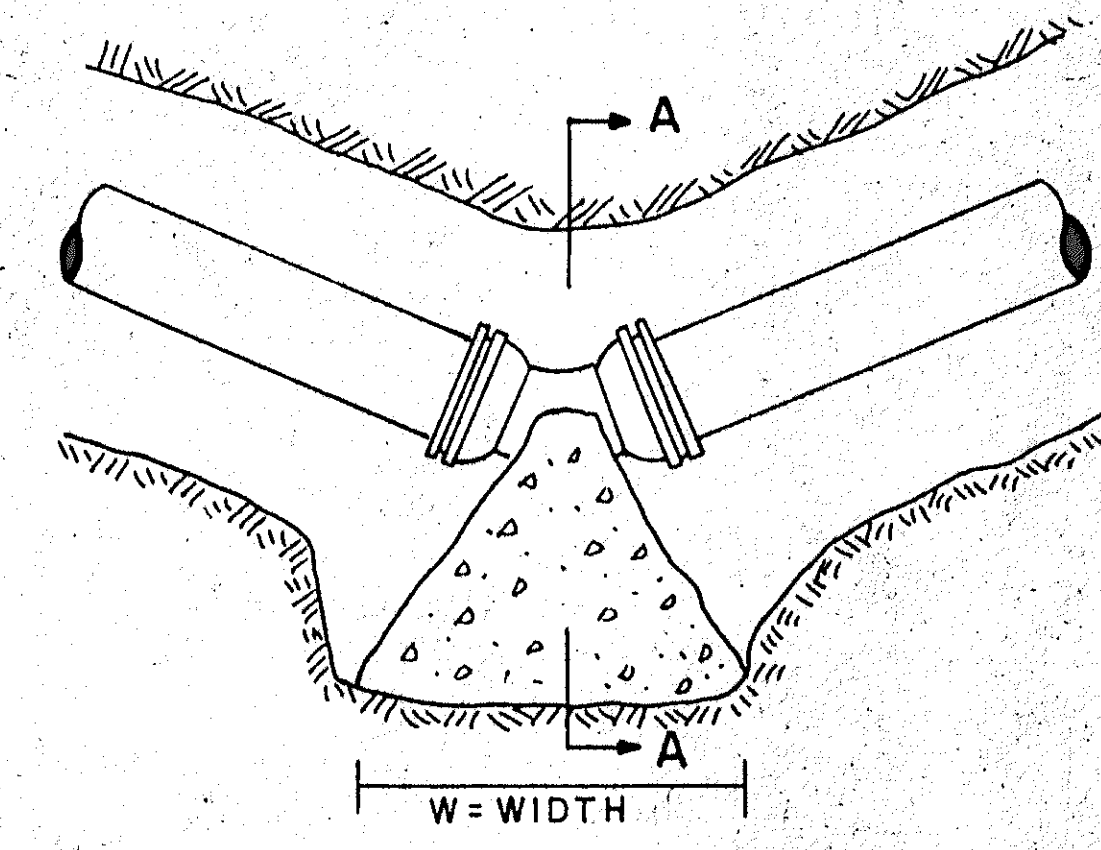
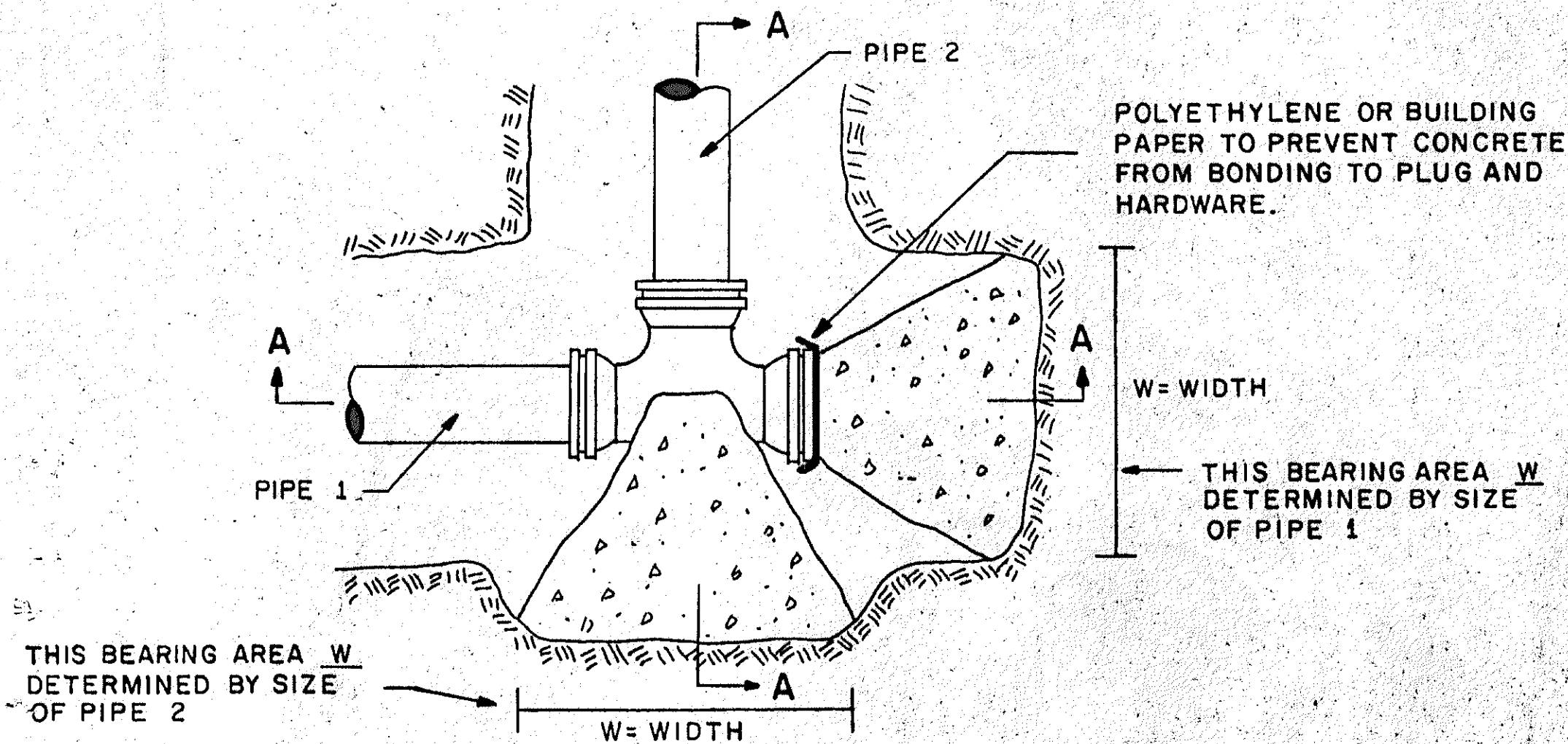




TEE



BEND



TEE WITH PLUG

TABLE 1
SAFE BEARING LOADS OF SOILS & MULTIPLICATION FACTORS FOR MODIFICATION OF THRUST BLK. AREAS

SOIL	SAFE BEARING LOAD (LBS./SQ. FT.)	FACTOR
MUCK	0	0
SOFT CLAY	1000	2.00
SAND	2000	1.00
SAND & GRAVEL	3000	0.67
SAND & GRAVEL CEMENTED WITH CLAY	4000	0.50
SHALE	10000	0.20

TABLE 2
REQUIRED BEARING AREAS & DIMENSIONS FOR CONCRETE THRUST BLOCKS

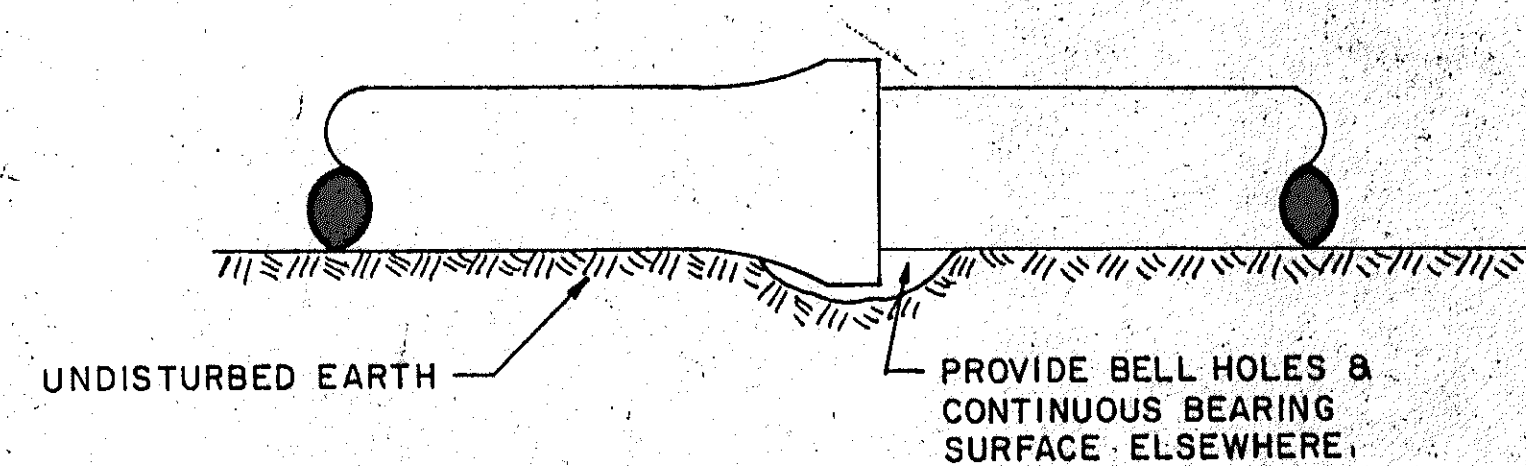
REQUIRED BEARING AREAS & DIMENSIONS FOR CONCRETE THRUST BLOCKS										
PIPE SIZE INCHES	TEE AREA sq.ft.	90° (1/4) BEND		45° (1/8) BEND		22-1/2° (1/16) BEND		11-1/4° (1/32) BEND		
		Dimensions D x W	Area sq.ft.	Dimensions D x W	Area sq.ft.	Dimensions D x W	Area sq.ft.	Dimensions D x W	Area sq.ft.	
2	0.4	0.5 x 1.0	0.5	0.5 x 1.0	0.3	0.5 x 1.0	0.1	0.5 x 1.0	0.1	0.5 x 1.0
3	0.8	1.0 x 1.0	1.1	1.0 x 1.5	0.6	0.5 x 1.5	0.3	0.5 x 1.0	0.2	0.5 x 1.0
4	1.4	1.0 x 1.5	2.0	1.0 x 2.0	1.1	1.0 x 1.5	0.6	0.5 x 1.5	0.3	0.5 x 1.0
6	3.2	1.5 x 2.5	4.5	2.0 x 2.5	2.4	1.5 x 2.0	1.2	1.0 x 1.5	0.6	0.5 x 1.5
8	5.7	2.0 x 3.0	8.0	2.0 x 4.0	4.3	2.0 x 2.5	2.2	1.5 x 1.5	1.1	1.0 x 1.5
10	8.8	2.5 x 3.5	12.5	3.0 x 4.5	6.8	2.0 x 3.5	3.4	1.5 x 2.5	1.7	1.0 x 2.0
12	12.7	3.5 x 3.5	18.0	4.0 x 4.5	9.7	2.5 x 4.0	5.0	2.0 x 2.5	2.5	1.5 x 2.0
14	17.3	3.5 x 5.0	24.5	4.5 x 5.5	13.3	3.5 x 4.0	6.8	2.0 x 3.5	3.4	1.5 x 2.5
16	22.6	4.5 x 5.0	32.0	5.0 x 6.5	17.3	3.5 x 4.5	8.8	2.5 x 3.5	4.4	2.0 x 2.5
18	28.6	5.0 x 6.0	40.5	5.5 x 7.0	21.9	4.0 x 5.5	11.2	3.0 x 4.0	5.6	2.0 x 3.0
20	35.3	5.5 x 6.5	50.0	6.5 x 8.0	27.0	4.5 x 6.0	13.8	3.5 x 4.0	6.9	2.0 x 3.5

NOTES:

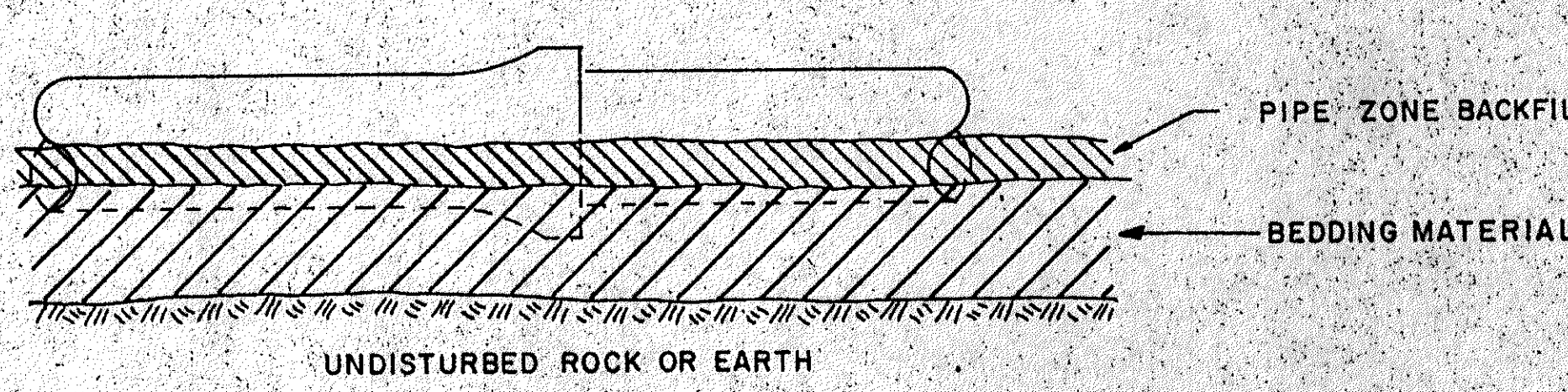
- FOR REQUIRED BEARING AREA AND DIMENSIONS D & W SEE TABLE 2. VALUES OF D & W OTHER THAN THOSE SHOWN IN THE TABLE, MAY BE USED PROVIDED THEY YIELD A BEARING AREA EQUAL TO OR LARGER THAN THAT REQUIRED.
- ALL THRUST BLOCKS SHALL BE 3000 P.S.I. POURED CONCRETE.
- CONCRETE NOT TO OVERLAP ANY JOINT.
- CONCRETE TO BE PLACED SO AS NOT TO INTERFERE WITH REMOVING OR INSTALLING ANY OF THE JOINTING HARDWARE.
- VALUES FOR TEE, ALSO APPLY TO END PLUGS, CAPS AND TAPPING SLEEVES.
- REQUIRED BEARING AREA ARE DUE TO THRUSTS CAUSED BY 150 P.S.I. WORKING PRESSURE PLUS 50% (75 P.S.I.) SURGE ALLOWANCE RESULTING IN 225 P.S.I. TOTAL INTERNAL PRESSURE, NOMINAL PIPE DIAMETER USED.
- REQUIRED BEARING AREAS ARE BASED ON ALLOWABLE SOIL BEARING CAPACITY OF 2000 LBS. PER SQ. FT. FOR SAND. DUE TO OTHER SOIL CONDITIONS ENCOUNTERED, BEARING AREAS MAY BE MODIFIED BY THE ENGINEER BY MULTIPLYING THE AREA GIVEN IN TABLE 1 FOR THE APPROPRIATE PIPE SIZE AND FITTING BY THE LISTED CORRECTION FACTORS.
- IN MUCK, PEAT OR RECENTLY PLACED FILL, ALL THRUSTS SHALL BE RESISTED BY PILES OR TIE RODS TO SOLID FOUNDATIONS, OR BY REMOVAL OF SUCH UNSTABLE MATERIAL AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THE THRUSTS, ALL A.D.B.E.

SECTION A-A

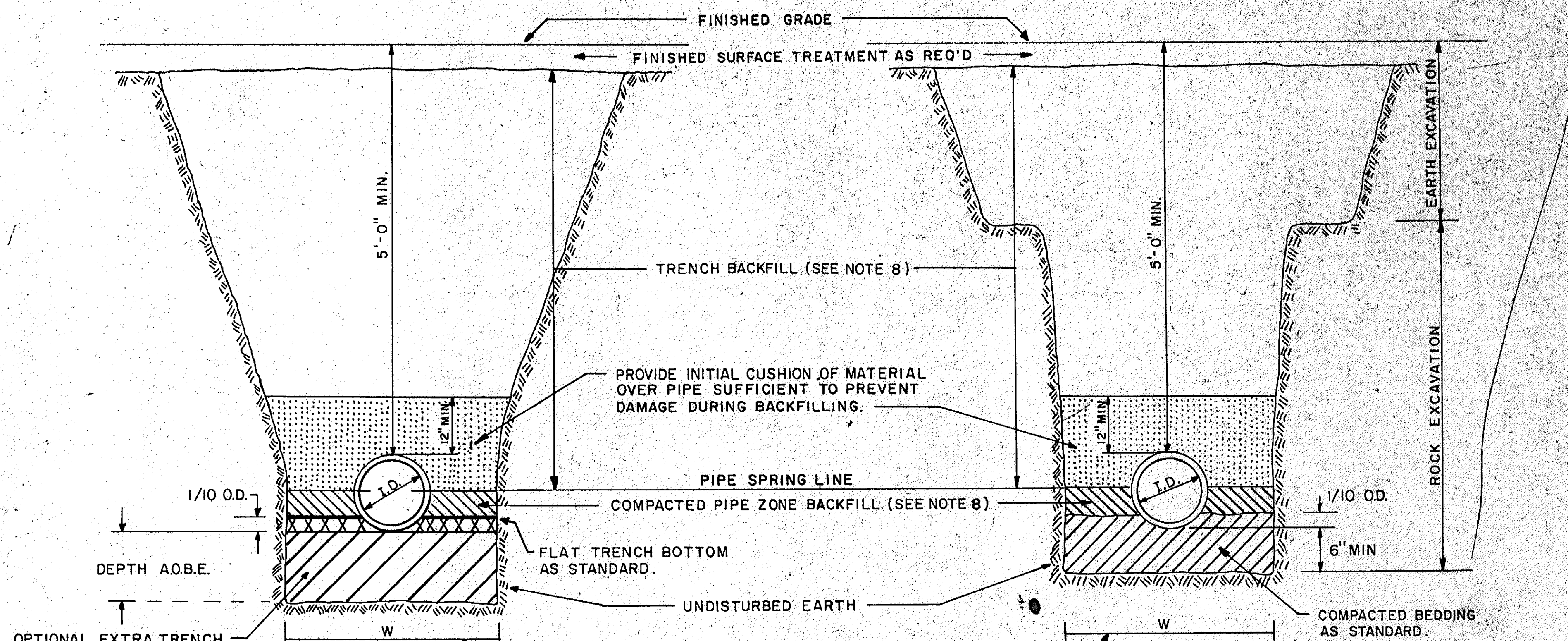
TYPICAL CONCRETE THRUST BLOCK DETAILS



ELEVATIONS



TRENCH IN ROCK



TRENCH IN EARTH

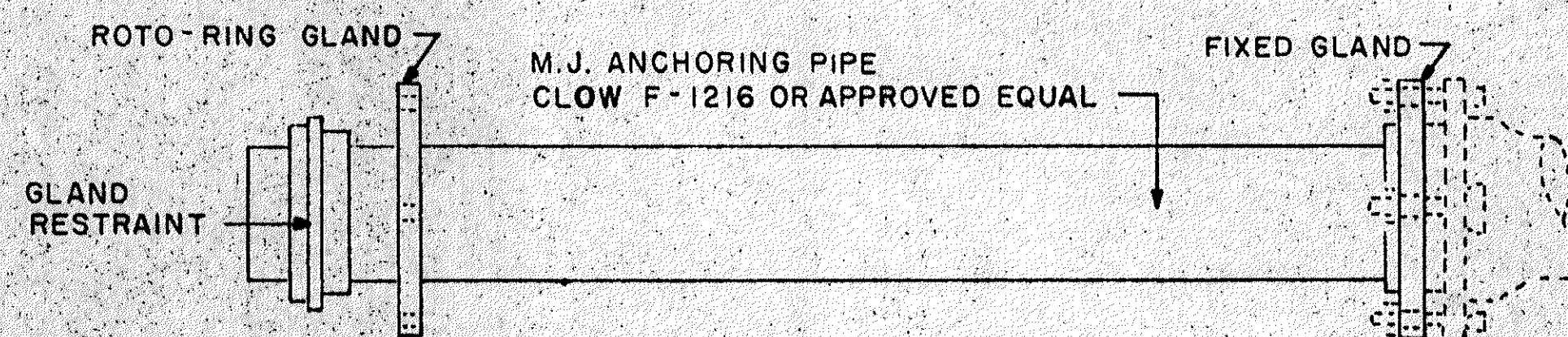
TYPICAL TRENCH DETAILS

NUMBER OF TIE RODS REQUIRED.

PIPE SIZE INCHES	MINIMUM NO. OF 3/4" RODS
2	2
3	2
4	2
6	2
8	2
10	2
12	2
14	4
16	4
18	6
20	6

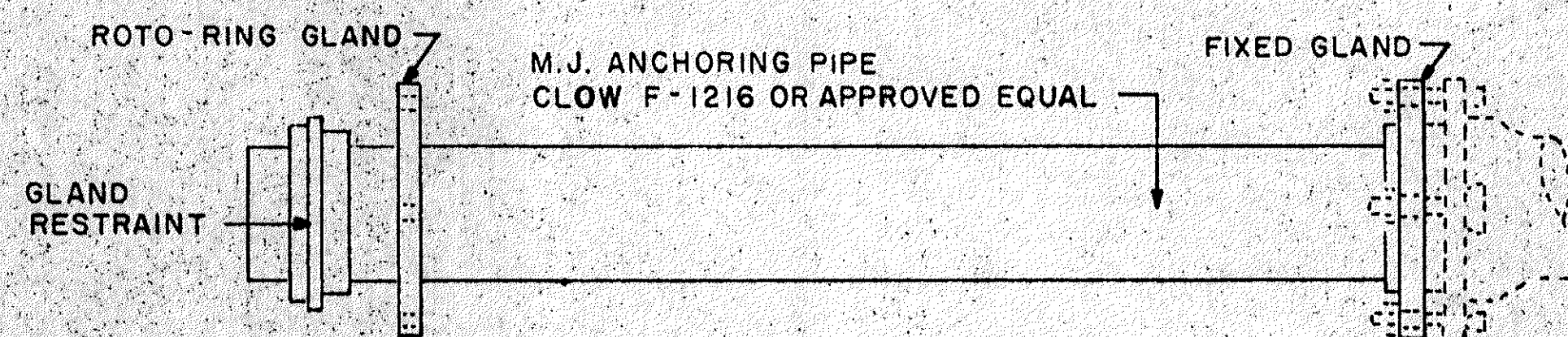
NOTES:

- APPLIES TO 5/8" RODS AS WELL.



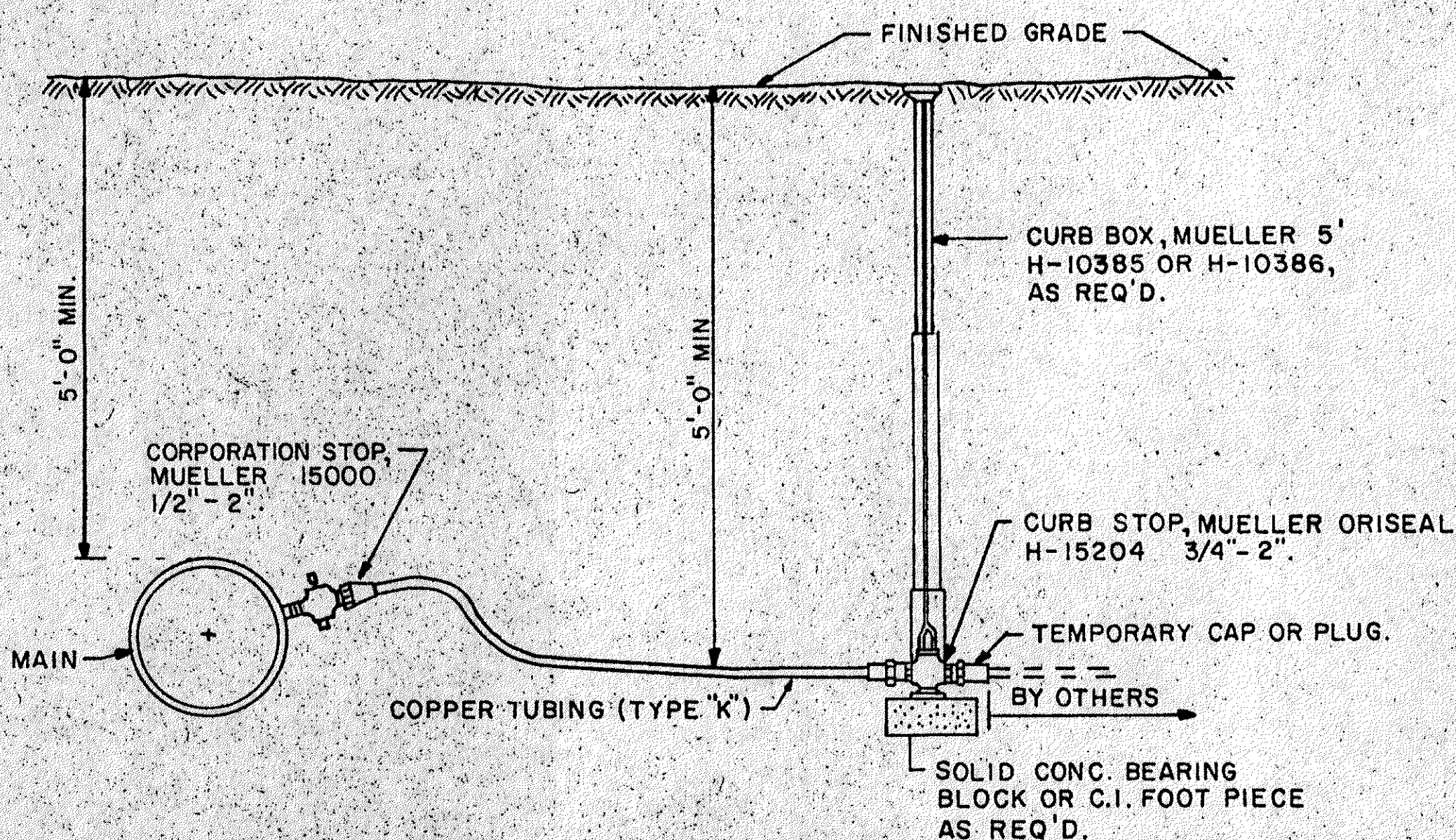
RETAINER GLAND

TIE RODS



ANCHORING PIPE

THRUST RESTRAINT OPTIONS



COPPER SERVICE PIPE FOR SERVICES 2" DIAMETER OR LESS

NOTES:

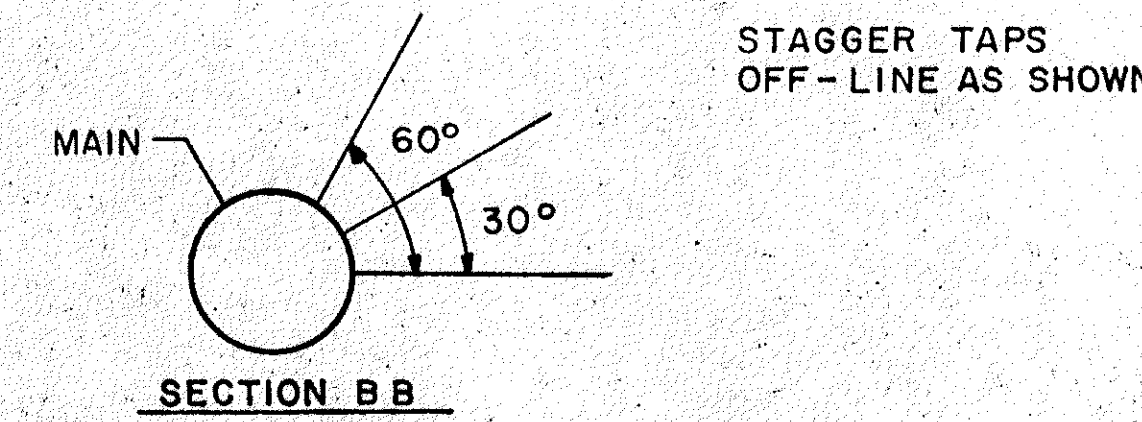
- All watermains and appurtenances will be ductile iron class 52, double cement lined paint, sand coated, constructed in 18' or 20' lengths. Joints shall be 180° or 180° of the type in accordance with ANSI/AWWA C-111/A21.1 latest provision. All valves shall open to the left and shall be double gate valve "N" ring sealed.
- All hydrants shall be ground line break flange, dry-barrel wet-top asbestos packing. All hydrants open to the left with a 5/2" main valve and a 6" inlet. Plus 2-2" hose nozzles and 1-1/2" steamer connection.
- Extreme care shall be taken in the handling of pipe and appurtenances. Under no circumstances shall such material be dropped, rolled or skidded against other pipe on the ground. All slings, hooks or pipe tongs shall be padded and used in such a manner to prevent damage to the exterior of the pipe. Handling pipe from the interior of the pipe wall will be prohibited.
- All water mains and appurtenances shall be installed in a dry trench. Under no circumstances shall water mains or appurtenances be dropped or dumped into the trench. When construction is not in progress the open ends of pipe will be closed by a watertight plug or approved equal.
- Horizontal Separation
 - Whenever possible, water mains should be laid at least 10 feet, horizontally, from any existing or proposed sewer line. Should local conditions prevent a lateral separation of 10 feet, a water main may be laid closer than 10 feet to a sewer main if:
 - It is laid in a separate trench.
 - It is laid in the same trench with the sewer main located at one side on a bench of undisturbed earth.
 - In either case the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.
- Vertical Separation
 - Whenever water mains must cross over sewers, the water main shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.
- Special Conditions
 - When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the water main should be constructed of slip-on or mechanical joint ductile iron pipe, and the sewer constructed of mechanical joint ductile iron pipe and both services should be pressure tested to assure watertightness.
- When installing retainer glands, any joint deflections should be taken prior to tightening of any bolt. Deflection at any joint shall not exceed 3 degrees.
- All clamps, tie rods or retainer glands shall be coated after installation with a heavy coating of approved bitumastic paint (see AWWA C-105).
- Bedding materials, pipe zone and trench backfill shall consist of selected excavated material, R.O.B. gravel not exceeding 2" in diameter, crushed stone or sand A.O.B.E.
- All bedding, pipe zone and backfill materials to be compacted A.O.B.E. shall have a moisture content suitable for the compactor selected for proper compaction. Impact rammer, plate or small drum vibrators may be used with layer thicknesses not exceeding the capability of the compaction equipment being used. Engineer's approval or rejection of the above described mechanical devices based upon the results of appropriate on-site field test or experience shall be final.
- All highway borings shall have detailed plans and profiles approved by the Town of Bethlehem, New York State Department of Transportation or Albany County Highway Department, whoever has jurisdiction. Right sheeting extending 4' above original ground on all sides facing traffic with a minimum of 10' returns on sides. Pits shall be enclosed by a 4' high fence. Work shall progress to completion as soon as possible after work is started. Pavement, shoulders, curbs, sidewalks, lawns, etc. will be restored to original condition A.O.B.E.
- All trench backfill in pavement areas are to be compacted, before applying base course of asphaltic concrete. The existing pavement shall be cut back in a uniform line 12" past the trench edge. Pavement to be repaired or replaced with approved materials - 3" compacted thickness of base and 1" compacted thickness of top or A.O.B.E. All pavement joints to be primed and sealed with RC-250 cutback asphalt.
- Appropriate traffic control devices shall be provided in accordance with Federal, State or Local regulations to regulate, warn and guide traffic at the work site.
- All water mains and appurtenances are to be:
 - Flushed at a rate of 245 P.P.S.
 - Pressure and leakage tests of 12 times the working pressure or 150 P.S.I., whichever is greater for at least 2 hours and not vary by more than 5 P.S.I.
 - Disinfected with a chlorine residual of 50 P.P.M. after 24 hours.
- All material and construction methods shall comply with details and specifications set forth by the N.Y.S.D.E.C., N.Y. State Department of Health and the AWWA standards.
- There shall be no changes on these plans unless first approved by the Engineer.

TRENCH WIDTH

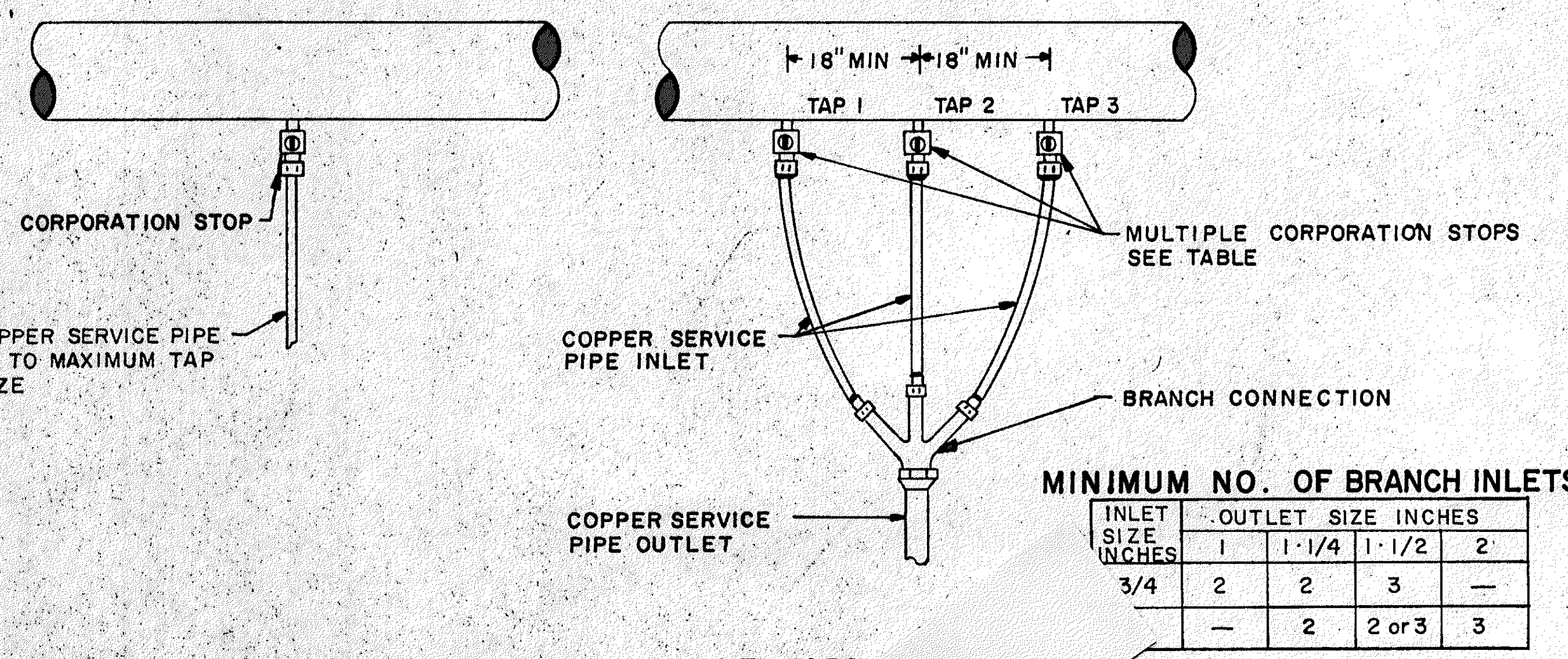
PIPE SIZE - I.D. (INCHES)	MIN. SUGGESTED TRENCH WIDTH FOR ANPLE WORKING SPACE (O.D. BELL PLUS 3")	MAX. TRENCH WIDTH AT TOP OF PIPE
2	18	26
3	18	27
4	18	28
6	21	30
8	24	32
10	26	34
12	28	36
14	30	38
16	32	40
18	35	42
20	37	44

MAXIMUM TAP SIZE

MAIN SIZE - INCHES	3	4	6	8	10	12
MAX. TAP SIZE - INCHES	1/2	3/4	1	1-1/4	1-1/2	2



TYPICAL HYDRANT INSTALLATION



SINGLE & MULTIPLE TAPS

INLET SIZE INCHES	OUTLET SIZE INCHES		
	1	1-1/4	1-1/2
3/4	2	3	2
1	2	2 or 3	3

WATER DISTRIBUTION DETAILS

TOWN OF BETHLEHEM
DEPARTMENT OF PUBLIC WORKS
445 DELAWARE AVE. DELMAR N.Y. 12054

SCALE: NONE
DRAWN BY: C. WICKHAM, JR.
APPROVED BY: B.H. SECOR

DATE: 12-12-89

SHEET 5 OF 5