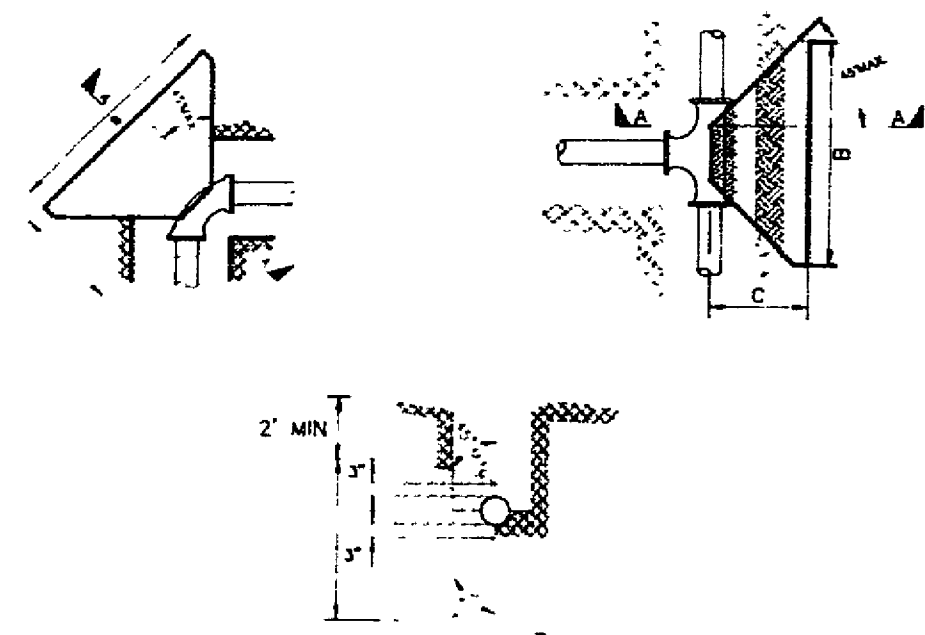
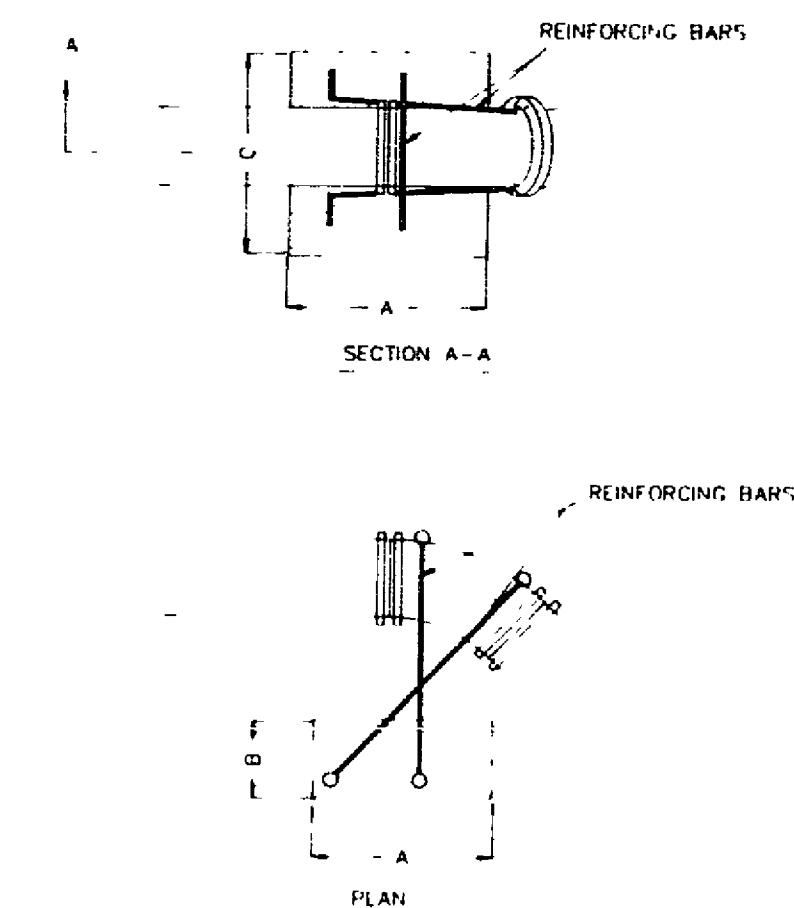




SECTION A-A

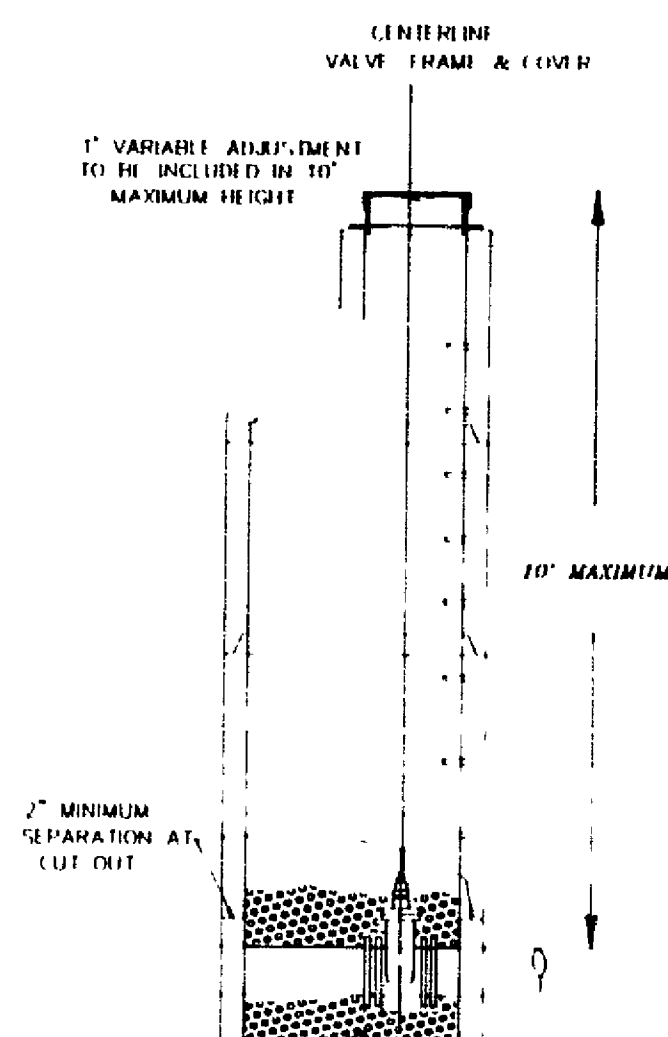
PIPE SIZE	TEE OR DEAD END	90° BEND	45° BEND	22.5° LESS BEND
12"	1.2' 3.0'	1.5' 3.5' 2.0'	1.2' 2.3' 1.0'	1.2' 2.0'
14"	1.7' 3.8'	2.0' 4.5' 2.0'	1.3' 3.6' 1.5'	1.3' 2.0'
16"	2.0' 4.9'	2.0' 4.7' 2.0'	1.7' 4.5' 2.0'	1.5' 2.6' 1.5'
18"	2.5' 5.7' 2.0'	2.5' 5.8' 2.5'	2.2' 5.0' 2.5'	1.7' 3.3' 1.5'
20"	3.5' 7.0' 3.0'	4.5' 8.0' 3.5'	3.0' 6.5' 3.0'	2.5' 4.0' 2.0'
24"			3.5' 7.0' 3.25'	3.0' 4.5' 2.5'

- NOTES:
- THE ABOVE NOTED DIMENSIONS ARE MINIMUM BASED ON CONCRETE ANCHOR EXTENDING TO UNDISTURBED SOIL. LINE PRESSURE NOT TO EXCEED 150 PSI AND MINIMUM SOIL BEARING CAPACITY OF 2500 PSF. UNSATISFACTORY SOIL BEARING OR EXCESS PRESSURE WILL REQUIRE ADDITIONAL DESIGN.
 - CONCRETE SHALL NOT BE POURED ON JOINTS OR BOLTS.
 - CONCRETE TO BE MINIMUM 3000 PSI - 28 DAY COMPRESSIVE STRENGTH.



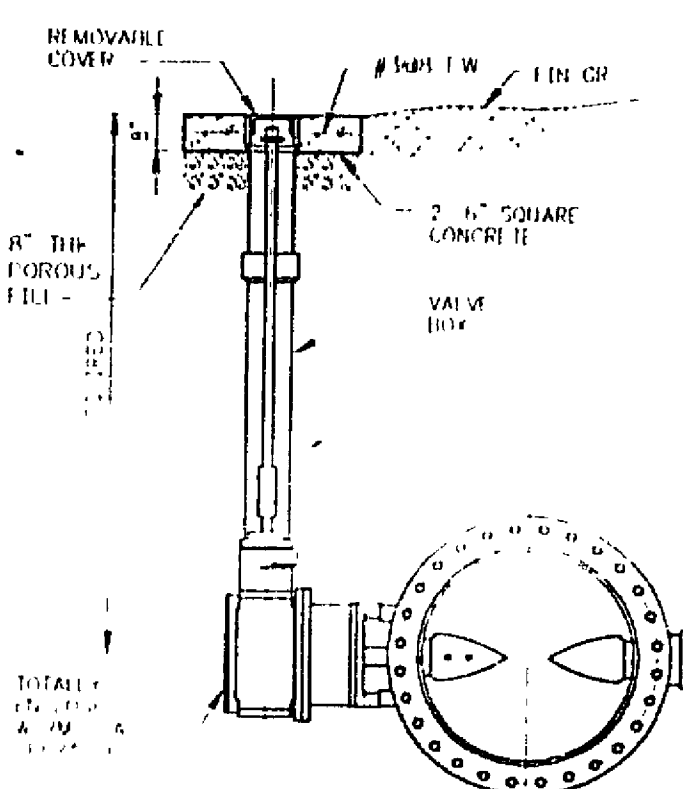
PIPE SIZE 12" 4' 25' 4' 4' 36'

VERTICAL THRUST BLOCK

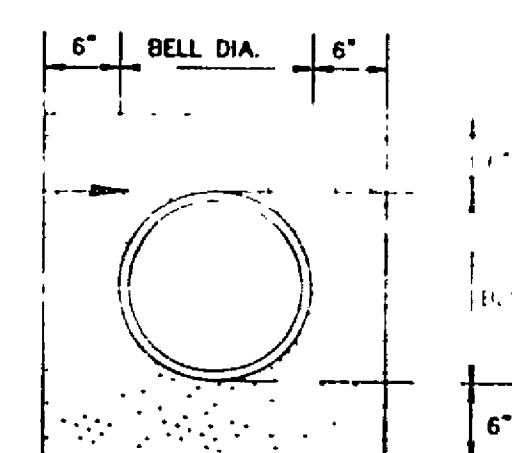


6" MINIMUM GRAVEL BEDDING

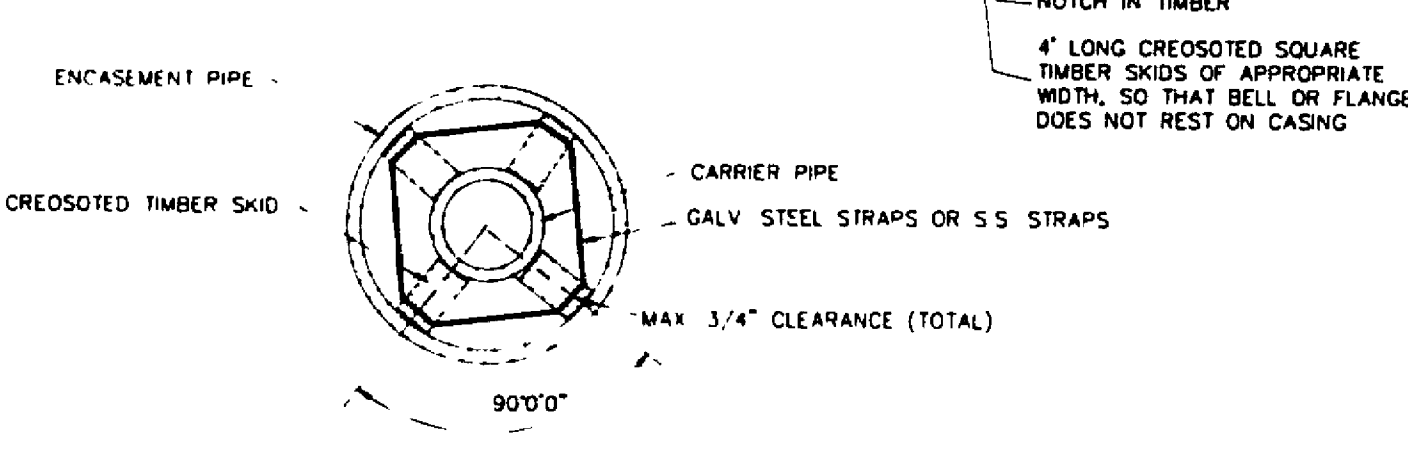
ALTERNATE VALVE VAULT (MANHOLE)



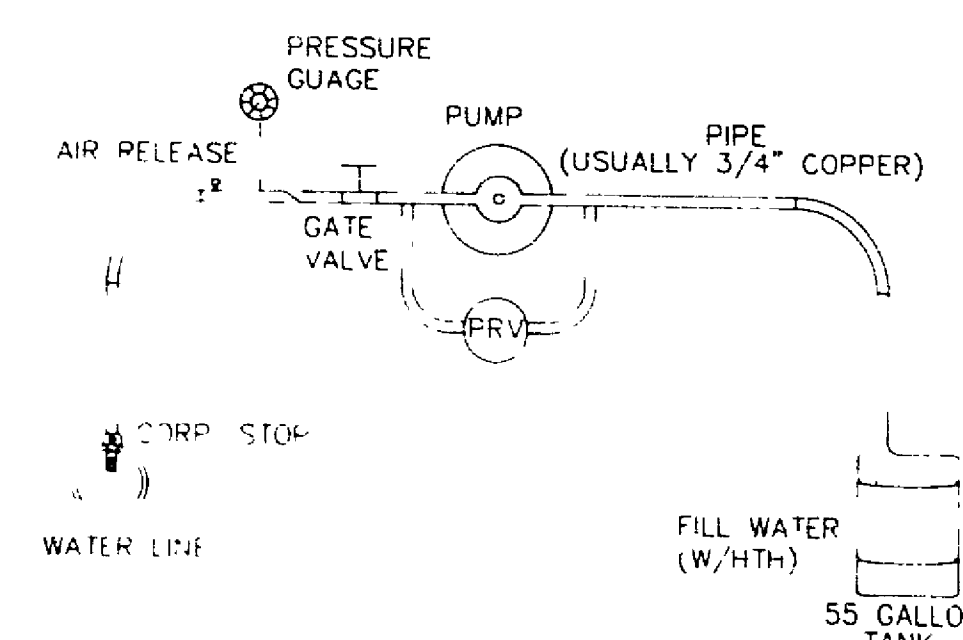
BURIED BUTTERFLY VALVE (BFV)



CONCRETE ENCASED PIPE



PIPE SUPPORT IN CASING PIPE



TYPICAL WATER PRESSURE TEST RIG

VAULT AND WATER STANDARDS FOR CONSTRUCTION

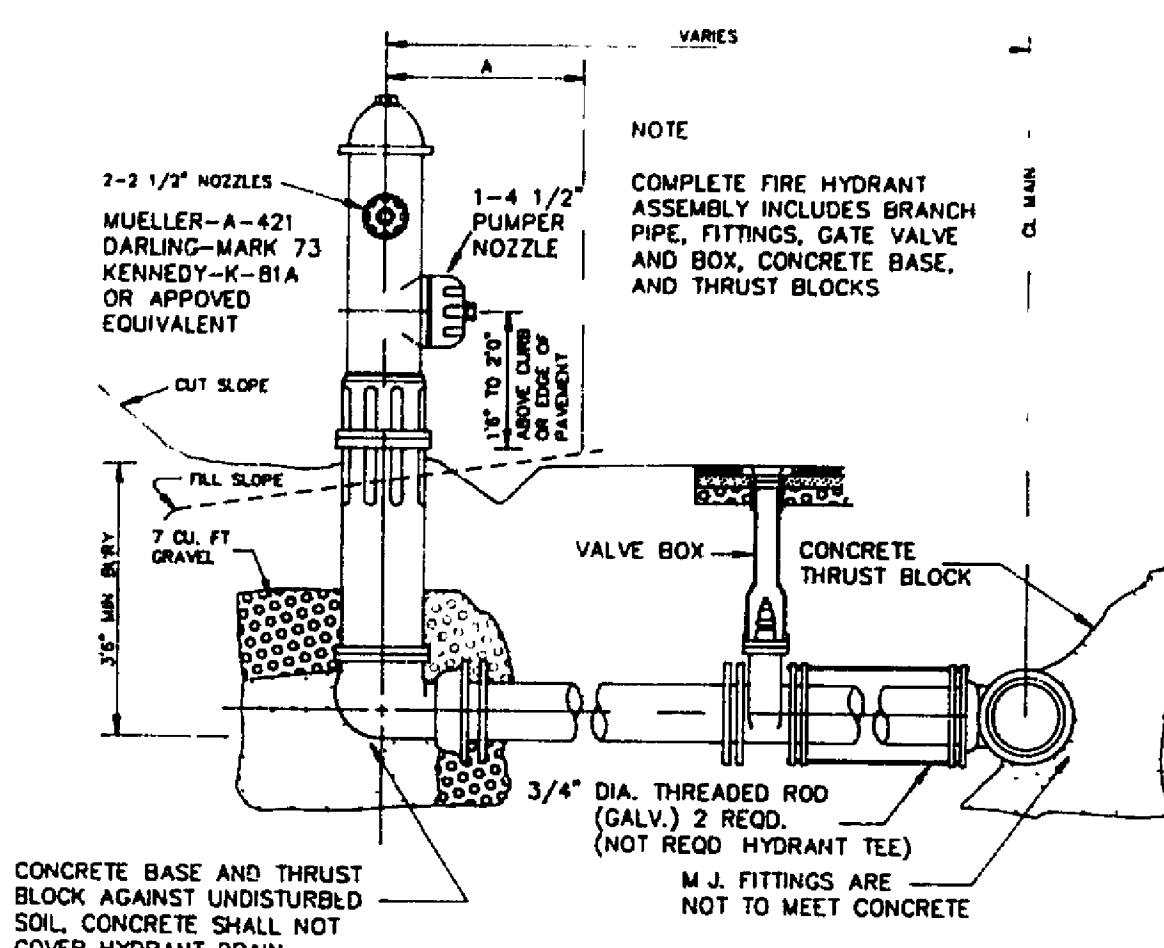
- VAULTS, MANHOLE BASES, RISERS, TAPERS AND GRADE RINGS SHALL BE PRECAST REINFORCED CONCRETE MANUFACTURED IN ACCORDANCE WITH VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS, SECTION 503.
- MANHOLE BASE AND RISER SECTIONS CONSTRUCTION SHALL BE VERTICAL WITH MAXIMUM 1" IN 4' TILT.
- A MAXIMUM OF 2 CONSTRUCTION GRADE RINGS OR MAXIMUM OF 1' OF GRADE RINGS AND FRAME AND COVER ADJUSTMENT ARE ALLOWABLE.
- FINAL ADJUSTMENT OF FRAME AND COVER SHALL BE IN ACCORDANCE TO FRAME AND COVER ADJUSTMENT DETAIL USING NON SHRINK CONCRETE WITH MAXIMUM OF 4 BRICKS OR CONCRETE BLOCKS FOR GRADE CONTROL. FRAME AND COVER ARE TO BE SET AT FINISH GRADE OR 1/4" ABOVE FINISH GRADE IN PAVEMENT AND YARD AREAS AND MINIMUM 6" ABOVE FINISH GRADE IN OTHER AREAS. MANHOLE FRAMES AND COVERS ARE NOT TO BE SET IN DRAINAGE SWALE, VALLEY GUTTER, ETC.
- JOINTS AND OPENINGS IN MANHOLE UNITS SHALL BE MADE WATER TIGHT BY USING BUTYL SEALANTS, O-RING GASKETS OR MASTIC. THE CONCRETE SURFACE SHALL BE CLEANED PRIOR TO USE OF SEALANT.
- FRAME AND COVERS:
 - DEMCO BROTHERS INC. MH - RCR - 56
 - APPROVED EQUAL
- ALL LIFT HOLES, OPENINGS AROUND PIPE, ETC. SHALL BE FILLED FROM INSIDE AND OUTSIDE TO THICKNESS OF STRUCTURE.
- ALL UNITS USED IN MANHOLE AND VAULT CONSTRUCTION SHALL BE SECURELY CONNECTED BY INTERLOCKING BETWEEN UNITS, CONCRETE COLLARS OR OTHER APPROVED METHODS.
- AREA AROUND METER BOX AT A RADIUS OF 4' TO BE ON FINISH GRADE AND UNOBSTRUCTED EXCEPT FOR ROAD CONSTRUCTION.

APPROVED MATERIALS

- METER BOXES:
 - FORD IRONCRETE METER BOX WITH NO 2 IRONCRETE TOP OR APPROVED EQUAL.
 - SOUTHEASTERN DISTRIBUTOR MODEL MB-5 PLASTIC BOX WITH FORD OR CHARLOTTE MODEL C-32 CAST IRON BASE AND COVER (NOT APPROVED FOR ROADWAY AREA).
 - APPROVED EQUAL.
- METER SETTER (INCLUDING INLET RISER VALVE AND DOUBLE CHECK VALVE ON OUTLET):
 - FORD VBM 72-15-WD
 - APPROVED EQUAL.
- METER SETTER EXTENDER OR RISER:
 - NOT ALLOWED UNLESS APPROVED BY THE UTILITY DIRECTOR.
- CORPORATION STOP:
 - MUELLER MODEL H-1500
 - FORD MODEL F-600
 - APPROVED EQUAL.
- U-BRANCH:
 - FORD MODEL U28-43
 - MUELLER MODEL H 15362
 - APPROVED EQUAL.
- SERVICE SADDLES (FOR PVC PIPE):
 - FORD MODEL FS 202 AND FC 202 WITH STAINLESS STEEL BAND AND BOLTS
 - APPROVED EQUAL.

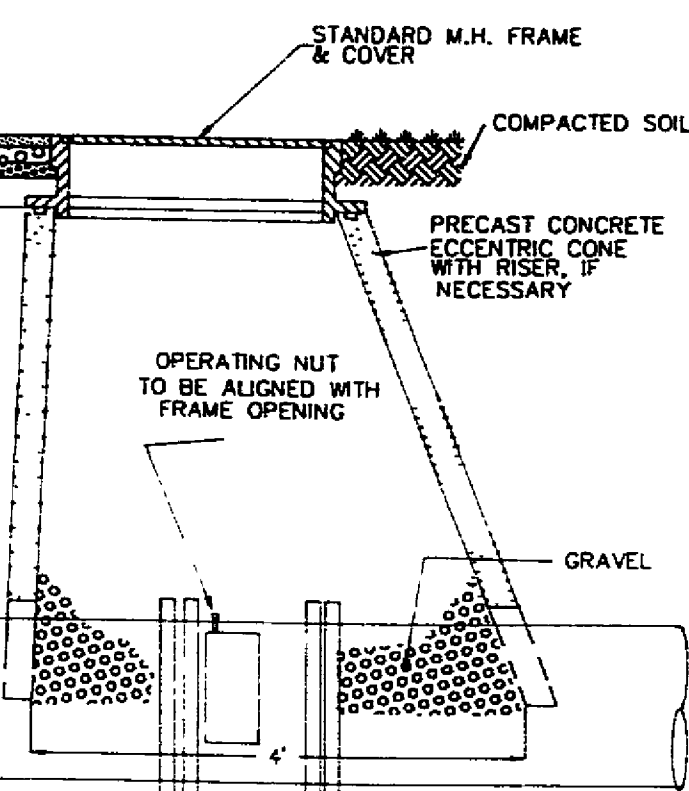
THRUST BLOCK FOR HORIZONTAL & LOWER VERTICAL BENDS

- NOTES:
- MAIN BODY OF HYDRANT MUST BE SILVER AND HAVE RED CAPS AND BONNET.
 - DISTANCE "A" WITH CURB AND CUTTER, 2' MIN., 4' MAX. FROM BACK OF CURB.
 - DISTANCE "A" WITHOUT CURB AND CUTTER, 6' MIN., 12' MAX. FROM EDGE OF PAVEMENT.
 - AREA AROUND HYDRANT AT A RADIUS OF 4' TO BE APPROXIMATELY LEVEL AND UNOBSTRUCTED FOR ROAD CONSTRUCTION.

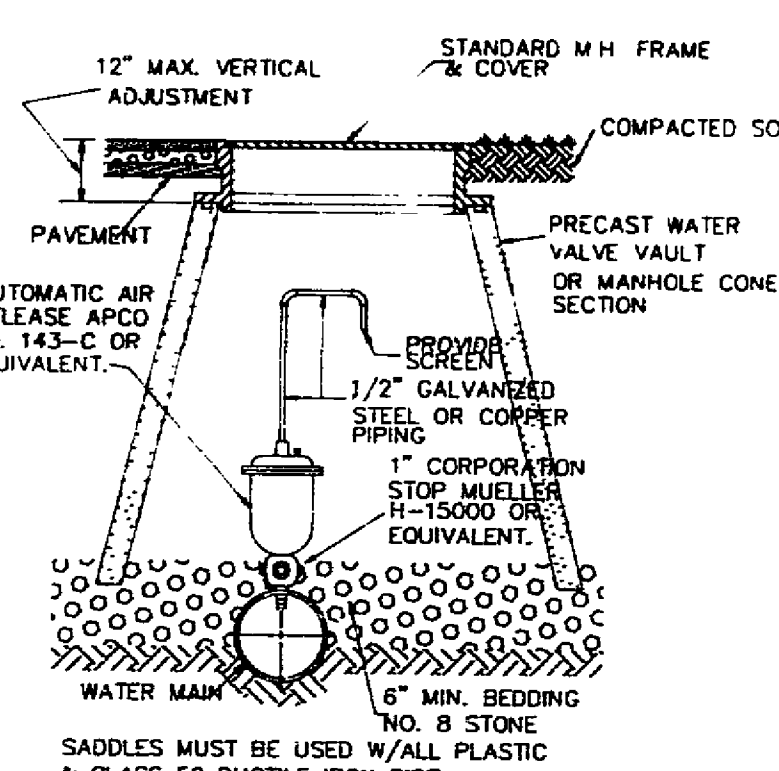


FIRE HYDRANT SETTING

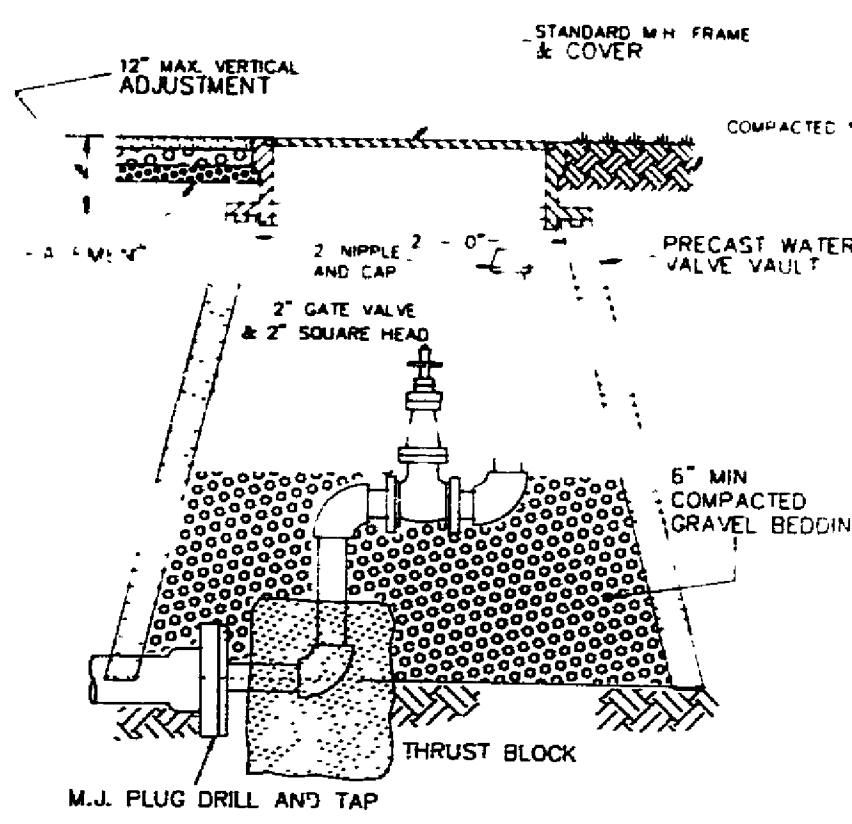
BLOW OFF ASSEMBLY FOR MAIN LINE TEMPORARY TERMINATION



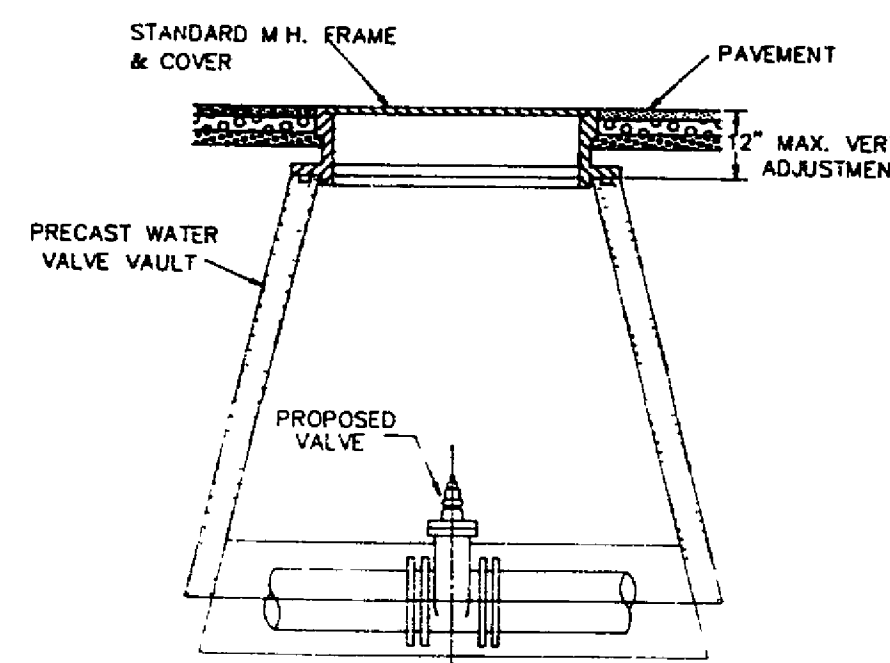
BUTTERFLY VALVE



AUTOMATIC AIR RELEASE ASSEMBLY



PERMANENT END OF LINE



WATER LINE VALVE INSTALLATION

12-16-89 12-16-89
3-2-99 3-2-99

COMBINED CONSTRUCTION PHASES

WATER DETAILS FOR
STARKEY ROAD
WATERLINE EXTENSION
PREPARED FOR
ROANOKE COUNTY UTILITY DEPARTMENT
CAVE SPRING MAGISTERIAL DISTRICT
ROANOKE COUNTY, VIRGINIA

LUMSDEN ASSOCIATES, P.C.
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIA

1 NOV 1990 12-16-89

WT-0366