

**City of Alabaster, Alabama
Environmental Collections Department**



**Standard Sanitary Sewer
Specifications**

Revised January 2009

Written By InSite Engineering, LLC
in conjunction with the City of Alabaster for the Protection of Public Safety, Health, and
welfare for the Citizens of Alabaster, Alabama.

**City of Alabaster Environmental Services Department
Standard Specifications**

1. GENERAL

This specification covers design and construction of new gravity sewer mains, force mains, laterals, and pumping stations on the City of Alabaster Sanitary Sewer System.

Scope:

- a. All labor, material, equipment, work and testing required for a complete and functional system shall be furnished by the developer or entity installing the improvements.
- b. Sewer service design shall be in accordance with Ten States Standards unless otherwise noted.
- c. Sanitary sewer design flows shall be based on 100 gpcd, at 2 or 3 peak factor (Case Sensitive), with a 3.5 person per unit minimum.
- d. Sanitary sewer force mains shall be sized to maintain a minimum velocity of 2 feet per second minimum.
- e. All work on the sewer system must be performed by a licensed contractor.
- f. All final subdivision plats must include a signature block indicating acceptance by the Director of Environmental Services on behalf of the sewer department.
- g. Sewer connection permits will not be issued until the sewer department has approved all sewer construction.
- h. All materials must be submitted to the City of Alabaster for approval prior to beginning work.
- i. All proposed new developments must include capped sewers in accordance with the City of Alabaster's Capped Sewer Ordinance.
- j. All raw sewage entering the sewer system must meet the City of Alabaster's pretreatment regulations, including SID permits for industrial applications.
- k. All work to be performed off of City ROW should be submitted to the Environmental Services Department for review and approval prior to submission to other agencies for permitting.

Quality Assurance:

- a. All improvements will have a 1 year warranty beginning from the date of recording of the final plat.
- b. All items will be maintained for the first year at the developer's expense. In the event of a failure or break a repair must be made by the developer within a 24 hour period or such repairs will be made and billed to the developer. At the end of that stated year, acceptance of the mains and items within the right of way will be assumed by the City except for pumping stations. In the event of a problem the one year warranty will restart from the date of repair.
- c. Pumping stations must have final inspection at the end of a one year warranty period. At this time either a final correction list or and acceptance letter will be issued. The developer will retain responsibility for maintenance and upkeep of the pumping station until all corrections are made. If a major

problem exists during this period a repair will be made and billed to the developer.

- d. Plan changes will not be allowed without written approval from the City of Alabaster and the Design Engineer. Failure to comply with this will result in suspension of the project.
- e. If during construction of the project, the site or project conditions reveal conflicts or harm to existing utilities either by vicinity or by destruction during construction, the contractor must repair or relocate the existing utility at the contractor or developer's expense. Failure to do this in a timely manner will result in suspension of the project or rejection of final acceptance of the project until the item is corrected. If a major break occurs and the contractor does not correct immediately a repair will be made and billed to the developer.

Plans:

All plans must be submitted on a 24 x 36 inch sheet and must include the following:

- North arrow
- Graphic and Noted Scale
- 1" = 50' minimum
- Manhole count Listed
- Foot of Pipe by Size Listed
- Plan View with line numbers, manhole numbers, delta angles, Alabama State Plane West Northing and Easting Coordinates, lateral location and stations, Connection Location, Streets and Road Names, Etc.
- All appropriate manhole, backfill, lateral, etc details
- Profile Sheets showing the existing and proposed grades, with manhole locations and numbers accompanied by top of rim elevation, invert in and out elevations, line grade, line type, sizes, and crossings of existing utilities.
- All other appropriate information concerning the installation, connection, and development of the sanitary sewer system for proper review and approval.
- All pumping station plans shall be accompanied by the appropriate number of sheets to cover all site, grading, erosion control, mechanical, and electrical plans to allow for proper review and approval.
- Minimum grades for 8" pipe will be 0.50%, minimum grade for 10" pipe will be 0.40%. All other pipe sizes and grades must be pre-approved by the City of Alabaster.
- No drops over two feet are allowed inside a manhole.
- No grades over 12% are allowed without written approval from the City of Alabaster.
- A bench mark shall be located and shown on each sheet.
- Easements shall be a minimum of 20 feet wide or wide enough to access by OSHA standards, which ever is greater.
- Sewer shall not run under curbs.
- 90° connections or greater only are allowed.
- High traffic commercial areas are required to be ductile iron for mains and laterals only.

- Service laterals for residential units will be 4" minimum.
- Service laterals for commercial units will be 6" minimum.
- During construction, plugs must be installed at the right of way. (twist or caps accepted but must pass air test)
- A green witness post must be clearly placed at the termination point of the lateral and a 1 inch by 1 inch "S" must be scribed in the curb.

2. MATERIALS

a. PIPE

i. Gravity Sewer

1. Ductile Iron Pipe shall meet the requirements of AWWA C151, pressure class 350 minimum, for gravity sewer pipe. A 4 inch green stripe must be painted along the top of all sanitary sewer gravity mains. Ductile Iron Pipe shall be installed under storm drains, under a depth of 3 feet to the top of the pipe, and over a depth of 12 feet to the top of the pipe.
2. PVC pipe shall be SDR 26 heavy wall sewer pipe meeting the requirements of ASTM D3034 for 4" to 15" gravity pipe and ASTM F679 for 18" and 21" gravity pipe. ALL PVC PIPE SHALL BE GREEN IN COLOR AND SHALL HAVE GREEN SANITARY SEWER MARKER TAPE BURIED WITH ALL MAINS AND LATERIAL.
3. Sewer laterals shall be Ductile Iron Pipe meeting the requirements of AWWA C151, pressure class 350 minimum, from the main to the property line if the depth of the sewer is over 12 feet or under 3 feet to the top of the pipe. Laterals between 3 and 12 feet to the top of the pipe may be SDR 26 meeting ASTM D3034. Laterals from the property line to the structure may be Ductile Iron Pipe, class 350 minimum, Schedule 40 solid PVC pipe, or SDR 26 as approved by the Building Official.

ii. Force Main Sewers

1. Ductile Iron Pipe shall meet the requirements of AWWA C151, pressure class 350 minimum, for force main installations. A 4 inch green stripe must be painted along the top of all sanitary sewer gravity mains.
2. PVC pipe shall not be used for force mains.

iii. All ductile iron pipe shall be cement lined in accordance with AWWA C104.

iv. Gaskets for ductile iron pipe shall meet the requirements of AWWA C111 for rubber gaskets. Gaskets for PVC pipe shall be ASTM F477 elastomeric seals.

v. D.I. Pipe shall be manufactured by U.S. Pipe and Foundry, American Cast Iron Pipe Company, or Griffin Pipe Company only. Pipe from other manufacturers will not be accepted.

- vi. Casing pipe shall be ASTM A252, Grade 2, with casing spacers, minimum 4 per joint, and end seals.
- b. **FITTINGS**
 - i. Fittings on PVC or Ductile Iron force main piping shall be restrained joins as follows:
 - 1. Compact Ductile Iron in accordance with ANSI/AWWA C153/A21.53 with Mega-Lug type retainer glands with twist-off nuts.
 - 2. Joint restraint may be provided using Lok-Ring or equivalent pipe joints.
 - 3. Transition gaskets shall be used with pressure class PVC pipe to Ductile Transitions.
 - ii. Fittings shall not be used on gravity sewer piping. All changes in direction on gravity piping shall occur at a manhole.
- c. **ENCASEMENT**
 - i. Polyethylene encasement for ductile iron pipe shall meet the requirements of ANSI/AWWA C105/A21.5 and shall only be used around gas mains.
 - ii. Steel casing pipe shall be ASTM A252, Grade 2, with casing spacers, minimum 4 per joint, and end seals and shall have end caps and should be used in all bores, major crossings, or inaccessible areas.
- d. **VALVES**
 - i. All valves installed in force mains shall be AWWA C515 resilient-sealed gate valves with ductile iron body and bonnet, bronze or 304SS stems, non-rising stems, and 2" square operating nut.
 - ii. Valve boxes shall comply with AWWA M44 for cast-iron valve boxes with adjustable extension and 5' diameter barrel. The use of PVC valve boxes and/or extensions is prohibited.
- e. **MANHOLES**
 - i. All manholes shall be normal traffic precast reinforced concrete in accordance with ASTM C478, 48" minimum diameter, with provision for ASTM C 443 rubber gasketed joints.
 - ii. All manholes shall be furnished with precast concrete inverts.
 - iii. All manholes shall be furnished with monolithic base section (6" minimum floor slab thickness), concentric cones, manhole steps, and Kor-N-Seal pipe connectors.
 - iv. All manhole frames and covers shall be East Jordan Iron Works Model V-1480-1 or John Bouchard & Sons Model 1190 lettered "Sanitary Sewer" or approved equivalent. SEWER or STORM SEWER will not be accepted for lettering on sanitary sewer manholes.
 - v. External Manhole Sealing Sleeve to prevent inflow and infiltration shall be as manufactured by Sealing Systems, Inc. or approved equivalent.
 - vi. Rings and covers must have plastic or rubber non-flood inserts installed on every manhole.

f. MISCELLANEOUS

- i. Memphis Tees are not allowed.
- ii. Kor-N-Seal Boots are required at all new pipe to manhole connections.
- iii. All houses shall have back water valves installed in an appropriate manor as to protect the entire home and to allow for home owner access.
- iv. All grout must be non-shrink hydraulic cement. Mortar or concrete will not be accepted and if found to be used will result in rejection of sewer system.
- v. All piping shall be painted with black epoxy paint.
- vi. All commercial multi family buildings (hotels, motels) having kitchens other than a single family residence types must have a grease traps; see City Building Officials for code requirements. Grease Traps located under the sink will not be allowed. All grease traps must current PDI and ASME codes.
- vii. Low pressure or single grinder pump systems are not allowed. However in the event one is required due to an uncontrollable situation a Grinder Pumping Station agreement between the builder/owner/etc. must be signed and in place prior to installation.
- viii. Asphalt cutting and repair must be permitted prior to construction and must be repaired to meet the City of Alabaster Standards.

3. INSTALLATION

a. PIPE

- i. Ductile iron force main and gravity sewer pipe shall be installed in accordance with AWWA C600.
- ii. PCV gravity sewer pipe shall be installed in accordance with ASTM D2321.
- iii. Sewer lines shall be installed with a minimum 18" vertical and 60" horizontal separation.
- iv. Manholes shall be installed at all changes in direction on gravity sewer piping.
- v. All gravity sewer pipe shall be bedded in a minimum of 6" of ALDOT #8910 stone.
- vi. All gravity sewer pipe shall be backfilled to 12" minimum above the pipe with ALDOT #8910 or #57 stone.
- vii. All trenches under paving shall be backfilled completely with ALDOT #8910 stone.
- viii. The maximum allowable slope on gravity sewer piping is 12% without the City Engineer's approval.
- ix. All pipes on slopes over 10% will have concrete restraint collars on 50 foot centers with the first collar located at the face of the downstream manhole.
- x. If a geotechnical engineer/tester is present, after reaching 12" of stone above the top of the sanitary sewer main, a geotextile fabric may be laid over the stone and compacted backfill installed in a maximum of

6" lifts reaching 98% compaction may be utilized if separate compaction test reports will be submitted otherwise all sanitary sewers within roads, parking lots, or paved areas will have to be backfilled with 100% stone.

b. FITTINGS

- i. Restrained joint ductile iron fittings shall be installed at all changes in direction on force main piping in accordance with AWWA C600.
- ii. Install concrete thrust blocks at all fittings

c. POLYETHYLENE ENCASUREMENT

- i. Install polyethylene encasement in accordance with ASTM A674 or AWWA C105.
- ii. Other Casing shall be installed by the proper ASTM or AWWA Standard.

d. VALVES

- i. Install resilient seat gate valves with stem pointing up in accordance with AWWA C600.
- ii. Cast iron valve boxes and extensions are required at all valves and shall be installed true and plumb, with top of box flush with grade. PVC Valve box extensions are not allowed.
- iii. Air relief valves shall be installed at locations as directed by the sewer department and will be installed in a bottomless manhole cone section with a rim and cover and a minimum of 3 foot of #57 from under the pipe to the bottom of the shut off valve.

e. MANHOLES

- i. Install precast concrete manhole sections with gaskets in accordance with ASTM C891.
- ii. Set tops of frames and covers flush with final grade in pavement areas and 3" above finished grade in unpaved areas unless specifically noted otherwise.
- iii. Set tops of frames and covers a minimum of 1 foot above the 100 year flood elevation in flood prone areas.
- iv. Seal between precast concrete grade rings for final grade adjustment with silicone or butyl. The use of brick and mortar is prohibited.
- v. All inverts are to be precast or solid poured. Concrete coated brick is not allowed.
- vi. Manholes shall not be less than three feet deep from rim to invert.
- vii. Manholes shall not be over 400 feet apart.
- viii. Manholes shall have a minimum of 0.2 feet drop across each.
- ix. Bolt down frame and covers are required in flood hazard areas.
- x. Manholes over 20 feet deep will be required to be larger diameter and special design.
- xi. All manholes shall have sealing boots from the factory; in the event of a core connection a neoprene boot will be required.
- xii. Manholes shall be cast with additives to be completely water tight.

f. MISCELLANEOUS ACCESSORIES

- i. Exterior Manhole Sealing Sleeve-Install sleeves at all manhole joints and at the frame and cover connection to the grade rings after manhole and all grade rings are set. Follow manufacturer's written installation instructions.
- ii. Memphis Tee's are not allowed.
- iii. Rubber coated steps shall be installed in all manholes and wet wells from the top to 12" from the bottom.

4. TESTING

- a. All new sewer force mains shall be pressure tested at a minimum of 2 times the anticipated working pressure or 200 psi, whichever is greater, for a minimum duration of 6 hours. Pressure charts shall be provided to the sewer department prior to acceptance.
- b. All new sewer force mains shall be leak tested in accordance with AWWA C600 for ductile iron or AWWA C605 for PVC.
- c. All new gravity mains shall be air tested according to UNI-B-6.
- d. All manholes shall be vacuum tested according to ASTM C1244.
- e. All tests shall be delivered to the sewer to the sewer department a minimum of 5 working days prior to requesting approval and shall be accompanied by the as-built survey drawings.
- f. In the event the question of a line or installation the City may request additional testing, i.e. mandrel testing, flashing, TVI, etc.
- g. All lines, manholes, etc. must be flushed and vacuumed prior to testing. All material and water must be discarded. No flushing should be washed into an existing sanitary sewer system.

5. INSPECTION

- a. ALL SEWER MAINS MUST BE VISUALLY INSPECTED BY THE SEWER DEPARTMENT OR ENGINEERING DEPARTMENT PRIOR TO BACKFILLING. ANY MAINS NOT INSPECTED PRIOR TO BACKFILL WILL NOT BE ACCEPTED.
- b. A representative of the sewer department must be present when the cap on all service stub-outs is removed. At submerged stub-outs, the water level in the excavation must be lowered and kept below the elevation of the cap until the cap is removed and the pipe is extended above the water level. Any caps removed without a representative of the sewer department present will result in rejection of the connection.

6. PUMPING STATIONS AND TREATMENT FACILITIES

- a. Wet wells shall be pre-cast or cast in place concrete.
- b. Submersible pumps shall be EBARA or pre-approved equivalent.
- c. Provisions for backup/bypass pumping shall be integrated into all pumping station designs. A 6 inch suction and a 4 inch discharge cam lock style. Caps shall have 1/8 inch diameter hole drilled in each for ventilation.

- d. A 6 inch steel vent with insect screen shall accompany all pumping stations.
- e. A City of Alabaster Standard TVSS shall be supplied with all pumping stations and shall be capable of protecting the control panel, Mission Control unit, plug, and all other electrical components.
- f. Mission control M110 or pre-approved equal shall be installed on all stations under 40 horsepower servicing multiple subdivisions/developments
- g. Mission control M800 or pre-approved equal shall be installed on all stations over 40 horsepower or servicing multiple subdivisions/developments.
- h. All sites shall be a minimum of 40 feet x 40 feet.
- i. All sites shall have a 6 foot black coated metal chain link fencing with black privacy slats with concrete under the fence to 6 inches outside to eliminate weed growth, one entry gate with privacy slats, and a double hung twelve foot gate with privacy slats.
- j. All sites shall be covered with asphalt (6:2:1) or a 6 inch reinforced concrete slab.
- k. All sites shall have a paved access road with a minimum of (6:2:1) or 6 inches of concrete.
- l. The control panel shall meet the sewer department requirements and be stainless steel.
- m. The level controller shall be manufactured by Multitrode or a pre-approved equivalent with the appropriate probe and shall have a float back up system.
- n. All stations having motors 15 horsepowers and over should be equipped with Toshiba soft starters or pre-approved equal with by pass contractors.
- o. A stainless steel junction box will be located above the wet well at a height of between 24 and 36 inches for all connections between the control panel and the wet well wiring.
- p. All wet well piping and valve box piping shall be ductile iron.
- q. All wet well hardware shall be stainless steel.
- r. A 110 Volt plug will be required at all pumping stations sites. Plug may be installed inside the control panel.
- s. Additional Specifications for Pumping Stations and Treatment Facilities will be furnished on a case by case basis and will vary for each particular situation.
- t. All pumping station sites shall have a 30 foot common area fully around the perimeter and should be incorporated into the subdivision design. The common area should be dense planted buffer zone (NO Pines).
- u. If a pumping station, new or upgrade, meets any of the following a trailer mounted or skid mounted backup pump, brand to match existing types, must be supplied with pumping station: Pump must include a quiet pack, battery charger, and block heater.
 - 1. Pumping Station Serves More Than 75 Homes or 80, 000 Gallons Per Day.
 - 2. Pumping Station Serves More than One Development.
 - 3. Pumping Station is within 250 feet of Stream, Creek, or Wetland.
 - 4. Pumping Station is within an area that in the event of an overflow would cause a direct public health hazard.

- v. All pumping stations will have 3 phase power supplied. (VFD or Single Phase Not Allowed)
- w. All wet wells shall have steps from bottom to the top.
- x. All pumping station shall be accompanied by a full set of seals and o-rings, impeller, for each pump, one spare float switch, on spare relay, and two spare pilot lights.
- y. A pre inspection must be performed by the City of Alabaster prior to live power being supplied to the pumping station.
- z. Control Panel should have two sets of laminated schematics for electrical layout.
- aa. Control Panel will have cooling fan and block heater.

7. AS-BUILTS

As-builts must be furnished to the City of Alabaster prior to the final signing of the final plat. The following items must be present on the plat.

- a. Plan View with manhole location, line numbers, manhole numbers, lot numbers, northing and easting (State Plane Coordinates), rim elevation, curbs, roadway, easements and widths. Lateral locations and stations, location elevation, northing, easting of a permanent benchmark on the site, street and road names, etc.
- b. Profile View of lines with manholes numbers, invert elevations, pipe size, pipe type, pipe grade, and lengths, finished grade profile, etc.
- c. Plan View and Profile View must be submitted in paper form with test results for review and comment a minimum of 5 day prior to requesting signature on the plat. After approval from the City a mylar of each plan view and profile view, along with an Auto CAD 2000 layout of the lots with sewer and easements of the overall plan view shall be submitted stamped and sealed by the surveyor who performed that as-built survey.

8. FEES

- a. All fees for individual houses or commercial lots will be collected at the time prior to obtaining a building permit.
- b. Upgrade/New Construction to service a "community station" or a "joint venture" which will involve City and private entities will be collected prior to beginning construction and placed in an escrow account.

9. OTHER

The City of Alabaster reserves the right to modify, change, or amend the above mentioned specifications if it is seen to be in the benefit of the entire sanitary sewer system as a whole.

The City of Alabaster also reserves the right to reject, decline, or turn down any construction, materials, submittals, inspections, test, etc., if found to be out of compliance with the above mentioned regulations or the intent of the above mentioned regulations.

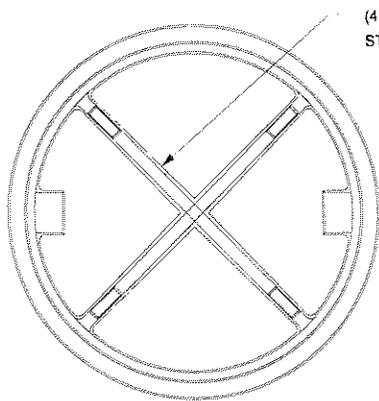
ADOPTED THIS _____ DAY OF _____, 2008, BY THE CITY OF ALABASTER SEWER COMMITTEE / BOARD.

BY: _____
Chairman of the Board / Committee

BY: _____
Environmental Collections Director

Written By:

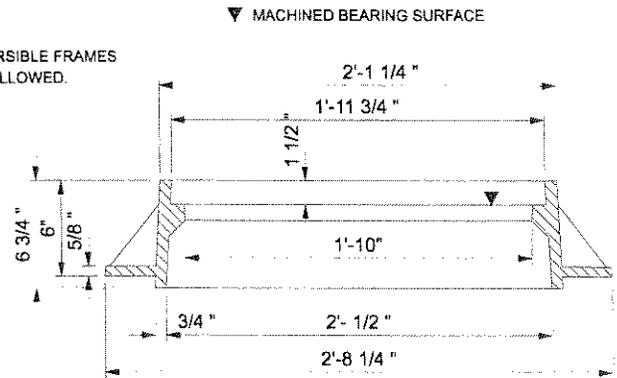




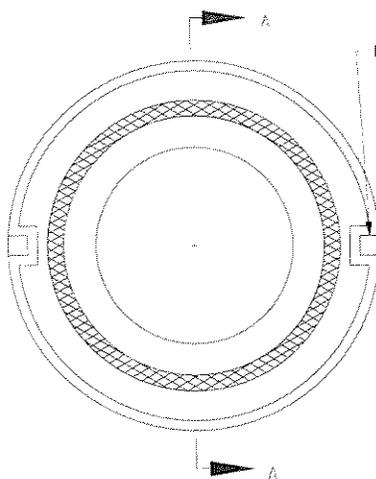
(4) 5/8" X 2"
STACKING LUGS

COVER BACK

NOTE:
NO REVERSIBLE FRAMES
WILL BE ALLOWED.

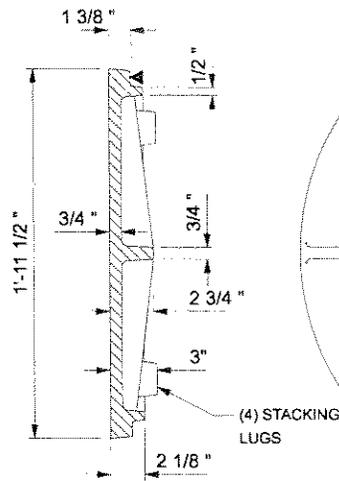


▽ MACHINED BEARING SURFACE

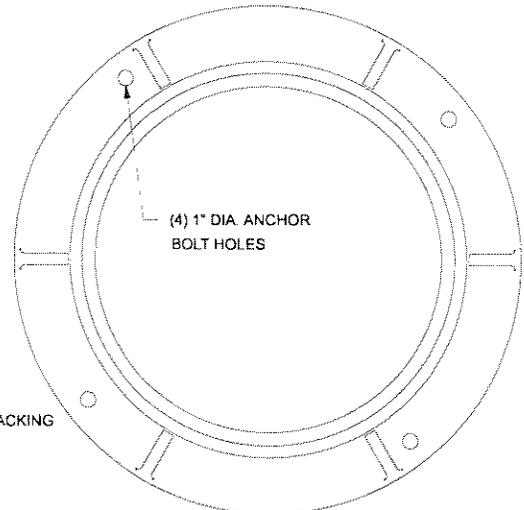


PICKHOLE

COVER TOP



SECTION A-A



(4) 1" DIA ANCHOR
BOLT HOLES

(4) STACKING
LUGS

FRAME

ESTIMATED WEIGHTS

FRAME 174 LBS.

COVER 124 LBS.

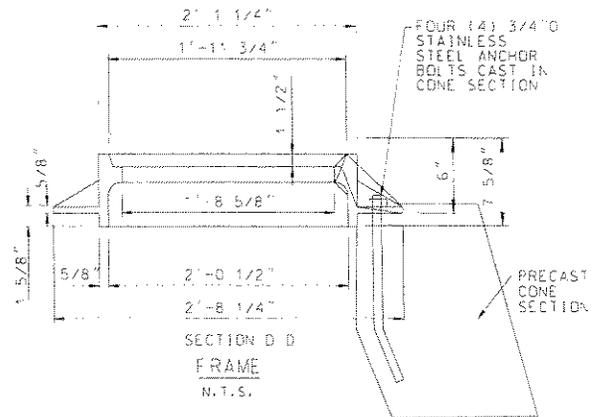
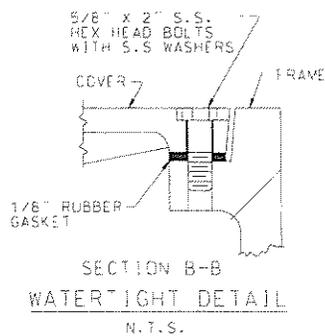
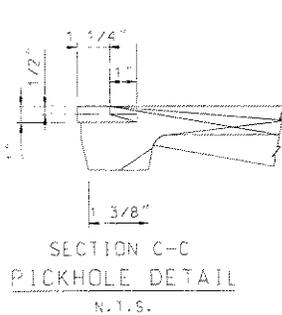
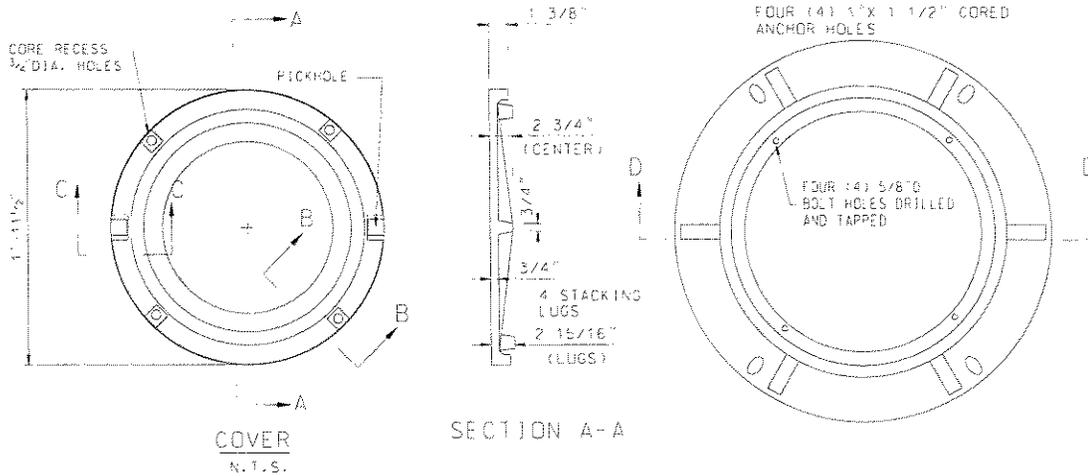
STANDARD: V1480-1 VULCAN OR XXXXX & SONS EQUIVALENT

DETAIL No.

1

STANDARD MANHOLE
FRAME & COVER
SCALE: NONE





ESTIMATED WEIGHTS
FRAME 200 LBS.
COVER 105 LBS.

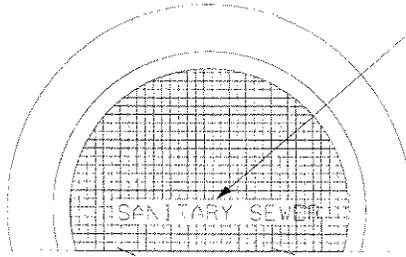
STANDARD: V1480-1 VULCAN OR XXXXX & SONS EQUIVALENT

DETAIL No.

2

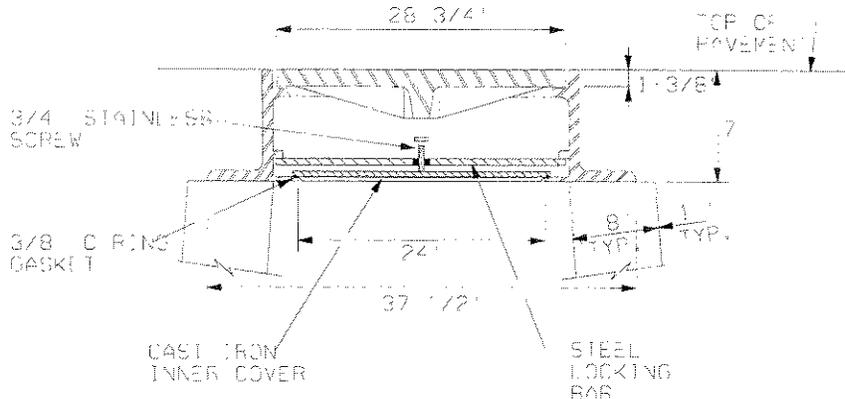
BOLT DOWN MANHOLE
FRAME & COVER
SCALE: NONE

Alabaster



'SANITARY SEWER'
AS SHOWN SHALL
BE CAST IN CENTER
OF COVER.

HALF PLAN



SECTION

NOTES:

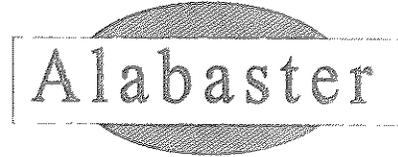
1. USE VOLCAN FOUNDRY INC. #V-2150 3 OR APPROX. EQUAL.
2. APPROXIMATE WEIGHT OF FRAME AND COVER 575 LBS.

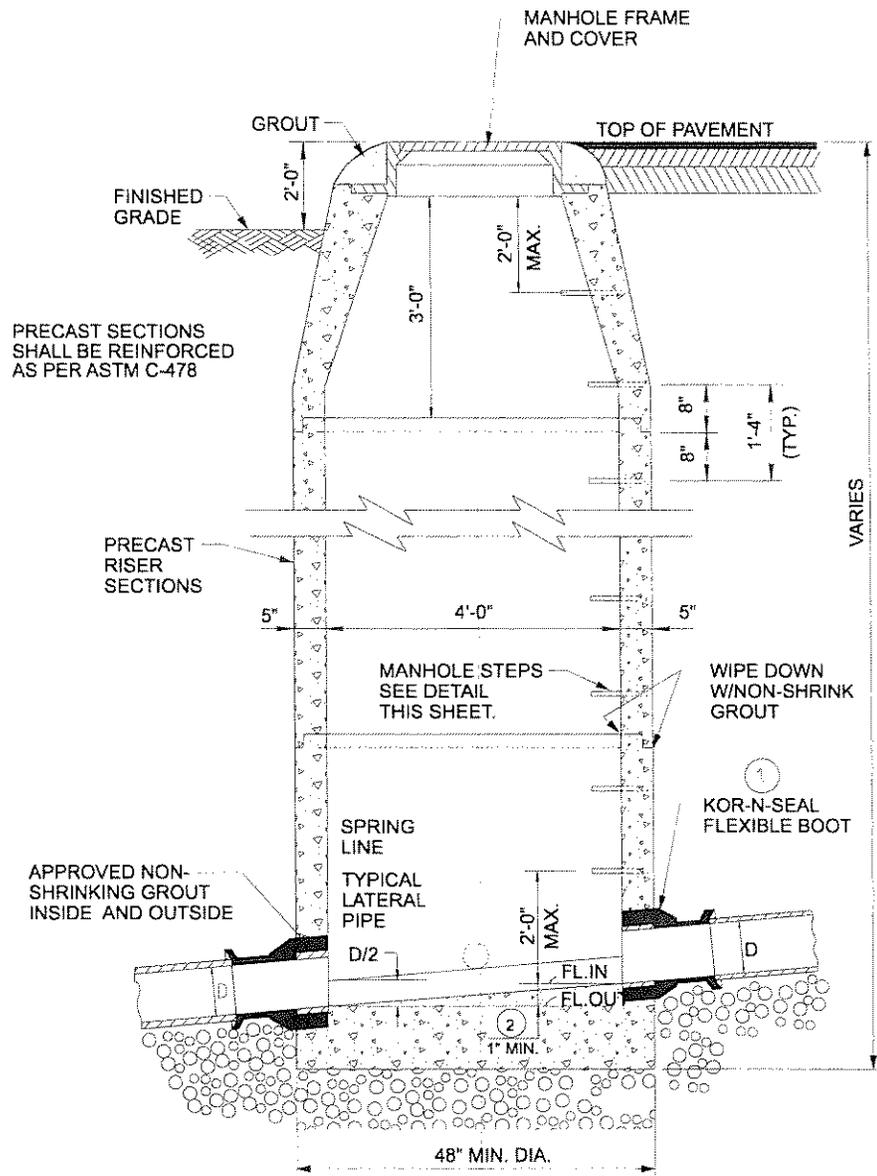
DETAIL No.

3

**WATERTIGHT MANHOLE
FRAME AND COVER**

SCALE: NONE





NOTES:

1. ALL MANHOLES WITH PIPE ENTERING WITH DIAMETER OF 18" D.I.P. OR LESS SHALL BE SUPPLIED WITH KOR-N-SEAL FLEXIBLE BOOTS OF APPROVED EQUAL.
2. WHERE THE DIFFERENCE IN THE INVERT ELEVATION IS >6" A STANDARD LENGTH OF DUCTILE IRON PIPE SHALL BE INSTALLED TO BRIDGE THE FILL AREA BETWEEN THE MANHOLE AND THE UNDISTURBED PIPE TRENCH.

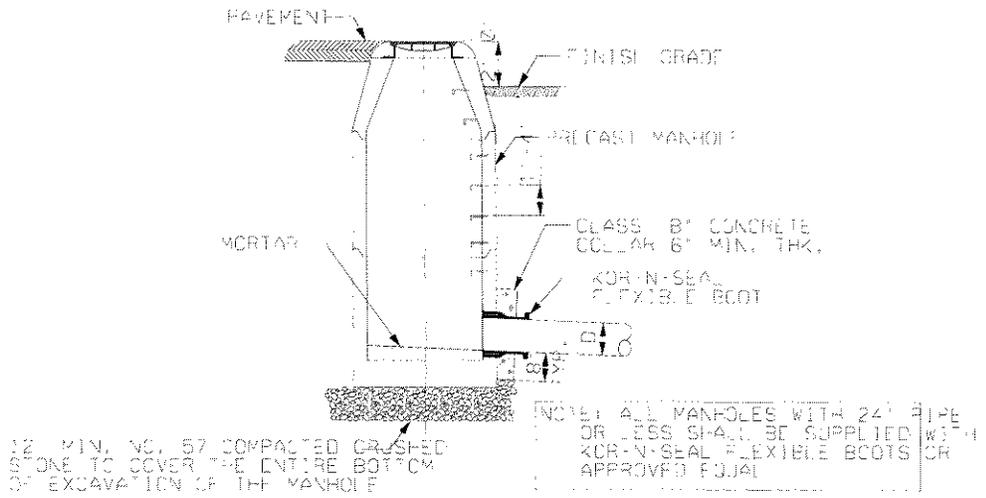
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4

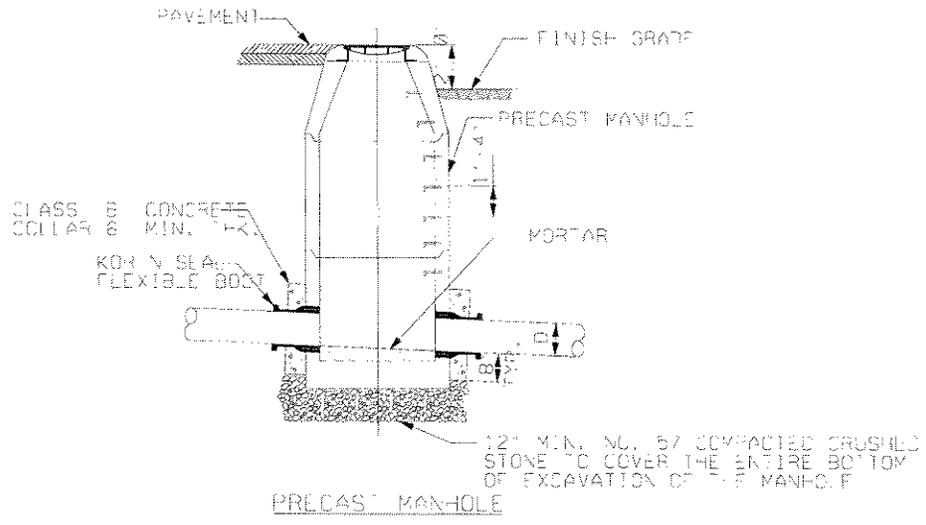
STANDARD PRECAST MANHOLE

SCALE: NONE





PRECAST TERMINAL MANHOLE



PRECAST MANHOLE

NOT TO SCALE

NOTE: WIDE DOWN INNER AND OUTER JOINTS W/ NON SHRINK GROUT

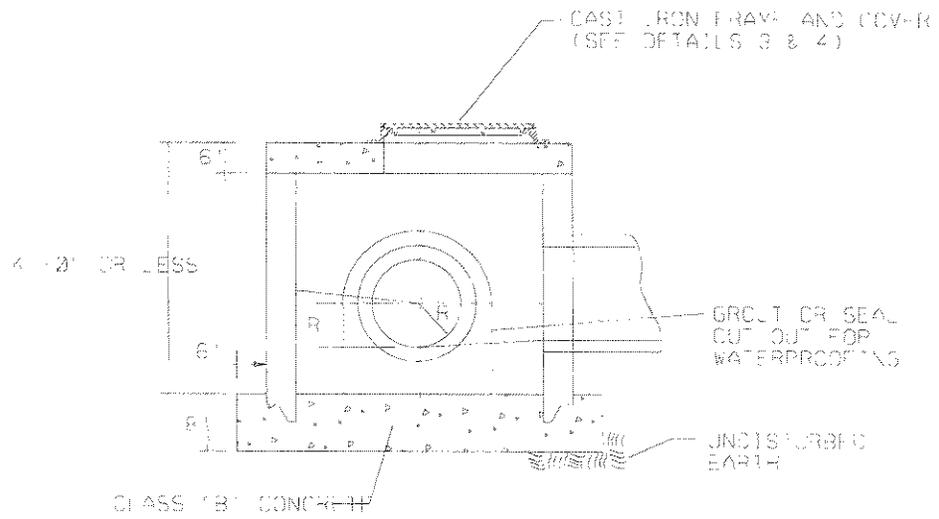
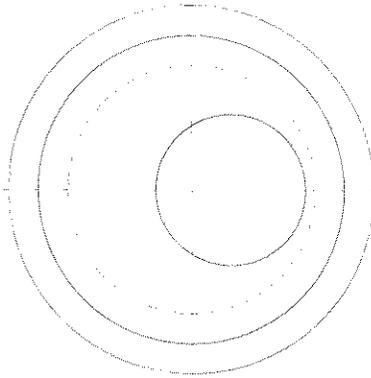
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5

STANDARD PRECAST MANHOLE

SCALE: NONE

Alabaster



NOTES:

1. GASKET TO DRAIN WITH CONCRETE OR SOLID MORTAR

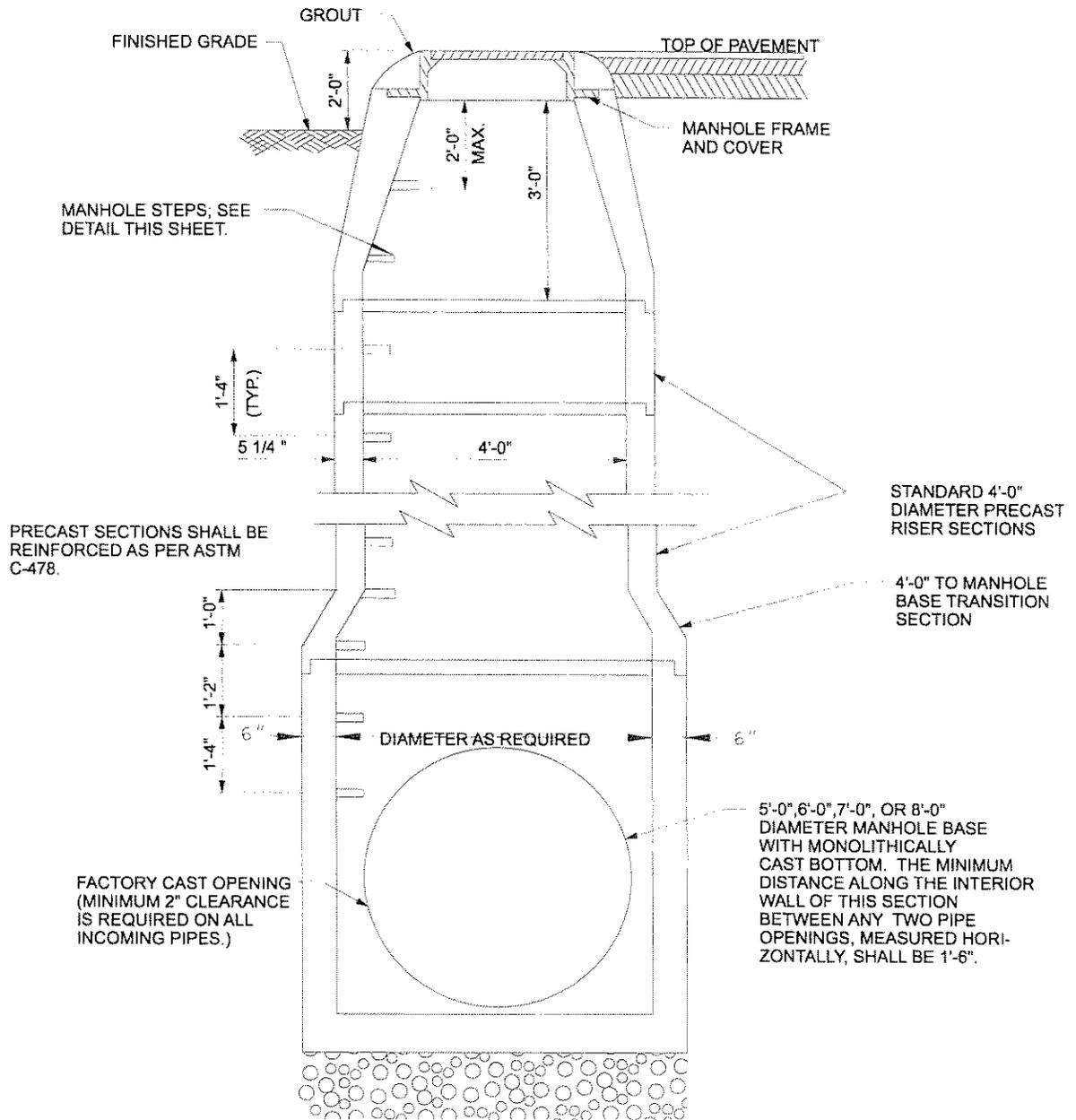
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6

SHALLOW BOTTOM MANHOLE

SCALE: NONE





SECTION

NOTES:

1. BASE SECTION SHALL BE SET ON FOUNDATION OF NO.57 COMPACTED STONE AGGREGATE A MINIMUM OF 12" THICKNESS AND COVERING THE ENTIRE BOTTOM OF THE EXCAVATION FOR THE MANHOLE.
2. WIPE DOWN INNER AND OUTER JOINTS W/NON-SHRINK GROUT

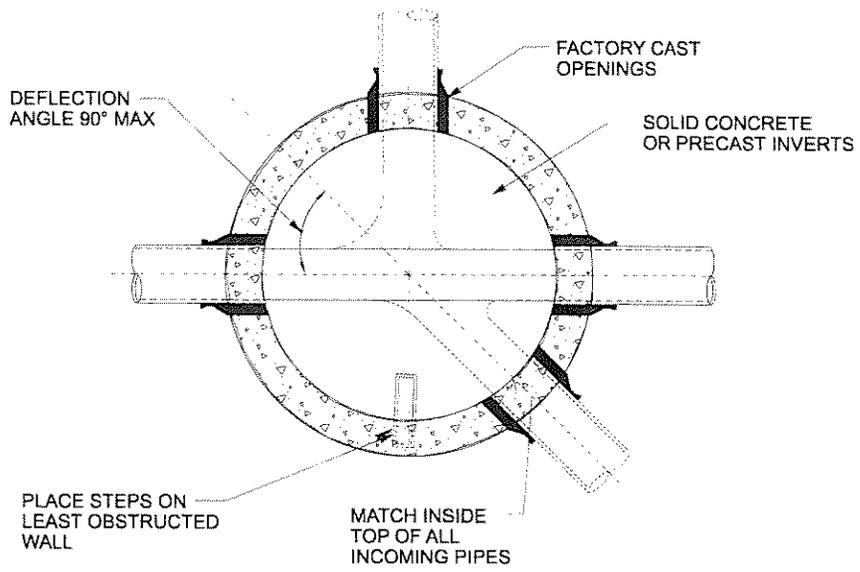
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7

PRECAST MANHOLE FOR
PIPES 21" TO 42" DIAMETER

SCALE: NONE

Alabaster

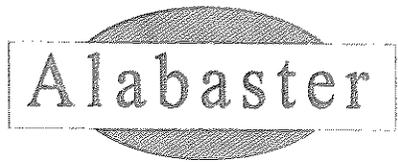


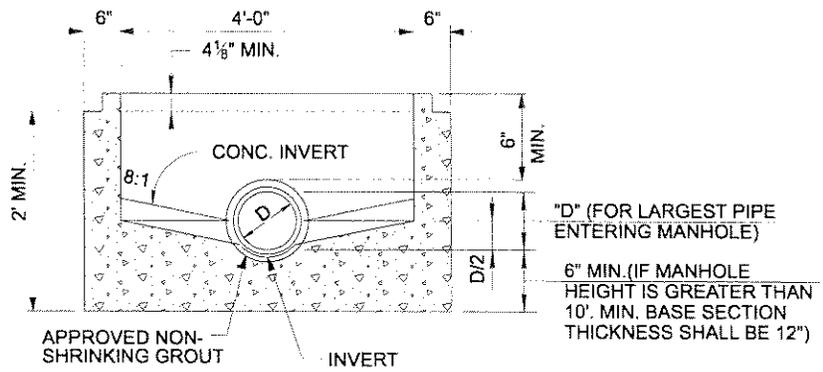
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8

MANHOLE INVERT PLAN

SCALE: NONE





BASE SECTION SHALL BE SET ON FOUNDATION OF NO. 57 COMPACTED STONE AGGREGATE A MINIMUM OF 12" THICKNESS AND COVERING THE ENTIRE BOTTOM OF THE EXCAVATION FOR THE MANHOLE.

DETAIL No.

9

MANHOLE INVERT SECTION

SCALE: NONE

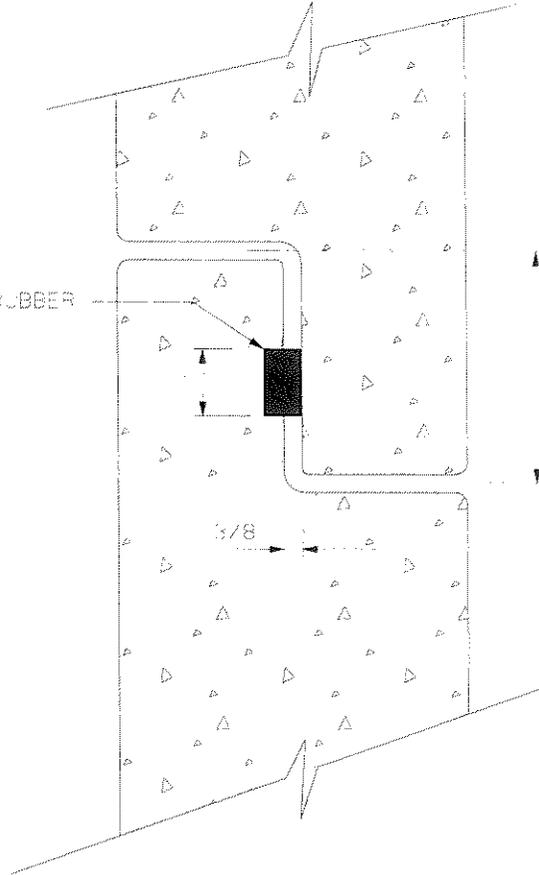
Alabaster

S043
22 10 95

BUTYL RUBBER
GASKET

4 1/4"

3/8"

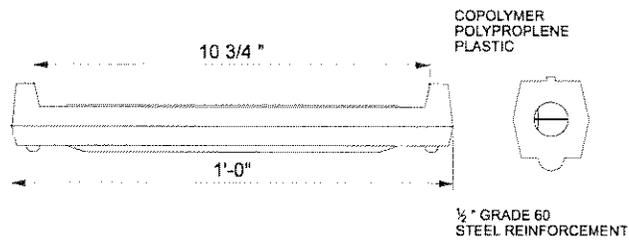
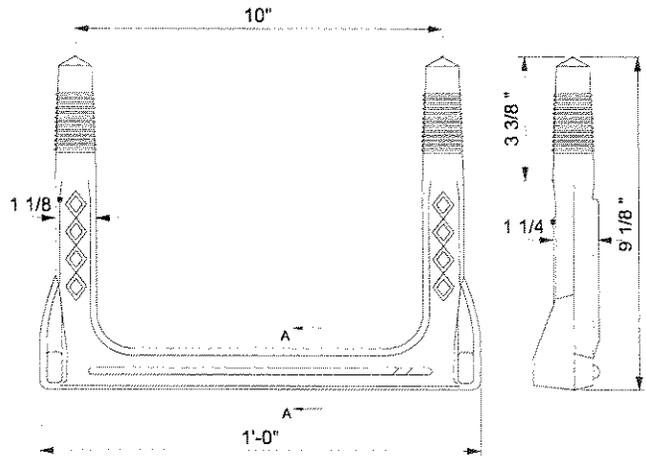
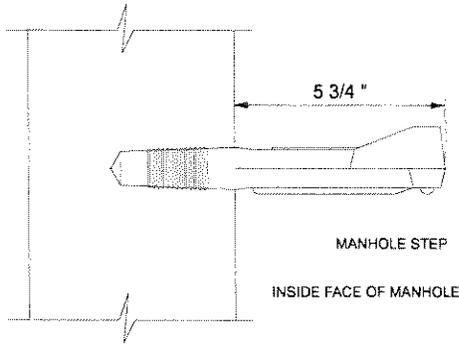


DETAIL No.

10

GASKET FOR PRECAST
MANHOLE SECTIONS
SCALE: NONE

Alabaster



SECTION A

NOTES:

1. MANHOLE AND INLET STEPS SHALL BE PLASTIC COATED REINFORCED STEEL. PLASTIC COATED MANHOLE STEPS SHALL BE POLYPROPYLENE COATED STEEL REINFORCING RODS WITH ROD AND PULL OUT RATINGS MEETING OSHA STANDARDS.
2. FOR LARGER DIAMETER MANHOLES (DEEPER THAN 22') A CAGED ALUMINUM LADDER SHALL BE USED.
3. MANHOLE AND INLET STEPS SHALL BE INSTALLED AT MAXIMUM 16" INTERVALS.

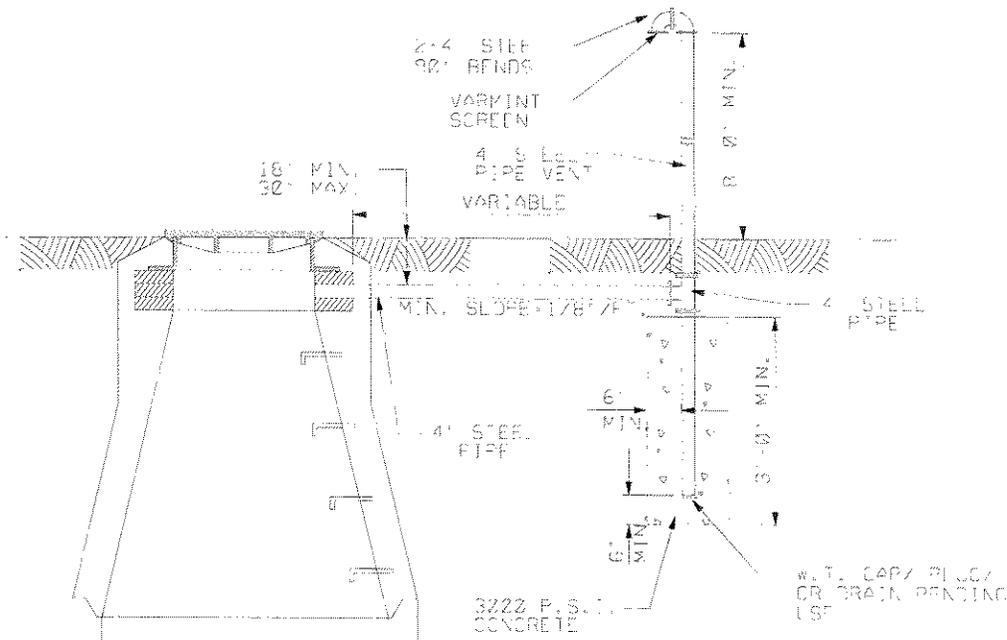
DETAIL No.

11

MANHOLE STEPS

SCALE: NONE

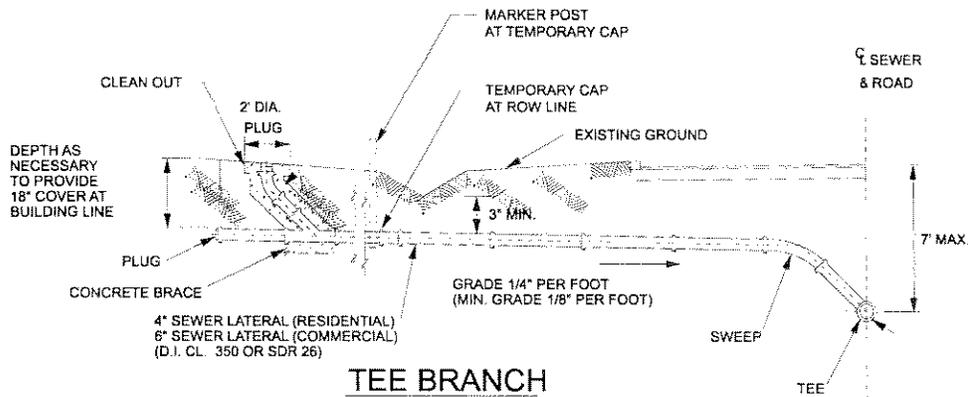
Alabaster



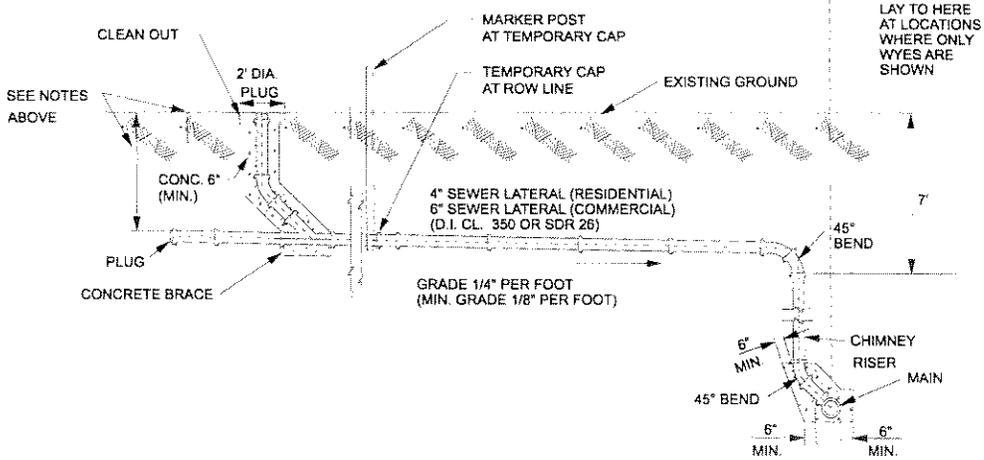
- NOTES
- 1. PIPE TO BE PAINTED WITH ONE COAT OF RED LEAD PRIMER AND TWO COATS OF DARK GREEN ENAMEL.
 - 2. TOP OF VENT TO BE MINIMUM OF 8' 0" ABOVE GRADE OR HIGHER IF ELEVATION IS SHOWN ON PLANS.

NOTE:
 1. TO BE USED ON CAP SEWER, HIGH PRESSURE OR FLOW SEWERS.

DETAIL No.	12	MANHOLE VENT SCALE: NONE	
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TEE BRANCH



DETAIL No.

13

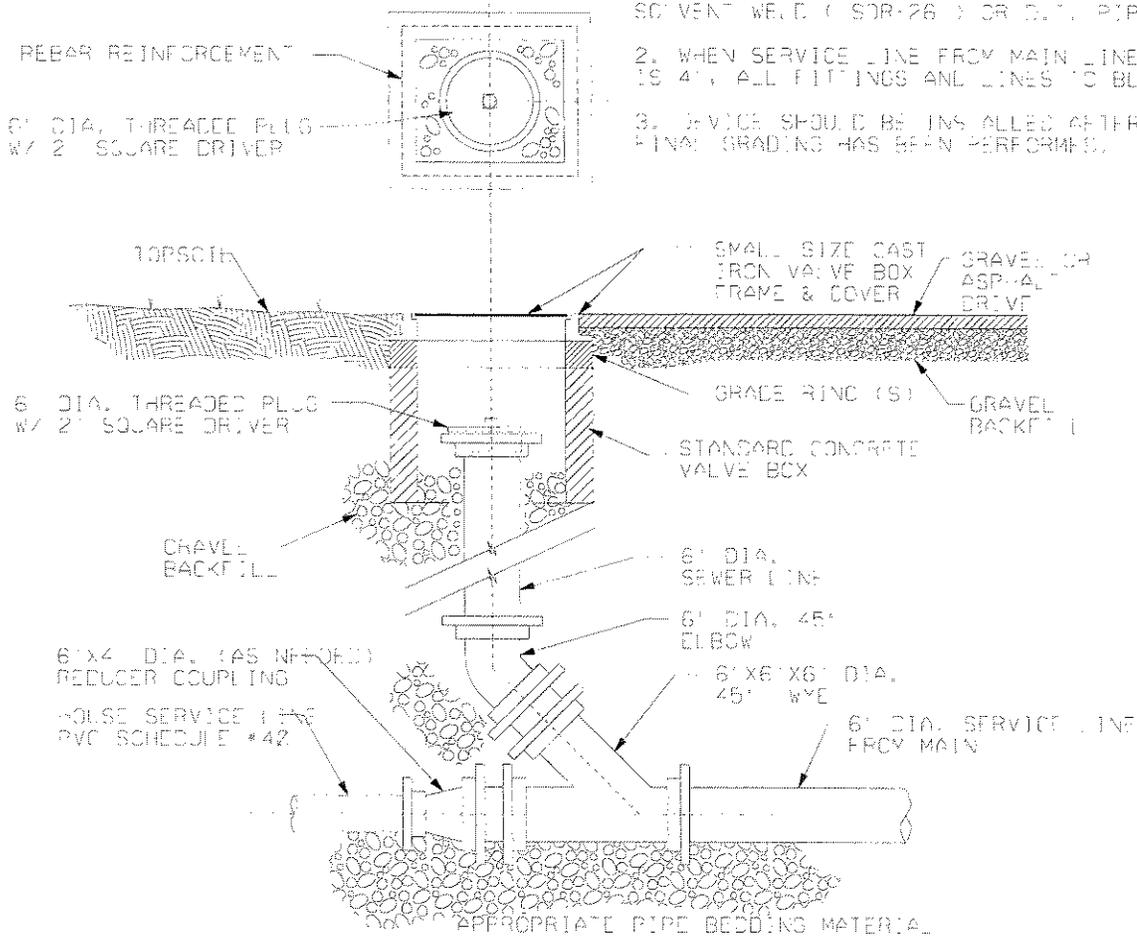
SANITARY SEWER LATERAL

SCALE: NONE

Alabaster

NOTES:

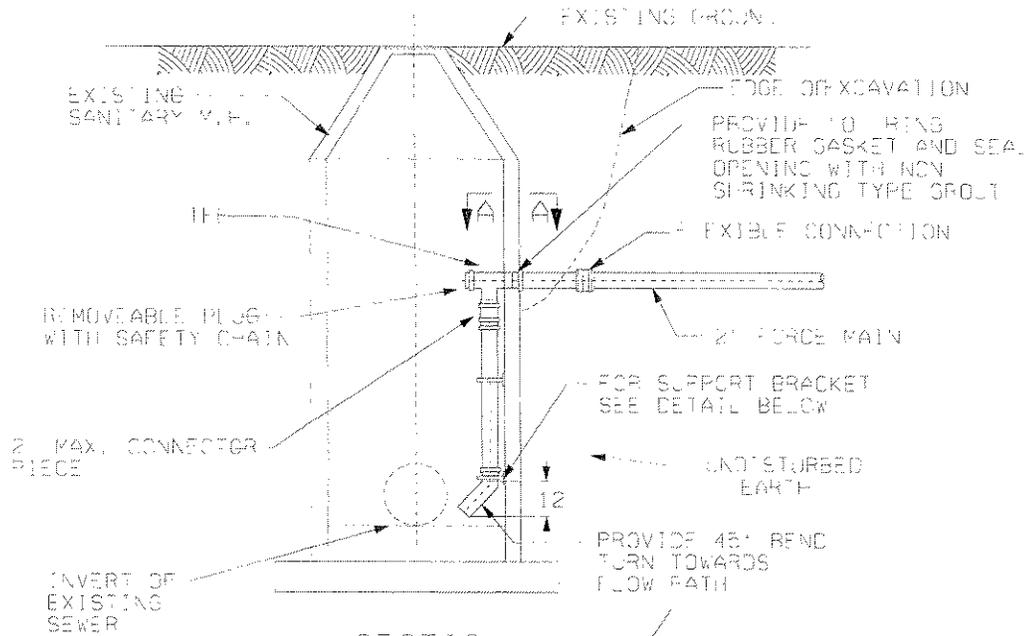
1. ALL FITTINGS AND LINES TO BE R.V.C. SOLVENT WELD (SDR-26) OR D.I. PIPE.
2. WHEN SERVICE LINE FROM MAIN LINE IS 4', ALL FITTINGS AND LINES TO BE 4'.
3. DEVICE SHOULD BE INSTALLED AFTER FINAL GRADING HAS BEEN PERFORMED.



DETAIL No.
14

**SANITARY SEWER
CLEANOUT**
SCALE: NONE





3/16\"/>

WITH 1/2\"/>

EXPANSION ANCHORS. STRAPS TOP AND BOTTOM 2 MIN., 6\"/>

MAX. SPACING.

1-1/2\"/>

X 3/8\"/>

DIA. STAINLESS STEEL BOLT AND NUT

4\"/>

X 4\"/>

X 6\"/>

HARDWOOD BLOCKING CUT TO CONTOUR AT M.F. AND PIPE FOR FULL CLEARANCE

SECTION A-A

SIZE MAY VARY ON FORCE MAIN PIPING

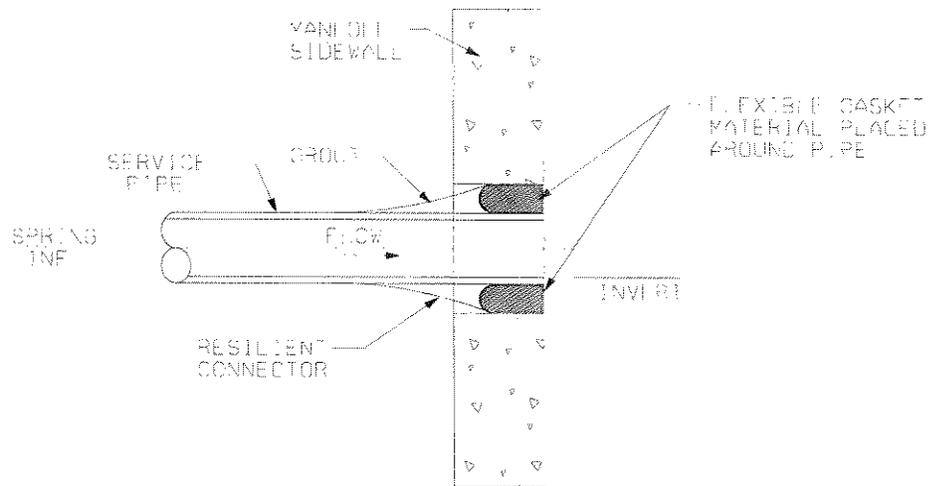
DETAIL No.

15

FORCE MAIN/LATERAL CONNECTION

SCALE: NONE

Alabaster



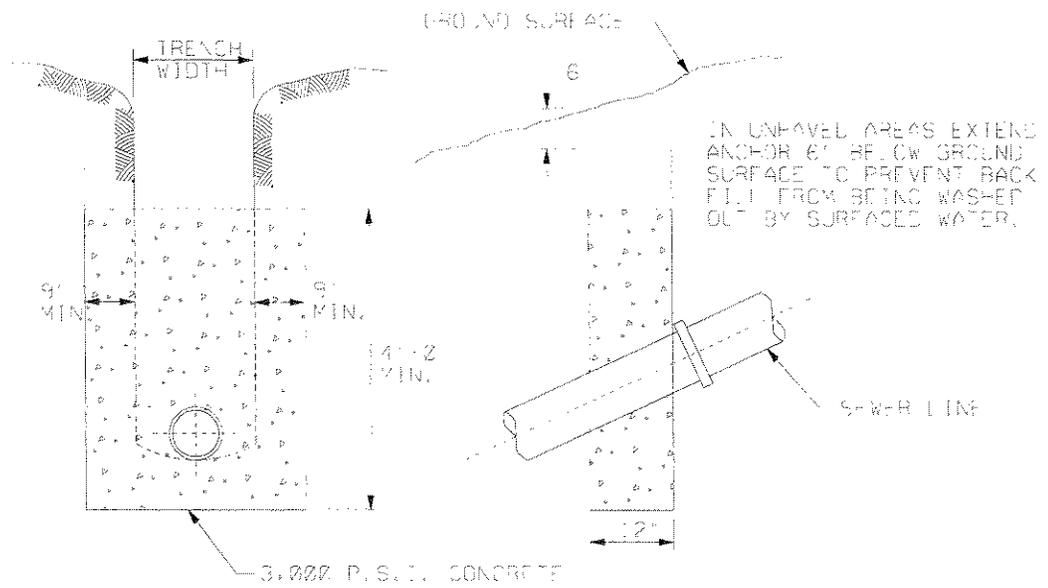
DETAIL No.

16

SERVICE PIPE TO MANHOLE
CONNECTION

SCALE: NONE

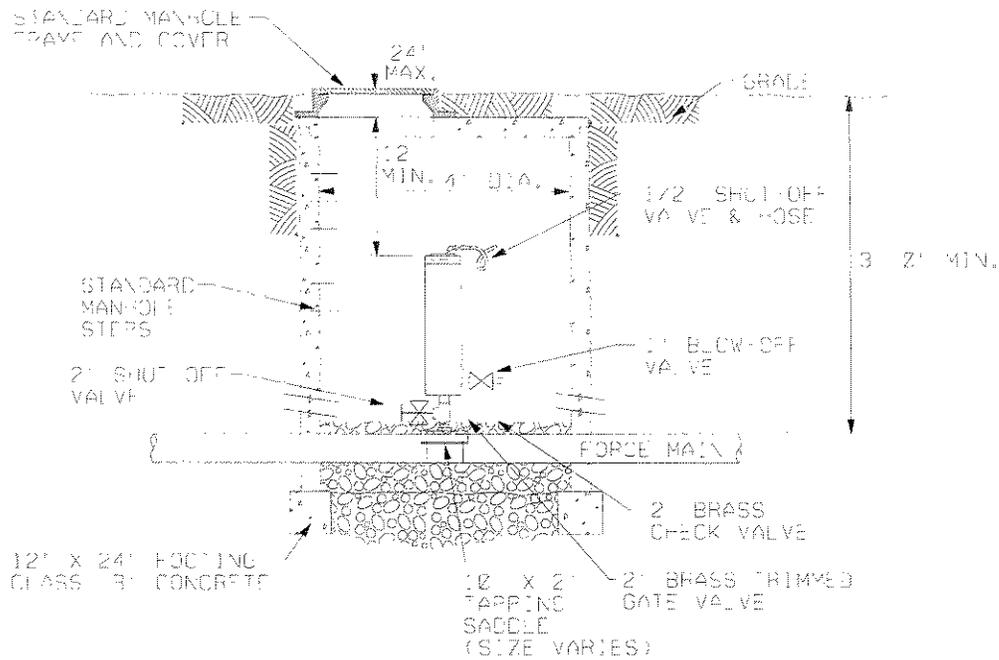
Alabaster



NOTES:

1. PROVIDE NO ANCHOR ON GRADES LESS THAN 12% UNLESS NOTED.
2. PROVIDE ANCHOR 50' CENTER TO CENTER ON GRADES BETWEEN 12% AND 32%.
3. PROVIDE ANCHOR 25' CENTER TO CENTER ON GRADES BETWEEN 32% AND 52%.
4. CONTRACTOR MAY SUBMIT ALTERNATE DESIGN UTILIZING ROCK BOLTS TO KEY ANCHOR TO ROCK TRENCH.
5. FOR CONDITIONS OTHER THAN SHOWN HEREON, ANCHORS SHALL BE PROVIDED AS REQUIRED BY THE CONTRACT PLANS OR ORDERED BY THE ENGINEER.

DETAIL No. <h1 style="margin: 0;">17</h1>	<h2 style="margin: 0;">CONCRETE RESTRAINT COLLAR</h2> <p style="margin: 0;">SCALE: NONE</p>	
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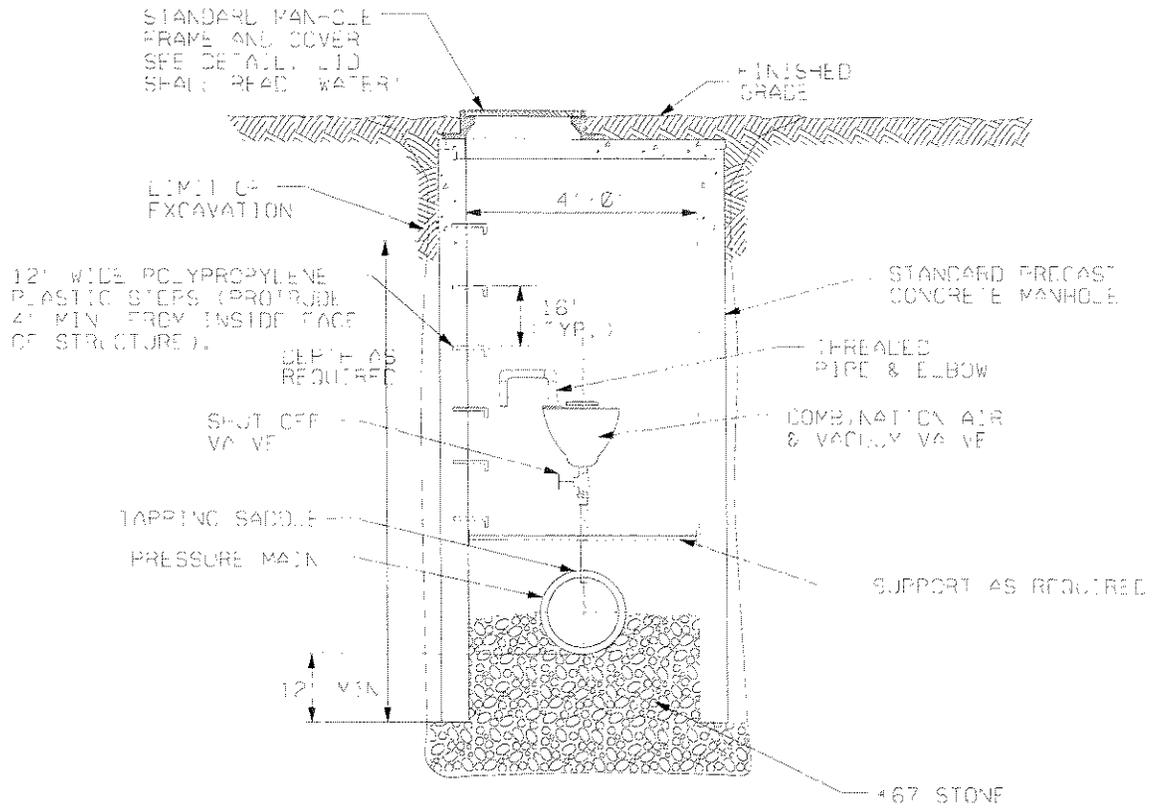
NOTE:
 SEWAGE AIR AND VACUUM VALVES SHALL ALLOW UNRESTRICTED VENTING OR RE-ENTRY OF AIR THROUGH IT, DURING FILLING OR DRAINING OF THE FORCE MAIN, TO PREVENT VACUUM. THE SEWAGE AIR AND VACUUM VALVE SHALL INCORPORATE (2) STAINLESS STEEL FLOATS DIRECTLY CONNECTED BY A STAINLESS STEEL FLOAT GUIDE, TO MAINTAIN AN AIR GAP BETWEEN THE BOTTOM FLOAT AND TOP SHUT-OFF FLOAT. THE AIR GAP SHALL RETARD WASTE SOLIDS FROM FOULING OR CLOGGING THE TOP SHUT-OFF FLOAT. THE INTERNAL Baffle SHALL BE FITTED WITH A GUIDE BUSHING AND ACTION PROTECT THE SHUTOFF FLOAT FROM DIRECT AIR FLOW. THE Baffle SHALL RETAIN THE 45° DUROMETER BUNA N SEAT IN PLACE, WITHOUT DISTORTION, FOR TIGHT SHUT-OFF. VALVE SHALL BE APCO SERIES 420 AS MANUFACTURED BY VALVE AND PRIMER CORPORATION, OR APPROVED EQUAL. ALL INTERNALS SHALL BE EASILY REMOVED THROUGH THE TOP COVER WITHOUT REMOVING THE MAIN VALVE FROM THE LINES. THE COMPLETE VALVE SHALL WITHSTAND 300 P.S.I. TEST. INLET AND BLOW OFF VALVES, QUICK DISCONNECT COUPLINGS AND MINIMUM 5' HOSE FOR FLUSHING. SEE SEWER DEPARTMENT FOR CURRENT MODELS.

DETAIL No.

18

AIR RELEASE VALVE
 SANITARY FORCE - MAIN
 SCALE: NONE

Alabaster



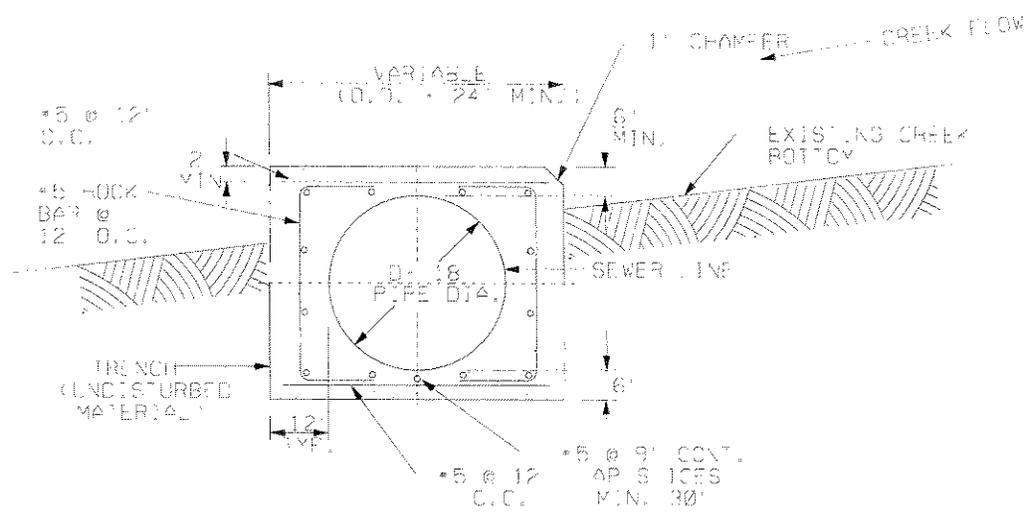
NOTE:
VALVE IS TO BE SIZED FOR CONDITIONS. SEE SEWER DEPARTMENT FOR CURRENT MODELS.

DETAIL No.

19

COMBINATION AIR AND
VACUUM VALVE ASSEMBLY
SCALE: NONE

Alabaster



NOTE:
 3000 P.S.I. CONCRETE TO BE
 POLURED 16 HOURS BEFORE
 BACKFILL IS PLACED AND IN
 SUCH A MANNER AS TO PRE-
 VENT PIPE FROM FLOATING.

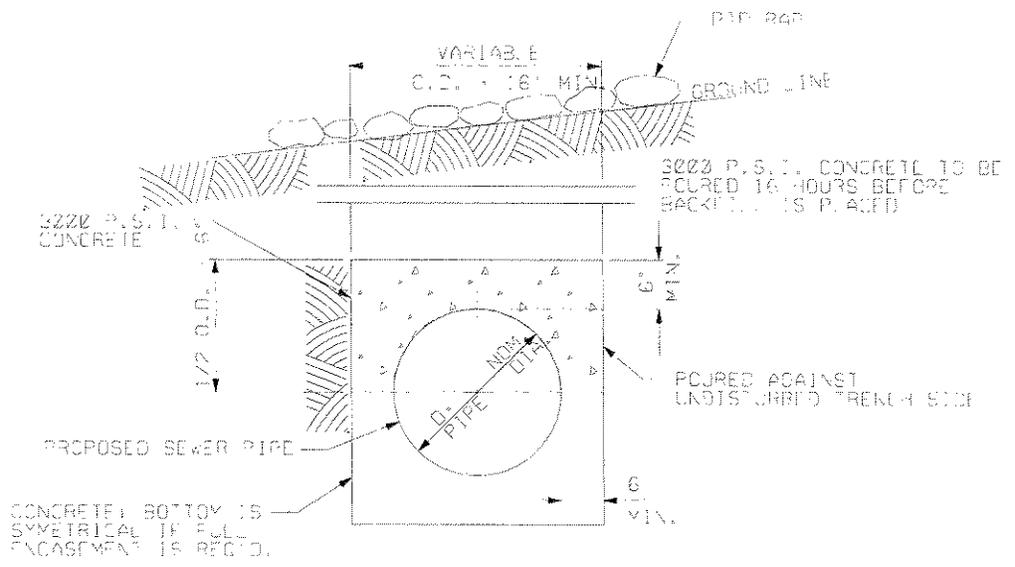
DETAIL No.

20

CONCRETE ENCASMENT
 FOR CREEK CROSSING

SCALE: NONE

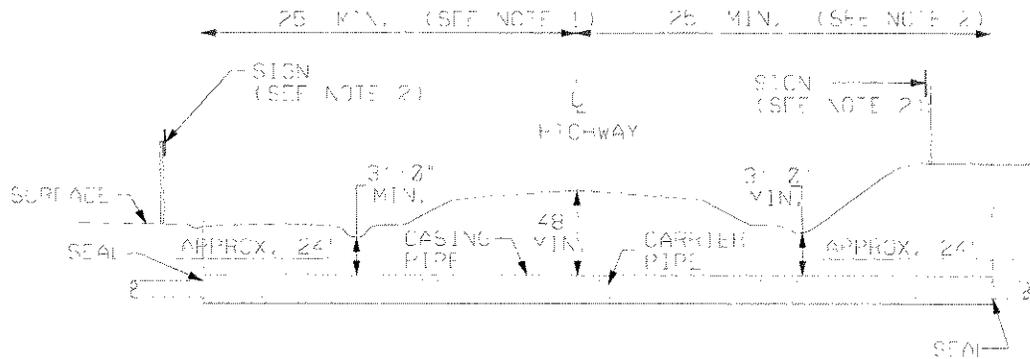
Alabaster



DETAIL No.
21

**CONCRETE PIPE PROTECTION
FOR SANITARY SEWER**
SCALE: NONE





SEWER LINES

NOTES:

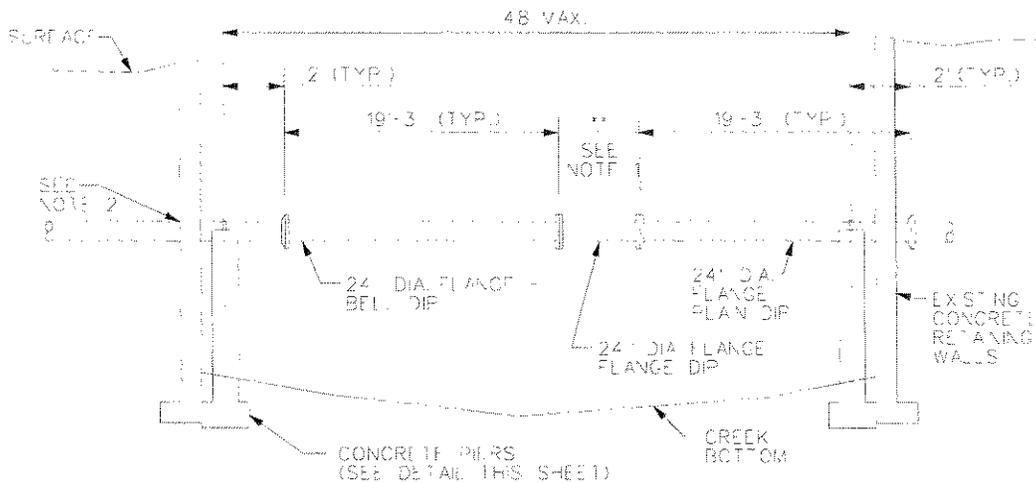
1. CASING SHALL EXTEND TO THE GREATER OF THE FOLLOWING DISTANCES:
 - A. 2' BEYOND TOE OF SLOPE
 - B. 3' BEYOND DITCH LINE
 - C. MIN. OF 25' WHEN CASING IS SEALED AT BOTH ENDS.
2. SIGN TO INDICATE LOCATION OF PIPE LINE AT R.O.W. LINE, KIND OWNERSHIP, AND DEPTH OF PIPE LINE.
3. THE INSIDE DIAMETER OF THE CASING PIPE SHALL BE AT LEAST TWO INCHES GREATER THAN LARGEST DIAMETER OF CARRIER PIPE, JOINTS OR COUPLINGS FOR CARRIER PIPES LESS THAN 6" IN DIAMETER AND AT LEAST 4" GREATER FOR CARRIER PIPES 6" AND OVER IN DIAMETER.
4. SEWER LINE MUST BE BLOCKED INSIDE CASING PIPE TO MAINTAIN ALIGNMENT. BACKFILL CASING WITH SAND TO TOP OF CARRIER PIPE.

DETAIL No.

22

**HIGHWAY CROSSING
SANITARY SEWER**
SCALE: NONE

Alabaster



NOTES:

- 1 ** DENOTES THIS DIMENSION TO BE FIELD DETERMINED
- 2 SAW CUT MAX. 42" DIA. OPENING IN EXISTING RETAINING WALL AND SEAL GROUT OPENING AFTER PIPE INSTALLATION
- 3 ADDITIONAL REQUIREMENTS MAY BE SPECIFIED

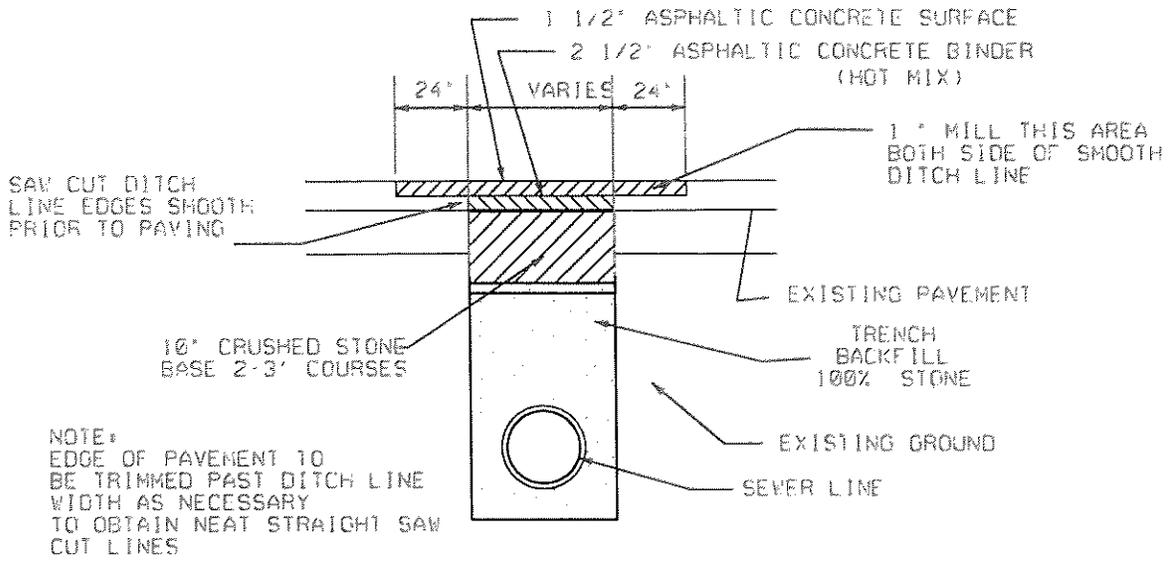
DETAIL No.

23

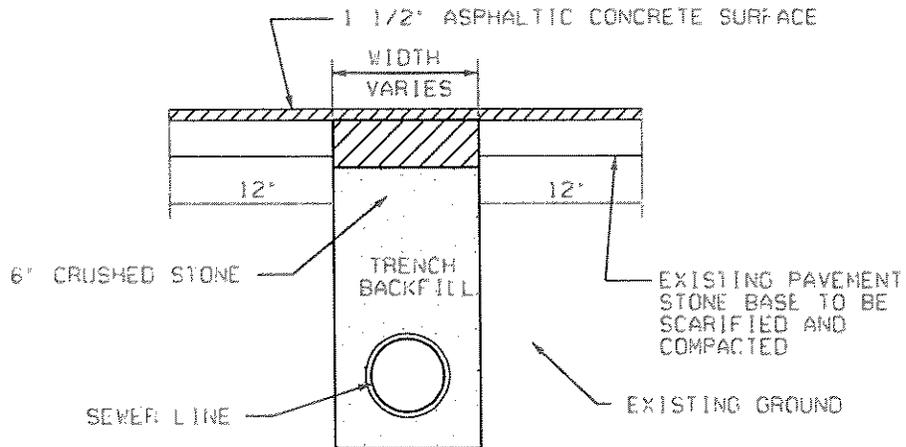
**LONG SPAN PIPING
FOR CREEK CROSSING**

SCALE: NONE

Alabaster



TYPICAL SECTION STANDARD ASPHALT SURFACE REPAIR



TYPICAL SECTION DOUBLE SURFACE TREATMENT

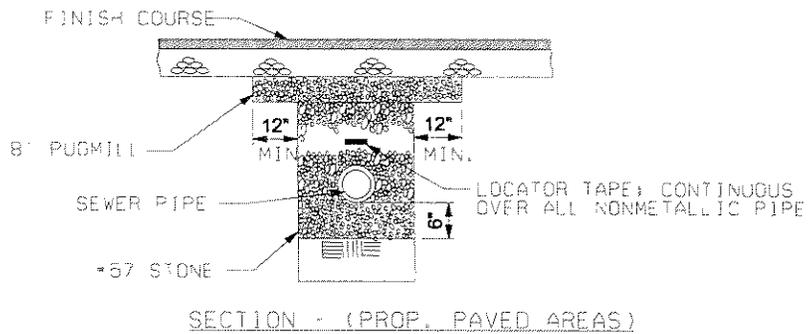
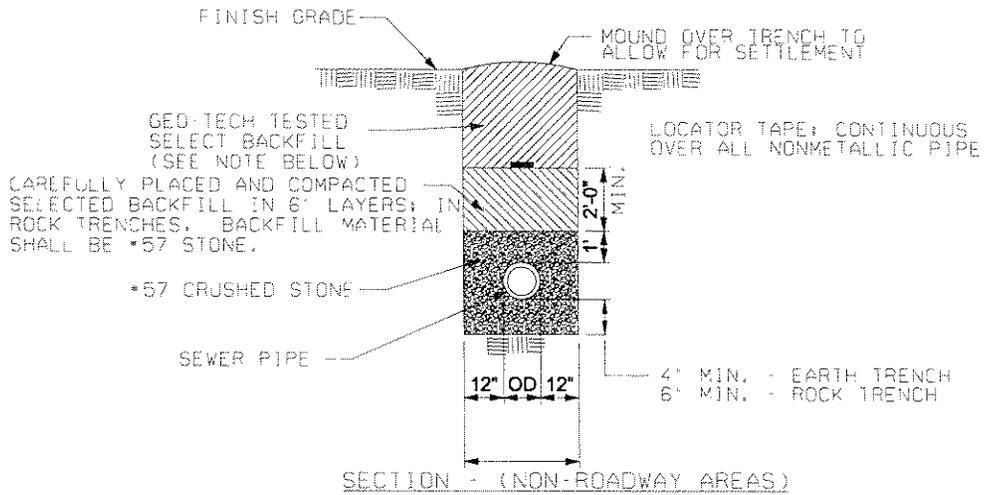
DETAIL No.

24

TYPICAL PAVEMENT REPLACEMENT

SCALE: NONE

Alabaster



NOTE: ONLY ACCEPTABLE GRANULAR MATERIAL WITH A ZERO P.I. WILL BE CONSIDERED FOR SELECTED BACKFILL. BACKFILL MUST BE COMPACTED TO 98% STD. PROCTOR DENSITY. COMPACTION SHALL BE TESTED BY THE CONTRACTOR AND THE RESULT OF SAID TEST SHALL BE SUBMITTED TO THE ENGINEER.

DETAIL No.

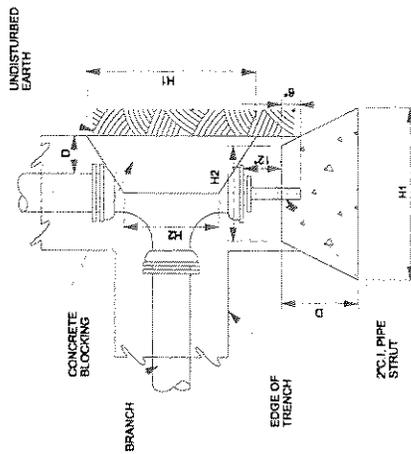
25

TRENCH & BACKFILL
FOR 8" - 18" DIA.
SCALE: NONE

Alabaster

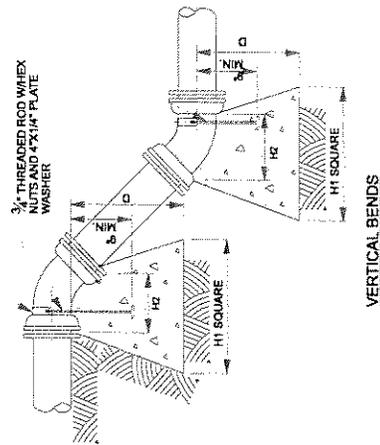
DETAIL No.
26

PIPE BRACING
SCALE: NONE

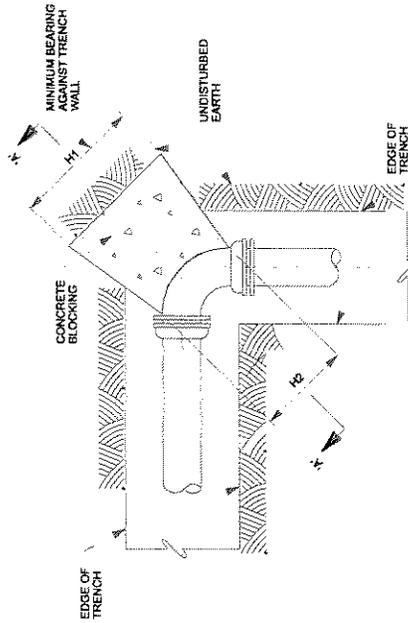


TEES, CROSSES AND PLUGS

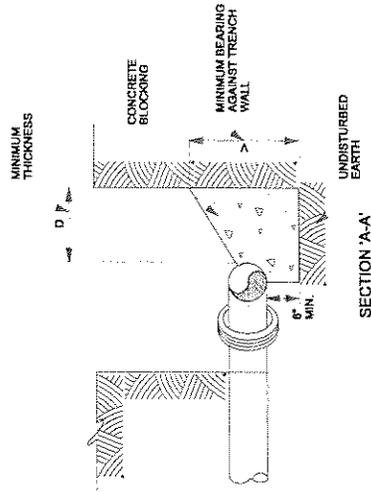
2"x1/4" GALVANIZED STEEL STRUT



VERTICAL BENDS



HORIZONTAL BENDS



SECTION 'A-A'

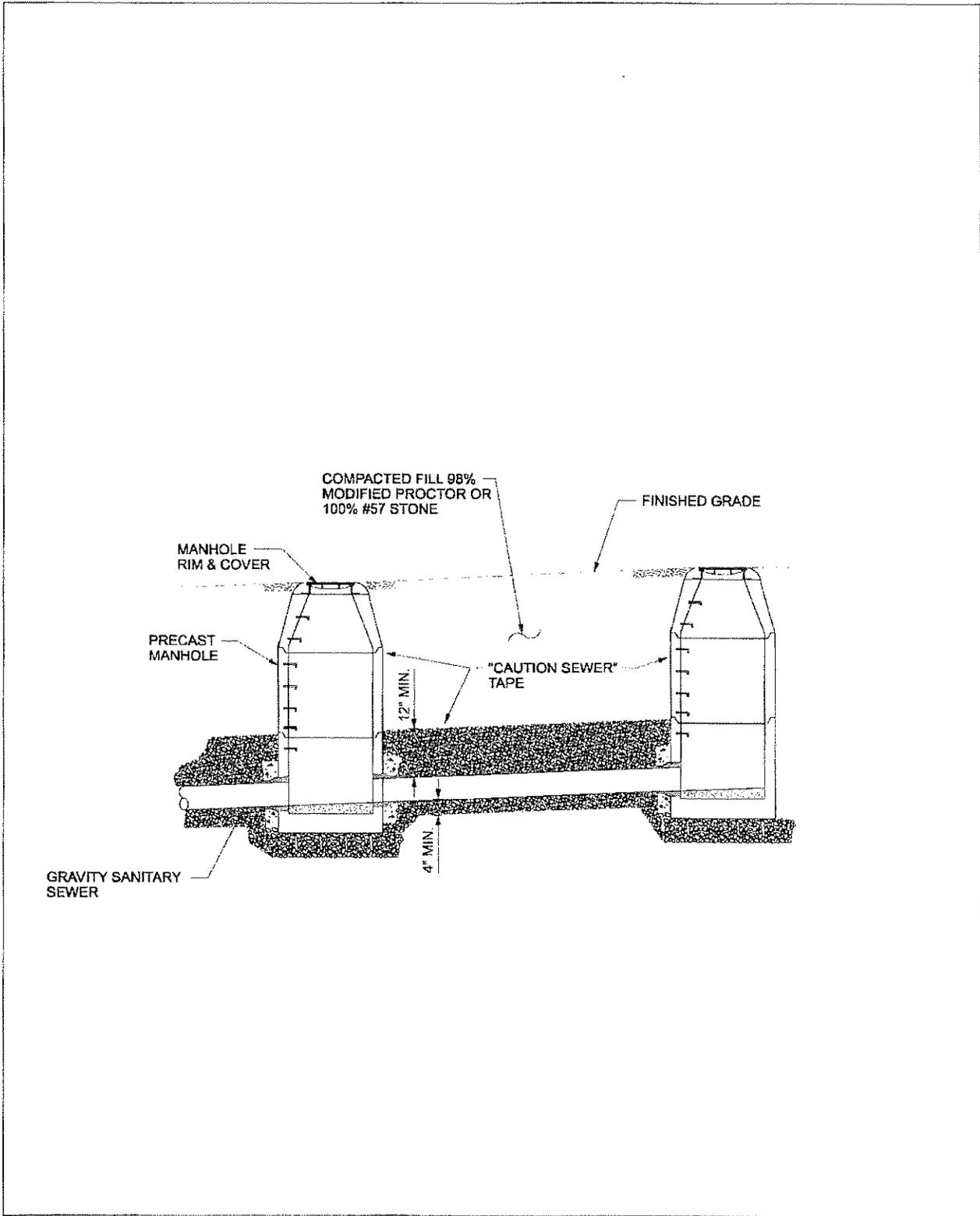
NOTE: DIMENSIONS ARE CONTROLLED BY DIAMETER OF BRANCH/MAIN

TABLE OF DIMENSIONS FOR CONCRETE BLOCKERS

TEES, CROSSES & PLUGS				90° BENDS				45° BENDS				22-1/2° BENDS				11-1/2° BENDS				PIPE SIZE		
H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	D	C.F.	
18"	10"	12"	18"	1.90	18"	10"	12"	18"	1.90	18"	6"	12"	18"	1.50	18"	6"	12"	18"	1.50	12"	18"	1.50
24"	12"	12"	18"	2.25	24"	12"	12"	18"	2.25	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	12"	18"	1.60
24"	16"	18"	18"	3.50	30"	16"	18"	18"	4.05	24"	10"	16"	18"	3.20	24"	10"	16"	18"	3.20	16"	18"	3.20
36"	18"	18"	18"	5.05	36"	18"	18"	18"	7.30	30"	11"	18"	18"	3.95	24"	11"	16"	18"	3.95	16"	18"	3.40
48"	24"	18"	24"	7.15	54"	32"	24"	18"	10.25	24"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	18"	18"	4.60
54"	30"	24"	24"	13.4	54"	32"	36"	24"	18.15	42"	18"	24"	24"	8.60	24"	18"	24"	24"	6.60	24"	24"	6.10
60"	32"	30"	24"	17.9	60"	40"	42"	24"	25.00	44"	24"	30"	24"	13.2	30"	24"	24"	24"	9.20	24"	24"	7.80
66"	34"	36"	24"	22.5	69"	48"	48"	24"	29.00	48"	30"	36"	24"	17.0	36"	30"	27"	24"	11.80	27"	24"	9.10
66"	36"	40"	24"	27.5	69"	48"	48"	24"	33.00	48"	30"	36"	24"	17.0	36"	30"	28"	24"	13.0	27"	30"	11.0
38"	24"	24"	24"	48"	48"	48"	48"	24"	24"	48"	48"	48"	24"	24"	30"	40"	28"	24"	24"	30"	28"	20"
42"	24"	24"	24"	60"	60"	60"	24"	24"	24"	48"	48"	48"	24"	24"	42"	42"	42"	24"	24"	42"	32"	24"
58"	24"	24"	24"	96"	96"	96"	24"	24"	24"	72"	72"	72"	24"	24"	72"	72"	72"	24"	24"	48"	48"	30"

DETAIL - PIPE BRACING
SCALE: NONE

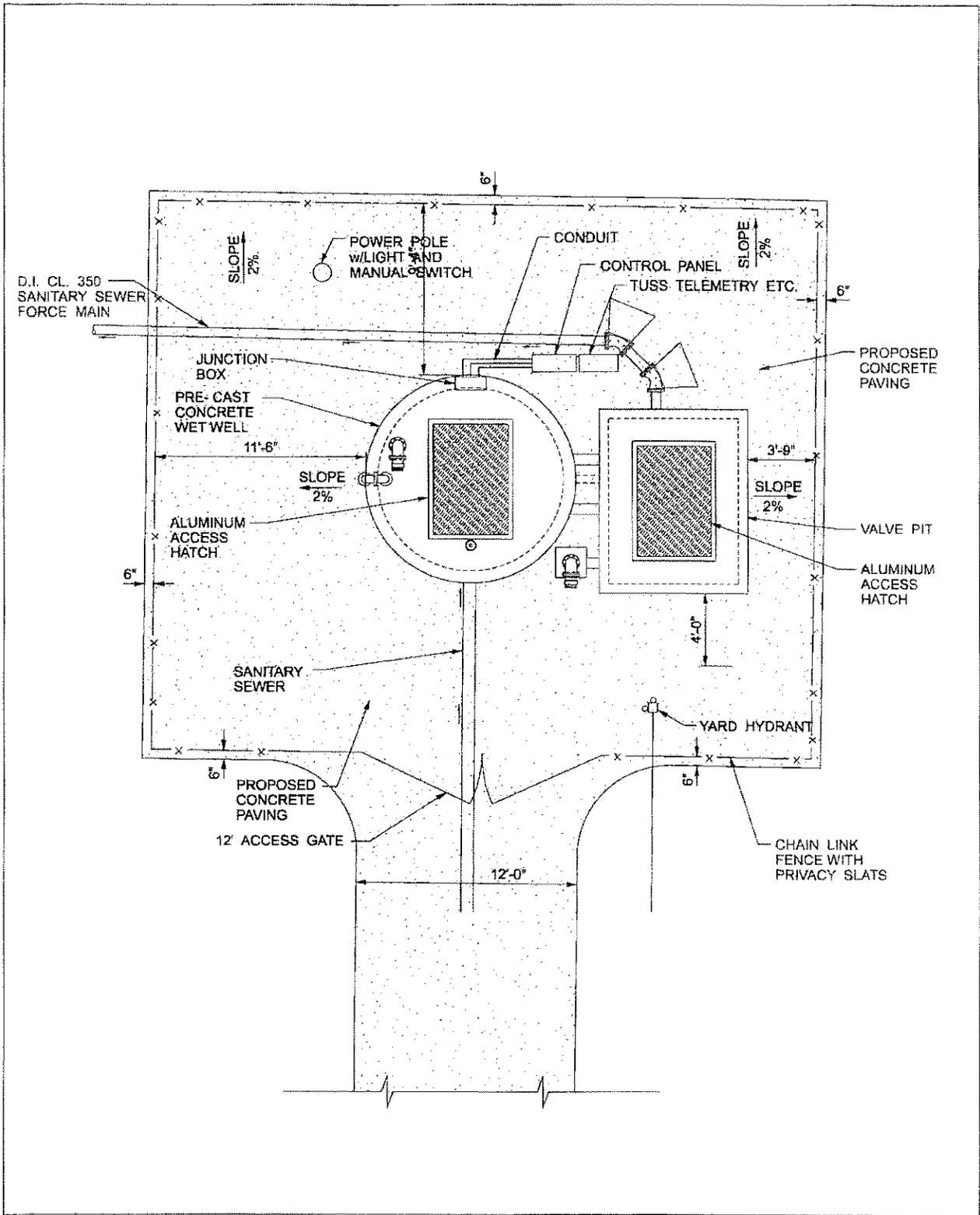
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DETAIL No.
27

TYPICAL GRAVITY SEWER LINE
INSTALLATION
SCALE: NONE





DETAIL No.

28

TYPICAL PUMP STATION
SITE PLAN
SCALE: NONE



