



SANITARY SEWER SYSTEMS - GENERAL DEVELOPMENT STANDARDS

1. OBJECTIVE:

Section I is intended to present information and provide an outline of the minimum general standards required by the City of Burlington for Developer constructed sanitary sewer line, facilities and improvements.

2. GENERAL NOTES:

Detailed plans shall be submitted for the City's review which provides the location, size, type and direction of flow of the proposed sewers and the connection with existing sewers.

Project plans should have a horizontal scale of not more than 50 feet to the inch and a vertical scale of not more than 5 feet to the inch. Plan views shall be drawn to a corresponding horizontal scale. Plans and profiles shall show:

- Locations of streets, rights-of-way, existing utilities, and sewers.
- Ground surface, pipe type, class and size, manhole stationing, invert and surface elevation at each manhole, and grade of sewer between adjacent manholes. All manholes shall be numbered on the plans and correspondingly numbered on the profile. Where there is any question of the sewer being sufficiently deep to serve any residence, the elevation and location of the basement floor, if basements are served, shall be plotted on the profile of the sewer, which is to serve the house in question. The Developer shall state that all sewers are sufficiently deep to serve adjacent basements, except where otherwise noted on the plans.
- All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly water mains, gas mains, storm drains, overhead and underground power lines, telephones lines, and television cables.
- All utility easements.

- General Notes
- City Approval Block
- Details in scale drawings, which clearly show special sewer joints and cross-sections, and sewer appurtenances such as manholes and related items.

Construction of new sewer systems or extensions of existing systems will be allowed only if the existing receiving system can support the added hydraulic load and meet sanitary sewer pretreatment requirements.

Collection and interceptor sewers shall be designed for the ultimate development of the tributary areas.

Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow.

Computations and other data used for the design of the sewer system shall be submitted to the City for approval.

The sewage facilities shall be constructed in conformance with the current WSDOT Standard Specifications for Road, Bridge, & Municipal Construction, and current amendments thereto, revised as to form to make reference to Local Governments, and as modified by the City's requirements and standards.

Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WEF, and APWA standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints, impede cleaning operations and future tapping, nor create excessive side fill pressure or deformation of the pipe, nor seriously impair flow capacity.

All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of trench should be made. When standard-strength sewer pipe is not sufficient, extra-strength pipe shall be used.

After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.

3. GENERAL REQUIREMENTS:

1. Prior to construction, the sewer plans shall be reviewed and approved by the City of Burlington.
2. Work shall be performed only by contractors experienced in laying public sewer mains.
3. Prior to any work being performed, the Developer shall contact the City to set forth his proposed schedule.
4. Contractor shall obtain approval of materials to be used from the City prior to ordering of materials.
5. Sewer main shall be laid only in dedicated streets or in easements, which have been granted to the City. A street is normally not considered until the plat, which created it, has been filed with the County Auditor.
6. The sewer main shall maintain a minimum 10-foot horizontal separation from proposed or existing water mains.
7. The maximum distance between manholes shall be 400 feet.
8. All manholes shall be accessible to maintenance vehicles.
9. Manholes in easements shall be provided with a green fiberglass locator marker post with the footage to the manhole stenciled on with two-inch (2") letters.
10. Manholes shall be a minimum of 8 feet deep unless approved by the City.
11. Terminating manholes, where sewer extension may occur, shall be provided with knockouts and channeled accordingly and stubbed out a minimum of 8 Ft.
12. Manholes shall be provided with a 0.10 foot drop across the channel.
13. Locking lids shall be provided for all manholes and all manhole lids shall have the word "sewer" cast integrally onto its surface.
14. The minimum slope for 8" gravity mains shall be 0.4% (except the minimum slope for dead end runs shall be 1.0% for 8" gravity mains) and the minimum slope for 6" side sewer laterals shall be 1.0%.
15. All side sewer laterals shall be of the same material as the main line.
16. Front lot corners and a property line stake shall be staked prior to construction for side sewer tee location.
17. All side sewers shall be extended to the lowest property corner and located a minimum of 10 feet from the side lot line and extend a minimum of 15 feet past the street right-of-way line (or property line).
18. Side sewer connections allowed directly into manholes shall be constructed to match the sewer main crown and the manhole channeled accordingly.

19. All commercial, industrial or school food establishments shall be equipped with an approved grease interceptor as required by the City prior to discharging to the sewer main.
20. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected by the City.
21. Road restoration shall be per City and/or State design and construction standards. The Developer shall become familiar with all City and State conditions of required permits and shall adhere to all conditions and requirements.
22. Final air testing shall not be accepted until after all underground utilities have been installed, and the lines have been flushed, cleaned, deflection tested, and television inspected.
23. Manhole rim and invert elevations shall be field verified after construction by the Developer's engineer(s) and the "as constructed" drawings individually stamped by a Washington State licensed professional engineer which shall attest to the fact that the information is correct.
24. Cleanouts shall be constructed at the right-of-way line for all side sewers.

4. MATERIALS:

Sewer Mains, Laterals and Force mains

Sewer mains to be installed shall be of material noted below:

Gravity Sewer and Laterals:

PVC Pipe: 2'-18' Cover

DI Pipe (Class 52): Less than 2' Cover 18'

Force Main: DI Pipe (Class 52) , PE Pipe

PVC pipe shall be a minimum Class S.D.R. 35 and be manufactured in accordance with ASTM D3034. The pipe and fittings shall be furnished with bells and spigots, which are integral with the pipe wall. Pipe joints shall use flexible elastomeric gaskets conforming to ASTM D3212. Nominal laying lengths shall be 20 feet and 13 feet.

The ductile iron pipe shall conform to AWWA C151 Standards, and current amendments thereto, except the ductile iron pipe shall be thickness Class 52 for gravity sewers force mains. The grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16" and the exterior shall be coated with an asphaltic coating.

Each length shall be plainly marked with the manufacturer's identification, year cast, thickness, class of pipe and weight. The pipe shall be furnished with mechanical joint or push-on type, employing a single gasket, such as "Tyton", except where otherwise calling for flanged ends. Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.

Restrained joint pipe shall be push-on joint pipe with "Field Lok" gaskets as furnished by U.S. Pipe or equal for 24" diameter and smaller pipe and "TR FLEX" as furnished by U.S. Pipe or equal for larger diameter pipes. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.

All pipes shall be joined by the manufacturer's standard coupling, be all of one manufacturer, be carefully installed in complete compliance with the manufacturer's recommendations.

All fittings shall be short-bodied, ductile iron complying with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be cement lined and either mechanical joint or flanged, as indicated on the Plans.

Fittings in areas requiring restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG, or approved equal.

All couplings shall be ductile iron mechanical joint sleeves.

The sewer pipe, unless otherwise approved by the City shall be laid upgraded from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with an approved temporary plug. Wherever movable shoring (steel box) is used in the ditch, pipe shall be restrained by use of a winch mounted in the downstream manhole and a line of sufficient strength threaded through the pipe and set tight before each move. Any indication that joints are not being held shall be sufficient reason for the City to require restraints, whether movable shoring is being used.

All gravity pipes shall be laid in straight lines and at uniform rate of grade between manholes. Variance from established line and grade shall not be greater than one-half inch (1/2"), provided that such variation does not result in a level of reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed one-sixty-fourth inch (1/64") per inch of pipe diameter, or one-half inch (1/2") maximum. Any corrections required in line and grade shall be reviewed with the City and shall be made at the expense of the Developer.

All extensions, additions and revisions to the sewer system, unless otherwise indicated, shall be made with sewer pipe joined by means of a flexible gasket, which shall be fabricated and installed in accordance with the manufacturer's specifications.

All joints shall be made up in strict compliance with the manufacturer's recommendations and all sewer pipe manufacture and handling shall meet or exceed the ASTM and recommended specifications.

Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position or loading it with dirt or other foreign material. Any gaskets so disturbed shall be removed, cleaned, relubricated if required, and replaced before the rejoining is attempted.

Care shall be taken to properly align the pipe before joints are entirely forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Since most flexible gasketed joints tend to creep apart when the end pipe is deflected and straightened, such movement shall be held to a minimum once the joint is home.

Sufficient pressure shall be applied in making the joint to assure that it is home, as described in the installation instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure that joints once home are held until fill material under and

alongside the pipe has been sufficiently compacted. At the end of the workday, the last pipe laid shall be blocked in an effective way to prevent creep during “down time.”

For the joining of dissimilar pipes suitable adapter couplings shall be used which have been approved by the City.

All gravity sewer pipes shall be 6" bedded with pea gravel or buck shot. The PVC pipe shall be bedded from a depth of six (6") inches below the pipe to six (6") inches above the pipe and ductile iron gravity sewer pipe shall be bedded from a depth of six (6") inches below the pipe to the spring line of the pipe. The bedding material shall extend across the full width of the trench and shall be compacted under the haunches of the pipe.

Special concrete bedding shall consist of a pipe cradle constructed of Portland cement concrete containing not less than four (4) sacks of cement per cubic yard. Sand, gravel and water proportions are subject to approval by the City. Maximum aggregate size shall be 1-1/2". Maximum slump shall be 4". The bottom of the trench shall be fully compacted before the placement of pipe cradle. The Developer shall protect pipe against flotation and disturbing the horizontal alignment of the pipe during the pouring of the concrete.

Clay or Bentonite dams shall be installed across the trench and to the full depth of the granular material in all areas of steep slopes, stream crossings and wetland to prevent migration of water along the pipeline.

All backfill in roadway sections shall be placed and compacted in accordance with City and/or State requirements and copies of the compaction results shall be provided to the City.

All backfill in easements shall be placed and compacted to 90% of the modified proctor dry maximum density per ASTM D1557.

5. MANHOLES:

Manholes shall be of the offset type and shall be precast concrete sections with either a cast in place base, or a precast base made from a 3,000-psi structural concrete. Joints between precast wall sections shall be confined O-ring or as otherwise specified.

For connections to existing systems, a concrete coring machine, suitable for this type of work, shall be utilized in making the connection. The existing manhole shall be rechanneled as required. The new pipe connection shall be plugged (watertight) until the new pipe system has been installed and approved. The Developer shall be responsible for any existing defects in the existing manhole unless these defects are witnessed by a representative of the City prior to any work being performed to make the connection. The Contractor shall be required to remove all deleterious material in the existing manhole and downstream reaches as a result of this work.

Manholes located in easements or outside of paved areas shall have concrete collars with a minimum size of four feet (4') and six inches (6") thick (see drawing no. 35)

Manhole Sections

Manhole sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder steps. The completed manhole shall be rigid, true to dimension, and be watertight. Rough, uneven surfaces will not be permitted. Sections shall be grouted inside and outside.

Manhole Steps and Ladders

Manhole steps shall be polypropylene, Lane International Corp. No. P13938 or equal.

Ladders shall be polypropylene Lane International Corp. or equal and shall be compatible with steps.

Grade Adjustment

Where work is located in public right of way, not less than 8" or more than 26" shall be provided between the top of the cone or slab and the top of the manhole frame.

Masonry units (manhole adjusting brick) shall conform to the ASTM C-32, Grade MA. The outside and inside of manhole adjusting bricks and the joints of precast concrete sections shall be plastered and troweled smooth with 1/2" (minimum) of mortar to attain a watertight surface.

Channels

Channels shall be neatly channeled to the satisfaction of the City of Burlington Sewer Department. Channeling shall be performed using a non-shrink grout to provide a smooth channel flow and made to conform accurately to the sewer grade. It shall be brought together smoothly with well-rounded junctions, satisfactory to the City. The channels shall be field poured after the inlet and outlet pipes have been laid and firmly grouted into place at the proper elevation. Allowances shall be made for a one-tenth foot (0.1') drop in elevation across the manhole in the direction of flow. Channel sides shall be carried up vertically from the invert to three-quarters of the diameter of the various pipes. The concrete shelf shall be warped evenly and sloped 3/8" per foot to drain. Rough, uneven surfaces will not be permitted. Channels shall be constructed to allow the installation and use of a mechanical plug or flow meter of the appropriate size.

Drop Manholes

Drop manholes shall be a minimum of 60 inches and be constructed as a standard manhole except for the drop connection.

Lift Holes and Steel Loops

All lift holes shall be filled with expanding mortar, smoothed both inside and outside, to insure water tightness. All steel loops shall be removed, flush with the manhole wall. The stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

Frames and Covers:

Frames and covers shall be ductile iron. Castings shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects, which would impair serviceability. Repair of defects by welding, or using “smooth-on” or similar material, will not be permitted. Frames and covers shall be machine finished or ground on seating surfaces so as to assure non-rocking fit in any position and interchangeability of covers. Frames and covers shall be provided with three bolt locking lids. Rings and covers shall be positioned so one of the three locking bolts is located over the manhole steps and shall be adjusted to conform to the final finished surface grade of the street or easement to the satisfaction of the City.

Manhole Marker Posts:

A fiberglass manhole marker post shall be located adjacent to all manholes located in easement areas. The marker post shall be green in color, 3.75 inches wide (flat), 60 inches long and furnished with a 3-inch by 3-inch high intensity white reflector (250 Candle Power) and a flexible anchor barb. Each post shall include the following decal: “Caution Sewer Manhole. Before digging, call 811, Utility Underground Location Center”.

The marker posts shall be set to leave 36 inches of the post exposed above grade.

Distance from the marker to the manhole shall be stenciled on the marker with two-inch (2”) letters.

6. SIDE SEWER LATERAL:

A side sewer lateral is that portion of a sewer line that will be constructed between a main sewer line and a property line or easement limit line.

All applicable specifications given herein for sewer construction shall be held to apply to side sewer laterals.

Side sewers shall be a minimum six-inch (6”) diameter pipe. Side sewers shall be connected to the wye tee, provided in the sewer main where such is available, utilizing approved fittings or adapters. The side sewer shall rise at a maximum of 45° and a minimum of 2%, from the sewer main.

Where there are no basements, the minimum side sewer depth shall be six (6) feet below existing curb line and five (5) feet below ground at the property line, except where existing

improvements, proposed improvements or topography may dictate additional depth. The elevations of the side sewer connections shall be of sufficient depth to serve all existing and potential future basements.

Each 6-inch side sewer service shall be provided with a twelve (12) foot long 2 x 4 wooden post, which extends from the invert of the end of the 6-inch pipe to above the existing ground. The exposed area of this post shall be painted white and shall have stenciled thereon in two-inch letters (black paint) "S/S" and shall also indicate the total length of the 2 x 4.

Where no tee or wye is provided or available, connection shall be made by installing a Smith-Blair cast coupling TYP 461 with Buna-n-gasket or equal may be utilized on concrete, DI or PVC pipe. (See drawing no. 32)

The maximum bend permissible at any one fitting shall not exceed forty-five degrees (45°). The maximum bend of any combination of two adjacent fittings shall not exceed 45° (one-eighth bend) unless straight pipe of not less than three (3) feet in length is installed between such adjacent fittings, or unless one of the fittings is a wye branch with a cleanout provided on the straight leg.

7. PRIVATE SIDE SEWERS:

Private side sewers are the extension of side sewer laterals located outside of the public rights-of-way or easements granted to the city.

1. Side sewer pipe for residential property shall be 4" or larger. Side sewer pipe for duplexes, multi-family, industrial, commercial, etc., shall be 6" or larger. Pipe material shall be ductile iron or PVC ASTM 3034 and shall be installed at 2% minimum grade (1/4 inch fall per foot) for 4" and 1% for 6". Construction on private property may be performed by owner but requires a permit.
2. Pipe shall be bedded with pea gravel or buck shot six (6") above and below pipe.
3. Six-inch sewer pipe is required in the street right-of-way and shall have a 2% minimum grade. Construction in street rights-of-way shall be performed by a licensed side sewer contractor and requires a right-of-way use permit.
4. Side sewers shall be inspected by the City prior to backfilling.
5. On private property, minimum cover shall be 18" over top of pipe from the point, which is 30" out from house and continuing to the connection with the City sewer

system.

6. Parallel water and sewer lines shall be 10 feet apart horizontally wherever possible and have a vertical separation of 18" if a vertical crossing is necessary.
7. No more than 100 feet is allowed between cleanouts. Cleanouts are required for bends equal to or greater than 45°. Cleanout shall be a plugged tee or plugged wye lateral.
8. All pipe joints shall be rubber gasket type.
9. Provide "grease trap" of a size and type approved by the city at all such locations as may be deemed necessary by the City.
10. Install backflow valve on all side sewers where potential occurs for flow to back into the private service.

8. TESTING GRAVITY SEWERS FOR ACCEPTANCE:

The Developer shall furnish all facilities and personnel for conducting tests. Methods other than Low Pressure Air Test shall be subject to the approval of the City.

Preparation for Testing for Leakage

The Developer shall be required, prior to testing, to clean and flush all gravity sewer lines with clean water. The completed gravity sewer, including side sewer stubs, after completion of backfill and cleaning shall be televised. This will be permitted prior to paving. The sewer shall then be tested by the low-pressure air test method and/or an infiltration test but only after all utilities are installed. Except, however, that in certain conditions an exfiltration test may be required by the City.

Low Pressure Air Test

The sewer pipe shall be tested for leaks through the use of air (unless exfiltration test is approved) in the following manner:

Following the pipe cleaning and utility installation, the pipe installation shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 5.0 pounds per square inch for 10 minutes.

If the pipe installation fails to meet these requirements, the Developer shall determine at his own expense the source or sources of leakage, and he shall repair (if the extent and type of repairs proposed by the Developer appear reasonable to the City) or replace all defective

materials or workmanship. The completed pipe installation shall meet the requirements of this low-pressure air test before being considered for acceptance.

Plugs used to close the sewer pipe for the air test shall be securely braced to prevent the unintentional release of a plug, which can become a high velocity projectile. Gauges, air piping manifolds and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole where a plugged pipe is under pressure. Air testing apparatus shall be equipped with a pressure release device such as a rupture disk or a pressure relief valve designed to relieve pressure on the pipe under test at 6 psi. This test must be performed in the presence of a Sewer Department representative.

9. TESTING FORCE MAIN:

Test Specifications

All force mains shall be tested prior to acceptance of work. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Developer. Feed for the pump shall be from a barrel or other container within the actual amount of “makeup” water, so that it can be measured periodically during the test period.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer shall furnish and install temporary blocking.

The pipeline shall be subjected to a pressure and leakage test of a minimum of 150 pounds per square inch for a period of not less than one (1) hour. The test pressure shall be applied at the low end of the section tested.

Prior to calling for the City to witness the pressure test, the Developer shall first perform a satisfactory pressure test. The allowable leakage rate per thousand feet of each size pipeline is as follows:

	Allowable Leakage
Pipe Size	Gal. per Hour per 1,000 Ft. @ 150 psi
6”	0.64
8”	0.85
10”	1.06
12”	1.28

Defective materials or workmanship, discovered as a result of the tests, shall be replaced by the Developer at the Developer’s expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be re-run at the Developer’s expense until a satisfactory test is obtained.

Preliminary Tests

The developer shall conduct preliminary tests and ensure that the section to be tested is in an acceptable condition before requesting the City to witness the test.

Thrust Blocks & Anchor Blocks

Fittings shall be “blocked” with poured-in-place concrete, with a firm minimum bearing against an undisturbed earth wall. Timber blocking will not be permitted. Thrust blocks shall be poured as soon as possible after setting the fittings in place to allow the concrete to “set” before applying the pressure test. The concrete thrust blocks shall be in place before beginning the pressure test. Anchor blocks shall be allowed to set sufficiently to develop the necessary bond strength between the reinforcing rods and the concrete anchor before beginning the pressure test. A visqueen barrier shall be provided to protect glands, bolts and other miscellaneous materials required for this type of connection from the concrete. Fittings that must be blocked against an undisturbed earth wall shall be restrained with restrained joint pipe and fittings.

10. VIDEO INSPECTING:

After the gravity sewer lines have been cleaned flushed and manhole channeled, the Developer is responsible for returning skilled personnel to provide a video inspection of all portions of the sewer main installed and provide one copy to the City of Burlington.

The Developer shall perform a complete televised inspection of the sewer pipe and appurtenances and shall provide the City, a recording of the inspections together with a written log of the television inspection. The camera shall be a pan and tilt type equipped with adequate light and focusing to allow inspection of sewer main, side sewers and full circumference inspection of main line joints and fittings.

Immediately prior to televised inspection, the Developer shall run water through each sewer line for five (5) to ten (10) minutes to provide water for detection of any adverse grade sections visible by the presence of ponded water. The camera shall be stopped periodically at the ponded areas and the depth of water shall be measured with a ball of known diameter on the pull line. During the inspection, all tees and other fittings shall be logged as to exact location within one (1) percent maximum error in measurement, wherein accuracy is checked with various fittings and the terminating manhole.

The City shall be notified forty-eight (48) hours prior to any video inspection and this work shall be performed on a schedule to allow the City to witness the inspection.

Any defects in material or installation identified by the inspection shall be repaired as required by the City at the Developer’s expense.

11. ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO GRADE

This work consists of constructing and/or adjusting all new and existing utility structures encountered on the project to a finished grade.

Asphalt Concrete Paving

On asphalt concrete paving projects, the manholes shall not be adjusted until the pavement is completed, at which time the center of each manhole lid shall be relocated from references previously established by the Developer. The pavement shall be cut as further described and base material removed to permit removal of the cover. The manhole shall then be brought to proper grade.

Prior to commencing adjustment, a plywood and visqueen cover as approved by the City shall be placed over the manhole base and channel to protect them from debris.

The asphalt concrete pavement shall be cut and removed to a neat circle, the diameter of which shall not exceed 48" or 14" from the outside diameter of the ductile iron frame, whichever is smaller. The ductile iron frame shall be brought up to desired grade, which shall conform to surrounding road surface.

Adjustment to desired grade shall be made with the use of concrete or bricks. No cast or ductile iron adjustment rings will be allowed. An approved class or mortar (one part cement to two parts of plaster sand) shall be placed between adjustment rings or bricks and ductile iron frame to completely fill all voids and to provide a watertight seal. No rough or uneven surfaces will be permitted inside or out. Adjustment rings or brick shall be placed and aligned so as to provide vertical sides and vertical alignment of manhole steps and ladder.

Check manhole specifications for minimum and maximum manhole adjustment and step requirements. Special care shall be exercised in all operations in order not to damage the manhole, frames and lids or other existing facilities.

The annular spaces of the manhole frames shall be filled with 5/8" minus crushed gravel and compacted with hand tamper to within 2" of the top of the frame. Asphalt concrete patching shall not be carried out during wet ground conditions or when air temperature is below 50°F. Asphalt concrete mix shall be at required temperature when placed. Before making the asphalt concrete repair, the edges of the existing asphalt concrete pavement and the outer edge of the casting shall be tack coated with hot asphalt cement. The remaining 2" shall then be filled with Class B asphalt concrete and compacted with hand tampers and a patching roller.

The completed patch shall match the existing paved surface for texture, density and uniformity of grade. The joint between the patch and the existing pavement shall then be carefully painted with hot asphalt cement or asphalt emulsion and shall be immediately covered with dry paving sand before asphalt cement solidifies. All debris such as asphalt pavement, cement bags, etc., shall be removed and disposed of by Developer.

Prior to acceptance of a project, manholes shall be cleaned of all debris and foreign material. All manhole steps and ladders shall be cleaned free of grout. Any damage occurring to the existing facilities due to the Developer's operations shall be repaired at his own expense.

Adjustment of Manholes in Easements

Manholes in easement areas shall be adjusted to ensure drainage away from the manhole frame and cover. The manhole frame and cover shall be set approximately one (1") above finished grade.

Adjustment of Cleanouts and Cast or Ductile Iron Frames and Covers

Cleanout castings shall be adjusted to grade in the same manner as for manholes.

Adjustment of Valve Box Castings

Adjustment of valve box castings shall be made in the same manner as for manholes.

12. SANITARY SEWER SYSTEMS – PRIVATE PUMP STATIONS:

Detailed plans shall be submitted for city review which will provide the location, size, type and the direction of flow for the proposed sewer system and the connection with existing sewers. Property owners shall retain ownership and maintenance responsibilities for the system. Private pump stations are approved for connection to existing gravity sewer only.

Pumps

- Only submersible grinder/chopper pumps are approved for installation.

Control Panel

- Shall have a visual and audible high-water alarm.
- Shall comply with all current electrical codes.

Discharge Line/Force Main

- Will be a minimum 1.5" P.V.C. ASTM 3034 Bell and Spigot or 1.5" SDR 11 HDPE Pipe
- All joints will be flexible elastomeric gaskets.
- Cleanouts are required on all directional changes. (not on HDPE)
- Check valves and isolation valves shall be mounted outside the wet well and an isolation valve located at property line for maintenance.

Wet Well

- A wet well shall be constructed to prevent ground water from entering and shall have a watertight cover.

Trench Back-Fill

- Minimum ditch depth for force main will be 24”
- Back fill will be Pea Gravel or Buckshot. (See ditch detail no.1 for public right-of-way)
- “SEWER” tracer tape will be installed in public right-of-ways.

Inspections

- Call 360.757.4085 for inspections
- Any portion of the installation covered or backfilled without approval by the inspector will be uncovered. NO EXCEPTIONS.

Pressure Tests

- All force mains shall be tested at a minimum pressure of at least 50 percent above the design working pressure.

Gravity Sewer

- Requirements are outlined on sewer permit.

13. FINAL ACCEPTANCE:

Prior to final acceptance, all lines shall be flushed, cleaned and all debris removed.

- Air Pressure Test - completed
- Video Inspection - approved
- Manhole Inspection - completed
- As-Builts - approved
- Copy of Field Inspector’s Daily Report – provided to the Sewer Department

II. SEWAGE LIFT STATIONS - GENERAL STANDARDS

1. OBJECTIVE:

Section II is intended to present information and provide an outline of the minimum general standards to be accomplished in planning a sewage lift station installation within the City of Burlington sewer service area.

The Developer shall submit to the City for review and approval, complete sewage lift station plans and design which provide for the lift station, electrical service, SCADA controls, and auxiliary generator/transfer switch together with all accessories for a complete, automatically operating installation.

Design material and drawings shall provide all civil, mechanical and electrical details and align with all applicable codes and regulations, and good engineering practice.

2. DESIGN CALCULATIONS:

The Developer shall perform a study and make the determination to assure that the lift station installation is sized to serve the overall sewage flows generated within the potential service area. The flow study shall include the Developer's boundary area as well as adjacent and future service areas. The service areas shall be the areas within which could be served by the installation of the lift station(s).

The station's design flow capacity shall be based on an average daily per capita flow with related peaking factors and inflow/infiltration allowances.

Documentation of present and future service area flow rates for lift station size and capacity determination shall be provided to the City.

The effects of the minimum flow conditions shall be estimated to ensure that retention of the sewage in the wet well will not create a nuisance and that pumping equipment will not operate too infrequently. The wet well shall be sized to provide full submergence on the pumps as recommended by the pump manufacturer and a minimum of three (3) minutes between pump cycles at pump design capacity.

Lift station capacity shall meet the maximum rate of flow expected. The capacity of the receiving sewer shall also match the flow expected. At least two (2) pumping units shall be provided at each lift station installation. The pump shall have sufficient capacity and capability to efficiently handle the peak design flow with one (1) pump out of service and to ensure a minimum velocity of three (3) feet per second velocity in the force main. The force main shall be sized for a minimum velocity of three (3) feet per second and a maximum of eight (8) feet per second. The minimum diameter of the force main shall be four (4) inches.

Three (3) copies of the Design Calculations shall be submitted to the City for review. As a minimum, the report shall include.

1. Project description
2. Projected flows
3. Connection point with downstream capacity
4. Wet well sizing
5. Run time calculation
6. Run time calculation and cycle time
7. Pump station head calculation
8. Pump selection
9. Force main size, length and material
10. Generator sizing
11. Odor potential calculations
12. Wet well buoyancy calculations

3. LOCATION:

The Developer shall furnish a site layout for the lift station installation.

The lift station shall be located as far as practicable from present or proposed built-up residential areas, and an asphalt concrete access road shall be provided. Sites for sewage lift stations shall be of sufficient size for future expansion or addition, if applicable.

The easement or deed for the lift station site shall be submitted to the City for review prior to construction of the lift station.

As a minimum, the site shall provide for the following:

1. Lift station
2. Auxiliary power, including automatic transfer switch
3. Electrical
4. Telemetry
5. 3/4-inch water service with reduced pressure backflow preventer and hose bib installed in an above ground slab enclosure on concrete. Furnish 50 feet of 3/4-inch heavy-duty rubber hose.
6. Odor control, as applicable for location and capacity.
7. Cuts and fills to provide level site for maintenance.
8. Asphalt concrete pavement for access and maintenance areas.

9. Six (6') foot high galvanized chain link fence with vertical vinyl slats in-laid for screening, enclosing the site and a 12-foot wide access gate.

City of Burlington PUMP STATION DESIGN STANDARDS

The following list is the current Sewer Department standard for sewer pump stations.

Control Panel:

1. The control panel will be configured to operate two pumps with a supply voltage of 480 volts 3 phase.
2. The outer enclosure will be a Hoffman on 12" legs with a single padlock Hoffman A-LI-DR and full back panel or sized accordingly to house the pump controls.
3. The outer enclosure will have an external light fixture located and aimed to illuminate the wet well area.
4. The enclosure will have an internal fluorescent lighting package Hoffman A-LF16D24.
5. The generator receptacle shall be Crouse-Hinds AR1041S22 with AJ67 Adapter, NO EXCEPTIONS.
6. The PLC will be Allen-Bradley Micro-Logix 1500 and will connect to the city fiber network.
7. Phase monitors shall be Automatic Timing & Controls SLA-440-ALE or approved equal.
8. The control power transformer shall be Allen-Bradley, Square-D or equal and sized to supply all the control panel's internal needs while simultaneously supplying the external light fixture and the duplex receptacle.
9. U.L. 508 intrinsically safe relays will be Warrick Series.
10. Motor starters shall be Allen-Bradley SMC Dialog Plus or approved equal.
11. Circuit breakers shall be Rockwell Automation, Allen-Bradley or Square D.
12. Elapsed time meter for each pump Yokogawa 240311AAAB or approved equal.
13. Cycle counter for each pump DURANT-6-TY-40724-400-ER or approved equal.
14. Ammeters for each pump will be full scale reading approximately 125% of the pump motor full load. Yokogawa 250340LSNT and 5RL-500CT or approved equal.
15. A test switch for all panel indicator lights.
16. All push buttons, switches and indicator lights will use LED.
17. Level control will be Milltronics Hydroranger 200.

The Hoffman A727216ULP will house: (see example of panel configuration)

1. GFI 120 volt 20A receptacle.
2. Designated control switch for external floodlight and internal light.
3. Load center sized accordingly.
4. 800 watt 115vac heater Hoffman D-AH8001B
5. Mounted on top will be an alarm light (Edwards-105FINHR-45 weatherproof strobe).

Wet Well, Valve Vault & Equipment:

1. The float switches shall be SJE-Rhombus Sensor float with Kellem stainless steel cable support grips.
2. The pumps shall be Hydromatic unless notified otherwise.
3. Wet well will be a minimum of 96" diameter.
4. Hydromatic stainless steel Metal-To-Metal rail system with stainless steel lifting cable.
5. All on site penetrations shall be cut with a core hole saw.
6. Inside wet well and valve vault will be coated with epoxy.
7. All piping will be painted.
8. The engineer shall demonstrate that the pump system will not exceed the maximum starts per hour.
9. The valve vault will drain to the wet well.
10. All pipe supports shall be hot dip galvanized or stainless steel.
11. All flanges shall be at least one foot from the vault walls and floor.
12. The wet well and valve vault will be vented using 4" stainless steel pipe with a screen.

Start-Up:

1. Conduct a pump start-up and flow test in the presence of a representative from the Sewer Department to demonstrate proper operation of the pump station. Submit a pump startup and flow test report containing all data from the test.
2. Provide one 30-minute training session to Sewer Department personnel demonstrating system operation and maintenance.
3. The city will remove and install each pump with the Sewer Department's boom truck to verify operation.
4. The Sewer Department will test run the pump station on generator power for 30 minutes.
5. The contractor will supply the City with six (6) copies of O&M manuals.

Equipment Certification:

All applicable material, including accessories to the system and including all wire and cable, shall be listed by an approved agency recognized by Washington State Department of Labor and Industries for the use intended.

Warranty:

1. The control panel manufacturer shall warranty the control panel to be free from defects for a period of one year from the time of successful completion, startup and submittal of six (6) copies of O&M manuals.
2. The warranty shall cover the complete cost of repair for all material and labor defects discovered during the warranty period.

FORCE MAIN

The force main shall be a minimum 4" diameter ductile iron Class 52 and provided with a continual positive slope. There shall be no intermediate high point between the pump station and the force main discharge point (depth shall be a minimum of 4'-0"). All pipes (gravity and pressure) entering and leaving the wet pit or dry pit shall have flexible couplings within 18-inches of the structure.

An emergency pump connection equipped with a Cam Lock fitting and cap shall be located near the wet well.

LIFT STATION TEST PROGRAM

The Developer shall perform, as a minimum, the following tests and provide the City written documentation of the date performed and results obtained. Pump tests shall meet or exceed specified capacity. The City shall be informed of the testing schedule 48 hours prior to the test.

DRAWING INDEX

1. Trench Section
2. Sanitary Sewer Manhole Section
3. Type II – 72” Manhole
4. Type I Manhole
5. Shallow Manhole
6. Saddle Manhole
7. Inside Drop Structure
8. Ladder and Manhole Steps
9. Blank
10. Manhole Frame and Cover
11. Typical Utility Crossing
12. Casing Detail for Sewer
13. Cleanout
14. Side Sewer Installation
15. Blank
16. Side Sewer New Construction
17. Blank
18. Concrete Anchor for Sewer Main Steep Slopes
19. Unsuitable Foundation Excavation
20. Grease Interceptor Vault
21. Grease Interceptor Notes
22. Force main Discharge Manhole
23. Backflow Preventer
24. Sanitary Sewer Air and Vacuum
Release Assembly
25. By-pass Pump Connection
26. Vertical Anchor Block
27. Thrust Block
28. Wet Well and Valve Pit
29. Pump Station Plan

30. Pump Station Elevation

31. Sewer Manhole with Force main

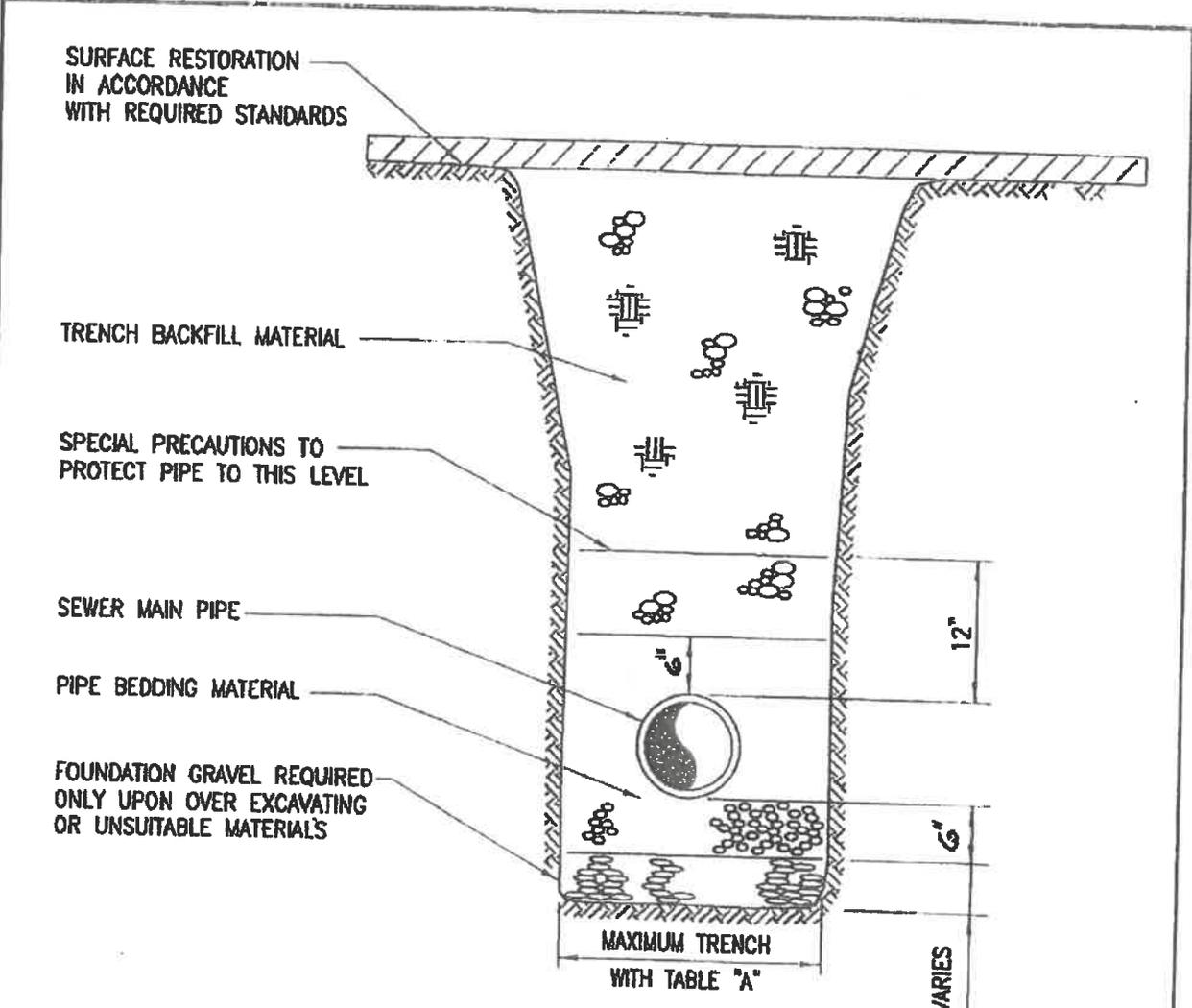
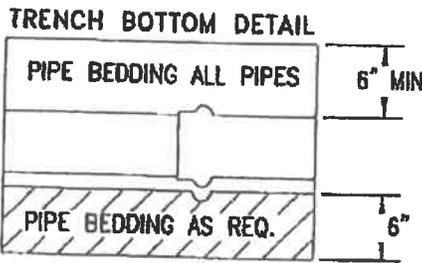


TABLE "A"

6" PIPE	-2'-6"
8" PIPE	-2'-6"
10" PIPE	-3'-0"
12" PIPE	-3'-0"
16" PIPE	-3'-6"
18" PIPE	-4'-0"
24" PIPE	-4'-0"



KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. NO TEMPORARY SUPPORTS I.E. BLOCKS, ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.

TRENCH SECTION

MANHOLE FRAME & COVER WITH "SEWER"
 CAST ON COVER WITH 3" HIGH RAISED
 LETTERS (NON-SKID PATTERN) EAST JORDAN IRON
 WORKS NO. 370063 OR OLYMPIC FOUNDRY NO. MH30AD/T.
 3 HOLE LOCKING FRAME AND COVER. ONE
 (1) BOLT HOLE TO BE CENTERED OVER
 LADDER. SEE V-S5 FOR OPENING LOCATION.

FIRST STEP
 14" MIN.
 18" MAX.

GROUT BETWEEN RINGS

POLYPROPYLENE MANHOLE
 STEPS AT 12" O.C.

GROUT LIFT HOLES
 INSIDE AND OUTSIDE

MANHOLE DIAMETER	
48"	STANDARD
54"	DEPTH ≥ 20FT
60"	PIPE DIA. = 15"
72"	PIPE DIA. = 24"

SEE NOTE 1 FOR
 PIPE CONNECTION

REINFORCED CONC.
 COLLAR IN UNPAVED
 AREAS. SEE NOTE 5.

FINISHED GRADE

4" X 24" PRECAST CONC.
 ADJUSTMENT RINGS
 2 RINGS REQUIRED
 5 RINGS MAXIMUM
 PLASTER INSIDE AND
 OUTSIDE FACE WITH 1/2"
 THICK GROUT

OFFSET CONE

48" MIN. INSIDE DIAMETER
 PRECAST MANHOLE

RUBBER GASKET TO SEAL

POLYPROPYLENE LADDER

10' MIN.

SLOPE 3/8"/FT

3/4 PIPE DIA

GROUT FILL

FLOW

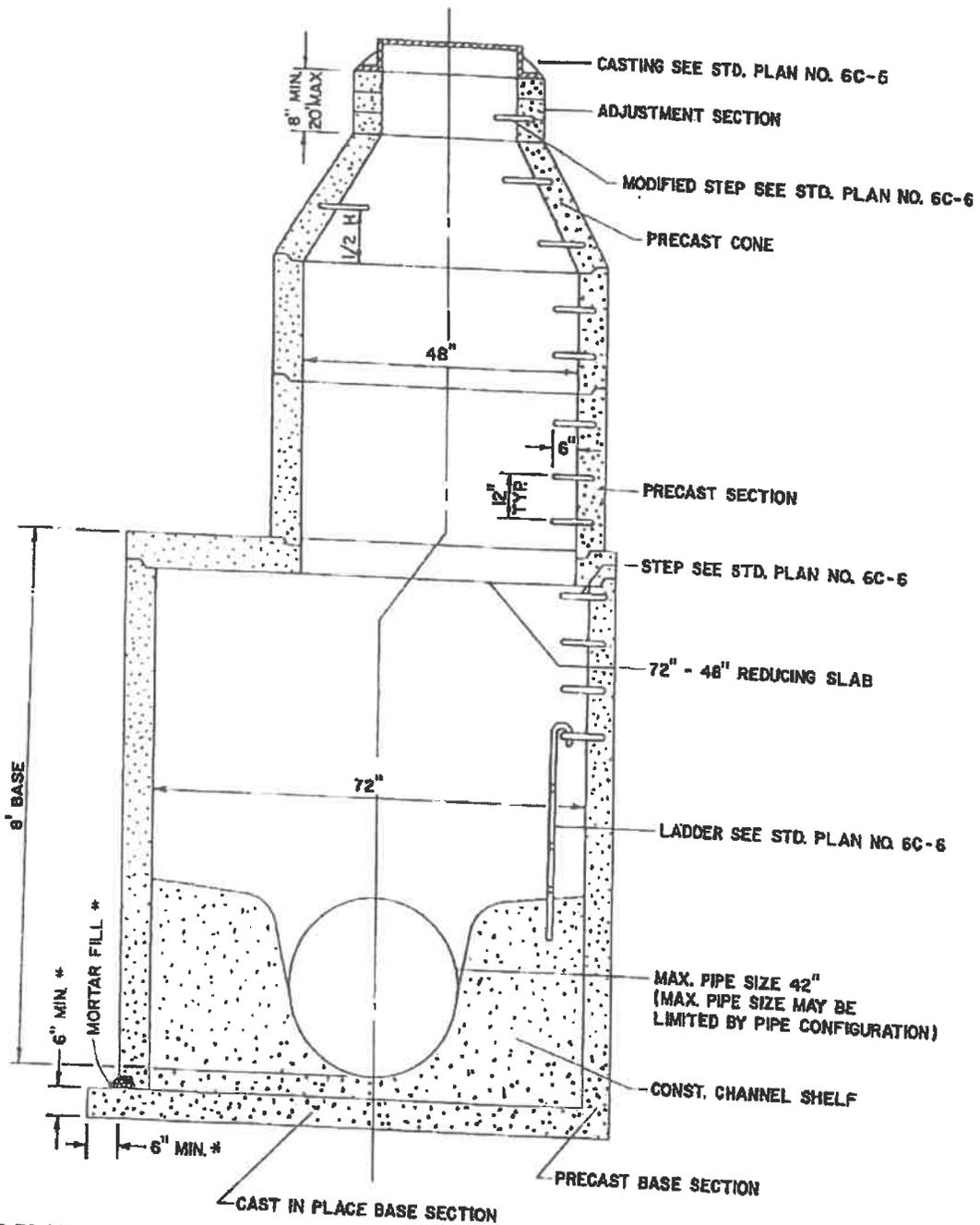
FOUNDATION GRAVEL

UNDISTURBED EARTH

NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
 PVC PIPE: CAST OR GROUT A MANHOLE COUPLING INTO WALL.
 D.I. OR PVC PIPE: CORE THE MANHOLE AND CONNECT SEWER
 PIPE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN MANHOLE
 WALL, KOR-N-SEAL BOOT OR EQUAL.
2. DROP OF GRADE THRU MANHOLE SHALL
 BE 0.10', UNLESS OTHERWISE NOTED.
3. MINIMUM DEPTH OF MANHOLE SHALL BE
 8' UNLESS APPROVED BY THE DISTRICT.
4. PROVIDE FIBERGLASS MANHOLE MARKERS
 IN EASEMENTS.
5. POUR 4'-0" DIAMETER BY 12" THICK
 CONCRETE COLLAR AROUND ALL MANHOLES
 IN UNPAVED AREAS.

**SANITARY SEWER MANHOLE
 SECTION**

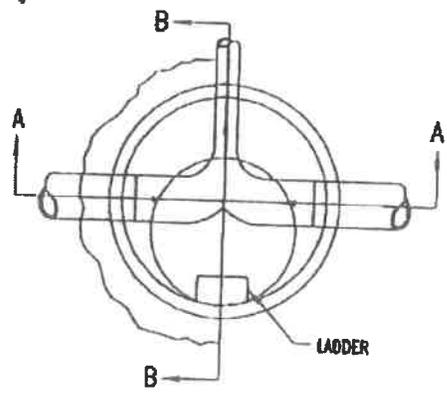
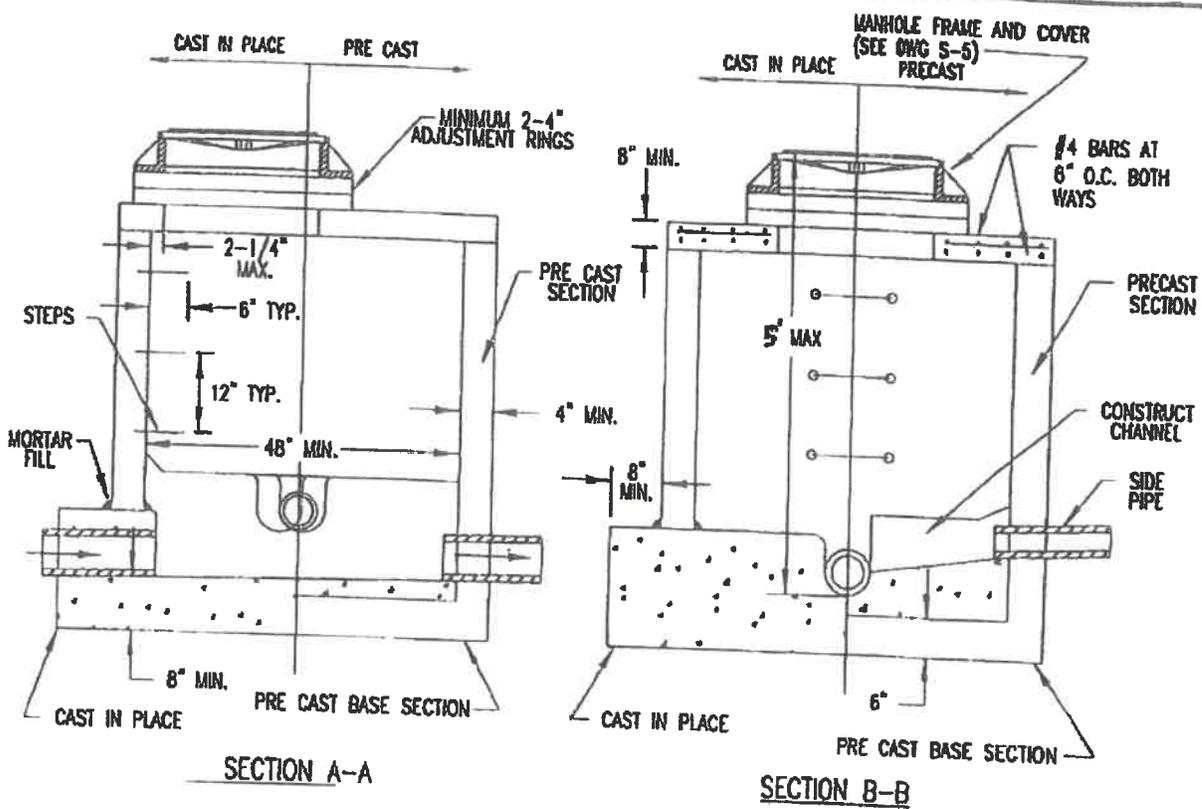


* APPLIES TO CAST IN PLACE BASE SECTION.

TITLE

TYPE II - 72" MANHOLE

NO SCALE



NOTE:

1. ONLY USED WITH SPECIAL WRITTEN APPROVAL
2. PRE CAST MANHOLE SECTION AND FLAT SLAB COVER SHALL CONFORM TO WSDOT STD DWG B-23C.
3. ALL MANHOLE JOINTS SHALL BE GROUTED TO INSURE A WATER TIGHT SEAL AND THE INTERIOR SHALL BE TRAWLED TO A BROOM FINISH.
4. ALL CHANNELIZATION OF MANHOLE BASES SHALL BE COVERED BY A RIGID MATERIAL DURING CONSTRUCTION OF ROAD SURFACES TO PREVENT FOREIGN MATERIALS FROM ENTERING SYSTEM.
5. WHEN CONSTRUCTING MANHOLE OVER AN EXISTING MAIN, SUPPORT PIPE(S) AND MANHOLE SECTION WITH CONCRETE BLOCK AND POBR BASE AS SHOWN. REMOVE TOP 1/2 OF MAIN PIPE AND FORM SIDE CHANNEL(S) AS REQUIRED.

**SHALLOW MANHOLE
UNDER 5' INVERT TO COVER**

POURED IN PLACE CONCRETE

LOCATE MANHOLE FRAME AND COVER ON UPSTREAM SIDE OF MANHOLE AND TO THE SIDE OF CHANNEL

1" POLY SAFETY MANHOLE STEPS

MANHOLE FRAME & COVER SET FLUSH WITH ASPHALT OR CONCRETE. SEE NOTE 3.

FIRST STEP 14" MIN. 23" MAX.

1" POLY. SAFETY TYPE MANHOLE STEPS LOCATED @ 12" O.C.

COMPACTED TRENCH BACKFILL

48" INSIDE DIAMETER PRECAST MANHOLE

8" MINIMUM

NOTES:

1. MANHOLES SHALL BE LEAK PROOF.
2. SURFACE RESTORATION IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND LOCAL REGULATORY AUTHORITY.
3. IN NON PAVED AREAS WHERE MANHOLE COVER IS SUBJECT TO TRAFFIC, INSTALL 6 FT. DIAMETER CONCRETE PAD-4 INCHES THICK AROUND FRAME AND COVER.
4. TOP OF EXISTING PIPE SHALL BE CUT ONLY AFTER NEW PIPE IS TESTED AND TV'D.

4"X8"X16" SOLID CONCRETE BLOCKS

48" INSIDE DIAMETER PRECAST CONCRETE MANHOLE

SET INVERT PER APPROVED DESIGN OR AS DIRECTED

PROPOSED CHANNEL

SLOPE SHOULDERS 5/8"/FT.

FINISHED GRADE

4" X 24" DIAM. PRECAST CONC. ADJUSTMENT RINGS 8" MINIMUM 20" MAXIMUM PLASTER INSIDE AND OUTSIDE FACE WITH 1/2" THICK GROUT

48" TO 24" OFFSET CONE

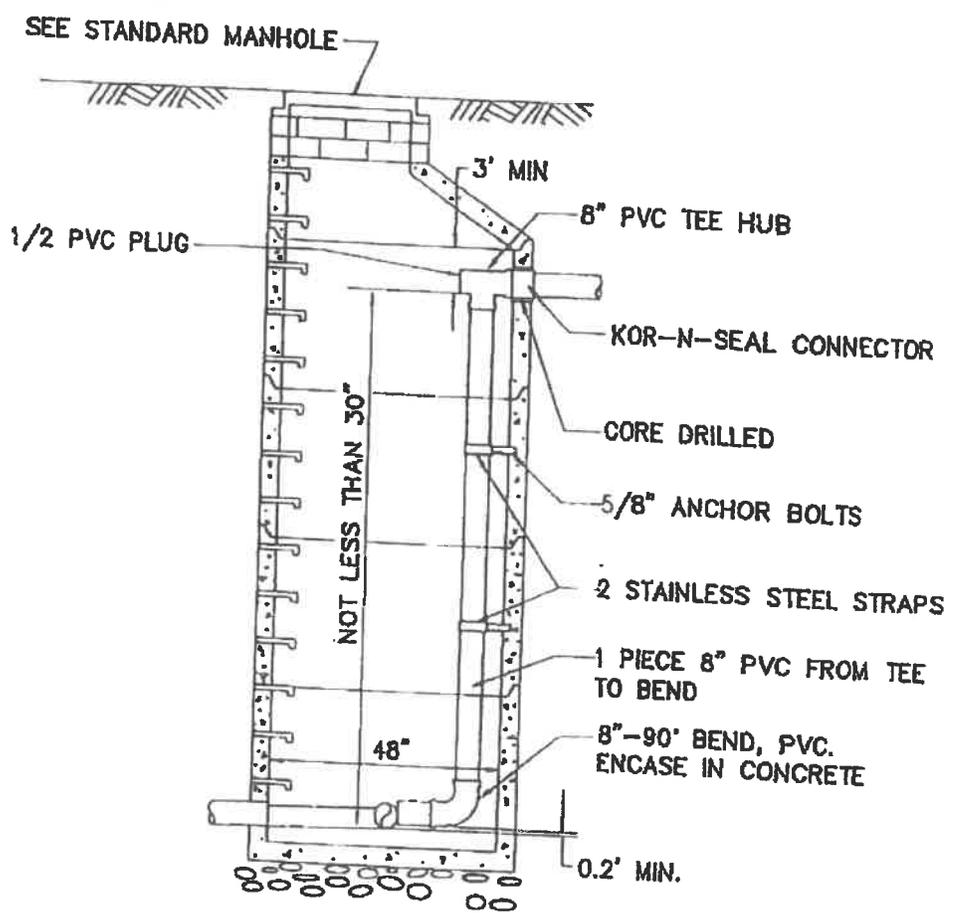
FULL MORTAR JOINT CONTINUOUS OR APPROVED EQUAL

GROUT PIPE INTO PLACE FROM OUTSIDE OF MANHOLE

WATERTIGHT SEAL ON MANHOLE

UNDISTURBED EARTH

SADDLE MANHOLE



NOTES:

1. DROP TEE TO BE INSTALLED MINIMUM OF 3' BELOW CONE SECTION
2. INSIDE DROP MANHOLE SHALL BE INSTALLED ONLY WHERE APPROVED BY THE CITY

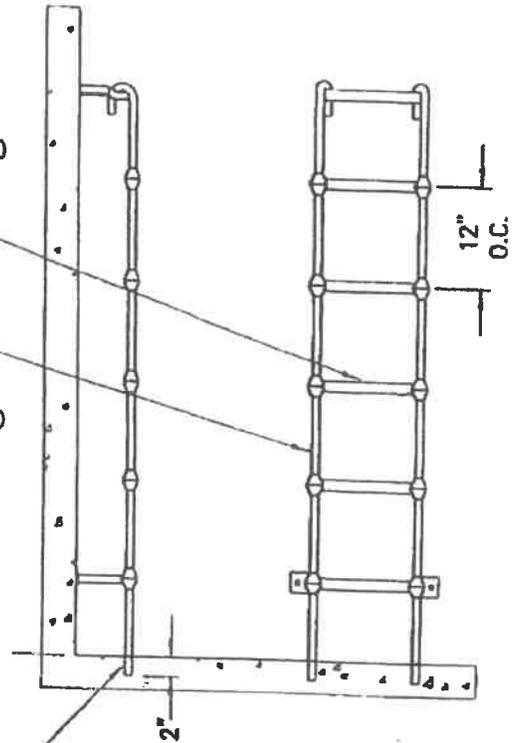
TITLE	INSIDE DROP STRUCTURE
-------	-----------------------

NO SCALE

RUNG
1/2" GRADE 60



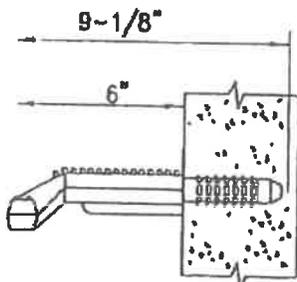
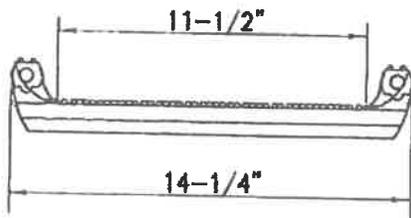
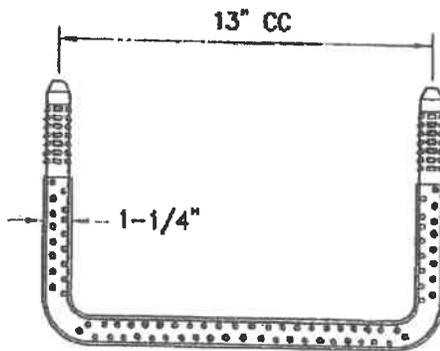
RAIL
9/16" ROUND
BAR



PROVIDE 2" MINIMUM PENETRATION INTO
MANHOLE BASE. PROVIDE MEANS TO
SECURELY ANCHOR INTO MANHOLE BASE.

LADDER SHALL CONFORM TO
POLYPROPYLENE ASTM D-4101
1/2" GRADE 60 REINFORCING
BAR A-615 9/16" COLD DRAWN
BAR C-1018

POLYPROPYLENE LADDER

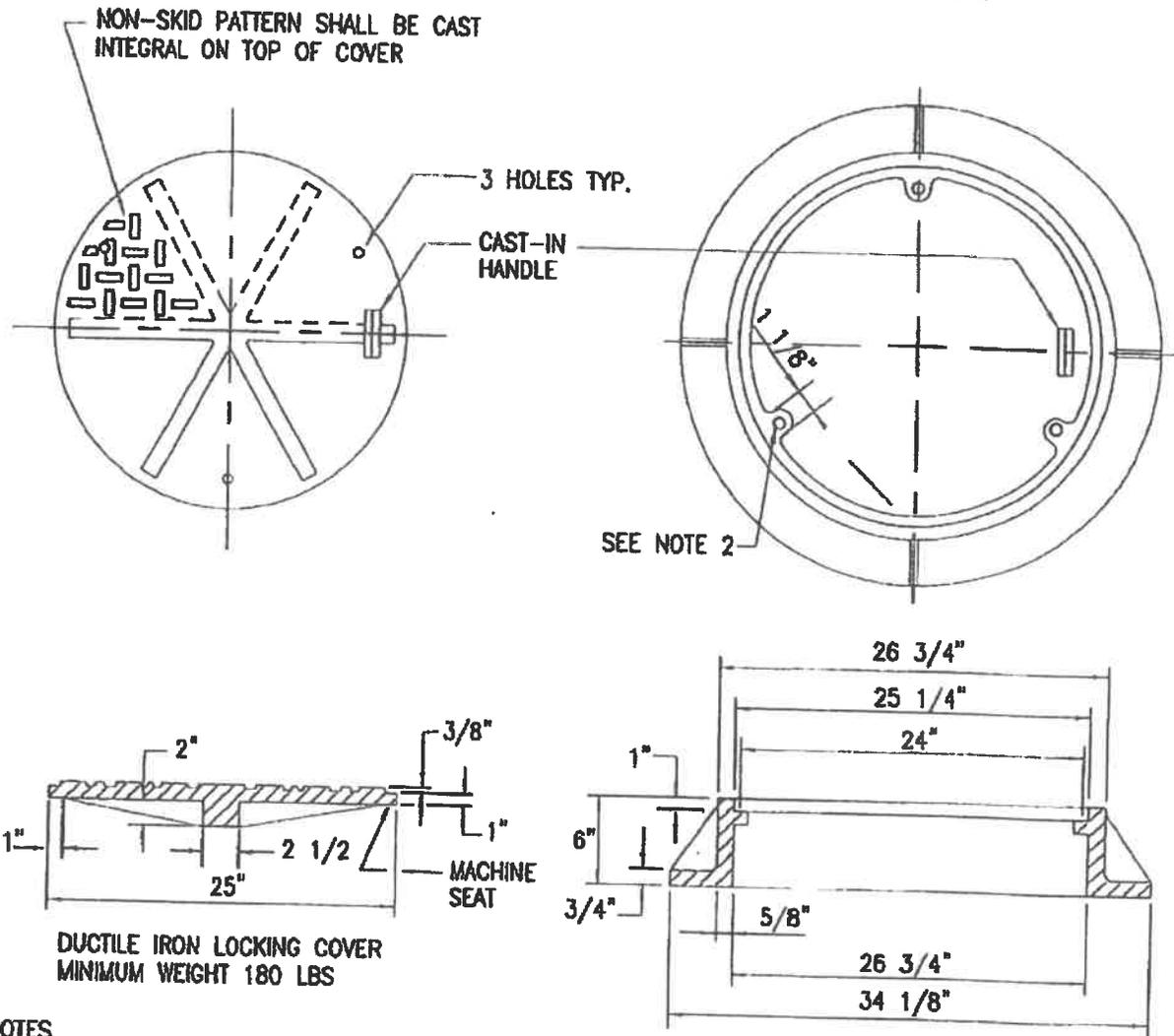


POLYPROPYLENE STEP, LANE
NO. P-13938 OR EQUAL

POLYPROPYLENE
MANHOLE STEPS

POLYPROPYLENE LADDER
AND MANHOLE STEPS

COVERS SHALL HAVE THE WORD "SEWER" IN RAISED LETTERS WHEN USED IN CONNECTION WITH SANITARY SEWER INSTALLATION, OR "WATER" WHEN IN CONNECTION WITH WATER DISTRIBUTION INSTALLATION.

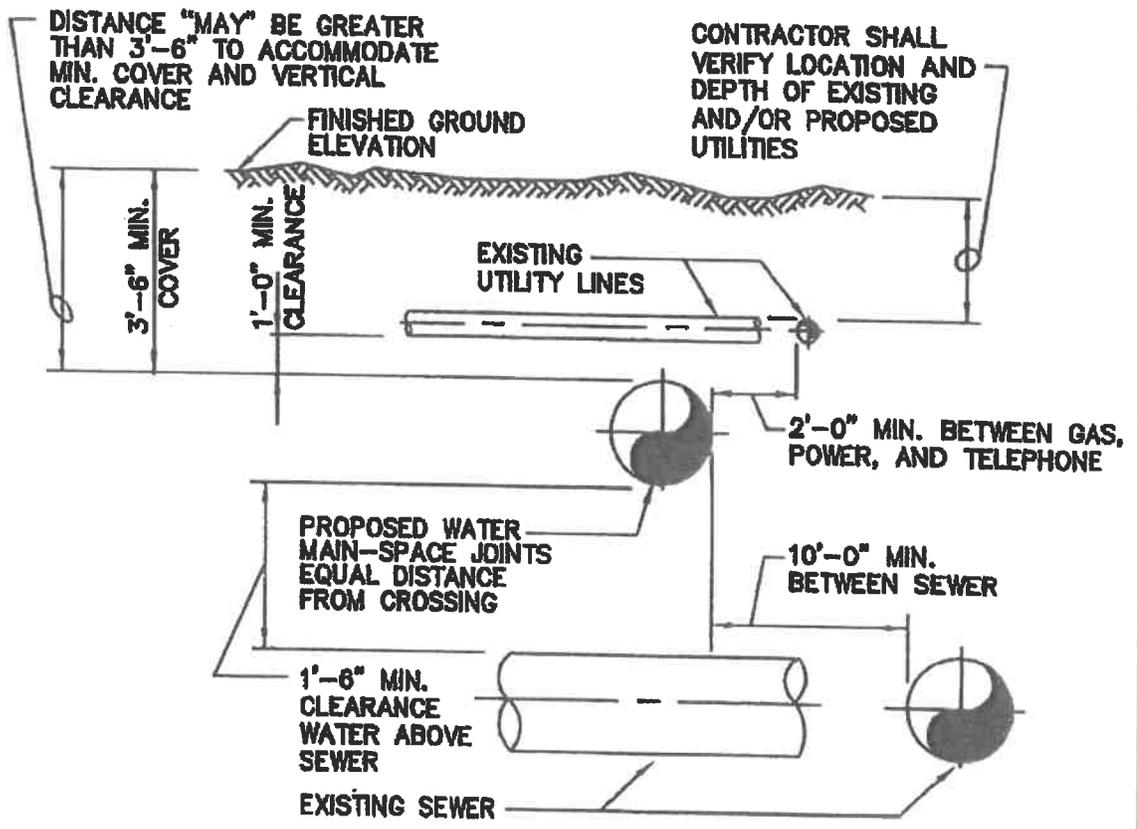


NOTES

1. MATERIALS ARE DUCTILE IRON ASTM A-48 CLASS 30
2. DRILL AND TAP THREE 5/8" HOLES THRU FRAME AT 120° AND 11 1/16" RADIUS
3. SATHER MANUFACTURING CO AWD 2440

4. MANHOLES LOCATED WITHIN NON-PAVED AREAS SHALL REQUIRE THE INSTALLATION OF GREEN FIBERGLASS MARKER POSTS 5' IN LENGTH WITH DECAL STATING "CAUTION SEWER PIPELINE". THE BURIED END SHALL BE "BARBED" OR AN ANCHOR KIT SHALL BE USED AND A CONCRETE COLLAR 5'-6" DIAMETER 4" THICK UNLESS OTHERWISE DIRECTED BY DISTRICT.

MANHOLE FRAME AND COVER



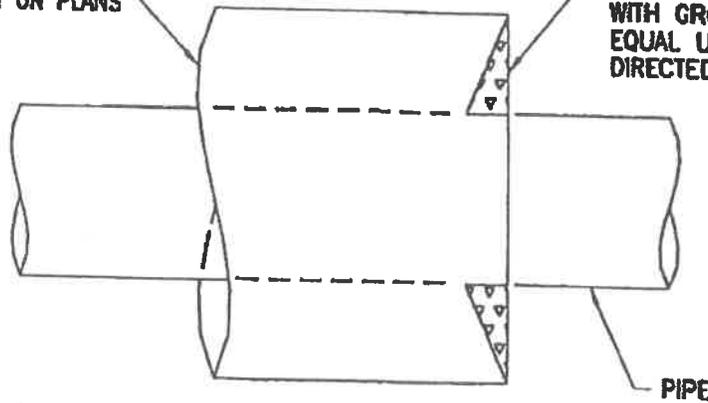
NOTES:

1. REGULATORY AGENCY REQUIREMENTS SHALL SUPERCEDE CITY STANDARDS IF MORE STRINGENT.

TYPICAL UTILITY CROSSING

CASING LENGTH
AS SHOWN ON PLANS

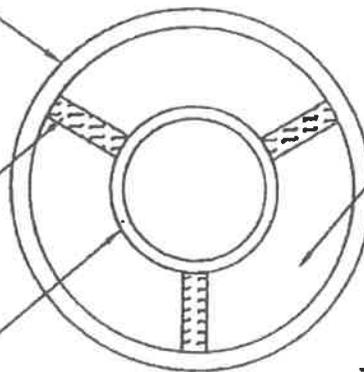
SEAL ENDS OF CASING
WITH GROUT OR APPROVED
EQUAL UNLESS OTHERWISE
DIRECTED.



PIPE

CASING

USE MANUFACTURED
CASING SPACERS. SPACING
TO BE PER MANUFACTURES
REQUIREMENTS.
INSTALL AS DIRECTED



FILL ANNULAR SPACE
METHOD TO BE APPROVED
BY AAWD.

PIPE

CASING TABLE
SCHEDULE 20 STEEL PIPE
UNLESS OTHERWISE INDICATED

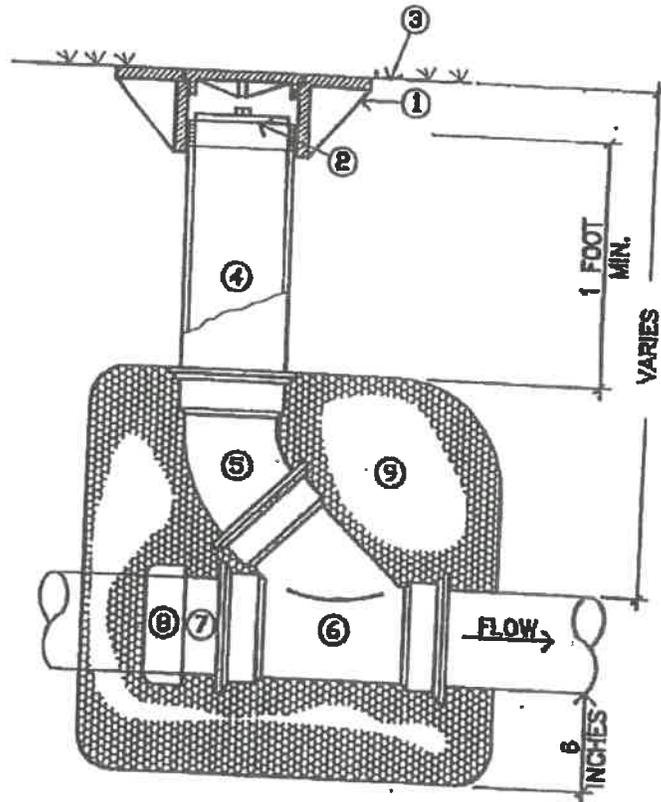
PIPE DIAMETER	MIN. CASING DIAMETER
6	12
8	14
10	16
12	18
14	20
16	22

NOTES:

1. COMPLY WITH ALL REGULATORY REQUIREMENTS OF JURISDICTIONAL AUTHORITY.
2. PRESENT PROPOSED METHOD FOR BLOCKING AND SUPPORTING PIPE WITHIN CASING TO ENGINEER FOR APPROVAL.
3. PIPE SHALL BE DUCTILE IRON RESTRAINED JOINT WITHIN CASING.

**CASING DETAIL FOR
SEWER**

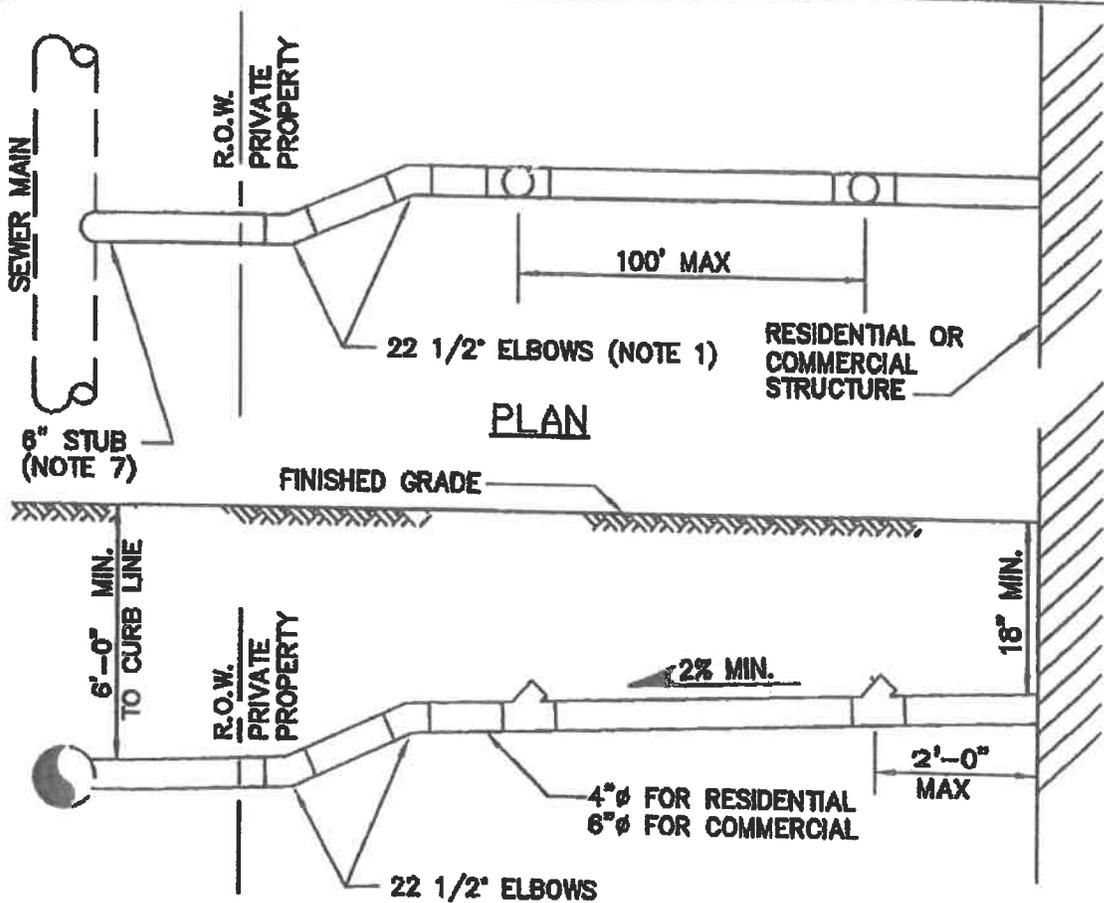
- ①-ALUMINUM OR CAST IRON FOOTIGHT VALVE CASING COVER OR EQUAL.
 - ②-THREADED PVC PLUG
 - ③-RESTORATION SHALL BE IN ACCORDANCE WITH TYPICAL TRENCH REPAIR DETAIL
 - ④-PVC STAND PIPE
 - ⑤-PVC 45 BEND
 - ⑥-PVC 45 DEGREE WYE
 - ⑦-SHORT PVC STUB
 - ⑧-PVC CAP OR PIPE AS DICTATED BY PLANS
 - ⑨-PEA GRAVEL OR BUCKSHOT
- ALL JOINTS SHALL BE GASKETED



CLEANOUT ASSEMBLY DETAIL

NO SCALE

PROVIDE AND INSTALL ENCLOSURE ① ON ALL EXISTING CLEANOUT ASSEMBLIES. ADJUST EXISTING CLEANOUT ASSEMBLIES SO ENCLOSURE IS FLUSH WITH IMPROVEMENT.



PLAN

ELEVATION

NOTES:

1. ELBOWS SHALL NOT BE GREATER THAN 45°. MINIMUM DISTANCE BETWEEN BENDS SHALL BE 4'.
2. CLEAN OUT IS REQUIRED FOR EACH PIPE LENGTH GREATER THAN 100' AND FOR EACH 90° ACCUMULATED ELBOW/100'
3. BACKFILL FOR PAVED AREA SHALL BE 5/8" MINUS CRUSHED SURFACING TOP COURSE, COMPACTED IN 12" LIFTS
4. ALL PLUMBING OUTLETS SHALL BE CONNECTED TO THE SEWER. NO DOWNSPOUTS OR STORM DRAINAGE MAY BE CONNECTED TO THE SEWER SYSTEM.
5. 18" MINIMUM COVERAGE OVER PRIVATE SIDE SEWER.
6. LAY PIPE IN STRAIGHT LINE BETWEEN BENDS. MAKE ALL CHANGES IN GRADE OR LINE WITH AN ELBOW OR WYE. 90° CHANGE WITH AN ELBOW AND WYE.
7. 4" SEWER PIPE MINIMUM SIZE ON PRIVATE RESIDENTIAL PROPERTY. 6" SEWER PIPE MIN. SIZE ON COMMERCIAL PROPERTIES. 2% MINIMUM GRADE, 100% MAXIMUM.
8. ALL CONSTRUCTION REQUIRES A PERMIT AND PAYMENT OF FEE COMPLETE LEGAL DESCRIPTION OF PROPERTY AND DIMENSIONS.
9. AS-BUILT DRAWING SHOWING LOCATION OF SIDE SEWER IN RELATION TO THE HOUSE IS REQUIRED AFTER INSTALLATION.
10. CONSTRUCTION IN RIGHT-OF-WAY SHALL BE PERFORMED BY A REGISTERED LICENSED CONTRACTOR.
11. RIGHT-OF-WAY RESTORATION SHALL MATCH OR EXCEED THE ORIGINAL CONDITION.
12. PRE-TREATMENT SYSTEMS REQUIRE DESIGN SUBMITTAL STAMPED BY LICENSED ENGINEER.

**PRIVATE SIDE
SEWER INSTALLATION**

WRAP MARKER TAPE AROUND SERVICE MARKER BOARD. 4 WRAPS MINIMUM.

INSTALL BURIED METALLIC MARKER TAPE. TAPE SHOULD READ "CAUTION BURIED SEWER BELOW". CARLTON IND., BLACKBURN MFG. CO. OR EQUAL.

6" SIDE SEWER SHALL BE THE SAME MATERIAL AS THE MAIN LINE

6" TEE ON SEWER MAIN

SEWER MAIN

FINISHED GRADE

APPROVED WATERTIGHT PLUG

PROPERTY LINE
PERMANENT EASEMENT LINE

2" X 4" BOARD SERVICE MARKER

4'-0"

6'-0" MINIMUM

VARIABLE

3"

MINIMUM SLOPE
0.02 FT./FT.

45 DEGREES MAXIMUM SLOPE FOR PVC
2 % MINIMUM SLOPE

CONCRETE POURED IN PLACE
SIDE SEWER OVER 15% SLOPE

1'-0"

NOTES:

1. 2" X 4" BOARD - LENGTH AS REQUIRED IN EVEN FOOT INCREMENTS. PAINT TOP 5' WITH WHITE PAINT. STENCIL IN BLOCK LETTERS THE WORD "SEWER" & TOTAL LENGTH OF THE 2" X 4" BOARD. LETTERING TO BE 3" IN HEIGHT. TOP OF 2" X 4" SHALL BE 4' ABOVE GROUND LEVEL.
2. FOR DUCTILE IRON PIPE USE JOINT RESTRAINING DEVICE AS SPECIFIED BY DISTRICT.

**SIDE SEWER
NEW CONSTRUCTION**

WRAP MARKER TAPE AROUND SERVICE MARKER BOARD. 4 WRAPS MINIMUM.

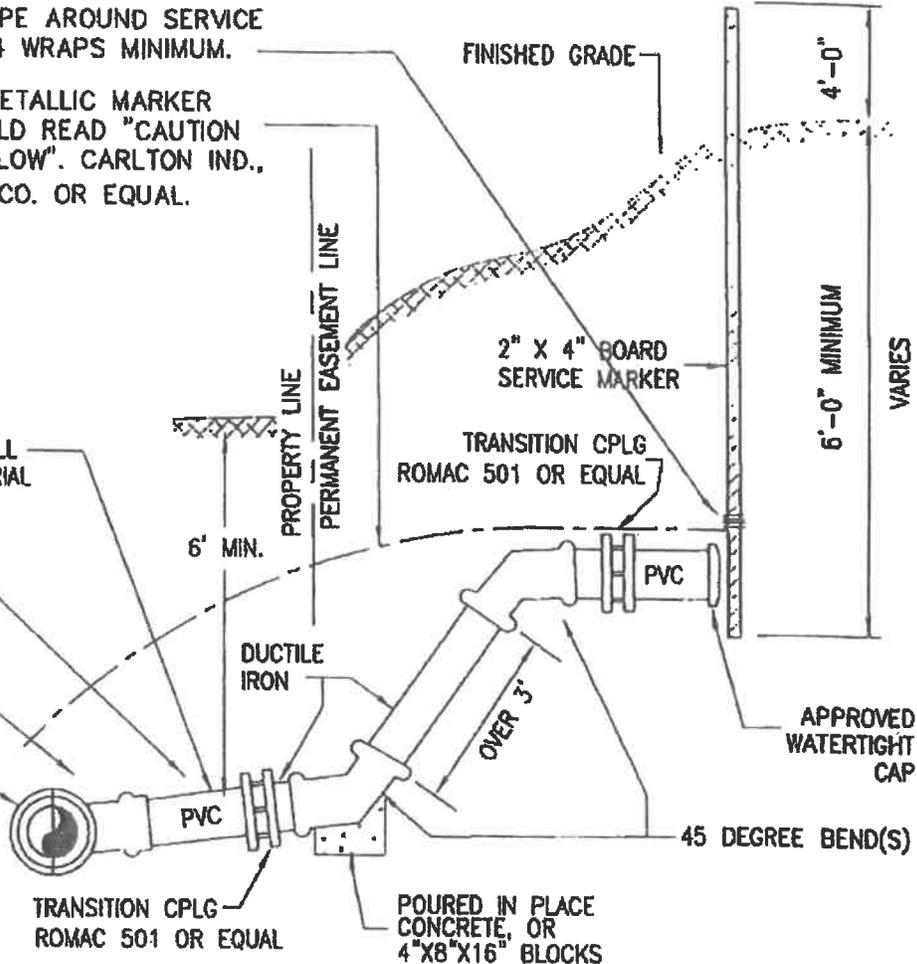
INSTALL BURIED METALLIC MARKER TAPE. TAPE SHOULD READ "CAUTION BURIED SEWER BELOW". CARLTON IND., BLACKBURN MFG. CO. OR EQUAL.

6" SIDE SEWER SHALL BE THE SAME MATERIAL AS THE MAIN LINE

MINIMUM SLOPE 0.02 FT./FT.

6" TEE ON SEWER MAIN

SEWER MAIN

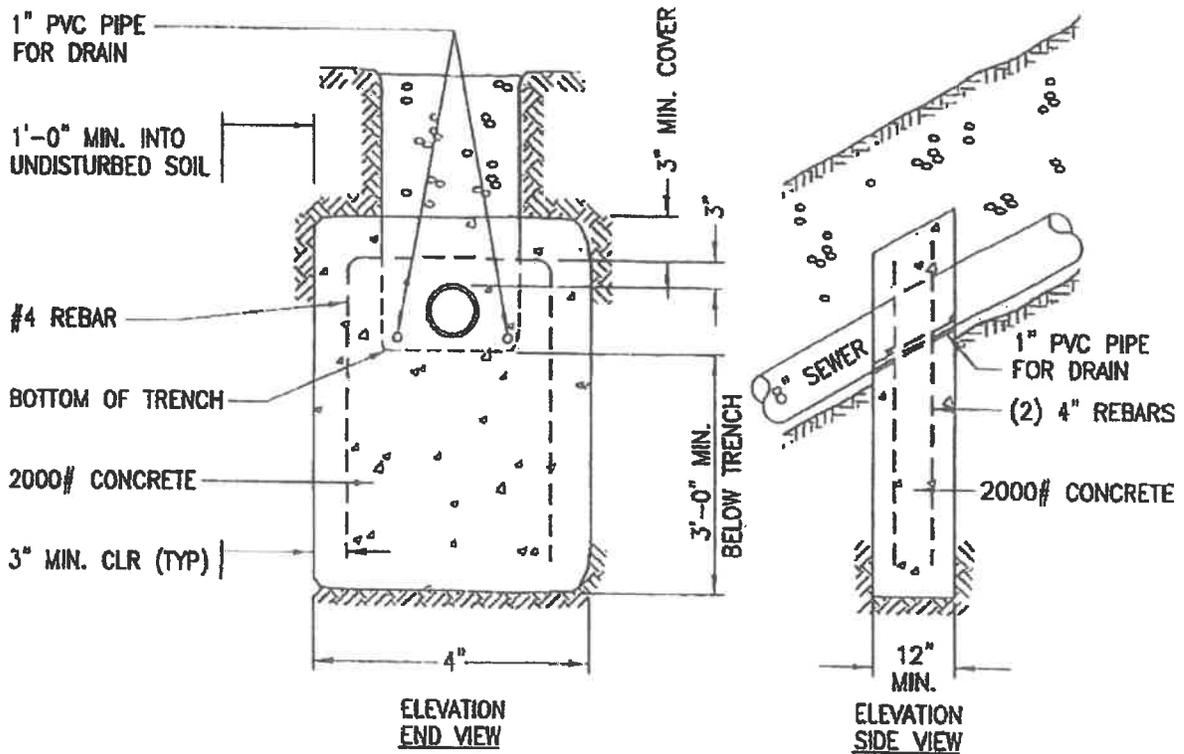


NOTES:

1. 2" X 4" BOARD - LENGTH AS REQUIRED IN EVEN FOOT INCREMENTS. PAINT TOP 5' WITH WHITE PAINT. STENCIL IN BLOCK LETTERS THE WORD "SEWER" & TOTAL LENGTH OF THE 2" X 4" BOARD. LETTERING TO BE 3" IN HEIGHT. TOP OF 2" X 4" SHALL BE 4' ABOVE GROUND LEVEL.
2. IF SLOPE OF PIPE IS OVER 45 DEGREES, AND LENGTH BETWEEN VERTICAL BENDS IS GREATER THAN 3 FEET, TRANSITION TO DUCTILE IRON USING APPROVED GASKETED TRANSITION COUPLINGS.
3. FOR DUCTILE IRON PIPE USE JOINT RESTRAINING DEVICE AS SPECIFIED BY DISTRICT.
4. NO VERTICAL BENDS IN THE RIGHT-OF-WAY.

5. ALTERNATE SIDE SEWER IS INTENDED FOR THOSE SPECIAL CASES WHERE THE LOCATION AND GRADE OF THE STRUCTURE DOES NOT PROVIDE FOR A NORMAL SEWER INSTALLATION AND SHALL REQUIRE APPROVAL BY THE DISTRICT PRIOR TO INSTALLATION.

**ALTERNATE SIDE SEWER
NEW CONSTRUCTION**



MINIMUM ANCHORAGE SPACING:

Not over 36 feet center to center on grades 20 percent and up to 35 percent.

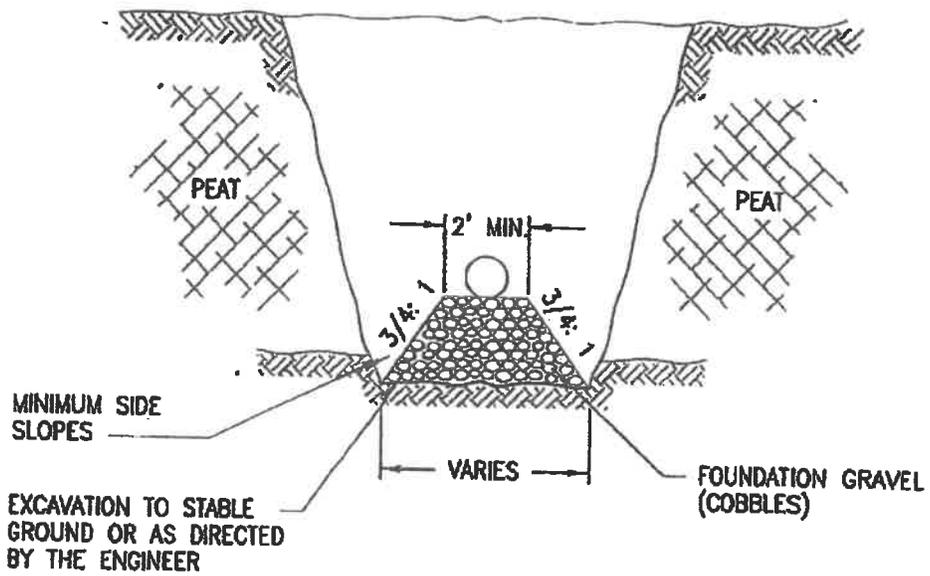
Not over 24 feet center to center on grades 35 percent and up to 50 percent.

Not over 16 feet center to center on grades 50 percent and over.

NOTE:

1. REQUIRED ON ALL PIPES WHERE SLOPE EQUALS 20% OR GREATER
2. PROVIDE EROSION CONTROL AS REQUIRED BY JURISDICTIONAL AUTHORITY.

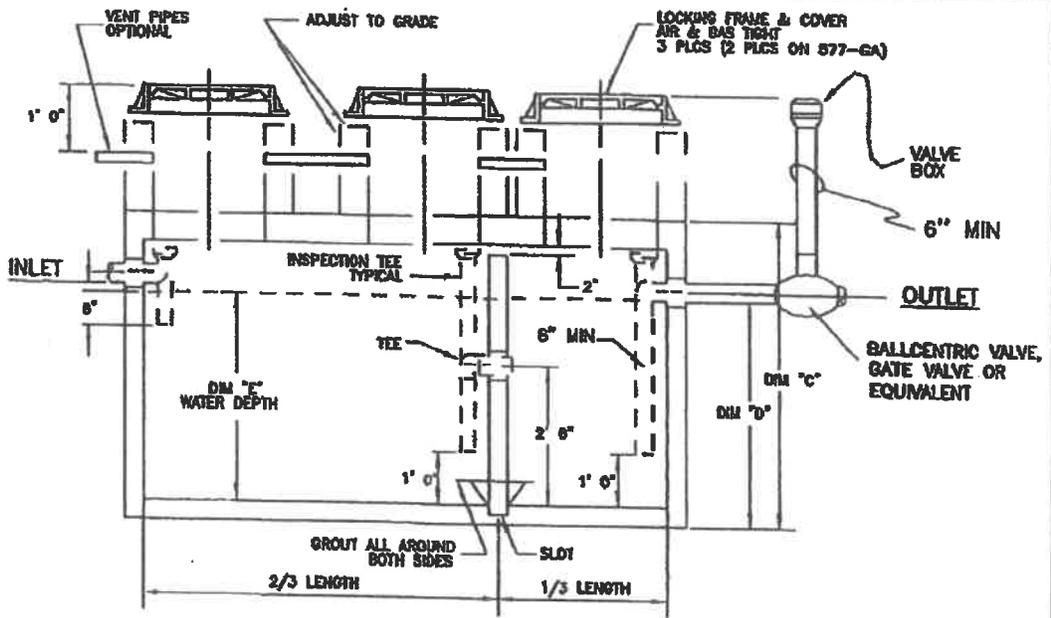
**CONCRETE ANCHOR FOR
SEWER MAIN IN STEEP SLOPES**



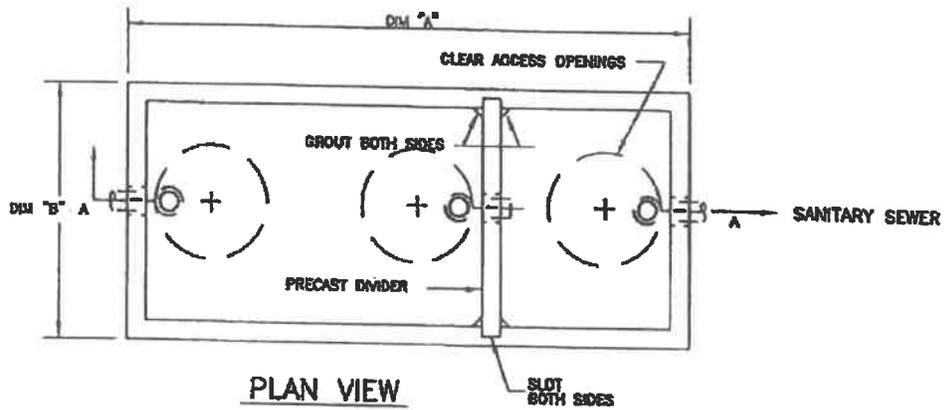
NOTE:

1. OVER EXCAVATION REQUIRED WHEN UNSUITABLE FOUNDATION MATERIALS ENCOUNTERED.
2. STRICTLY COMPLY WITH ALL TRENCH SAFETY SYSTEM REQUIREMENTS.

**UNSUITABLE FOUNDATION
EXCAVATION**



SECTION VIEW AA



PLAN VIEW

NOTES:

1. CONCRETE: 28 DAY COMPRESSIVE STRENGTH
fc = 4500 psi
2. REBAR: ASTM A-616 GRADE 60
3. MESH: ASTM A-185 GRADE 65
4. DESIGN: ACI-318-83 BUILDING CODE
ASTM C-857 "MINIMUM STRUCTURAL DESIGN
LOADING FOR UNDERGROUND PRECAST CONCRETE
UTILITY STRUCTURES"

* SEE CITY STANDARD NO. 406.2
FOR ADDITIONAL NOTES

	DIM "A"	DIM "B"	DIM "C"	DIM "D"	WATER DEPTH DIM "E"
600	7'-0"	4'-8"	7'-0"	3'-6"	3'-2"
750	7'-0"	4'-8"	7'-0"	4'-3"	3'-11"
850	7'-0"	4'-8"	7'-0"	5'-3"	4'-11"
1000	9'-0"	8'-0"	7'-2"	4'-2"	3'-10"
1250	9'-0"	8'-0"	7'-2"	5'-2"	4'-10"
1500	11'-2"	8'-8"	7'-2"	4'-4"	4'-0"
1750	11'-2"	8'-8"	7'-2"	4'-11"	4'-7"
2000	12'-8"	8'-8"	8'-0"	4'-7"	3'-10"
2500	12'-8"	8'-8"	8'-0"	5'-6"	4'-9"
2750	12'-8"	8'-8"	8'-0"	8'-0"	8'-3"
3000	15'-7"	9'-7"	8'-8.5"	8'-0"	3'-9"
4000	15'-7"	9'-7"	8'-8.5"	8'-3"	8'-0"
5000	19'-11"	9'-11"	8'-11"	8'-2"	4'-9"
6000	19'-11"	9'-11"	8'-11"	7'-2"	8'-8"



**PUBLIC WORKS
DEPARTMENT**

GREASE INTERCEPTOR

**CITY OF BURLINGTON
DESIGN STANDARDS FOR GREASE INTERCEPTORS**

1. Submit a completed Fats, Oil and Grease Discharge Survey to the Sewer Department for review.

2. Sizing Criteria:

The sizing formula of the grease interceptor shall be determined by using the following formula: seating capacity or the number of meals served per peak hour, whichever is greater, x 6.0 gallons x 2.5 hours x storage factor = interceptor size in gallons.

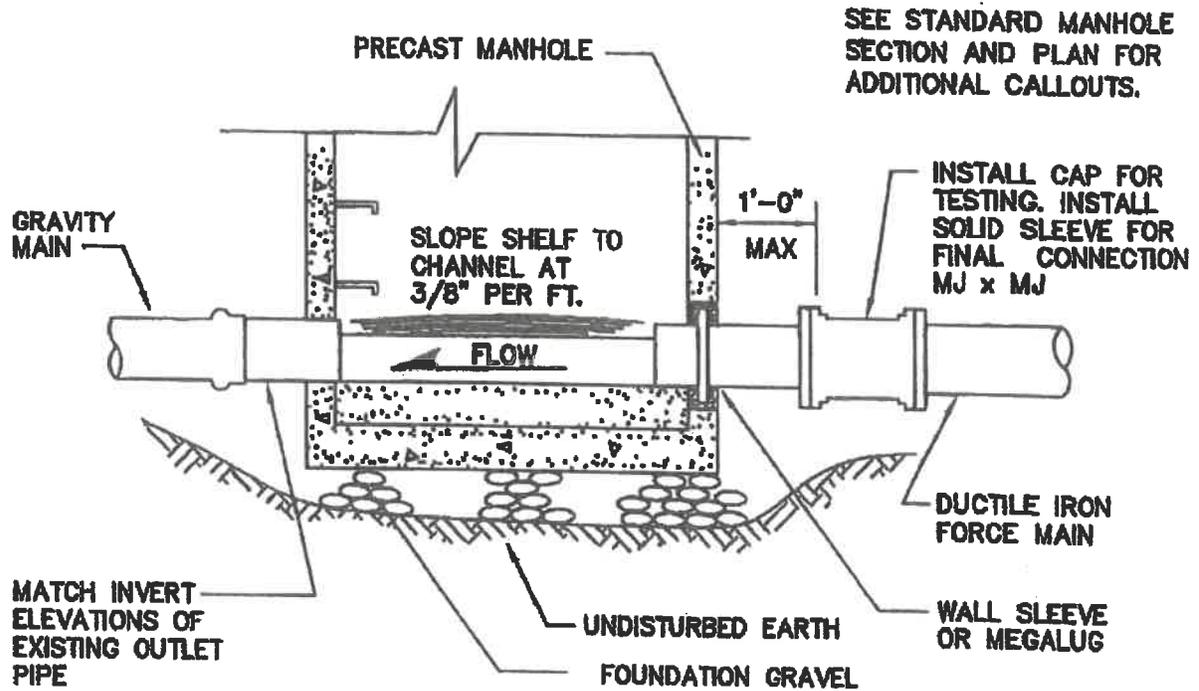
Storage factor shall be as follows:

Facilities open less than 16 hours = 1

Facilities open for 16 hours or more = 2

Facilities open for 24 hours = 3

3. The plans and specifications shall illustrate the following:
Property boundary lines
Piping and drainage details as well as the connection to the sanitary sewer.
Detail and elevation drawings of the grease interceptor.
4. Effluent from grease interceptor shall not exceed 100 mg/l of fats, oil and grease discharge into the sanitary sewer system.
5. The grease interceptor shall be installed and connected such that it shall be easily accessible for inspection and cleaning at all times.
6. Grease interceptors shall be a two compartment tank with at least a 24" diameter manhole cover. (example utility vault 814-ga)
7. The piping shall be constructed to establish "PARALLEL FLOW" (90 degrees to the baffle) through the grease interceptor. No radius, bend or elbow shall be allowed in the inlet pipe for a minimum of 10 feet or 20 pipe diameters whichever is greater upstream of the interceptor.
8. All grease interceptors shall be filled with clean water before use.
9. The property owner shall retain ownership of the grease interceptor and side sewer lines and shall be responsible for their operation and maintenance per the City Pretreatment Policy.
10. The property owner shall report immediately to the city any spill, surcharge, bypass or mechanical fault or failure which interrupts or otherwise reduces the capacity or removal efficiency of the grease interceptor.



NOTES:

1. PIPE CONNECTIONS TO MANHOLES SHALL BE AS FOLLOWS:
 PVC PIPE: CAST OR GROUT A MANHOLE COUPLING INTO WALL.
 D.I. OR PVC PIPE: CORE THE MANHOLE AND CONNECT SEWER PIPE WITH A WATER TIGHT FLEXIBLE RUBBER BOOT IN MANHOLE WALL, KOR-N-SEAL BOOT OR EQUAL, EXCEPT FOR FORCE MAIN CONNECTION
2. DROP OF GRADE THROUGH MANHOLE SHALL BE 0.10', UNLESS OTHERWISE NOTED.
3. ALIGN FORCE MAIN DISCHARGE WITH OUTLET PIPE.
4. RESTRAIN FORCE MAIN JOINTS AND FITTINGS

**FORCE MAIN DISCHARGE
MANHOLE**

3/4" REDUCED PRESSURE PRINCIPAL BACKFLOW PREVENTER IN ACCORDANCE WITH CURRENT WA ST DEPT OF HEALTH STANDARDS. PROVIDE TAP FOR INSTALLATION OF A PRESSURE GAUGE. INSTALLATION METHOD SUBJECT TO CITY APPROVAL. FEBCO 825Y TO BE INSTALLED ABOVE GRADE, WRAPPED WITH HEAT TAPE AND PROTECTED FROM IMPACT. APPLY 2" FIBERGLASS OVER THE HEAT TAPE. INITIAL & ANNUAL TEST REQUIRED.

"HOT BOX" INSULATED ENCLOSURE UNIT NO. HB1, MODEL NO. 1

**HOSE BIB
PIPE SUPPORT**

ELECT. CONDUIT

PROVIDE HEAT TAPE

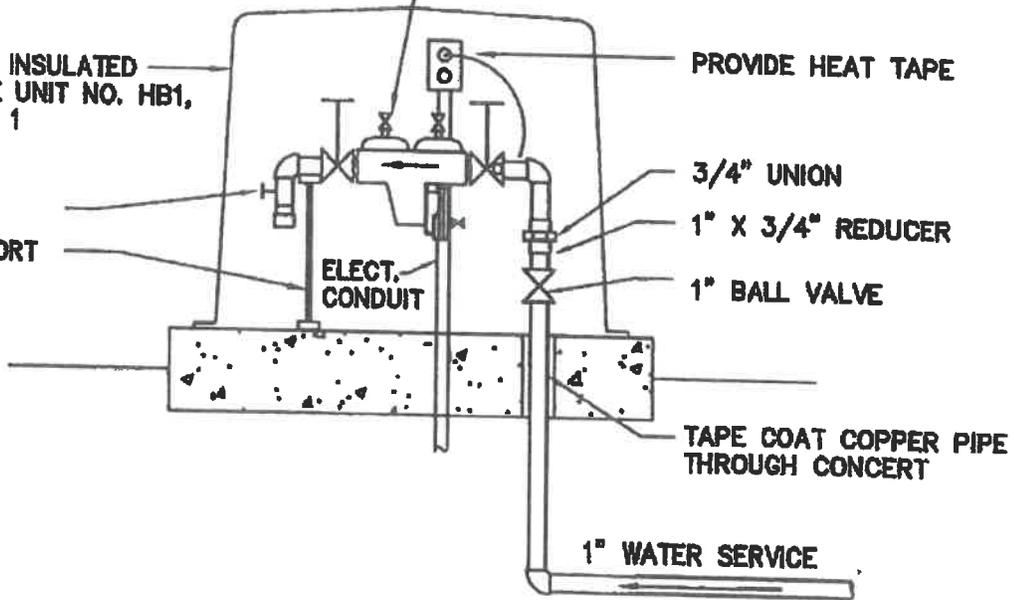
3/4" UNION

1" X 3/4" REDUCER

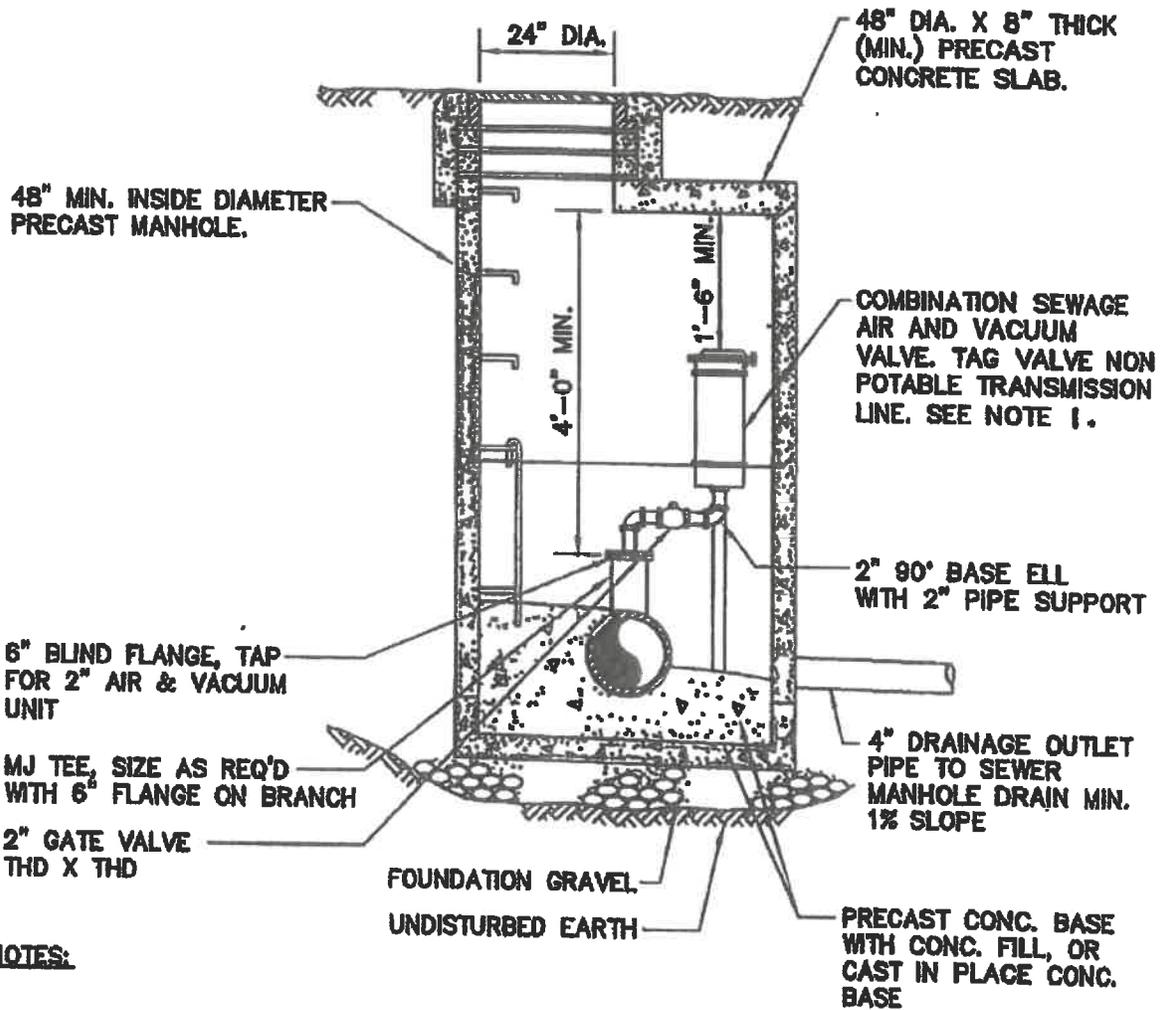
1" BALL VALVE

TAPE COAT COPPER PIPE THROUGH CONCERT

1" WATER SERVICE



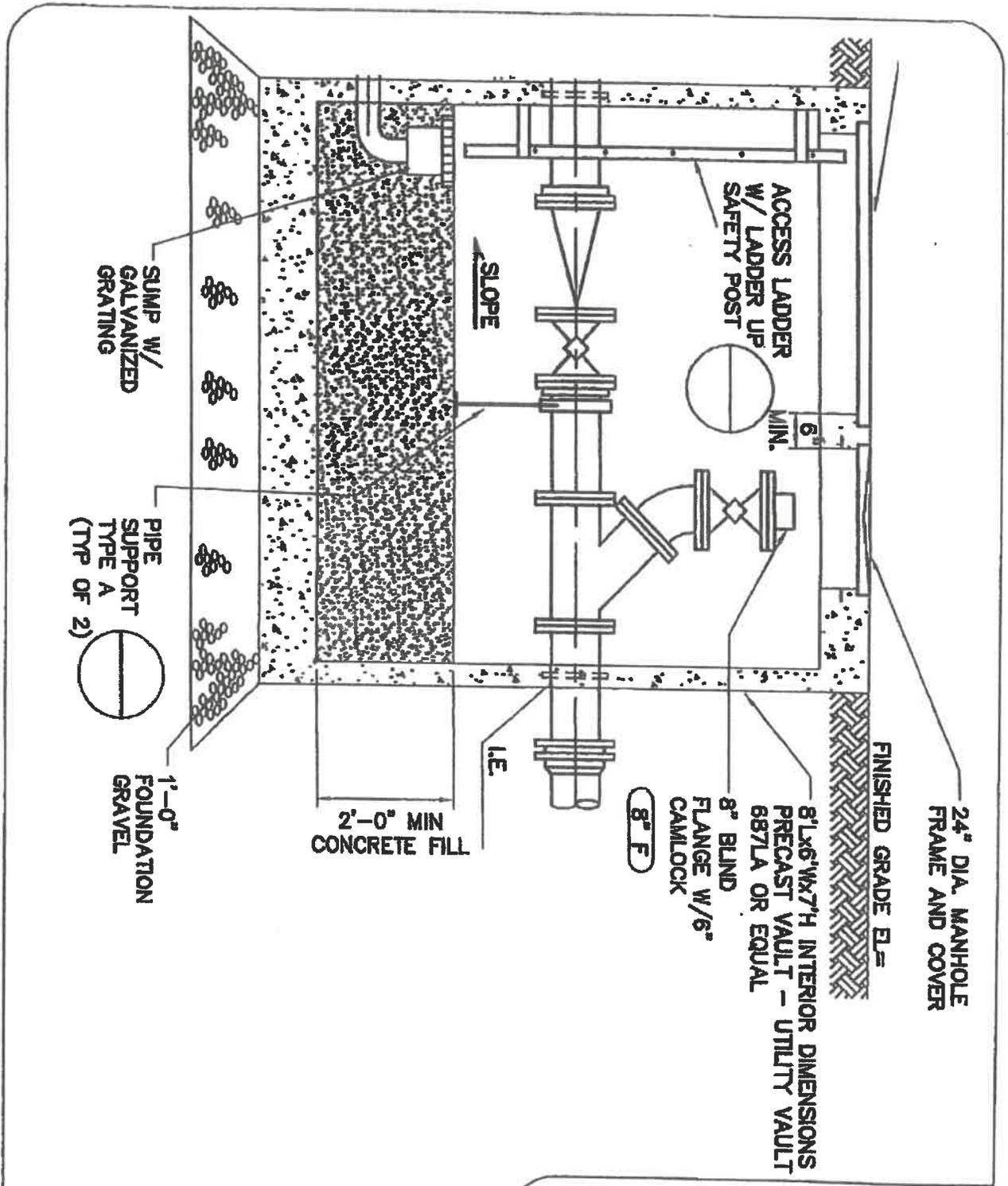
3/4" RPBA BACKFLOW PREVENTER



NOTES:

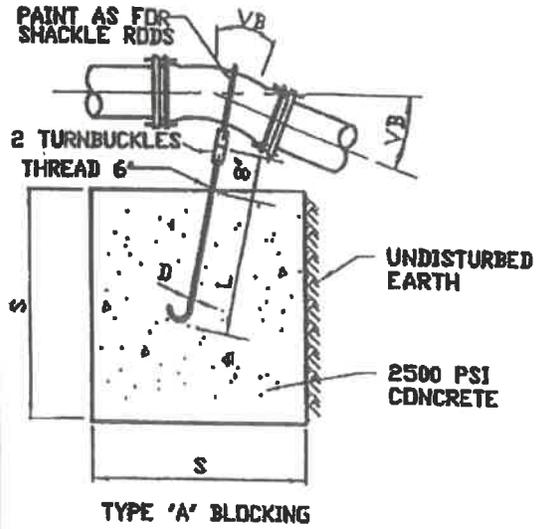
1. APCO, CRISPIN OR VALMATIC HEAVY-DUTY COMBINATION AIR AND VACUUM VALVE (SHORT BODY) W/STAINLESS STEEL INTERNALS, EPOXY COATING AND FLUSHING ATTACHMENTS. SEATS SHALL BE SUPPLIED FOR THE FOLLOWING WORKING PRESSURES: 20 PSI, 20-150 PSI.
2. 2" PIPING AND FITTINGS SHALL BE BRASS.

SANITARY SEWER AIR AND VACUUM RELEASE ASSEMBLY



EMERGENCY PUMP CONNECTION

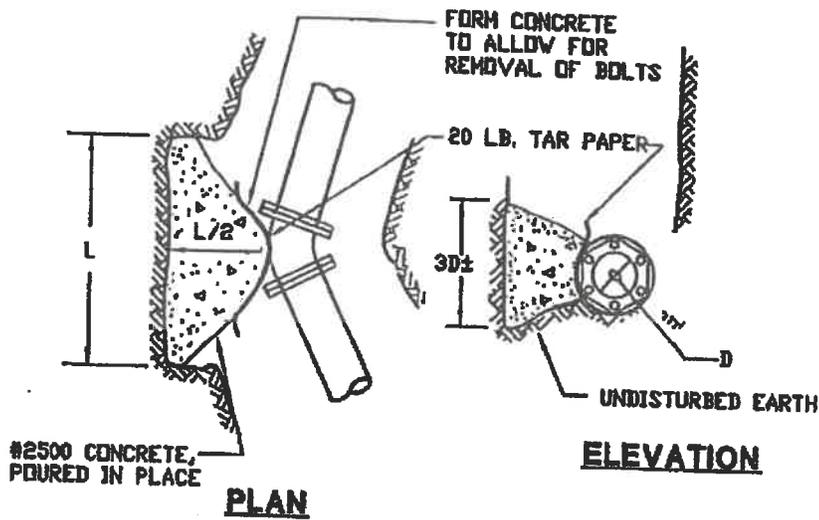
TYPE 'A' BLOCKING FOR 11 1/4°-22 1/2°-30° VERTICAL BENDS						
PIPE SIZE NOMINAL DIAMETER-- INCHES	TEST PRESSURE PSI	VB	S	D	L	
		VERTICAL BEND DEGREES	No. OF CU. FT. OF CONC. BLOCKING	SIDE OF CUBE LIN. FT.	DIAM. OF SHACKLE RODS (Ø) INCHES	DEPTH OF RODS IN CONCRETE LIN. FT.
14"	75	11 1/4	15	2.5	3/4"	2.0
		22 1/2	31	3.2		2.0
20"	75	11 1/4	31	3.2	3/4"	2.0
		22 1/2	61	4.0		2.0
24"	75	11 1/4	43	3.5	3/4"	2.5
		22 1/2	87	4.5		2.5



VERTICAL ANCHOR BLOCK

NTS

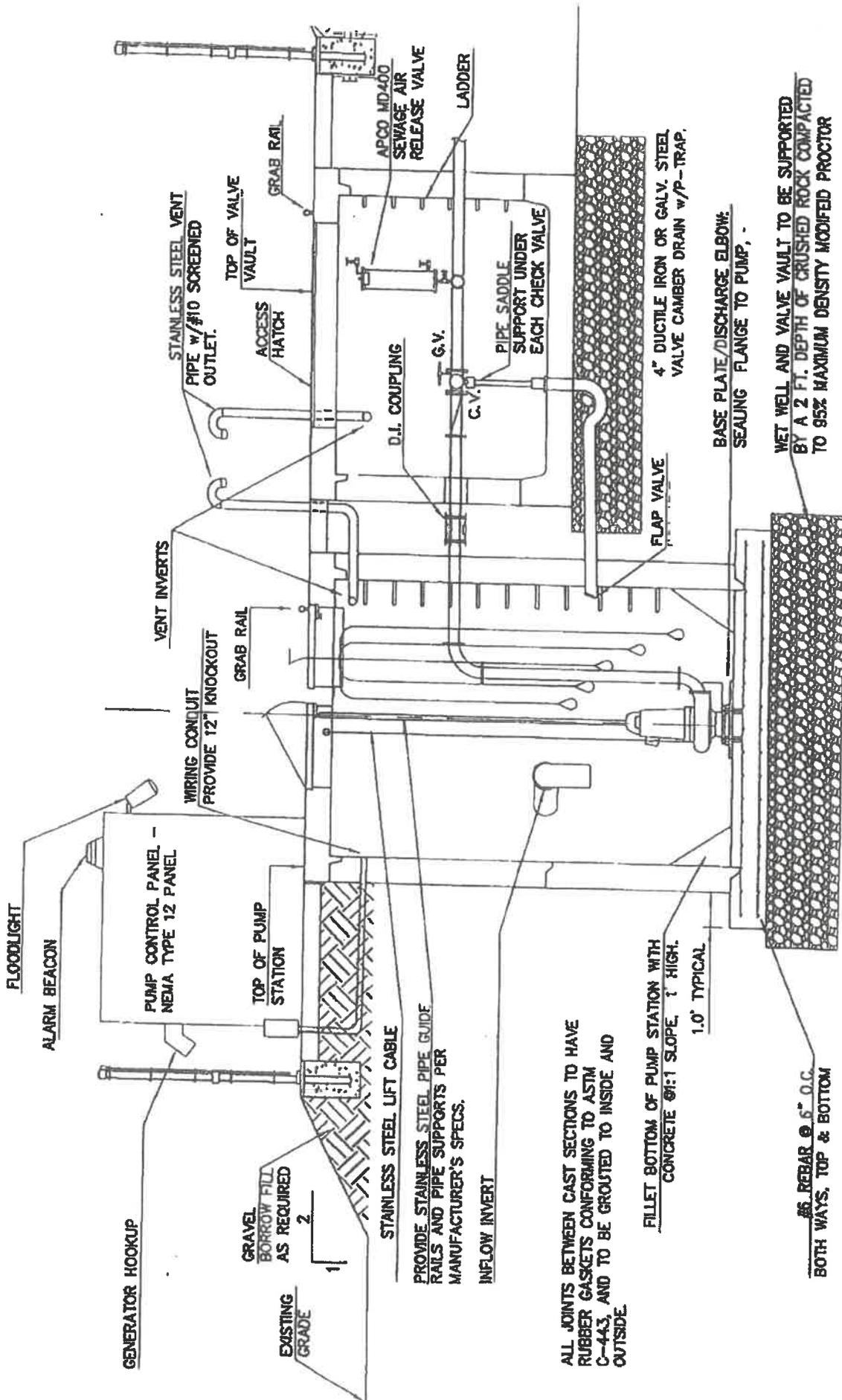
MINIMUM BEARING AREA TABLE				
FITTING D	90°	45°	22-1/2°	11 1/4°
14'	17 SQ.FT.	9 SQ.FT.	5 SQ.FT.	2 SQ.FT.
20'	34 SQ.FT.	18 SQ.FT.	9 SQ.FT.	5 SQ.FT.
24'	48 SQ.FT.	26 SQ.FT.	13 SQ.FT.	7 SQ.FT.

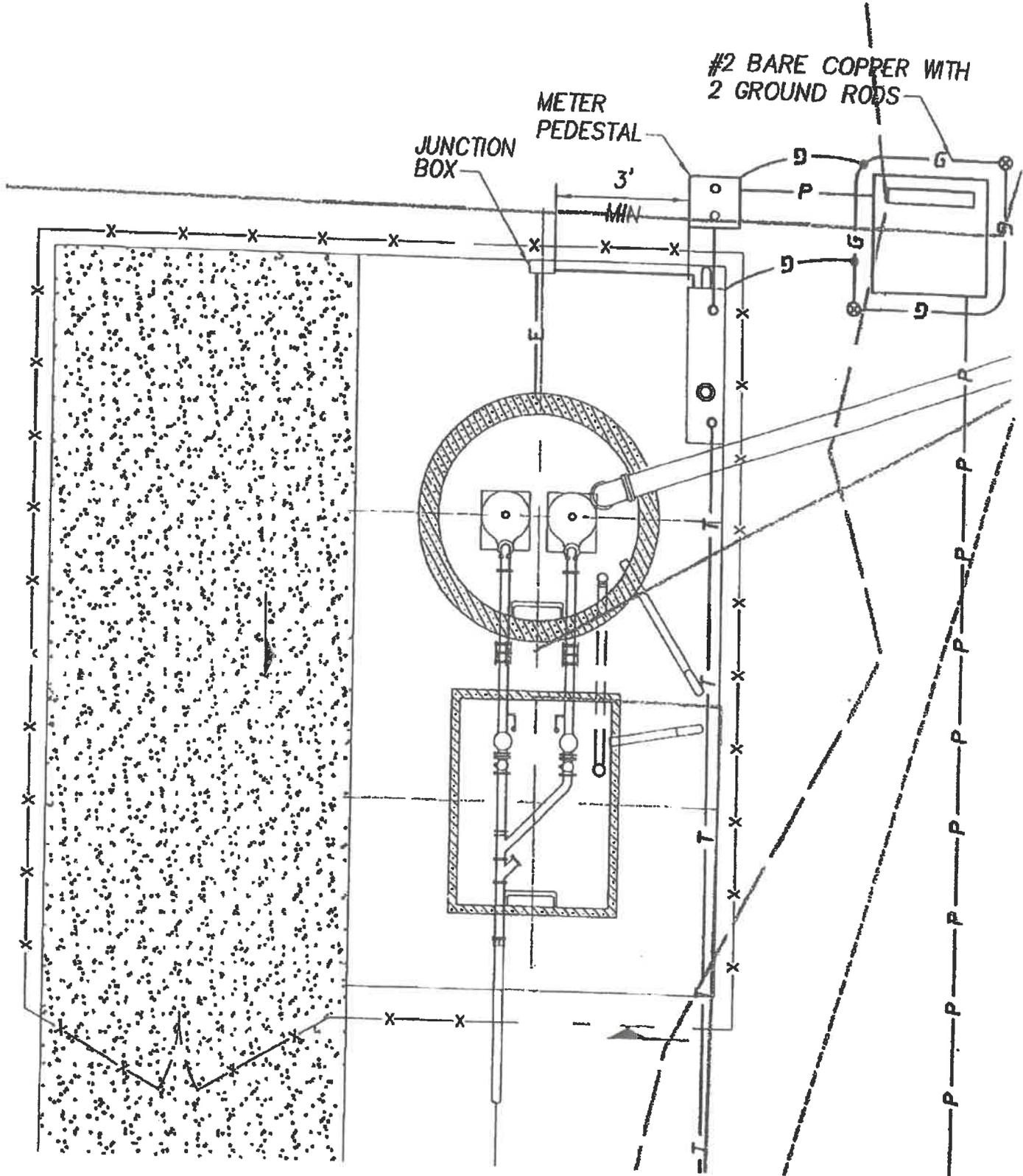


NOTES:

- ① BEARING AREA TABLE BASED ON 75 PSI PRESSURE AND 1500 PSF SOIL BEARING. IF HIGHER PRESSURE IS CREATED OR SOIL BEARING IS LESS, THE THRUST BLOCK SIZE SHALL BE INCREASED.
- ② THIS TABLE REPRESENTS THE 'MINIMUM' CONSTRUCTION STANDARDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE APPROPRIATE SIZE OF ALL THRUST BLOCKS BASED ON EXISTING AND LOCAL CONDITIONS.

THRUST BLOCK
NTS





PUMP STATION PLAN

6' CHAIN LINK FENCE.
PROVIDE WOOD SLATS FOR
SCREENING.

1.0' - TYPICAL
2

STAINLESS STEEL POWER
CORD & FLOAT SWITCH
BRACKET

6" FOUNDATION
GRAVEL, TYP.
CRUSHED SURFACING
BASE COURSE, TYP.

EXISTING LADDER
EXISTING 6'-0" I.D.
WET WELL
STAINLESS STEEL RAILS
- 2 PER PUMP, 4 TOTAL
LENGTH TO FIT. SEE
SPEC. SECTION 11313

316 STAINLESS STEEL
LIFTING CABLE - SECURE
NEAR HATCH OPENING
1" SCHEDULE 80
PVC PIPE
ULTRASONIC
LEVEL SENSOR

SUBMERSIBLE
CENTRIFUGAL
PUMP NO. 1
[PS 10-1]
EXISTING GROUT
FILLET
EXISTING EL. = 1.10
CONTRACTOR
TO VERIFY
EXISTING TRENCH

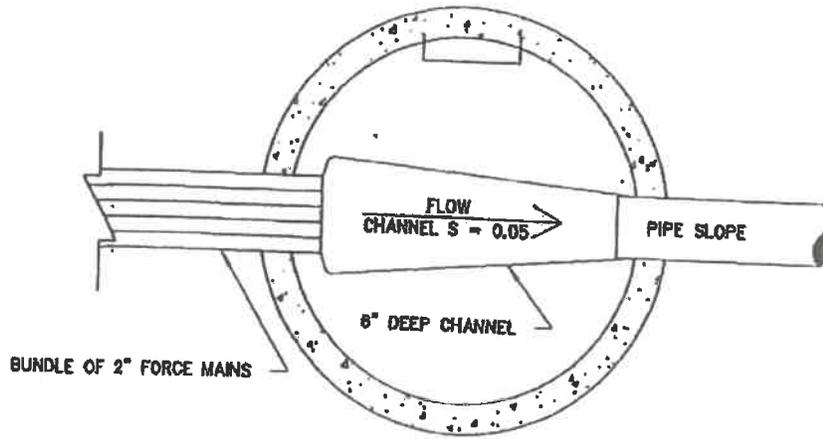
STAINLESS STEEL POWER
CORD & FLOAT SWITCH
BRACKET
1'-0" MIN.
1'-0" MIN.
1'-0" MIN.
12" COMPACTED
CRUSHED SURFACING
BASE COURSE

INTERMEDIATE GUIDE
RAIL SUPPORT IN
ACCORDANCE WITH PUMP
MANUFACTURER'S
RECOMMENDATIONS
NEW ACCESS LADDER
W/ LADDER-UP SAFETY
POST. SEE DETAIL 3

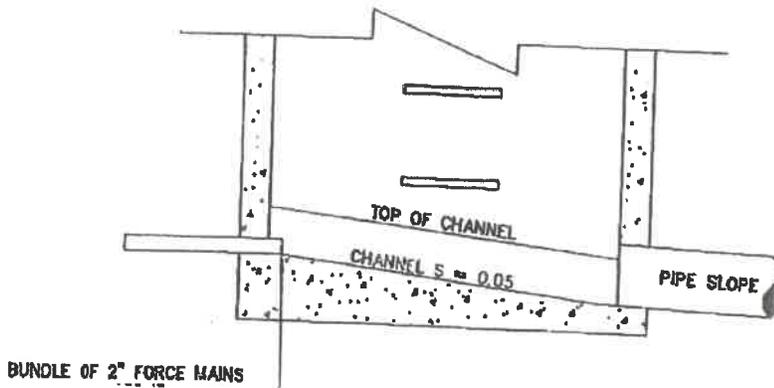
12"x6" ECCENTRIC
REDUCER, FL.
REMOVE PART OF THE GROUT
FILLET TO PROVIDE SHELF
UNDER LADDER FOR STEP
4" GROUT
DISCHARGE ELBOW
ASSEMBLY, FASTEN TO
FLOOR IN ACCORDANCE
WITH MANUFACTURER'S
RECOMMENDATIONS

8"x12" REDUCER,
FL.
4" V
PIPE SUPPORT
SEE SPECS
PRECAST CUSTOM
PANEL VAULT
7'-0"x6'-0"x6'-0" I.D.

WET WELL NTS

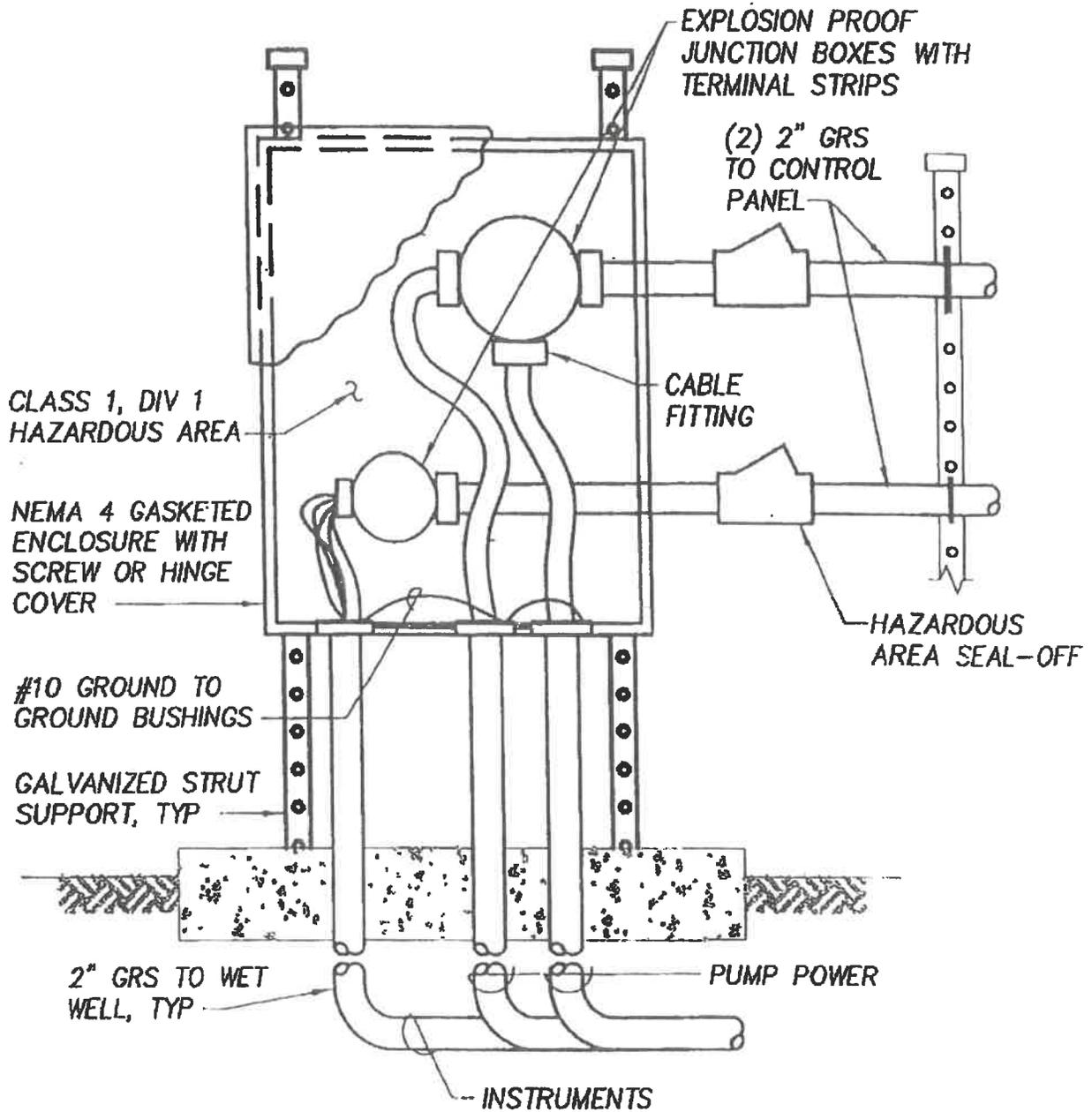


PLAN VIEW



SIDE VIEW

**SANITARY SEWER MANHOLE
WITH FORCE MAIN DETAIL
(NOT TO SCALE)**



JUNCTION BOX ELEVATION

SCALE: NTS

NEMA 12 STEEL ENCLOSURE WITH 3R RATING AND HEATER, FULLY 5' WIDE x 6' TALL x 16" DEEP

480V, 100A, 3 ϕ RECEPTACLE FOR GENERATOR CONNECTION, CROUSE-HINDS AR1041S22 WITH AJ67 ADAPTER. NO SUBSTITUTION ALLOWED. RECEPTACLE SHALL ANGLE DOWN

GALVANIZED STRUT CHANNEL SUPPORT

TO JUNCTION BOX

GROUNDING BUSHING ON 2" GRS CONDUIT, TYP

20A GFCI RECEPTACLE

PLUG

FUTURE PHONE DIALER REMOTE ALARM MODULE

ALARM BEACON

FLOOD LIGHT 277, 250W HPS

U.L. #508 DUPLEX PUMP CONTROL LISTED PANEL PROVIDED BY ACKERMAN ELECTRIC COMPANY,

FULLY GASKETED DOUBLE DOOR, LOCKABLE WITH PADLOCK

12" LEGS

CONCRETE EQUIPMENT PAD, 8" DEEP, TYP

TO METER

CONVERT TO 2" PVC WITH PULL CORD TO TELEPHONE HANDHOLE

#6 AWG BARE COPPER CONDUCTOR TO (2) 3/4"x10' GROUND RODS, 10' APART

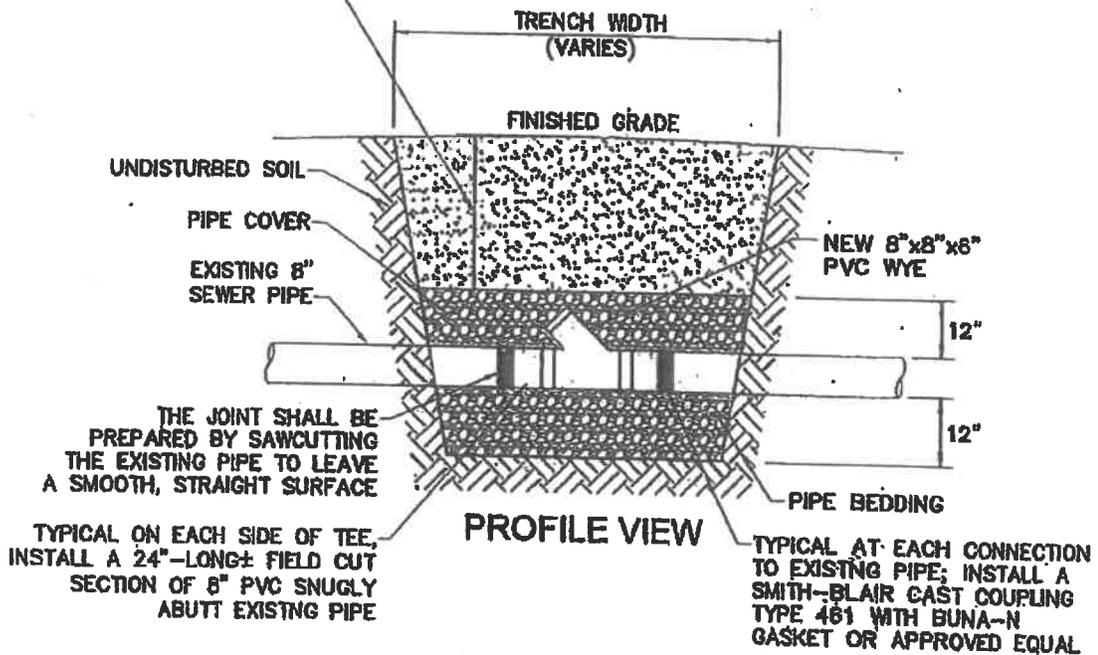
CONTROL PANEL ELEVATION

SCALE: NTS



PLAN VIEW

GRAVEL TRENCH BACKFILL IF BELOW AND WITHIN 5' OF OVERLAY IMPERVIOUS CONDITION, OTHERWISE, NATIVE SOIL BACKFILL.



PROFILE VIEW

CUT-IN SANITARY SEWER WYE DETAIL

NOT TO SCALE

6" ϕ VENT
10" GA. ST'L PIPE
W/ FLANGE

ST'L SCREEN
INSERT AND WELD TO PIPE

1.5"

1'-8"

6" D.I. PIPE
SPOOL (FLXPE)
POUR CONCRETE
SLAB AROUND PIPE

(1) 90° D.I.
BEND (MxMJ)

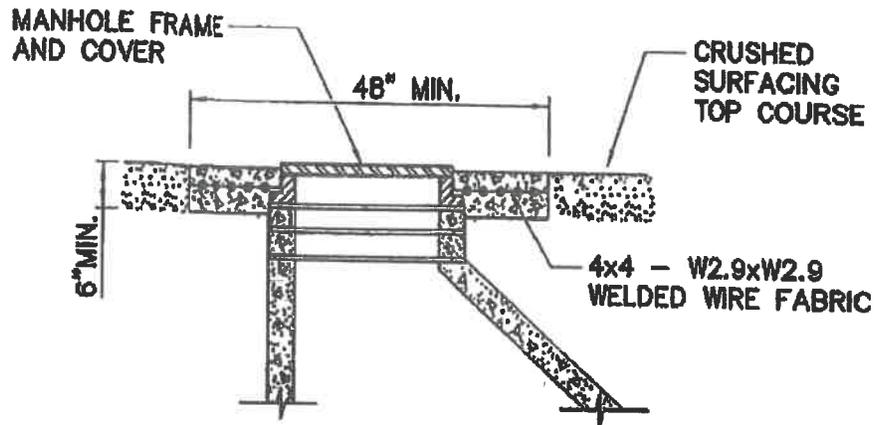
6" (FLXPE) SPOOL
LENGTH AS REQUIRED

CORE DRILL OR KNOCKOUT
TO BE PROVIDED. CONCRETE
OR MORTAR FILL AROUND PIPE
WHEN PLACED

NOTES:

1. HOT DIP GALV. VENT. "CANE" WITH FLANGE AFTER FABRICATION.

VENT DETAIL



NOTES:

1. POUR 4'x4'x6" MANHOLE CONCRETE COLLAR AROUND ALL MANHOLES IN UNPAVED AREAS.

MANHOLE CONCRETE COLLAR
NOT TO SCALE