

TOWN OF MONTVILLE, CT

SANITARY SEWER

MATERIAL AND CONSTRUCTION

STANDARDS



MARCH 2009

TOWN OF MONTVILLE, CONNECTICUT

SANITARY SEWER MATERIAL AND CONSTRUCTION STANDARDS

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Adopted by the MONTVILLE WATER POLLUTION CONTROL AUTHORITY (WPCA) pursuant to Section 7-247 of the General Statutes of the State of Connecticut 1958, as amended.

SECTION 1 PURPOSE

In order to ensure proper construction of the SEWAGE WORKS within the Town of Montville, and to ensure the proper OPERATION AND MAINTENANCE of public SEWERS within said TOWN, the WPCA from time to time establish standard requirements or specifications to regulate the sizes, materials, methods and workmanship to be used in the construction of SEWERS, BUILDING CONNECTORS, oil/water and grease separators, grinder pumps and other similar work and appurtenances thereto connected or intended to be connected or to discharge, directly or indirectly, into any public SEWER of the Town of Montville. Such standard requirements SHALL provide minimum requirements as to size, depth, slope or rate of grade for such pipes, and SHALL regulate the kinds of pipe, fittings, methods of laying, jointing, materials used, manner of connecting to pre-existing SEWER and BUILDING DRAINS, and general considerations as to location and other pertinent features. Any such requirements or specifications as the same MAY from time to time be amended, are hereby made a part of these Material and Construction Standards as provided in Sections 7-246-273a of the General Statutes of the State of Connecticut (1958), as amended, are hereby enacted.

SECTION 2 DEFINITIONS

Where, and as the context will admit, the following terms SHALL have the meanings indicated hereafter where used in these Rules and Regulations.

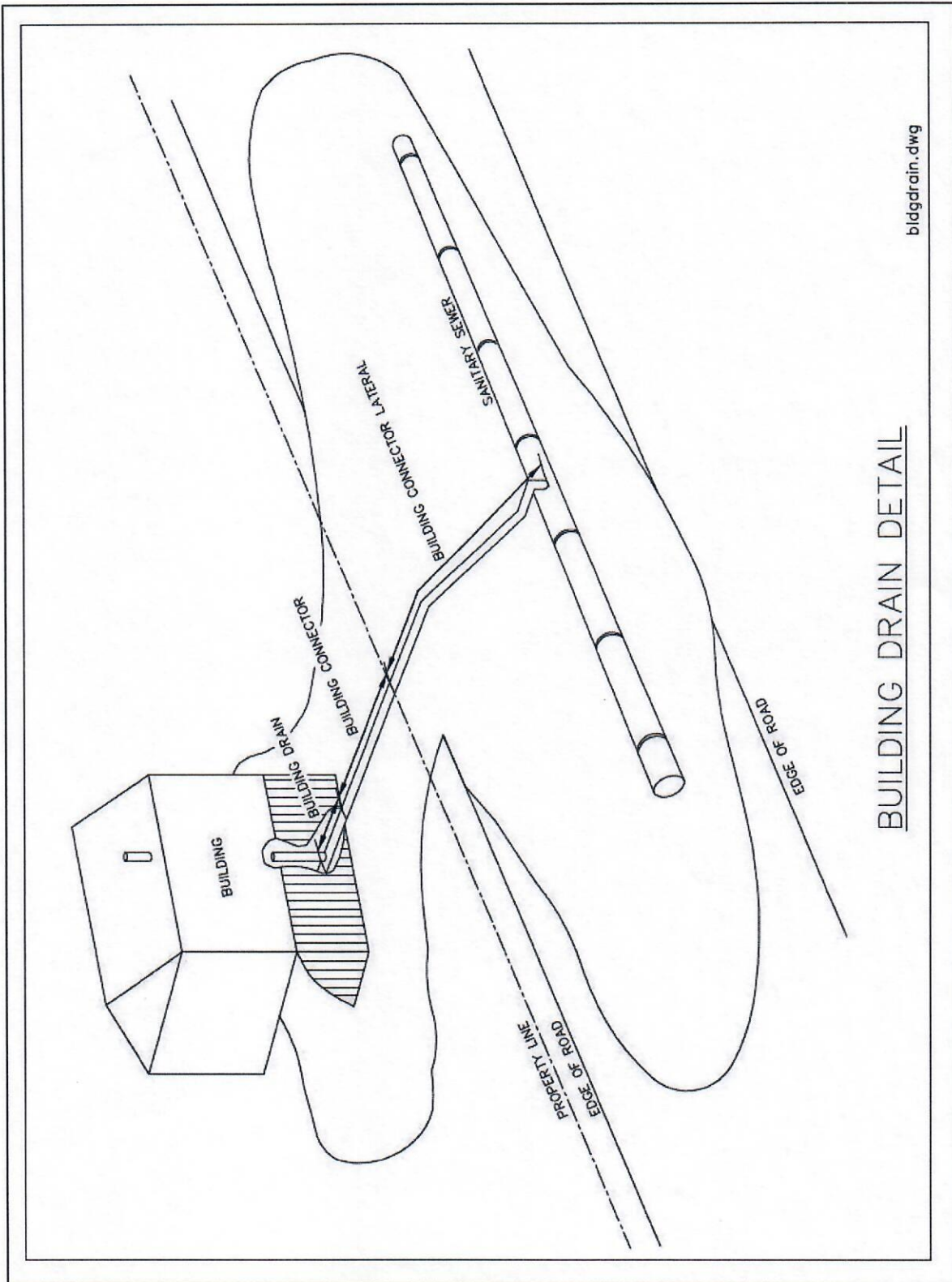
1. **"Building Connector"** shall mean a pipe which connects a building or structure drain to a main SEWER for the purpose of conveying sewage of any kind. The building connector SHALL be the pipe extending directly from the main SEWER to the termination point of the BUILDING DRAIN from the building or structure.
2. **"Building Connector Lateral"** shall mean a pipe laid incidental to the original construction of a main SEWER from that SEWER to some point at the side of the street, highway, R.O.W. or similar location and there capped, having been provided and intended for extension as defined in Section 2.1. When a BUILDING CONNECTOR LATERAL has been connected with and extended for the purpose of installing a BUILDING CONNECTOR, the lateral SHALL become and thereafter be part of such BUILDING CONNECTOR.
3. **"Building Drain"** shall mean that part of the piping of a drainage system which receives the discharge from sewage drainage pipes inside the walls of the building and conveys it to the BUILDING CONNECTOR.
4. **"Collection System"** shall mean the SEWER lines and appurtenances used and useful in the collection and conveyance of wastewater.

5. **"Commercial User"** shall mean retail stores, restaurants, office buildings, laundries, and other private business and service establishments.
6. **"Health Director"** shall mean the Director of Health of the Town of Montville or his authorized representative currently monitored under the Uncas Health District.
7. **"Infiltration"** shall mean water other than wastewater that enters a SEWER system (including SEWER service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. INFILTRATION does not include, and is distinguished from, INFLOW.
8. **"Inflow"** shall mean water other than wastewater that enters a SEWER system (including SEWER service connections) from sources such as, but not limited to, roof leaders, cellar drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between STORM SEWERS and SANITARY SEWERS, catch basins, cooling towers, STORM WATERS, surface runoff, street wash waters, or drainage. INFLOW does not include, and is distinguished from INFILTRATION.
9. **"Institutional"** shall include social, charitable, religious, and educational activities such as schools, churches, hospitals, nursing homes, penal institutions and similar INSTITUTIONAL USERS.
10. **"Industrial Wastes"** shall include the liquid or water-carried of any industrial process not clearly included within the definitions of SANITARY SEWAGE, STORM WATER, COOLING WATER, and sub-soil drainage herein. Wastewaters carrying oils, grease, fats, abrasives, chemicals, residues of manufacturing processes, wastes from commercial food preserving or canning, from slaughter-houses or meat processing plants, and similar substances whether dissolved, in suspension, or mechanically carried by water, SHALL be considered as INDUSTRIAL WASTE.
11. **"Operation and Maintenance"** shall mean those functions that result in expenditures during the useful life of the SEWAGE WORKS or materials, labor, utilities, and other items which are necessary for managing and maintaining the SEWAGE WORKS to achieve the capacity and performance for which such works were designed and constructed.
12. **"Person"** shall mean any individual firm, company, association, society, corporation, or group.
13. **"Property Owner"** or **"Owner of Property"** or **"Owner"**, as used herein, SHALL include the owner of the fee in any real estate and also his, her, its, or their agents or representatives.

14. **"Residential"** shall include all dwelling units such as detached, semi-detached, row-houses, mobile homes and multi family dwellings.
15. **"Sanitary Sewage"** shall mean the common wastewater and water-carried wastes from human dwellings and from toilet and lavatory fixtures, kitchens, laundries, and similar facilities of business and industrial buildings. SANITARY SEWAGE SHALL not include STORM WATER, INFILTRATION, INFLOW, clean waste or overflows from springs, wells or SUBSOIL DRAINAGE, large volumes of COOLING WATER, clean wastewater from hydraulically-operated contrivances, and those waters included within the definition of "INDUSTRIAL WASTE", Section 2.10.
16. **"Sanitary Sewer"** shall mean a SEWER intended to convey only SANITARY SEWAGE, or, if so stipulated with respect to the particular SEWER, sanitary sewerage plus industrial or other wastes, excluding STORM WATER.
17. **"Sewage"** shall mean wastewater, water-carried wastes or a combination of them, discharged into and conveyed by SANITARY SEWERS or intended or customarily so discharged and conveyed. SEWAGE MAY be further classified as defined in Section 2.10 and Section 2.15.
18. **"Sewage Works"** shall mean all facilities for collecting, pumping, treating and disposing of SEWAGE.
19. **"Sewer"** shall include the main pipe or conduit, manholes and other structures and equipment appurtenant thereto, provided to carry SEWAGE, INDUSTRIAL WASTES, or similar wastes, subject in each particular case to the purposes and limitations imposed upon the particular pipe or conduit or SEWER. Where the intent so indicates, the word "SEWER" SHALL be used only with respect to the main line of pipe or conduit, owned, controlled and maintained by a public municipal body for the conveyance of waste or SEWAGE from several properties, and SHALL not be understood to include BUILDING CONNECTORS or connections between the main SEWER and individual properties.
20. **"Drain Layer"** or **"Sewer Layer"** SHALL mean an individual, partnership or corporation to whom the State of Connecticut SHALL have issued a valid license under Sections 20-330-341 of the Connecticut General Statutes (1958), as amended, to install and repair SEWERS, SEWER connections, BUILDING CONNECTORS, etc., during the period when such license is valid, as hereinafter provided, and the proper agents and representatives of such DRAIN LAYER.
21. **"Shall"** is mandatory'; **"May"** is permissive.
22. **"Storm Sewer"** or **"Storm Drain"** shall mean a SEWER which carries storm, surface waters and subsurface drainage, but excludes SEWAGE and polluted INDUSTRIAL

WASTES.

23. **"Town"** as used herein, shall mean the Town of Montville, Connecticut, and/or it's WATER POLLUTION CONTROL AUTHORITY.
24. **"Water Pollution Control Authority (WPCA)"** shall mean the WATER POLLUTION CONTROL AUTHORITY of the Town of Montville created by TOWN Ordinance pursuant to Chapter 33a of the 1955 Supplement to the General Statutes, or its duly authorize representative.



SECTION 3 CONNECTIONS TO AND WORK ON SEWERS

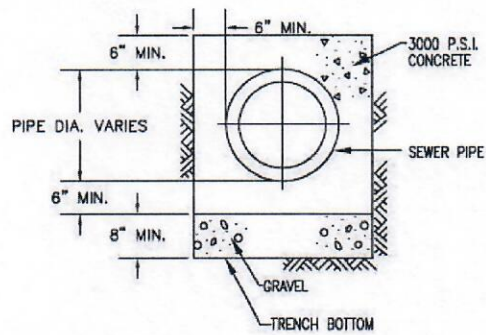
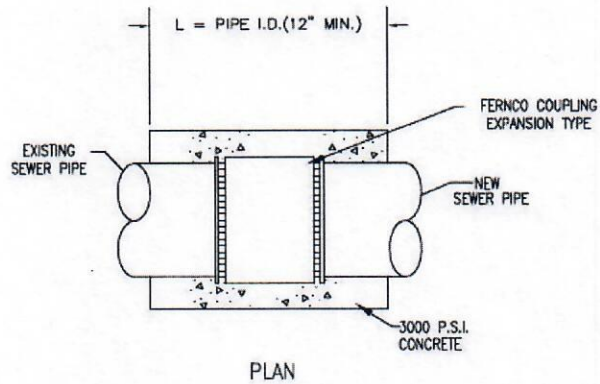
3.01 General

- A. The BUILDING DRAIN pipe extending outside the inner walls of any building or similar structure SHALL be 4" minimum diameter pipe a minimum of five (5) feet in length and exit the building a minimum of three (3) feet below grade or below the frost line whichever is greater or as approved by the WPCA to permit connection to the public SEWER by gravity using good engineering practice. The material SHALL be cement lined ductile iron, cast iron pipe or approved equal. The connections SHALL be made by use of bell-and-spigot joints with a lock-in rubber sealing ring when possible. When use of bell-and-spigot jointing is impracticable, the connection shall be made with a flexible coupling similarly used to connect dissimilar materials. The couplings SHALL utilize stainless steel hardware and be manufactured by Fernco Inc., Pipe Conx by Uniseal, or equal. See "Concrete Encasement Detail at Joint Repair".

Building Drain Dimensional Tolerance			
Nominal Size	Outside Diameter Average	Minimum Tolerance	Wall Thickness
Ductile Iron Pipe (Class 50)			
4	4.800	±0.130	0.250
Cast Iron Pipe			
4	4.800	±0.050	0.350

All dimensions in inches

- B. BUILDING CONNECTORS, with the exception of the length of pipe extending through the building wall, that is intended to be connected to a TOWN Lateral, Interceptor or Manhole SHALL be a minimum 6" diameter, SDR35 PVC plastic pipe or extra heavy iron pipe, or approved substitute.
- C. Any BUILDING CONNECTOR, which is within 75 feet of any well or 25 feet of a cellar, ground or surface drain SHALL be constructed of material approved by the Local Area Health District as defined in Section B of 3.01. No portion of the BUILDING CONNECTOR SHALL be conducted within twenty-five (25) feet of a well. Long BUILDING CONNECTORS SHALL be avoided to reduce the danger of ground water INFILTRATION, and SEWER blockages. See Section 3.02.O
- D. Schedule 40 P.V.C. SEWER pipe MAY be used where specifically allowed on contract drawings and SHALL conform to the following specifications for Polyvinyl Chloride Pipe.



CONCRETE ENCASEMENT DETAIL
AT JOINT REPAIR

conc encasement detail.dwg

3.02 Sewer Pipe Material, Size, Fittings, Joints, Properties and Workmanship

3.02.01 Gravity Pipe

- A. **Polyvinyl Chloride Pipe** - The requirements of this specification are to provide pipe and fittings suitable, from the point of building exit, for non-pressure drainage of SEWAGE, and certain other liquid wastes, where toughness, resistance to deterioration from the action of water and chemicals, dimensional stability, resistance to aging and tight joints are required.
- B. **Materials** - The pipe and fittings SHALL be made from virgin type 1 Grade 1 Polyvinyl Chloride compounds as defined and described in ASTM Specification D3034 - SDR35 for unplasticized polyvinyl chloride (PVC) plastic gravity SEWER pipe. Clean rework material, generated from the manufacturer's own pipe or fitting production MAY be used by the same manufacturer provided the pipe and fittings so produced meet the requirements of this specification.
- C. **Physical and Chemical Properties** - The physical and chemical properties SHALL conform to those minimums specified for Type 1, Grade 1 Polyvinyl Chloride Compounds designated in ASTM Specification D3034 - SDR35 noted above.
- D. **Dimensions** - The standard length of pipe for all BUILDING CONNECTORS provided under this specification SHALL be a minimum of **12.5** feet. The pipe SHALL be manufactured to the following minimum dimensions:

PVC Pipe Dimensional Tolerance				
Nominal Size	Outside Diameter Average	Minimum Tolerance	Wall Thickness	Weight/lbs 20' Length
6	6.275	±0.011	0.180	43.6
8	8.400	±0.012	1.240	82.5
10	10.500	±0.015	1.300	123.4

All dimensions in inches

Fittings SHALL be made in sizes and to the dimensions of standard pipe as shown above. If dimension, structural design or materials from which they are manufactured vary from other provisions of this specification, it SHALL be done so with the approval of this WPCA.

- E. **Joints** - Joints SHALL be the bell and spigot type with a "Locked-in" rubber sealing ring as manufactured by the J-M Manufacturing Company as subject to the approval of the WPCA.

Joints SHALL be sealed with an elastomeric "O" ring gasket that meets or exceeds the requirements of ASTM specification F-477, latest revision, approved by the WPCA, and SHALL be of a composition and texture which is resistant to common ingredients of SEWAGE, INDUSTRIAL WASTES including oils and ground water, and which will endure permanently under the conditions likely to be imposed by this use. The PVC pipe and fitting joints SHALL meet or exceed the requirements of ASTM specification D3212.

In addition, the elastomeric gaskets SHALL meet or exceed the following requirements when tested in accordance ASTM specification D1869, latest revision:

Elastomeric Gasket Properties after Oil Aging	
Tensile strength, average decrease max, percent	35
Elongation, average decrease, max, percent	40
Hardness, average change, points	-10 to +2
Volume change, average, percent	-1 to +15

The joint, when assembled, must be able to withstand a hydraulic pressure internally of at least 10 psi.

- F. **Fittings** - Wyes, Tees, Bends, and adapters, and any other fittings required by the WPCA SHALL be provided. Plans for such fittings showing cross-sectional views with dimensions SHALL be provided, and such plans and fittings SHALL be approved by the WPCA prior to their use. The materials used in the manufacture of fittings SHALL conform with the requirements for the pipe with which they SHALL be used and any variation of such SHALL be subject to the approval of the WPCA.
- G. **Marking** - Pipe SHALL be marked along the outside of the barrel in bold style type and SHALL indicate the Manufacturer's name, pipe size, PVC compound used. i.e., PVC Type 1, Grade 1 and the ASTM material spec. for the PVC compound used i.e., ASTM D3034 - SDR35.
- H. **Workmanship** - The pipe and fittings SHALL be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe SHALL be as uniform as commercially practical in color, opacity, density and other physical properties.
- I. **Waterstops** - The manufacturer SHALL provide waterstops, acceptable to the WPCA, which SHALL be applied to the outside of the plastic pipe when pipe is to be enclosed in any structure where concrete or mortar is used which will prevent leakage along the outer wall of the barrel of the pipe.

- J. **Allowable Pipe Deflection** - Plastic pipe provided under this specification SHALL be so installed in the ground that a deflection of no more than five (5) percent and be anticipated. Such deflection SHALL be computed by dividing the amount of deflection (nominal diameter less minimum diameter when measured) by the nominal diameter of the pipe.

However, between any two adjacent manholes, the average deflection SHALL not exceed six (6) percent and no deflection at any point in the pipe SHALL exceed seven (7) percent, computed in the manner described herein.

After an initial inspection by the WPCA and if in the opinion of the WPCA the deflection MAY be excessive they MAY order the contractor to arrange for and take accurate measurements of the pipe at whatever intervals and at whatever locations between adjacent manholes the WPCA deems advisable.

All costs involved in taking measurements ordered by the WPCA following the initial inspection by the WPCA SHALL be borne by the DRAIN LAYER if the deflection in the pipe exceeds either of the maximum limits specified herein.

Such measurements MAY be taken or ordered taken by the WPCA at any time during the maintenance period and such measurements SHALL be performed in a manner and by methods approved by the WPCA.

- K. **Pipe Straightness** - No single piece of pipe SHALL be laid on any project covered by these special provisions unless it is found to be generally straight. Such pipe SHALL have a maximum ordinate as measured from the concave side of the pipe not to exceed 1/16 inches per foot of length. If the deviation from straightness exceeds this requirement then the particular piece of pipe SHALL be rejected for use until it can comply with this provision.

- L. **Connection to Mainline** - Where a BUILDING CONNECTOR LATERAL has not been provided for at the property line and a tap in the mainline is necessary then the preferred method would be to remove a section of pipe and install a section of pipe with a preformed wye to make the connection. A tapping saddle MAY be used but will require the approval by the WPCA as to type and manufacturer and SHALL assure a watertight connection. Approved tapping saddles shall be the EZ Tap sewer saddle as manufactured by Fernco Inc., or approved equal.

In certain cases where the depth of the mainline is significantly deeper than the lateral depth at the property line, it may be the preferred method to install a vertical chimney from the mainline to the tie-in point of the lateral. See "Chimney Detail" and "Pre-cast Chimney Detail" for more information.

- M. **Jointing Dissimilar Materials** - Where required, a flexible coupling SHALL be used to connect dissimilar material types and sizes of pipe. Couplings SHALL utilize stainless steel hardware and be as manufactured by Fernco Inc., or equal.
- N. **Pipe Slope and cleanouts** - The grade of the BUILDING CONNECTOR SHALL be at least one-quarter (1/4) of an inch per foot for six (6) inch sewers and SHALL not be less than one-eighth inch per foot for larger sizes. Access manholes or surface cleanouts SHALL be provided at changes in direction exceeding 45°. Access manholes or surface cleanouts SHALL be provided for each 100 feet of length of BUILDING CONNECTOR from the foundation wall to the BUILDING CONNECTOR LATERAL.

3.02.02 Low Pressure Force Main

- A. **High Density Polyethylene (HDPE) Pipe** - The requirements of this specification are to provide pipe and fittings suitable, for the BUILDING CONNECTOR and BUILDING LATERAL, for low-pressure drainage of SEWAGE, and certain other liquid wastes, where toughness, resistance to deterioration from the action of water and chemicals, dimensional stability, resistance to aging and tight joints are required.
- B. **Materials** - High Density Polyethylene (HDPE) Low Pressure pipe and fittings shall comply with the requirements of ASTM D 3350, latest revision. All Low Pressure Sewer piping shall be rated for a minimum "WORKING PRESSURE" of one hundred fifty (150#) pounds at 73°F with water and a minimum factor of safety of two point five (2.5).
- C. **Physical and Chemical Properties** - Pipe shall be high performance, high molecular weight, high density polyethylene pipe, Driscopipe* 1000 as manufactured by Phillips Driscopipe, Inc., Dallas, Texas, HDPE PE3408 EHMW as manufactured by Rinker Polypipe or equal.
- D. **Dimensions** - The pipe supplied shall meet the requirements of SDR 11 pipe (standard Dimension Ratio). All couplings, adapters, transitions, socket flanges, etc. shall be compatible with pipe and fittings to which they are joined and suitable for the use intended.
- E. **Joints**
 - 1. **Heat fusion joining systems:** Pipe and fittings shall be joined by butt fusion, saddle fusion, socket fusion or electrofusion according to the manufacturer's recommended procedures. The personnel operating heat fusion joining equipment and the on-site joint inspector shall be trained by the manufacturer or authorized manufacturer's representative.

2. **Mechanical joining systems:** All components shall incorporate pack joint type compression fittings with insert stiffeners for easy, reliable installation of piping. Mechanical couplings shall be installed in accordance with the mechanical coupling manufacturer's recommended procedures.
- F. **Fittings** – All fittings shall be pressure rated to match the system piping to which they are joined. At the point of fusion, the outside diameter and wall thickness of the fitting shall meet the outside diameter and wall thickness specifications of the system piping. All fittings shall be properly rated according to the manufacturer's written specifications, and clearly labeled on the fittings.
- G. **Markings** - The pipe and fittings shall have product traceability. The manufacturer shall include a print line on the pipe which shall identify the manufacturer, date of manufacturer, lot and supplier of raw material, plant location, and the production shift on which the product was produced.
- H. **Workmanship** - The manufacturer shall certify that samples of the manufacturer's production have been tested in-house in accordance with ASTM D 2837, and validated in accordance with the latest revision of PPI TR-3.
- I. **Connection to Mainline**
1. **Connecting to Low Pressure mainline SEWERS** - The service connections MAY be connected to the mainline by way of an in-line tee of similar material or use of an electrofusion saddle as manufactured by Central Plastics or approved equal, installed in accordance with the manufacturer's procedures.
 2. **Connecting to Gravity mainline SEWERS** – see Section 3.02.01L
- J. **Joining Dissimilar Materials** – Connections to pipe of other materials, connections to equipment and at such other locations as indicated, directed or required shall be made with 150 pound flanges and 1/8-inch thick gaskets of material compatible with the material to be pumped. Bolts, washers and nuts shall be type 316 stainless steel. Flanges shall be faced and drilled to American 125 Standard and as required to match the facing and drilling of the flanges to which they are to be connected.
- K. **Check Valves** – Check valves shall be injection molded from non-corroding, glass fiber reinforced PVC for durability. The check valve flapper shall include a non-fouling, integral hinge made from fabric reinforced synthetic elastomer to assure corrosion resistance, dimensional stability, fatigue strength and trouble free operation. The check valve will provide a full-ported passageway and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. A

non-metallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating at low back pressure.

L. Curb Stops – Curb stops shall be solid brass constructed of a single solid piece conforming to ASTM specification B 62, and shall be manufactured and tested to AWWA C800. Curb stop shall be individually tested with an internal air pressure of 150 psi minimum. Valves shall be pressure tight in both directions with integral stops at the fully-open and fully-closed positions. Stem seals and rubber seats shall be Buna-N providing watertight seals in either direction as well as maximum flow capacity and ease of operation.

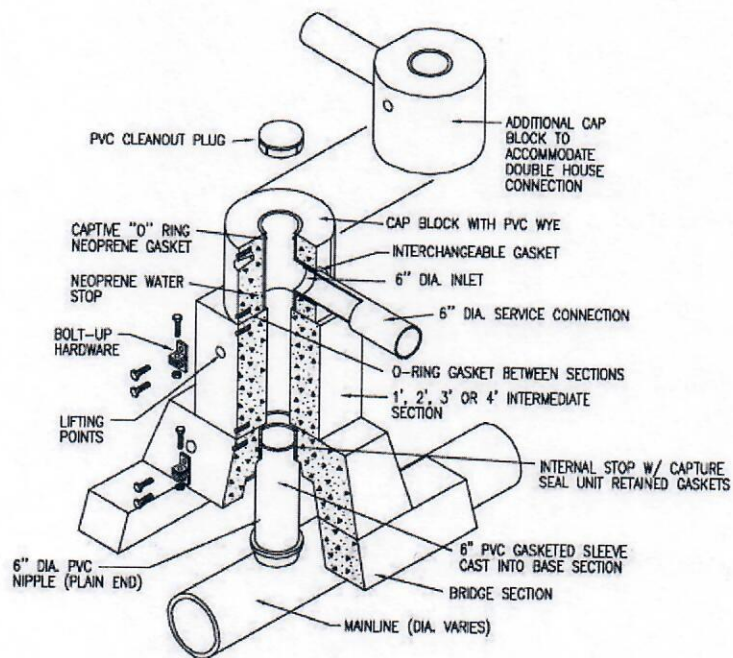
M. Curb Boxes - Curb boxes shall be constructed of iron filled polypropylene, or steel and cast iron as manufactured by Mueller, or equal, to provide durability and magnetic detect ability. All components shall be inherently corrosion resistant to assure durability in the ground. Curb boxes shall provide adjustment downward (shorter) from their nominal height. Curb box covers shall have the word "SEWER" cast on the top.

N. Miscellaneous

1. The grinder pump unit inlet and outlet are at 180° to each other. Contractor shall provide and install all fittings and adapters required to accommodate this orientation so as to provide a complete, approved operating system. All piping connections to the grinder pump unit shall be in strict conformance with the printed instructions of the grinder pump manufacturer.
2. Sleeves for service laterals adjacent to wells SHALL be required and SHALL be 4" HDPE.
3. The grinder pump unit inlet and outlet are at 180° to each other. Contractor shall provide and install all fittings and adapters required to accommodate this orientation so as to provide a complete, approved operating system. All piping connections to the grinder pump unit shall be in strict conformance with the printed instructions of the grinder pump manufacturer.

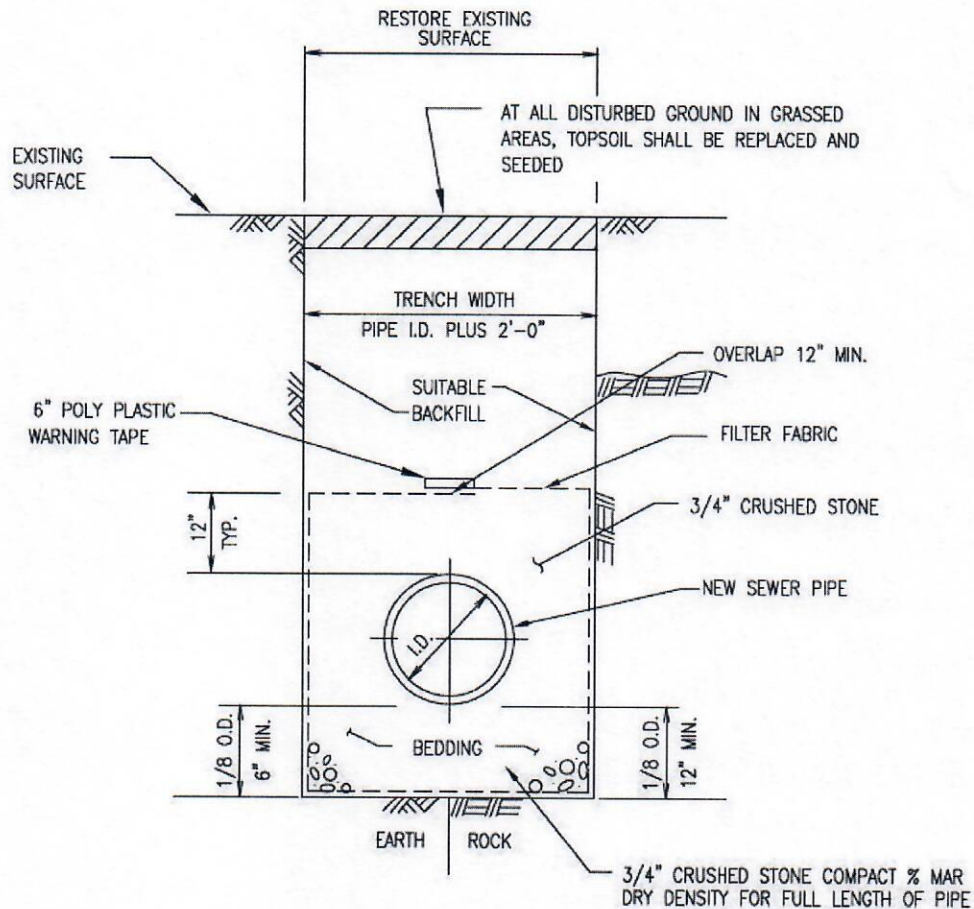
3.03 Sewer Pipe Trench

Typical Trench Cross-Section showing crushed stone foundation and haunching, and backfill for plastic pipe is shown in the following detail.



PRECAST CHIMNEY DETAIL

precast chimney detail.dwg



NOTE:

IF THE INSPECTOR DETERMINES THAT SUITABLE GRANULAR PIPE BEDDING MATERIAL IS AVAILABLE FROM ON-SITE EXCAVATIONS, IT MAY BE UTILIZED AS SELECT BACKFILL AND BEDDING.

SEWER PIPE TRENCH DETAIL

sewtrnc.dwg

3.04 Sewer Pipe Testing

To meet or exceed the minimum requirements for INFILTRATION, the following test SHALL be conducted by the OWNER at his/her expense:

3.04.01 Gravity Pipe

- A. The end of the BUILDING CONNECTOR nearest the public SEWER SHALL be dug up, the end exposed for the installation of a plug to seal off that end of the BUILDING CONNECTOR. Another plug is installed inside the house to seal that end. All vents etc.. must also be plugged so as not to allow any air to escape. The test section of the BUILDING CONNECTOR SHALL be plugged at each end. One of the plugs used in the test SHALL be tapped and equipped for the air inlet connection for filling the line from an air compressor. The plugs shall hold against the 10 psig pressure without bracing and without movement of the plugs.
- B. All BUILDING CONNECTORS, stubs and fittings into the SEWER test section SHALL be properly capped or plugged, and carefully braced against the internal pressure to prevent air leakage by slippage and blowouts.
- C. Now connect the air hose to the tapped plug selected for the air inlet. Then connect the other end of the hose to the portable air control equipment which consists of valves and pressure gages used to control:
 - 1. The air entry rate to the SEWER test section, and
 - 2. To monitor the air pressure in the pipe line

More Specifically, the air control equipment includes a shut-off valve, pressure regulating valve, pressure seduction valve and monitoring pressure gate having a pressure range from 0 to 5 psi. The gage SHALL have minimum divisions of 0.10 psi and an accuracy of ± 0.04 psi.

- D. Connect another air hose between the air compressor and the air control equipment. This completes the test equipment set-up. **Testing operations MAY now commence.**
- E. Supply air to the test section slowly, filling the pipe line until a constant pressure of 3.5 psig minimum greater than the average back pressure of any groundwater that may be over the pipe is maintained. Groundwater back pressure shall be determined by measuring the average height of the groundwater table in feet above the invert of the section of pipe being tested. The height in feet shall be divided by 2.3 to determine the pounds of pressure that shall be added to all test pressures. For

example, if the average height of groundwater over the pipe invert is 11.5 feet; the pressure to be added would be 5 psig ($11.5/2.3 = 5.0$). The prescribed pressure drop shall not exceed 1.0 psig from 3.5 psig to 2.5 psig in excess of the groundwater pressure above the top of the sewer. At least two minutes shall be allowed for the air pressure to stabilize. Any necessary adjustments in air pressure shall be made to the internal pressure and an additional two-minute stabilization period shall be allowed.. The air pressure SHALL be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig.

- F. During this stabilization period, it is advisable to check all capped and unplugged fitting with soap solution to detect any leakage at these connections.

If leakage is detected at any cap or plug, release the pressure in the line and tighten all leaky caps and plugs. Then restart the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new 5-minute interval must be allowed after the pipe line has been refilled.

- G. After the stabilization period the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "**Acceptable**" if the time required, in minutes, for a 1.0 psi pressure drop for the section of line being tested is not greater than the time shown for the given diameters in the following table:

Minimum Duration for Air Testing Pressure Drop	
Pipe Diameter (in inches)	Time (min/100 ft)
4	0.3
6	0.7
8	1.2
10	1.5
(For times other than those shown, use)	
$T = K \times (D^2L)/Q$	
D = pipe diameter (inches)	
K = 0.000371 (inch-pound units)	
L = length of line each pipe size	
Q = air loss (ft ³ /min)	
T = time (in minutes) to drop 1.0 psi	

Should the low pressure air tests on any section of the sewers show a rate of leakage exceeding the maximum allowable rate as shown below, the Contractor shall locate, repair or replace defective joints and retest until the rate of air pressure drop for each section of the sewers being tested does not exceed the rate specified herein.

Allowable Air Loss for Various Pipe Sizes	
Pipe Diameter (in inches)	Q (ft ³ /min)
4	2.0
6	2.0
8	2.0
10	2.5

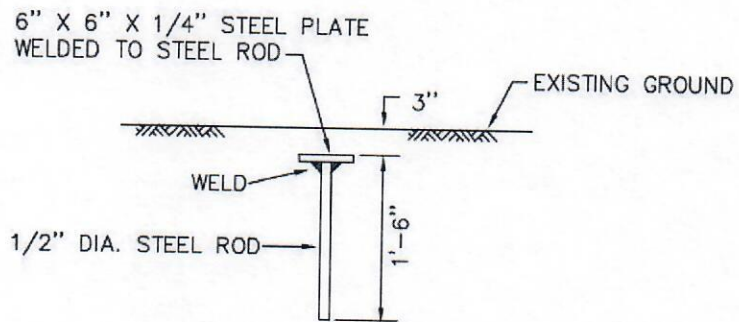
1. Along with the air testing of BUILDING CONNECTORS, they MAY also be televised, which will indicate their structural condition, root intrusion, broken or misalignment of some segments of the lateral system and the type of material in place.

3.04.02 Low Pressure Pipe

- A. Service connections will be required to be tested but will be subjected to visual examination and acceptance.

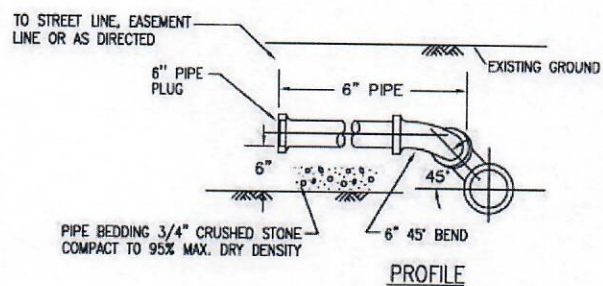
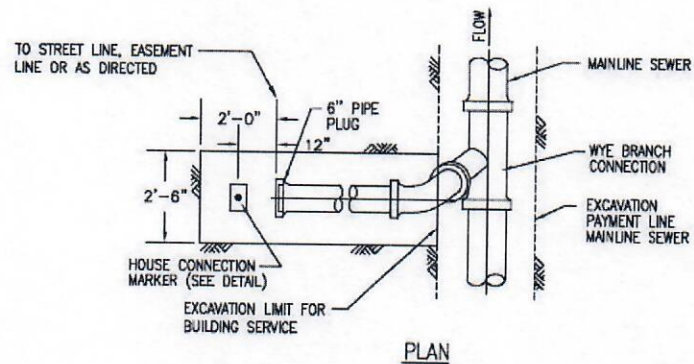
3.05 Building Connector Lateral Markers

A BUILDING CONNECTOR marker SHALL be provided at the property line approximately three (3) inches below grade and SHALL be fabricated of steel conforming to ASTM specification 36 Latest revision. A typical BUILDING CONNECTOR marker detail is provided as well as a typical building service detail.



BUILDING CONNECTOR MARKER DETAIL

bldgmkcr.dwg



TYPICAL BUILDING SERVICE DETAIL

building service.dwg

3.06 Manholes and Manhole Frames and Covers

A. **Manholes** - Where required, manhole bases, risers, tops and grade rings SHALL be precast reinforced concrete or as directed; manhole bases, risers, transition sections and tops SHALL conform to the requirements of ASTM Designation C478, latest revision. Manholes SHALL be four (4) foot in diameter except where drops are approved, then five (5) foot diameter SHALL be required. See Manhole details.

1. Leakage tests SHALL be made by the DRAIN LAYER at his expense and observed by the WPCA on each manhole. The test SHALL be by vacuum in accordance with ASTM Specification C-828-80. Notarized records of the test results SHALL be submitted by the DRAIN LAYER to the WPCA for approval.
2. Manhole steps SHALL be arranged in the manhole bases, transition sections, risers and cones so as to provide a manhole step ladder approximately twelve (12) inches on centers for the full height of installation. The manhole steps SHALL be aligned such that a person entering the manhole structure descends on the invert table and not above the invert channel. Manhole steps SHALL be copolymer polypropylene plastic coated 1/2" grade 60 steel reinforced step Model No. PS2-PFSL in conformance with ASTM C-478 paragraph 11 as revised, as manufactured by M.A. Industries, Peachtree City, GA. See Manhole Step Detail.
3. Wall thickness of manhole risers SHALL be not less than five (5) inches; wall thickness of manhole transition sections and cone type tops SHALL not be less than five (5) inches at the base and SHALL taper to a thickness of not less than eight (8) inches at the top.
4. The exterior surfaces of all manholes SHALL be shop coated with two coats of Tneme-Tar 46-413 as manufactured by Tnemec, Koppers bitumastic super service black, or approved equal.
5. The joints SHALL be the type using a Type A, rubber gasket for sealing the joints; all joints SHALL be provided so as to be watertight under all conditions of service. The rubber gaskets SHALL have a texture to assure a watertight and permanent seal and SHALL meet or exceed all of the requirements of AASHTO Specification M198, latest revision.
6. When the corbel section needs to be raised in order to bring the frame

and cover to grade, the following materials shall be used:

- a. In excess of three (3) inches, whenever possible, a precast concrete grade ring will be used to bring the frame to the desired height.
 - b. In cases less than three (3) inches, when a grade ring cannot be used, a fast curing, high strength, low permeability, structural concrete shall be used to bring the frame and cover to grade. Acceptable products shall be as manufactured by EMACO (T415), Five Star (structural concrete) or approved equal.
 - c. A minimum 2 hour compressive strength of 1,200 psi shall be attained.
7. Brick for manholes SHALL conform in all respects to ASTM Designation C 32, Grade SM, latest revision, size 2-1/2 inches by 3-3/4 inches by 8 inches.
 8. All openings in new manhole bases and risers shall be provided with a prefabricated mechanical type joint seal between manhole walls and entering pipes. The joint seal shall be of a type to insure watertight jointing between manhole and pipes under all conditions of installation; the type of joint seals to be used shall be subject to approval.
 9. Cut-ins for openings for new pipe entrances into the existing manholes SHALL be cut through the wall of the manholes at the required elevation, location and size for providing space for new pipelines to enter into the manholes. The openings SHALL be of sufficient size and at the proper elevation and location, providing for a uniform annular space between the outside of the pipe wall and the sides of the manhole wall opening to permit proper installation and use of a prefabricated mechanical type joint seal between manhole walls and entering pipes for existing pre-cast concrete manholes, or of approximately 3/4 inch to permit sealing of the opening with non-shrink mortar for brick or concrete block manholes.

The openings in the manhole walls SHALL be core-drilled for pre-cast concrete manholes, or carefully cut for brick or concrete block manholes, by qualified workmen so as to obtain an opening conforming to the requirements specified and so as not to damage existing work to remain nor to spall masonry adjacent to the opening.

10. Drop Manholes may be required where the velocity of the expected

sewage flow exceeds ten (10) feet per second. Direction of the type of drop (inside or outside) SHALL be at the discretion of the WPCA. No drop will be allowed where the vertical drop is less than 3'-6". Pre-cast outside drops MAY be used if approved by the WPCA. See Drop Manholes details.

11. Dog House Manhole Bases MAY be approved by the WPCA in instances where flow diversion is deemed cost-prohibitive in cases where a tie-in to an existing sewer is required or where replacement of an existing manhole is required. See "Pre-cast Dog House Manhole Base" detail.
12. The invert tables in the existing manholes shall be altered and rebuilt to provide proper flow channels for the flow of sewage through the manholes as required by the new arrangement of piping entering and leaving the manhole as indicated and/or as directed. The new flow channels shall be cut out of the existing invert tables to smooth, uniform cross section and after cutting all surfaces shall be lined with a heavy coating of cement-mortar steel-troweled and rubbed smooth. The complete inverts and flow channels shall present smooth flow conditions, transitions in size and changes in direction.
13. All concrete, brickwork or masonry in manholes designated for abandonment shall be removed to such depth that it will not encroach upon the base or subbase course of any pavement or of any of the new sewers or appurtenances. If any of the existing structure still remains, the influent and effluent pipes in said manholes shall be plugged as described herein and the remaining structure shall be filled with an approved backfill material, thoroughly compacted to the top of the existing masonry. All concrete, (including bases) brickwork and masonry of manholes to be removed shall be completely removed and shall be disposed of. No materials removed from manholes shall be used as backfill.
14. The existing pipe entrances at existing manholes which are indicated to be abandoned shall be filled-in solid with brick, concrete and mortar for the full area of the pipe diameter. Prior to filling the pipe entrances, the existing pipes shall be removed from within the manhole walls. The plugging and sealing of the pipe openings in the manhole walls shall be made watertight.

B. Manhole Frames and Covers - Gray iron castings SHALL conform to the requirements of AASTHO Designation: M 105-49, Class 30, latest revision. Iron castings SHALL be true to pattern in form and dimensions, free from pouring

faults, sponginess, cracks, blowholes and other defects in positions effecting the strength and value for the service intended. The sets of frames and covers SHALL be the weight $\pm 3\%$ as specified on the drawings and certification as to proof of weight shall be submitted. All covers in ROW's SHALL be fitted with a bolt type cover. When the cover is subjected to ponding the frame and cover SHALL be of the watertight type as shown on the detail. The frames and covers SHALL be as manufactured by LeBaron Foundry, Campbell Foundry or approved equal as designated on the detail.

The rubber used in the self sealing cover SHALL be a style #10 commercial neoprene compound, adaptable to extreme weather conditions, resist rotting, checking, and cracking due to ozone exposure. It SHALL meet ASTM D-2000 material: EPDM, color: black, 60 durometer. Material SHALL be able to withstand exposure to petroleum products. Dimensions are shown on the detail sheets. An adhesive SHALL be used to fasten the rubber gasket to the cover. The adhesive SHALL be an industrial type, Scotch-Grip (TM) 4799 as manufactured by 3M or approved equal.

- C. **Manhole Frame Seal** - Manhole frame sealing includes the sealing of the frame joint area and the chimney above the cone of the manhole with an applied flexible seal. The seal SHALL be designed to prevent leakage of water into the manhole through these areas throughout a 20-year design life. The seal SHALL remain flexible, allowing repeated vertical movement and/or repeated horizontal movement of the frame due to thermal movement of the pavement or other causes of up to 1/2-inch. The seal may not be applied to corbel that has been altered until two (2) hours minimum has elapsed to allow for the mortar to setup.

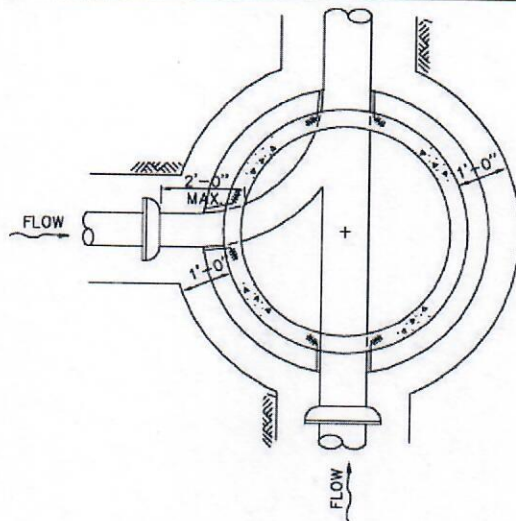
An applied seal is one that is achieved by applying a product, approved by the Engineer between the chimney and under the frame to provide a seal that meets the performance criteria contained in this section. All of the surfaces that are to be sealed SHALL be clean, dry, and free of dust, rust, oil, loose material and other contaminants.

If the sealing product is the type of material that is applied to the complete surface of the frame where the product is applied by trowel, roller, or by spraying, the thickness SHALL not be less than 250 mils (1/4 inch). The sealing material SHALL extend far over the entire surface area of the frame to insure bonding and cover enough of the chimney to insure sealing. Sealant Materials SHALL be as manufactured by Parsons Environmental (Parson Poxo FG), or approved equal.

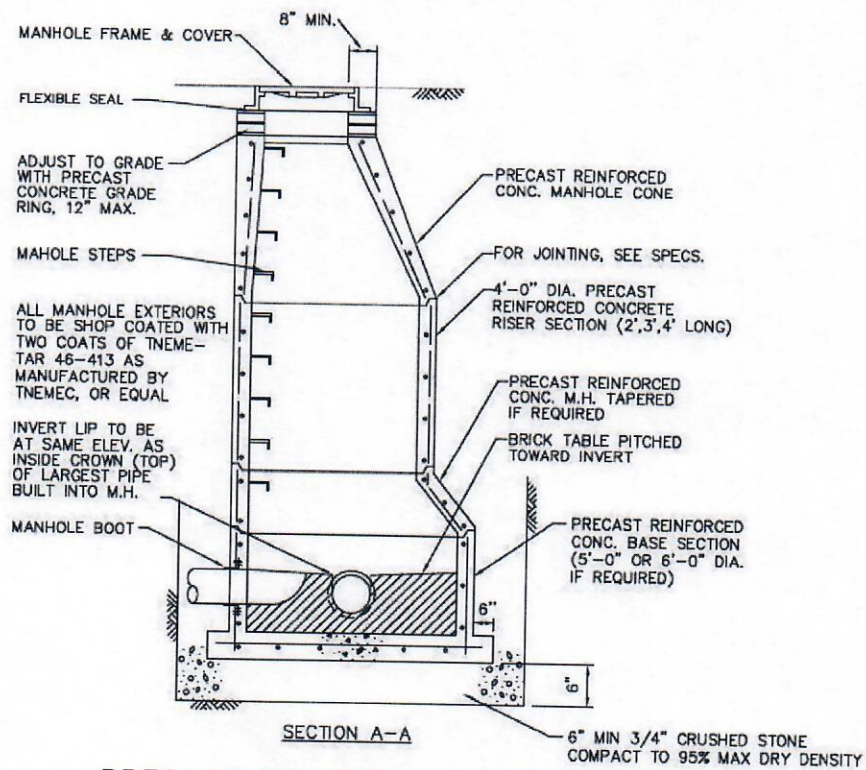
If the applied seal utilizes the elastomeric polyurethane resin-soaked oakum method, each joint SHALL consist of two concentric rings of one (1) inch oakum. The outer ring SHALL be saturated with the urethane base foam chemical

sealing material. The inner ring, saturated with water, SHALL be placed to prevent urethane foam from entering the manhole. The oakum saturated with urethane SHALL be sprayed with water. When foaming begins, the frame SHALL be set in place. Sealant materials for the elastomeric polyurethane resin-soaked oakum method SHALL be as manufactured by Avanti International (AV-219) Fibrotite and Polyurethane Hydrophylic Resin (AV-220), 3M-5600, or approved equal.

Application procedures SHALL be in accordance with the manufacturer's instructions.

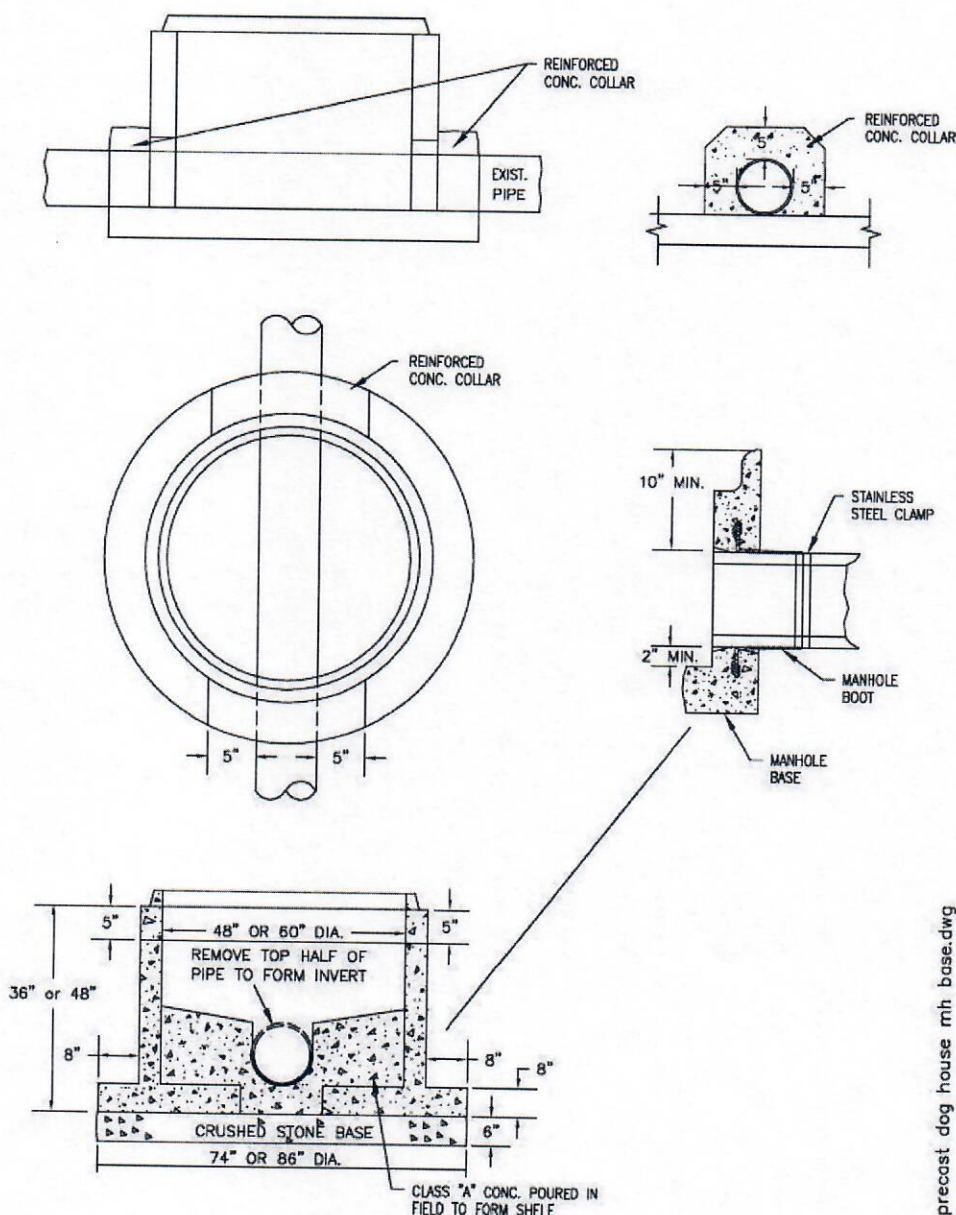


PLAN AT INVERT



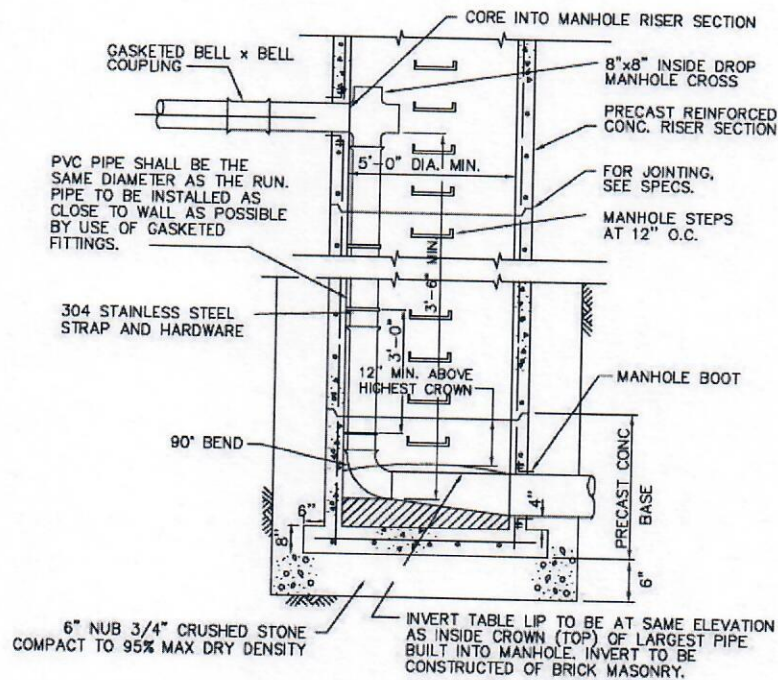
SECTION A-A
PRECAST SANITARY MANHOLE

san precast mh.dwg



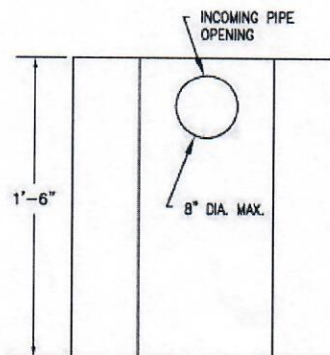
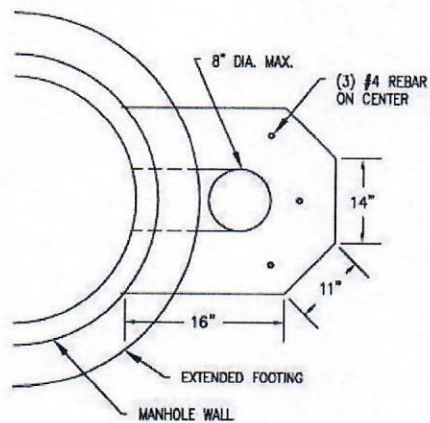
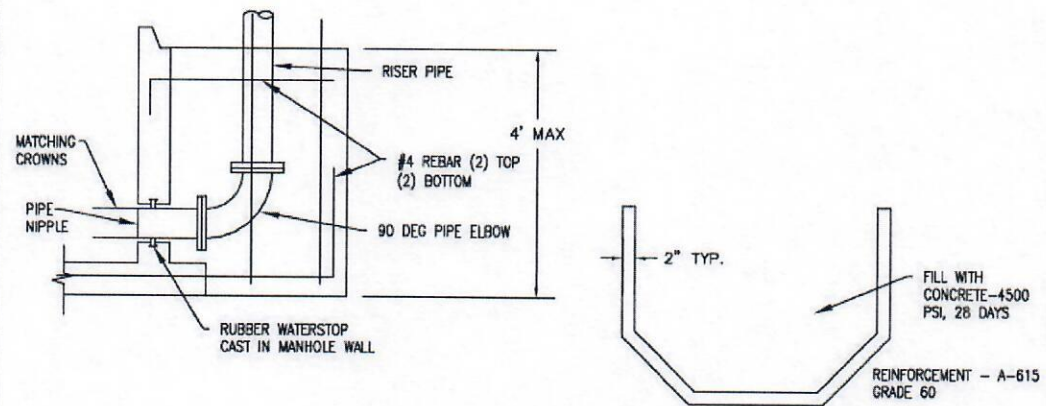
PRECAST DOG HOUSE MANHOLE BASE
 (FOR INSTALLATION OVER EXISTING SEWER LINE)

precast dog house mnh base.dwg



SANITARY INSIDE DROP MANHOLE

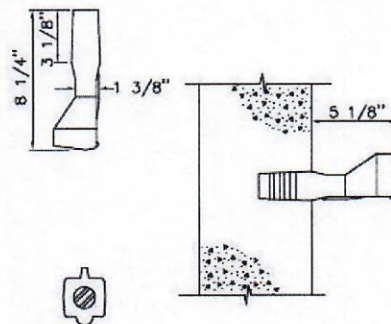
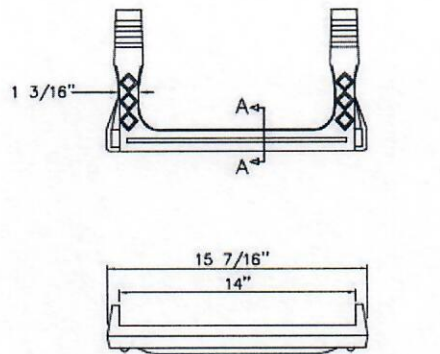
san inside drop mh.dwg



RISER FORM BLOCK

PRECAST OUTSIDE DROP

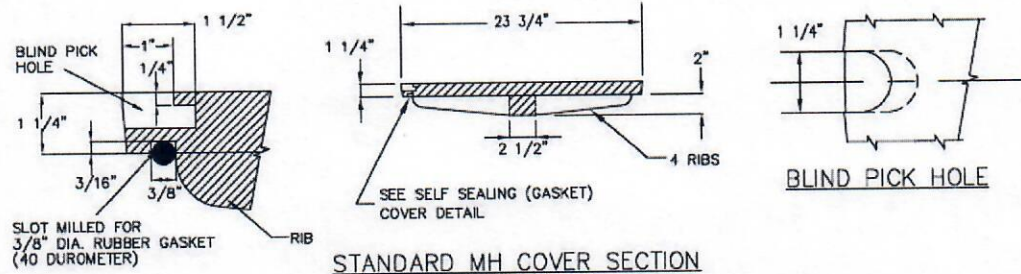
precast outside drop.dwg



SECTION A-A

MANHOLE STEP

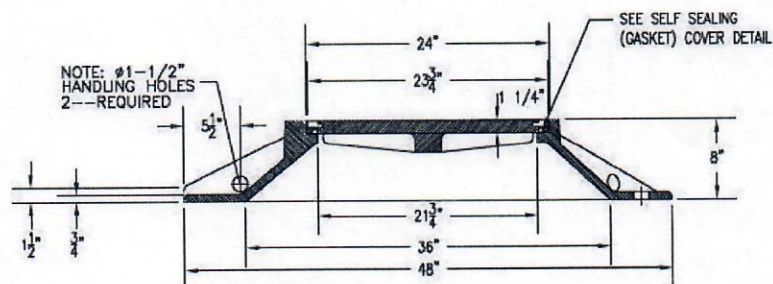
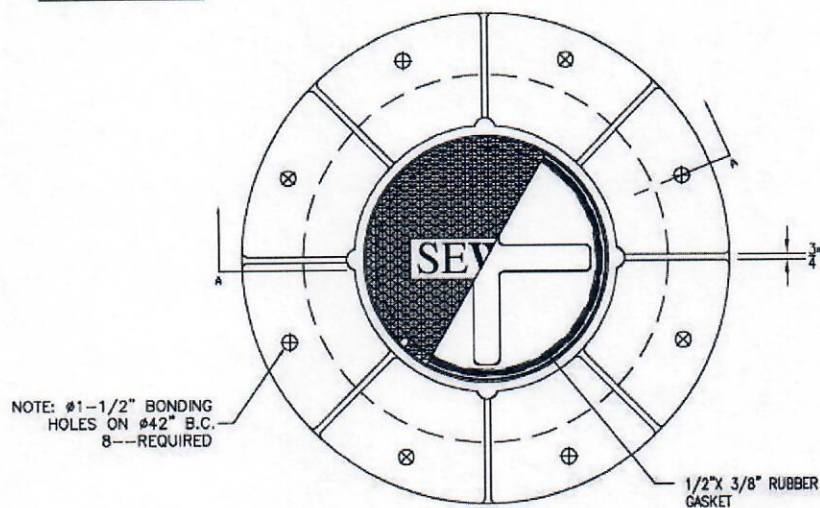
manhole step.dwg



SELF SEALING (GASKET)
COVER DETAIL

STANDARD MH COVER SECTION

COVER WEIGHT: 175 LBS $\pm 3\%$
LeBARON FOUNDRY CO., (L24C36P)



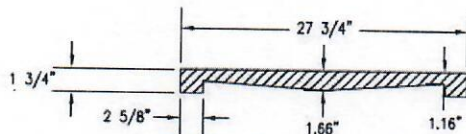
SECTION A - A

FRAME WEIGHT: 427 LBS $\pm 3\%$
LeBARON FOUNDRY CO., (LJ105S-P)

NOTE:
FRAME AND COVER SHALL BE AS MANUFACTURED BY LeBARON FOUNDRY CO.,
CAMPBELL FOUNDRY CO., OR EQUIVALENT; WEIGHT OF 602 LBS. $\pm 3\%$.
COVER SHALL HAVE THE WORD "SEWER" CAST ON TOP.

FRAME & COVER DETAIL
(STANDARD FRAME AND COVER)

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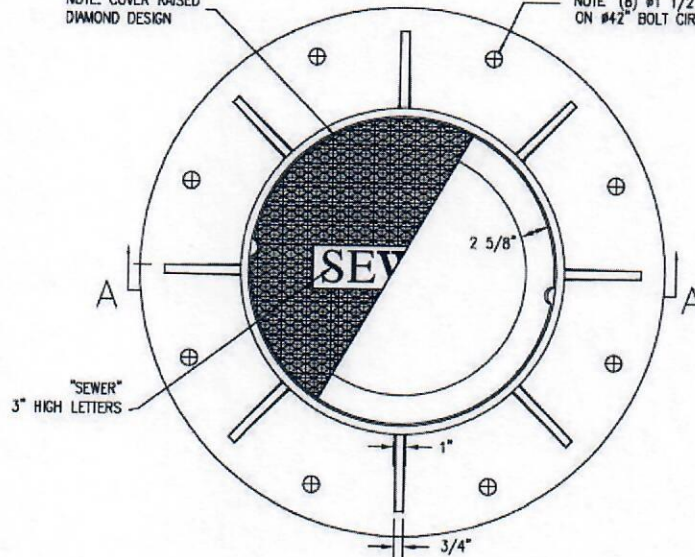


WATERTIGHT MH COVER SECTION

COVER WEIGHT: 220 LBS $\pm 3\%$
LeBARON FOUNDRY CO., (L28C21)

NOTE: COVER RAISED
DIAMOND DESIGN

NOTE* (B) #1 1/2" HOLES
ON #42" BOLT CIRCLE

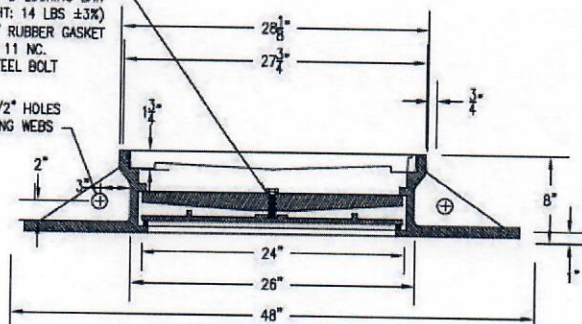


PLAN

FRAME WEIGHT: 533 LBS $\pm 3\%$
LeBARON FOUNDRY CO., (LBW28B-2)

NOTE: SET SUPPLIED WITH:
1 - LBW28B-A INNER COVER
(INNER COVER WEIGHT: 78 LBS $\pm 3\%$)
1 - LBW28B-B LOCKING BAR
(LOCKING BAR WEIGHT: 14 LBS $\pm 3\%$)
1/2" X 1/2" RUBBER GASKET
AND 5/8" - 11 NC.
STAINLESS STEEL BOLT

NOTE:
(2) #1 1/2" HOLES
ON OPPOSING WEBS

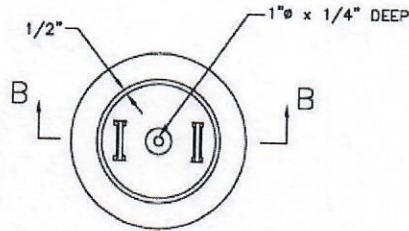


SECTION A-A

NOTE:
WATERTIGHT MANHOLE FRAME, COVER, INNER COVER, AND LOCK BAR SHALL BE AS MANUFACTURED BY
LeBARON FOUNDRY CO., CAMPBELL FOUNDRY CO., OR EQUIVALENT; WEIGHT OF 845 LBS. $\pm 3\%$
COVER SHALL HAVE THE WORD "SEWER" CAST ON TOP.

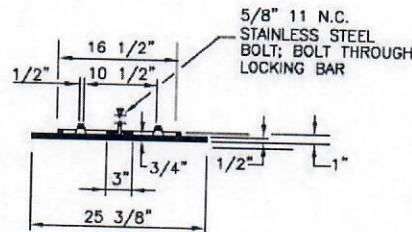
FRAME & COVER DETAIL - 1 OF 2
(WATERTIGHT FRAME AND COVER)

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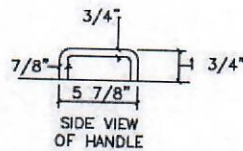


PLAN

INNER COVER WEIGHT: 78 LBS $\pm 3\%$
LeBARON FOUNDRY CO., (LBW288A)



SECTION B-B



A.S.T.M. CLASS 30
GRAY IRON

INNER COVER DETAIL

FRAME & COVER DETAIL - 2 OF 2
(WATERTIGHT FRAME AND COVER)

mhfcvr-wt2.dwg

3.07 Grease, Oil and Gross Particle Separators

The following technical standards SHALL apply when in the opinion of the WPCA that excessive grease, oil or gross particles exist for a particular connection as directed by the **Sewer Use Rules and Regulations**.

Grease Trap

- A. The dimensions and configuration of the tank, baffles, inlet, outlet and access openings SHALL be in accordance with the attached drawing which is incorporated as part of this specification.
- B. The size of the tank SHALL have a static liquid volume equal to approximately one-third (1/3) of the maximum daily flow through the tank, but in no case, SHALL the capacity be less than 1,000 gallons. In all cases the depth of the static liquid volume SHALL be a minimum of 48 inches as measured from the floor of the tank to the invert of the outlet pipe. The tank SHALL have sufficient capacity to provide at least 24-hours detention period for the kitchen flow.
- C. The air space provided between the liquid height and the underside of the tank top SHALL be a minimum of eight (8) inches).
- D. The tank SHALL be constructed of steel reinforced (ASTM A-615, GR. 60), precast concrete capable of withstanding an H-20 structural loading. The concrete mix SHALL have a minimum compressive strength of 4,000 psi at 28 days. The tank interior SHALL be coated with an epoxy based, petroleum resistant sealant. The exterior of the tank, including the top and bottom surfaces, SHALL be coated with an asphalt based damp proofing sealant.
- E. The horizontal structural seam of the tank SHALL be located above the static liquid level and SHALL be sealed with a butyl rubber gasket.

All interior joints or seams SHALL be filled in with a non-shrink grout and then coated with an epoxy-based, petroleum resistant sealant, to form a water-tight joint.

After installation of the top, the remainder of the exterior joint space as well as any other exterior joint spaces SHALL be filled in with a non-shrink cement or water-plug grout and then coated with an asphalt based water proof sealant.

- F. The internal baffles SHALL be tight fitting reinforced concrete panel sections with a minimum thickness of three (3) inches, set in tracks or grooves cast integrally into the walls of the tank. The position of the two baffles SHALL be spaced to create three approximately equal compartments within the tank when used for oil separation and two equal compartments when used for grease separation.

- G. Openings for the inlet and outlet piping SHALL be cast or neatly cored in the precast concrete wall. The precast knockout or cored hole SHALL be formed with a flexible rubber compression boot or sleeve so the inlet and outlet piping can form a watertight seal.
- H. The tank SHALL be set plumb and level on a six (6) inch depth bedding of 3/4-inch crushed stone extending one (1) foot beyond the sides of the tank. The 3/4-inch stone SHALL be placed on thoroughly compacted undisturbed soil.
- I. The inlet piping SHALL be a minimum of four (4) inches and the outlet piping a minimum of six (6) inches but in no case smaller than the inlet piping. All interior piping, including the piping passing through the tank walls, SHALL be PVC Schedule 40, Type I, ASTM D-2665, NSF-DWV, solvent weld pipe and fittings or approved equal. Flexible couplings as manufactured by Fernco, or approved equal, SHALL be provided on the inlet and outlet piping at the point of transition to the exterior building SEWER at approximately one (1) foot from the exterior wall of the tank.
- J. The inlet and outlet piping in the interior of the tank SHALL be fitted with "tees" that SHALL be aligned with the manhole openings but still allow access to the tank. The "tees" SHALL be equipped with standpipe risers extending to the outside edge of the tank and SHALL be securely strapped to the masonry wall of the manhole extension. The bottom of the outlet "tee" pipe SHALL be extended to a point twelve (12) inches above the floor and the inlet "tee" pipe extended twelve (12) inches down from the invert.
- K. Vent piping SHALL be a minimum of one-half the diameter of the outlet pipe. Pipe and fittings SHALL be PVC Schedule 40, Type I, ASTM D-2665, NSF-DWV, solvent weld or approved equal. It SHALL be sloped to drain into the separator. The vent stack SHALL extend eight (8) feet above the finish grade and terminate with a 180 degree elbow vent cap. The vent stack SHALL be screened and attached to the outside wall of the building.
- L. Openings in the top slab for three (3) 26" diameter access holes SHALL be cast approximately centered over the center compartment and approximately twelve (12) inches from the inside edge of the two outer compartments. If the tank is to be used as a grease trap only, then a 26" diameter access hole SHALL be provided for every fifty (50) square feet of cover surface. The same spacing dimensions for the outer covers SHALL apply. Frames and covers SHALL be the TOWN standard or approved equal. Manhole extensions MAY be constructed of concrete grade rings with mortar joints and SHALL not exceed twenty-four (24) inches. The interior of all manhole extensions SHALL be coated with an epoxy,

petroleum resistant sealant. The exterior of the extension SHALL be coated with an asphalt based waterproof sealant.

- M. The frame to corbel seal SHALL as designated in Section 3.06 C.
- N. Oil/Water Separators and Grease Traps SHALL be inspected by the WPCA prior to installation of the tank and after installation prior to placement of backfill material and hookup of inlet building lateral. Backfill material SHALL be free from refuse, organic material, boulders, rocks and stones or other material that, in the opinion of the inspector, is unsuitable.
- O. The interior epoxy coating MAY be omitted if the tank is to be utilized as a restaurant-kitchen waste grease trap tank only.
- P. The inlet piping SHALL not include any sources of domestic SEWAGE. The outlet piping SHALL be connected to the SANITARY SEWER.
- Q. Each Separator shall be so installed that it readily accessible for servicing and maintenance. Need for use of ladders or moving bulky objects in order to service separators SHALL constitute a violation of accessibility.

Grease Interceptor/AGRU (Automatic Grease Recovery Unit)

- A. Each interceptor SHALL be so installed that it is readily accessible for servicing and maintenance. Need for use of ladders or moving bulky objects in order to service interceptors SHALL constitute a violation of accessibility.
- B. Installed grease interceptors SHALL have a grease retention capacity of not less than 2 lbs for each gallon per minute of flow.
- C. Grease interceptors SHALL be equipped with devices to control the rate of flow through the interceptors so that it does not exceed the rated flow of the interceptors.
- D. All grease interceptors SHALL be of the type and capacity approved by the Plumbing and Drainage Institute and the WPCA.
- E. Sizing of a pot sink grease interceptor SHALL be performed using the following method:

Example: A sink 48 inches long by 24 inches wide by 12 inches deep.

- 1. Cubic content $48" \times 24" \times 12" = 13,824 \text{ cu. in.}$
- 2. 1 gallon = 231 cu. In./gal

Content in gallons $\frac{13,824 \text{ cu. in.}}{231 \text{ cu. In./gal}} = 59.8 \text{ gal.}$

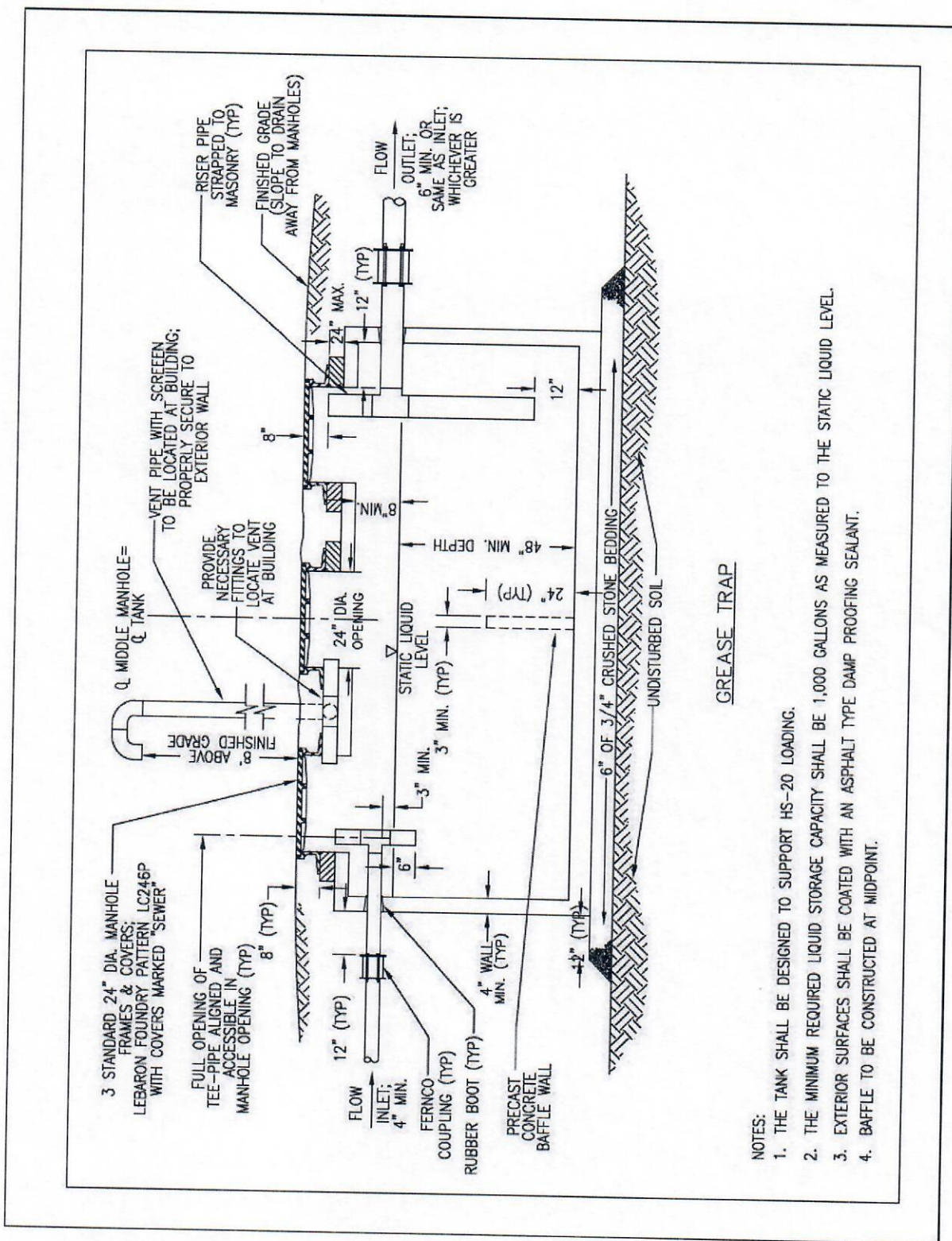
3. The pot sink is usually filled to about 75 percent of capacity while the items washed displaces about 25% of the sinks capacity.
Actual drainage load $0.75 \times 59.8 \text{ gal.} = 44.9 \text{ gal.}$
4. Determine the drainage period which is the time it takes to empty the pot sink. If the time to empty the sink is less than one minute then the time SHALL be one minute. If the time to empty is greater than two minutes then the time SHALL be two minutes. All times between one and two SHALL be the actual time it takes to empty the sink.

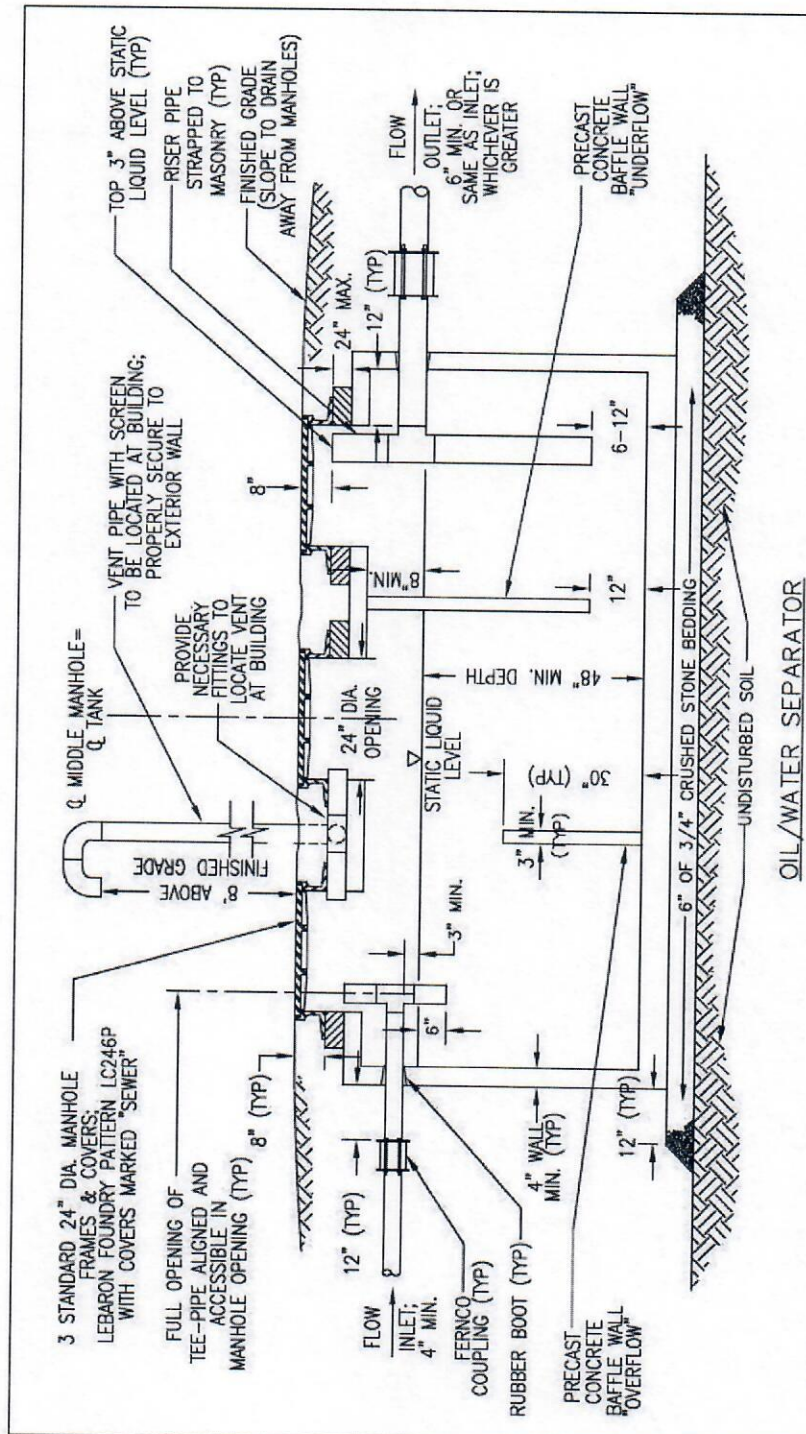
Flow rate $\frac{44.9 \text{ gal.}}{1.5 \text{ minutes}} = 29.9 \text{ gpm}$

5. The grease interceptor size SHALL be equal to or greater than the calculated flow rate.

Maintenance

- A. In-line grease traps and interceptors SHALL be maintained in efficient operating condition by periodic removal of accumulated grease, scum, oil, or other floating substances, and solids deposited on the bottom.
- B. Manual type grease interceptors SHALL be cleaned when cold, before normal operations have started. Usually the grease is congealed and easier to remove under these conditions. The grease MAY be removed by ladling the grease in either it's solid or liquid form which will be floating on the surface. It is also necessary to scrape any food particles from the bottom of the interceptor in order for it to function properly.
- C. A grease interceptor is considered full when the depth of grease and/or oil exceeds one-fourth of the normal liquid depth of the interceptor. The maximum time interval allowed between cleaning is three (3) months. It is recommended that passive interceptors and solids strainers of automatic interceptors be cleaned at least once a day. Failure to clean traps and interceptors at the specified intervals SHALL result in monetary penalties.
- D. Grease traps SHALL be inspected monthly and SHALL be cleaned by a licensed septage hauler whenever the level of grease is 25% of the effective depth of the trap, or at least every three (3) months whichever is sooner.





NOTES:

1. THE TANK SHALL BE DESIGNED TO SUPPORT HS-20 LOADING.
2. THE MINIMUM REQUIRED LIQUID STORAGE CAPACITY SHALL BE 1,000 GALLONS AS MEASURED TO THE STATIC LIQUID LEVEL.
3. ALL INTERIOR SURFACES SHALL BE COATED WITH AN EPOXY BASED, PETROLEUM RESISTANT SEALANT. EXTERIOR SURFACES SHALL BE COATED WITH AN ASPHALT TYPE WATER PROOFING SEALANT.
4. BAFFLES TO BE CONSTRUCTED IN THREE EQUAL COMPARTMENTS.
5. STRUCTURAL SEAM SHALL BE LOCATED ABOVE STATIC LIQUID LEVEL AND FILLED IN WITH NON SHRINKING CEMENT

3.08 Grinder Pumps

The following technical standards SHALL apply when in the opinion of the WPCA that gravity flow to the SEWER is not permissible.

3.08.01 General

A. Description

The intent of this specification is to define the type and quality of Individual Household Grinder Pumping Units for use in a low pressure sewer system. The equipment shall be the product of a company experienced in the design and manufacture of grinder pumps for specific use in low pressure sewer systems. The Manufacturer shall have an established service support program and a continuing inventory of pump unit replacement parts.

The grinder pumps shall be complete factory-built and tested household pump units, each consisting of grinder pump(s) suitably mounted in an HDPE basin, pump removal system, shut-off valve, anti-siphon valve, and check valve assembled within the basin, external remote control and electrical alarm/disconnect panel, equipped with generator transfer switch and receptacle and all necessary internal wiring and controls.

The pump SHALL be either semi-positive displacement type or a submersible end suction centrifugal type grinder unit. For ease of serviceability, when grinder pumps are used for complete subdivisions, all pump motor/grinder units shall be of like type and horsepower throughout the system. Design calculations SHALL be provided to show that the total head will be met and the pump will run within specification limits.

B. Shop Drawings

The DRAIN LAYER SHALL furnish two (2) sets of drawings detailing the equipment to be furnished including dimensional data and materials of construction. The WPCA SHALL promptly review this data, and return one (1) copy to the Contractor as accepted, or with requested modifications.

The DRAIN LAYER SHALL indicate required preventative maintenance. Preventative maintenance not so listed SHALL be considered as inclusive of the manufacturer's warranty and SHALL not be considered as justification of refusal of warranty claims.

The DRAIN LAYER SHALL submit detailed installation and user instructions (operation manuals) for each pump unit supplied; and submit complete parts and service manuals for each unit.

C. Design

The grinder pump manufacturer SHALL establish individual requirements for pumps reflecting random simultaneous operation of each pump in the system. This system must function without backups from individual basins during circumstances in which liquid levels at all grinder pump basins are signaling operation. The manufacturer SHALL provide detailed calculations demonstrating individual pumping capabilities in the system with regard to simultaneous discharge.

D. Operating Conditions

The pumps SHALL be capable of delivering a minimum 15 gpm against a rated total dynamic head of 0 feet (0 PSIG), 11 gpm against a rated total dynamic head of 92 feet (40 PSIG) and 7.8 gpm against a rated total dynamic head of 185 feet (80 PSIG). The design requirement shall use a C value of 130 and the pumps SHALL be capable of operating at negative total dynamic head without overloading the motor(s). Under no circumstances SHALL in-line piping or valving be used to create a false apparent head.

E. Warranty

The DRAIN LAYER SHALL provide a parts and labor warranty on the complete stations and accessories including, but not limited to, the control panel and redundant check valve, for a period of twenty-four (24) months after notice of Owner's acceptance, but no greater than twenty-seven (27) months after receipt of shipment.

3.08.02

Product

A. Semi-positive Displacement Grinder Pumps

1. Pump

The pump SHALL be a custom designed, integral, vertical rotor, motor driven, solids handling pump of progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings SHALL be cast iron, fully epoxy coated to 8-10 mil nominal dry thickness. The rotor SHALL be through-hardened, highly polished, precipitation hardened stainless steel. The stator SHALL be of a specifically compounded ethylene propylene synthetic elastomer. The material SHALL be suitable for domestic wastewater service. Its physical properties SHALL include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. The pump SHALL be U.L. listed to Standard 778 and CSA listed to Standard 108, as well as to NSF/ANSI 46.

2. Grinder

The grinder SHALL be positioned immediately below the pumping elements and SHALL be direct-driven by a single, one-piece motor shaft. The grinder impeller assembly SHALL be securely fastened to the pump motor shaft. The grinder impeller assembly SHALL be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. The grinder SHALL be a one-piece forged 4140 cutter wheel of the rotating type with inductive hardened cutter teeth (Rockwell 55-58c) for abrasion resistance. A stationary quench hardened and ground shredding ring SHALL be provided with a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. This assembly SHALL be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures.

The grinder SHALL be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. Sufficient vortex action SHALL be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements SHALL be accomplished by the following items in conjunction with the grinder pump tank:

- a. The grinder SHALL be positioned in such a way that solids are fed in an upward flow direction.
- b. The inlet shroud opening SHALL have a diameter no less than 5 inches.
- c. Maximum flow rate through the cutting mechanism must not exceed 4 feet per second.
- d. The impeller mechanism SHALL rotate at a nominal speed of no greater than 1,800 RPM.

The grinder SHALL be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, rubber and other foreign materials as defined by NSF/ANSI 46, to finely-divided particles which will pass freely through the passages of the pump and the 1¼" diameter discharge pipe.

3. Electric Motor

The motor SHALL be a 1 HP, 1,725 RPM, 240V, 60 Hz, single phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds.

Inherent protection against running overloads or locked rotor conditions for the pump motor SHALL be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination SHALL have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. The wet portion of the motor armature SHALL be 300 Series stainless steel.

4. Mechanical Seal

The pump core SHALL be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal SHALL have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

5. Tank & Integral Accessway

The tank SHALL be a wetwell/drywell design made of high density polyethylene (HDPE) of a grade selected for environmental stress cracking for simplex stations and HDPE or Fiberglass Reinforced Polyester Resin for duplex stations. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. Corrugations of outside wall are to be a minimum amplitude of 1½" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be a minimum ¼" thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The basin must be designed to withstand wall collapse or buckling based on a hydrostatic pressure of 62.4 pounds per square foot, a saturated soil weight of 135 pounds per cubic foot, a soil modulus of 700 pounds per square foot and constructed to withstand or exceed 200% of the assumed loading at any depth.

The tank SHALL be furnished with one EDPM grommet fitting to accept a 4½"OD (4" DWV (Drain, Waste, Vent) or SCH 40) inlet pipe.

The drywell access way SHALL be an integral extension of the wetwell assembly and include a lockable cover assembly providing low profile

mounting and watertight capability. Access way design and construction SHALL facilitate field adjustment of station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

The station SHALL have all necessary penetrations molded in and factory sealed. No field penetrations SHALL be acceptable.

All discharge piping SHALL be constructed of 304 Series Stainless Steel and terminate outside the access way bulkhead with a flexible stainless steel, 1½" female NPT fitting. The discharge piping SHALL include a stainless steel ball valve rated for 235 psi. The bulkhead penetration SHALL be factory installed and warranted by the manufacturer to be watertight.

The access way SHALL include a single NEMA 6P electrical quick disconnect (EQD) for all power and control functions, factory installed with access way penetrations warranted by the manufacturer to be watertight. An electrical junction box SHALL not be permitted in the tank. The access way SHALL also include a 2-inch PVC vent to prevent sewage gases from accumulating in the tank. The EQD SHALL be supplied with Thirty-two (32) feet of useable Electrical Supply Cable (ESC) outside the station, meeting UL requirements, to connect to the alarm panel. The ESC SHALL be installed in the basin by the manufacturer. The EQD SHALL be so designed to be conducive to field wiring as required.

6. Check Valve

The pump SHALL be equipped with a factory-installed, gravity-operated, flapper-type integral check valve built into the stainless steel discharge pipe. The check valve SHALL provide a full-ported passageway when open, and SHALL introduce a friction loss of less than 6 inches of water at a maximum rated flow. A non-metallic hinge SHALL be an integral part of the flapper assembly providing a maximum degree of freedom to ensure seating even at very low back pressure. The valve body SHALL be an injection molded part of the engineered thermoplastic resin. The working pressure of the valve SHALL be at least 235 psi.

Each grinder station SHALL also include a separate check valve for installation in the 1½" service lateral between the grinder pump station and the sewer main, preferably next to the curb stop.

Moving parts SHALL be made of 300 series stainless steel and fabric

reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability and fatigue strength.

7. Core Unit

The grinder pump SHALL have cartridge type, easily removable core assemblies containing pump, motor, grinder, motor and level controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. The core unit SHALL seal to the tank deck with a stainless steel latch assembly and must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench.

The watertight integrity of the core unit, including wiring and access cover, SHALL be established by 100% factory test at a minimum of 5 PSIG.

8. Controls

Controls, to make the system fully operational, SHALL be located in the top housing of the core unit. The cover SHALL be attached with 304 stainless steel fasteners. The wastewater level controls SHALL be housed in a separate enclosure from the motor starting controls, sealed via a radial type seal and integrally attached to the pump assembly so that it can be removed from the station with the pump. The level sensing housing SHALL be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer.

Non-fouling wastewater level detection for controlling pump operation SHALL be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column SHALL be integrally molded from thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column SHALL have only a single connection between the water level being monitored and the pressure switch with any connections sealed radially with redundant O-rings. The level detection device SHALL have no moving parts in direct contact with the wastewater. Depressing the run button SHALL operate the pump even with the level sensor housing removed from the pump.

9. Anti-Siphon Valve

The pump SHALL be equipped with a factory installed, gravity operated flapper-type integral anti-siphon valve built into the stainless steel discharging piping. Moving parts SHALL be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A non-

metallic hinge SHALL be an integral part of the flapper assembly providing a maximum degree of freedom to ensure seating even at very low back pressure. The valve body SHALL be an injection molded part of the engineered thermoplastic resin. The anti-siphon port diameter SHALL be no less than 60% of the inside diameter of the pump discharge piping

10. Control Panel

Each grinder pump station SHALL include a NEMA 4X, UL-listed Alarm/Disconnect Panel suitable for wall or pole mounting. The NEMA 4X enclosure SHALL be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure SHALL include a hinged, padlockable cover, secured dead front and component knockouts. The enclosure dimensions shall be large enough to include all components as specified. The enclosure shall not exceed approximately 12.5"W x 16"H x 7.5"D.

For each core unit, the panel SHALL contain one (1) 15 amp, double pole circuit breaker for the power circuit and one (1) 15 amp single pole circuit breaker for the alarm circuit. The panel SHALL contain terminal blocks, integral power bus, push to run feature, a complete alarm circuit and a generator transfer switch and one (1) 20 amp 250 VAC generator receptacle with spring loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a 4X rating.

The Control Panel SHALL include the following features: audio and visual alarm, push to run switch, push to silence switch, high level and (redundant) pump starting control and generator outlet. The alarm sequence is to be as follows:

- a. When liquid level in the sewage wet well rises above the alarm level, visual and audio alarms will be activated. The contacts on the alarm pressure switch will close. The redundant pump starting system will be energized.
- b. The audio alarm MAY be silenced by means of the externally mounted, push-to-silence button.
- c. Visual alarm remains illuminated until the sewage level in the wet well drops below the "off" setting of the alarm pressure switch.

The visual alarm lamp SHALL be inside a red oblong lens at least 3.75" L

x 2.38" W x 1.5" H. Visual alarm SHALL be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. For duplex units, in addition to the above, two high level indicator lights SHALL be mounted behind the access cover. During a high level alarm condition, the appropriate light will illuminate to indicate which pump core requires servicing.

The audio alarm SHALL be a printed circuit board in conjunction with an 93 dB @ 2 feet buzzer with quick mounting terminal strip mounted in the interior of the enclosure. The audio alarm SHALL be capable of being de-activated by depressing a push-type switch which is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure.

The entire Control Panel, as manufactured, SHALL be listed by Underwriters Laboratories, Inc.

11. Serviceability

The grinder pump core units SHALL have two lifting eyes complete with nylon lift out harness connected to its top housing to facilitate easy removal of the core unit from the tank when necessary. All mechanical and electrical connections must provide easy disconnect accessibility for core unit removal and installation. A push-to-run feature SHALL be provided for field troubleshooting. All motor control components SHALL be mounted on a readily replaceable bracket for ease of field service.

12. Corrosion Protection

All materials exposed to wastewater or within the wet well SHALL have inherent corrosion protection; i.e., epoxy powder coated cast iron, fiberglass, stainless steel, PVC.

13. Safety

The grinder pump SHALL be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station in its tank SHALL be listed by Underwriter's Laboratories, Inc. to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

The grinder pump SHALL meet accepted standards for plumbing equipment for use in or near residences, SHALL be free from noise, odor or health hazards, and SHALL have been tested by an independent laboratory to certify its capability to perform as specified in either

individual or low pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump SHALL bear the National Sanitation Foundation seal.

B. Submersible Centrifugal Grinder Pump

1. Pump

The pump SHALL be a custom designed, vertical suction, motor driven, solids handling pump with mechanical seal. The impeller SHALL be of the recessed, vortex design of 85-5-5-5 bronze construction. Shaft seals SHALL be ceramic and silicon carbon, stainless steel, mechanical type. All exposed hardware SHALL be 300 series stainless steel. Discharge connection SHALL be a horizontally oriented discharge flange with integral sealing diaphragm. The material SHALL be suitable for domestic wastewater service. Its physical properties SHALL include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability of 104° F, good aging properties, outstanding wear resistance and capable of running dry for extended periods of time as well as operating at zero or negative heads without damage to the pump. The pump SHALL be U.L. listed to Standard 778 and CSA listed to Standard 108, as well as to NSF/ANSI 46.

2. Grinder

The grinder mechanism SHALL be specifically designed for use in a grinder pump; garbage-disposal-style cutting mechanisms are not acceptable. The grinder SHALL consist of a radial cutter threaded and locked to the motor shaft, and a matching shredded ring. Grinding SHALL be accomplished by a slicing rather than chopping action. The shredding ring SHALL be reversible to provide twice the cutting life. The grinder components SHALL be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and SHALL be finish ground for a fine cutting edge.

The grinder SHALL be positioned immediately below the pumping elements and SHALL be direct-driven by a single, one-piece motor shaft. The grinding mechanism SHALL operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder SHALL be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. The grinder must be capable of handling a wide variety of solids, including cloth, paper, grit, sanitary products, and other foreign materials as defined by NSF/ANSI 46.

3. Electric Motor

As a minimum the motor SHALL be a 2 HP, 3,450 RPM, 240V, 60 Hz, single phase, submersible, capacitor start, ball bearing, squirrel cage, Induction type with NEMA L characteristics and SHALL be non-overloading throughout the entire pump curve. The motor SHALL operate submerged and SHALL be housed in a sealed housing filled with non-toxic dielectric oil. The motor SHALL have permanently lubricated, anti-friction bearings and stainless steel shaft, and continuously run submerged and not submerged without exceeding temperature limits. Thermal overload protection must be provided. Inherent protection against running overloads or locked rotor conditions for the pump motor SHALL be provided by the use of an automatic reset, integral thermal overload protector incorporated into the motor. This motor protector combination SHALL have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application.

Grinder pumps and motors SHALL be listed by UL for such locations. Guaranteed submergence SHALL not be considered equal to the UL listing for the application.

4. Mechanical Seal

Submersible motors SHALL be equipped with floating style single mechanical seal to prevent leakage between the motor and pump. Seal faces SHALL be silicon carbide for both the rotary and stationary seats, lapped and polished to a tolerance on one (1) light band. Seal SHALL be provided with 300 series stainless steel hardware and Buna elastomers.

5. Tank & Integral Accessway

The tank SHALL be a wetwell/drywell design made of high density polyethylene (HDPE) of a grade selected for environmental stress cracking for simplex stations with a corrugated high-density polyethylene riser sealed to the basin and cover adapter and HDPE or Fiberglass Reinforced Polyester Resin for duplex stations. The basin SHALL be provided with three (3) blanked off inlet positions, 90 degrees apart, for field selection to simplify installation. The basin must be designed to withstand wall collapse or buckling based on a hydrostatic pressure of 62.4 pounds per square foot, a saturated soil weight of 135 pounds per cubic foot, a soil modulus of 700 pounds per square foot and constructed to withstand or exceed 200% of the assumed loading at any depth.

The access way SHALL include a single NEMA 6P electrical quick disconnect (EQD) for all power and control functions, factory installed

with access way penetrations warranted by the manufacturer to be watertight. An electrical junction box SHALL not be permitted in the tank. The access way SHALL also include a 2-inch PVC vent to prevent sewage gases from accumulating in the tank. The EQD SHALL be supplied with Fifty (50) feet of useable Electrical Supply Cable (ESC) outside the station, meeting UL requirements, to connect to the alarm panel. The ESC SHALL be installed in the basin by the manufacturer. The EQD SHALL be so designed to be conducive to field wiring as required.

The drywell access way SHALL be an integral extension of the wetwell assembly and include a lockable cover assembly providing low profile mounting and watertight capability. Access way design and construction SHALL facilitate field adjustment of station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

The station SHALL have all necessary penetrations molded in and factory sealed. No field penetrations SHALL be acceptable.

6. Removal System

Each basin SHALL be equipped with an injection molded engineered polypropylene thermoplastic POD to locate and position the grinder pump and level control device. Pump and controls SHALL be removable without requiring the loosening of fasteners. The POD is to provide automatic alignment and connection of pump to discharge piping and level control with no additional adjustment required. A ½" diameter knotted polypropylene rope harness with a minimum breaking strength of 3,750 pounds SHALL be attached to the pump at two locations for removal and installation purposes for Simplex units. Larger units MAY be equipped with stainless steel guide rails to facilitate removal of the pump(s) from the top. Guide rail systems must be UL approved, non-sparking type.

7. Shutoff Valve

The pump discharge SHALL be equipped with a factory-installed manual ball valve. The ball valves SHALL be fully ported, constructed of bronze with stainless steel ball, stainless steel stem and hardware, and Teflon seats with a minimum rated pressure of 150 PSI. All valves SHALL be operable from ground level with a color-coded actuation cord tagged green to open, red to close. Shut-off valve must be replaceable from above without confined space entry.

8. Check Valve

The pump discharge SHALL be equipped with a factory-installed, gravity-operated, flapper-type integral check valve. The check valve SHALL provide a full-ported passageway when open, and SHALL introduce a friction loss of less than six (6) inches of water at a maximum rated flow. Working parts SHALL be 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A non-metallic hinge SHALL be an integral part of the flapper assembly providing a maximum degree of freedom to ensure seating even at very low back pressure. The valve body SHALL be an injection molded part made of PVC type I-II. Working pressure of the valve SHALL be at least 150 psi.

Each grinder station SHALL also include a separate check valve for installation in the 1¼" service lateral between the grinder pump station and the sewer main, preferably at the curb stop and require only ½ pound of backpressure for complete closure.

9. Anti-Siphon Valve

The pump SHALL be constructed with a positively-primed, flooded suction configuration. As added assurance that the pump cannot lose prime even under negative pressure conditions in the discharge piping system, the pump SHALL be equipped with an integral anti-siphoning, air relief valve in the discharge piping just below the main check valve. The valve will automatically close when the pump is running and open when the pump is off.

10. Pump Discharge Piping

All internal discharge piping SHALL be constructed of 304 stainless steel or bronze and terminate outside the access way bulkhead with a stainless steel flexible fitting with a 1-1/4 inch female NPT fitting. The manufacturer SHALL guarantee all bulkhead penetrations be watertight.

The discharge connection shall be constructed so as to prevent against shearing from the forces generated from backfilling and tank settlement.

11. Level Sensors

Level detection for controlling pump and alarm operation SHALL be accomplished by use of a detection device specifically designed for use in a sewage grinder station. Non-fouling sewage level detection for controlling pump operation shall be accomplished by solid state, continuous pressure sensing level measurement. Level control sensor shall meet NEMA 6P/IP68 for electrical enclosures and connectors for operation inside wet well. Switches used in the system SHALL be

hermetically sealed in a submersible, watertight protective housing, with an integral pressure-compensating diaphragm. Level detection SHALL not require any regular preventive maintenance. The level detection device SHALL include an automatically resetting, heat sensing thermal switch that interrupts current flow if excessive liquid temperature is detected. The level control SHALL be serviceable without confined space entry as defined by OSHA. The level sensing assembly SHALL meet UL approval.

12. Control Panel

Each grinder pump station SHALL include a NEMA 4X & 6, UL listed electrical control panel. The enclosure shall be manufactured of thermoplastic to ensure corrosion resistance. The enclosure SHALL not exceed approximately 13"W x 15"H x 7"D. It shall include a hinged, lockable cover with a secured dead front. The external control and alarm panel shall contain the motor contactor, terminal blocks and complete multi-alarm circuitry. The panel shall also have the following features: Audible and visual alarm with test and push-to-silence button, pump push-to-run switch with pump run LED, Emergency pump manual override switch, disconnect switch for generator power, 250V/20 AMP Male generator receptacle, one (1) 20 amp, thermal circuit breaker with accidental actuation protection, one (1) low voltage (24VDC) control and alarm circuit catastrophic over-voltage and over-current protection. The enclosure dimensions shall be large enough to include all components as specified

The visual alarm lamp SHALL be inside a red fluted lens at least 2-5/8" diameter and 1-11/16" in height. Visual alarm SHALL be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. For duplex units, in addition to the above, two high level indicator lights SHALL be mounted behind the access cover. During a high level alarm condition, the appropriate light will illuminate to indicate which pump requires servicing.

The audio alarm SHALL be a printed circuit board in conjunction with an 86 db buzzer with quick mounting terminal strip mounted in the interior of the enclosure. The audio alarm SHALL be capable of being de-activated by depressing a push-type switch which is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure.

The entire Control Panel as manufactured SHALL be listed by Underwriters Laboratories, Inc.

13. Corrosion Protection

All materials exposed to wastewater or within the wet well SHALL have inherent corrosion protection; i.e., epoxy powder coated cast iron, fiberglass, polyethylene, engineered polypropylene copolymer, stainless steel, PVC or CPVC.

14. Safety

The grinder pump SHALL be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled, factory wired and tested grinder pump station in its tank SHALL be listed by Underwriter's Laboratories, Inc. to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

The grinder pump SHALL meet accepted standards for plumbing equipment for use in or near residences, SHALL be free from noise, odor or health hazards, and SHALL have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump SHALL bear the National Sanitation Foundation seal.

3.08.03

Execution

A. Factory Tests

Each grinder pump or a representative centrifugal pump curve SHALL be submerged and operated for 5 minutes (minimum). Included in this procedure SHALL be the testing of all ancillary components such as the anti-siphon valve, check valve, discharge line, level sensors, each unit's dedicated controls, respective alarm/disconnect or control panel, etc. All factory tests SHALL incorporate each of the above listed items. Actual appurtenances and controls which SHALL be installed in the field SHALL be particular to the tested pump only. A common set of appurtenances and controls for all pumps will not be acceptable. Certified test results SHALL be supplied showing the operation of each grinder pump at three (3) different points on its performance curve, with the maximum pressure no less than 60 psi.

Grinder pump core unit SHALL be tested for watertightness up to 5 PSIG.

All tests SHALL be made in accordance with the applicable requirements of the test codes of the Hydraulic Institute and the American Institute of Electrical Engineers.

B. Delivery

Grinder pump units SHALL be delivered to the job site, 100% completely assembled, including testing, ready for installation. In some cases where centrifugal pumps are used, the pumps and level sensors are shipped separately and require field assembly. Each grinder pump unit will have a minimum of three (3) lifting eyes to facilitate unloading and be individually mounted on wooden pallets.

3.08.04 Operation and Maintenance

A. Manuals

In addition to the requirements for operational manual submittals previously detailed, the manufacturer SHALL supply one (1) copy of Operation and Maintenance Manuals to the Owner, and one (1) copy to the WPCA.

B. OSHA Confined Space

All maintenance tasks for the grinder pump station must be possible without entry of the grinder pump station (as per OSHA 1910.146 Permit-required confined spaces). "Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space."