

3.01 GENERAL

- A. The Contractor shall furnish all material and shall construct the pipe lines and all required appurtenances at the locations and to the lines, slopes and elevations shown on the drawings or designated by the Engineer.
- B. All sewer pipe shall be polyvinyl chloride (PVC) pipe.
- C. The Contractor shall submit certifications to the Engineer that all pipe, fittings and joints are as specified herein.

3.02 POLYVINYL CHLORIDE SEWER PIPE AND FITTINGS

- A. Polyvinyl chloride (PVC) pipe, used for sewer construction, shall equal or exceed the requirements of ASTM-D-3034 and shall have a minimum standard dimension (SDR) ratio of 35 and the minimum pipe stiffness, as tested in accordance with ASTM-D-2412, shall be 45 when measured under 5% deflection at 73° Fahrenheit. Pipe shall be manufactured with integral wall hell and spigot joints in standard lengths not exceeding 20.0 feet.
- B. All polyvinyl chloride (PVC) pipe and fittings shall utilize an elastomeric o-ring gasketed joint, assembled in accordance with the manufacturer's recommendations.
- C. Polyvinyl chloride wye branches, pipe stoppers and other fittings shall be manufactured in accordance with the same specifications and shall have the same thickness, depth of socket, and annular space as the pipe. Tee fittings will not be permitted for use. Wye branches shall be complete pipe sections. Saddles will not be permitted for use.
- D. Polyvinyl chloride pipe shall be delivered and stockpiled in unit pallets. Stacking of pallets above five (5) feet in height will not be allowed. If pipe is stockpiled for more than thirty (30) days prior to installation in the trench, it must be suitably covered with reflective material to protect the pipe from ultraviolet rays emanating from sunlight. Do not use plastic sheets. Allow for air circulation under covering.
- E. Bowed sections of pipe will be unacceptable and installation of pipe which has bowed, whether or not the bow has been corrected, will not be allowed.

3.03 POLYVINYL CHLORIDE FORCE MAIN PIPE AND FITTINGS

- A. Pipe shall be manufactured to meet the requirements of ASTM-D-1785 Polyvinyl Chloride (PVC) pressure pipe Schedule 80. Pipe shall be manufactured in lengths not exceeding twenty (20) feet. Pipe shall be integral bell by plain end design.

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- B. Pipe Joints
All pipes to be connected by solvent welding shall be installed by experienced pipe layers, to the satisfaction of the Engineer. Jointing shall be done in the manner recommended by the manufacturers. The PVC-compound shall meet ASTM-D-1784 requirements.
- C. Pour concrete thrust blocks according to the details on all horizontal or vertical pipe bends.
- D. The force mains shall be filled with water supplied by the Contractor, as directed by the Engineer, and the pressure raised to obtain a minimum test pressure of 75 psi, or two (2) times the operating pressure, whichever is greater, measured at the highest point of the section of pipeline under test. Particular care shall be taken to eliminate all air from the pipeline. The force mains shall be subject to a leakage test at the specified test pressure, measured at the highest point of the section of pipeline under test. This test shall be a minimum of four (4) hours duration during which time the leakage shall not exceed 25 gallons per inch of diameter per mile in 24-hours, and this is not to include any visible leaks. All visible leaks shall be repaired by the Contractor at no expense to the Owner. The Contractor shall make any and all repairs at his expense that may be necessary until the leakage test requirements have been met.

3.04 POLYETHYLENE (PE) PIPE AND FITTINGS (FOR DIRECTIONAL FORCE MAIN BORES)

- A. PE pipe shall be SDR11 plain end for fusion welding conforming to ASTM F 714 and ASTM D 3035. Minimum pressure rating shall be 160 psi.
- B. Molded fittings will conform to ASTM F 714. End sections of PE piping in directional bore shall have an AWWA C-207 Class D flanged end hutt. Fusion welded to PE main. Flange shall be drilled to standard 125 pound tenslate.
- C. Terminal end of PC pipe shall be connected to continuing ductile iron, PVC or PE pipe with a flanged expansion joint. The flanged expansion joint shall be a "FlexTend" flexible expansion joint as manufactured by EBAA, or approved equal.

3.05 PIPE INSTALLATION

- A. Pipe and fittings shall be carefully handled and lowered into the trench. Special care shall be taken to insure that each length shall abut against the next in such a manner that there shall be no shoulder or unevenness of any kind along the inside of the pipe.

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- B. Before pipe is placed, the bottom of the trench shall be carefully shaped to fit the lower part of the pipe exterior with reasonable closeness for width of at least 60% of the pipe width. Bell holes shall be dug sufficiently large to insure the making of proper joints and so that after placement, only the barrel of the pipe receives bearing pressure from the trench bottom. No pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Any defects due to settlement shall be made good by the Contractor.

- C. Minimum Pipe Slopes:

Assuming an "n-value" of 0.010 for PVC, the table below provides the minimum allowed pipe slopes.

Sewer Size	Minimum Slope in Feet/100 Feet
8 inch	0.28
10 inch	0.22
12 inch	0.17
15 inch	0.12
18 inch	0.10
21 inch	0.08
24 inch	0.06

- D. Proper and suitable tools and appliances, for the safe and convenient handling and laying of pipe, shall be used.
- E. Whenever a pipe requires cutting to fit into the line or to bring it to the required location, the work shall be done in a satisfactory manner so as to leave a smooth end.
- F. The pipes shall be thoroughly cleaned before they are laid and shall be kept clean until the acceptance of the completed work. The open ends of all pipelines shall be provided with a stopper carefully fitted so as keep dirt and other substances from entering. This stopper shall be kept in the end of the pipeline at all times when laying is not in actual progress.

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- G. All concrete required to support and reinforce wye branches, bends and other fittings shall be placed as directed, and the cost thereof shall be included and covered within the price bid.
- H. Backfill materials shall be hand placed and mechanically tamped in six (6)-inch layers, placed uniformly on both sides of the pipe, to a point at least one (1) foot above the pipe crown. Each layer shall be thoroughly compacted for the full trench width and under, around and over the pipe.
- I. Pipeline detectable tape shall be installed continuously along all sewer mains. The tape shall be installed directly above the pipe and twelve (12)-inches from the ground surface. The tape shall be Lineguard Type II Detectable tape as manufactured by Lineguard, Inc., of Wheaton, Illinois or equal. The tape shall be a minimum of two (2)-inches wide, imprinted with the words "CAUTION--SEWER LINE BELOW" and be capable of being detected with inductive methods.
- J. The pipe used for stream crossing shall be ductile iron encased in concrete within the limits of the stream and to a point ten feet (10') from each bank. All pipe located within ten feet of a stream shall be ductile iron. Wherever possible, the line shall be located three feet (3') or more below the stream bed at stream crossing.
- K. For refill of the remaining trench depth, refer to "Excavation and Backfill" Section of these specifications.

3.06 LAYING PIPE IN FREEZING WEATHER

No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the Engineer shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation, unless all required precautions as to the minimum length of open trench and promptness of backfilling are observed.

3.07 ARTIFICIAL FOUNDATION

Whenever directed, the Contractor shall lay pipe upon an artificial foundation which he shall construct. Such foundation may consist of gravel or of concrete; all to be of the form and dimensions and place according to the details or in the manner required by the Engineer.

3.08 TESTING

- A. Gravity sewer to be tested in accordance with the following:
- 1) Contractor shall furnish all labor, tools, materials, and equipment, including

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water, pumps, compressors, stopwatch, gauges, and meters, subject to the approval of the Engineer for testing in accordance with these specifications.

- 2) The Engineer shall be notified in advance of all tests, and all tests shall be conducted to his entire satisfaction.
- 3) The Gravity sewer shall be mirror, mandrel, and air tested as follows:

a. MIRROR TEST:

Upon completion of pipe laying and backfilling to a point at least two (2) feet above the crown of the pipe, the Engineer will conduct a mirror test to check for defects, excess deflection, leakage, and for horizontal or vertical misalignment. Mirror testing shall consist of reflecting sunlight or artificial light via mirrors through the completed section of pipeline, which, in order to be accepted, shall be true and straight in horizontal and vertical alignment to allow for the full passage of the reflected light.

b. MANDREL TEST:

Sanitary sewer pipe shall be deflection tested not less than 30 days after the trench backfill and compaction has been completed. The test shall be conducted by pulling an approved solid pointed mandrel through the completed pipeline. The diameter of the mandrel shall be 95 percent of the inside diameter of the pipe. The mandrel shall be a rigid, non-adjustable mandrel having an effective length of not less than its nominal diameter.

Testing shall be conducted on a manhole to manhole basis and shall be done after the line has been completely cleaned and flushed. Any portion of the sewer which fails to pass the test shall be excavated, repaired or realigned and retested with both air and deflection tests.

c. LEAK TESTING USING AIR:

- 1) Sewers shall be tested in sections of not more than 400 foot lengths unless otherwise approved by the Engineer. Each section shall be tested immediately upon completion thereof. Each section shall meet the air pressure drop limitations specified herein.
- 2) All material and labor required for leakage tests shall be

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furnished by the Contractor.

- 3) Sewers shall be tested using the low-pressure air method in accordance with the requirements of ASTM C-828 and the Uni-Bell Plastic Pipe Association recommendations, based upon the Ramseier test time criteria. Procedural and equipment details shall be submitted to the Engineer prior to acceptance of its use for testing.
- 4) If the test time for the designated size and length elapses before the test pressure drops 0.5 psig, the section undergoing the test shall have passed.
- 5) If the pressure drops 0.5 psig before the appropriate test time has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test. Contractor shall determine, at his own expense, the source or sources of leakage and he shall repair or replace all defective materials and/or workmanship to the satisfaction of the Engineer. The completed pipe installation shall then be retested and required to meet the requirements of this test.

3.09 BORING AND JACKING OF SANITARY SEWER

- A. Where possible, an approach trench shall be excavated far enough to provide a jacking face of at least three (3) feet from a pavement surface. This open face shall be shored securely to prevent slipping or raveling of the face.
- B. Boring pits shall be large enough to contain all necessary equipment and tools. Adequate provision shall be made for the removal of excavated material.
- C. A substantial backstop of heavy timber or steel beams shall be provided to take the thrust of the jack or boring equipment.
- D. As material is excavated or bored ahead of the pipe, the pipe shall be jacked in to follow this excavation. The distance dug ahead of the pipe shall not exceed six (6)-inches.
- E. The installation of casing pipe and the boring or excavation shall be done simultaneously.
- F. Voids between the sleeve and excavation shall be filled by pressure grouting.

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- G. Cement grout shall be used to seal the pipe ends between the carrier pipe and sleeve.
- H. A one (1)-inch PVC pipe shall be installed in the downgrade seal to permit drainage.
- I. Steel pipe sleeve shall be furnished in random lengths of the diameter shown on the plans and noted in the proposal and shall conform to the requirements of AWWA C-200; Grade B pipe shall be used. The pipe, including field connections, shall be coated with bitumastic compound, inside and outside. Pipe wall thickness for sleeves shall be standard thickness. All joints for casing pipe shall be made by continuous weld completely around the perimeter of the pipe in accordance with AWWA C-206.
- J. Carrier pipe shall be as required by the plans.
- K. Use runners or cradles to support the pipe in the casing. A minimum of three (3) supports is needed per joint of pipe providing a maximum span of 6 1/4-feet for PVC pipe lengths of 12.5 feet or less. The maximum span between supports for pipe lengths of 19 to 20 feet must not exceed 7.5 feet.

3.10 DIRECTIONAL BORE (FORCE MAIN ONLY)

- A. The system must be remotely steerable and permit electronic monitoring of tunnel depth and location. The system must be able to control the depth and direction of the pipe and must be accurate to a window of +/- 2 inches.
- B. The system must be capable of turning 90 degrees in a 35 foot radius.
- C. The system shall utilize a fluid-cutting process, using a liquid clay such as bentonite. This clay must be total inert and contain no risk to the environment.
- D. Liquid clay shall remain in the tunnel to increase stability of the tunnel and provide a lubricant to reduce frictional drag when the pipe is installed.
- E. Spoils shall be recovered by use of a vacuum system mounted on a vehicle for removal of spoils to an approved spoils site. Spoils shall not be discharged into sewers or storm drains.
- F. The equipment must be capable of completing the boring in a single bore.
- G. Equipment must be fitted with a permanent alarm system capable of detecting an electrical current. The system will have an audible alarm to warn the operator when the drill head nears electrified cables.

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3.11 SEWER MANHOLES

A. GENERAL

- 1) The Contractor shall have the option of constructing shallow (4' or less) manholes of precast reinforced concrete or "SS" sewer brick as indicated on the drawings. Manholes deeper than four (4) feet will be precast reinforced concrete.
- 2) Manholes shall be built at such points on the pipelines, and of such form and dimensions as are shown on the drawings or as may be directed. Manholes shall be built as pipe laying progresses, and the Engineer may stop work entirely on the pipe laying, if manhole construction is delayed to such an extent as to be hazardous to construction or the public.
- 3) Manholes shall be spaced no more than 400 feet apart and at all bends in gravity sewer mains.

B. PRECAST REINFORCED CONCRETE MANHOLES

- 1) Precast reinforced concrete risers, eccentric cones and bases shall be in conformance with ASTM Designation C 478. Joints between riser sections shall be fitted with an "O" ring rubber gasket, meeting the requirements of ASTM Designation C 443. Installation of risers shall be in accordance with manufacturer's recommendations under the supervision of the Engineer.
- 2) Precast reinforced concrete base and riser sections shall be as manufactured by Atlantic Concrete Products Company, Virginia Precast Corporation, or equal.
- 3) Interior and exterior joint spaces of all manhole risers shall be filled prior to application of the exterior waterproofing. The interior joint shall be mortared. The exterior joint may be mortared or filled with a joint filler compound. Said compound shall be Pioneer 301 as manufactured by Daubert Chemical Company, Oakbrook, Illinois, or equal.
- 4) Lifting holes in the walls of precast reinforced concrete risers will be allowed but shall be plugged with rubber stoppers and grouted flush with face or manhole wall after installation of manhole riser sections. Not more than two (2) holes shall be cast in the walls of each riser section for the purpose of handling.
- 5) The exterior surface of all precast manholes shall receive a minimum two (2)

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coat application of a 68% solids coal tar type protective coating. The total average dry film thickness shall measure 24 mils with no single measurement to be less than 20 mils. Surface shall be prepared in accordance with the manufacturer's instructions and coatings applied in the field in a manner acceptable to the Engineer. The coating material shall be Bitumastic Super Service Black manufactured by Koppers Company, Inc., Pittsburgh, Pennsylvania, Tar Jet Super Black XX-32-B-22 manufactured by Pennsbury Coatings Corp., New Britain, Pennsylvania, or equal.

- 6) All pipe-to-manhole connections in the precast manhole shall be made by means of an integrally cast flexible connector which shall be Lockjoint flexible manhole sleeve as manufactured by Interpace Corp., Parsippany, New Jersey, or A-Lok flexible manhole gasket as manufactured by A-Lok Corp., Trenton, New Jersey, or equal.

C. FLOW CHANNELS

- 1) Manhole flow channels and benches shall be constructed of "SS" sewer brick with care taken to secure smooth and even surfaces with full special mortar joints. Channel sections shall be built up to true line and radius, and curved sections shall provide a uniform transition in the flow direction.
- 2) Materials and construction of flow channels shall be in accordance with appropriate sections for materials so used, as hereinafter specified.
- 3) Precast concrete flow channels shall not be allowed.

D. CONCRETE

All concrete for manhole base slabs and cradles, encasements, blocking, etc. shall have a minimum compressive strength of 3,000 psi at twenty-eight (28) days.

E. BRICK

All brick shall conform to the "Standard Specifications for Sewer Brick," ASTM Designation C 32, Grade SS, except that the maximum absorption for the average of five (5) bricks shall not exceed 10%; and the individual brick maximum shall not exceed 14%.

F. MORTAR

- 1) Cement shall be in accordance with "Standard Specifications for Portland Cement", ASTM Designation C 150 for Type II.

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- 2) Sand shall be composed of sharp, angular, silicious grains, coarse, or graded from fine to coarse, with the coarsest grains predominating, and sensibly free from clay, loam, dirt, mica, organic matter, or other impurities. Sand containing more than 5% by weight of foreign material shall not be used. This limit may be changed for special classes of work, if hereinafter specified. Sand exhibiting more than an acceptable amount of fine matter or impurities may be required to be washed after delivery on the work or shall be rejected altogether. Sand for mortar shall be screened to reject all particles of a greater diameter than 1/4-inch and shall not contain more than 5% by weight of a very fine material.
- 3) Unless hereinafter specified otherwise, all mortar shall be composed of cement and sand of the character above specified. The proportion of volume shall be one (1) part of cement to two (2) of sand. One volume of cement shall be 94 pounds net. One volume of sand shall be 0.9 cubic feet, the sand not being packed more closely than by throwing it into a box in the usual way. Mortar shall be fresh mixed in small hatches for the work in hand. Tight boxes or platforms made for the purposes shall be used. The sand and cement shall be thoroughly mixed dry, in the proper proportions, until uniform color has been produced, whereupon a moderate dose of water shall be added, so as to produce a stiff paste of the proper consistency.
- 4) Sand obtained from the excavation shall not be used.

G. LAYING BRICK

- 1) All brickwork shall be laid by competent professionals.
- 2) All brick shall be laid in a full bed of mortar with all vertical and horizontal joints filled solid with mortar.
- 3) Joints shall not be less than 3/8-inch or more than 1/2-inch wide except as otherwise specified.
- 4) No brickwork shall be laid when the temperature is below 40° or when the indications are for lower temperatures within twenty-four (24) hours. The Contractor shall take such measures as may be approved to prevent brickwork from being exposed to freezing temperatures for a period of not less than five (5) days after laying.
- 5) Special care shall be taken in laying brick in inverts of manholes to insure a uniform flow of water through the sections. In such locations, joints shall not exceed 1/16-inch in thickness and each brick shall be laid in full mortar bed

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with joints on bottom side and end made in one operation. No grouting or working in of mortar after laying the brick, will be permitted.

H. MANHOLE STEPS

- 1) Manhole steps shall be made of 3/8-inch diameter (No.3) steel reinforcing bars, ASTM Designation A 615, Grade 60, encased in polypropylene plastic. Manhole steps shall have notched tread ridge with retainer lug on each side.
- 2) Manhole steps shall be cast in place during manufacture of precast reinforced concrete manholes or placed in brick manholes during construction. Embedment length shall be suitable for minimum five (5)-inch thick, precast reinforced concrete riser walls.
- 3) Manhole steps shall be OSHA approved and as manufactured by; M.A. Industries, Inc., Peachtree City, Georgia; ICM, Inc., Jacksonville, Arkansas, or equal.
- 4) Manhole steps shall be spaced twelve (12)-inches apart. The maximum spacing from top of manhole to the first step shall not exceed sixteen (16)-inches.

I. MANHOLE FRAMES AND COVERS

- 1) Frames and covers for manholes shall be set by the Contractor as the work progresses. The frame shall be well hedged in mortar.
- 2) Frames and covers shall be Neenah Model R-1642 heavy duty, solid lid, with one (1) pick hole. Material for frames and covers shall be in accordance with standard specifications for gray iron castings ASTM A-48 for Class 35.
- 3) The maximum allowable vertical adjustment of manhole cover frames shall be 12 inches. Adjustments shall be made with brick and mortar or precast adjustment rings.
- 4) Manhole stubs shall be extended four (4) feet outside of the manhole wall, unless otherwise detailed. The stub end shall be plugged.

J. TESTS

If inspection reveals any visible leakage or seepage in any manhole, the Contractor will be required to accomplish such remedial measures as may be directed by the Engineer. Caulking or patching of interior manhole surfaces will not be acceptance.

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3.12 SEWER HOUSE CONNECTIONS

A. GENERAL

- 1) In all house connections, each property shall be separately and independently connected with the sanitary sewer, and for the purpose of this regulation, each side of a so-called double house shall be considered as a separate property and each side must have a separate house connection located entirely within its boundaries.
- 2) The City must be given ample notice (48 hours) in order to examine the work before ordering the backfilling to begin.
- 3) Any part of the work which may have to be covered without previously obtaining the consent of the City, shall be uncovered for examination if so ordered by City.
- 4) The backfilling around a house connection shall be so executed as not to injure the joints of the pipes.
- 5) All sewer laterals for house connections shall connect directly to the gravity main using a Y-branch connection. No laterals shall be allowed to connect to a manhole.

B. HOUSE CONNECTION CONSTRUCTION

- 1) Cleanouts
 - a. At least one cleanout must be provided on every house connection.
 - b. Location(s) of cleanout(s) shall be governed by the following consideration:
 - Maximum pipe run between cleanout(s) shall be seventy-five feet (75').
 - A cleanout brought to grade shall be placed immediately upstream from deviation from straight horizontal alignment of more than 22 ½ degrees (1/16 bend).
 - Only one 22 ½ degree bend will be permitted per one hundred feet (100') without a cleanout.

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- c. A sanitary lateral cleanout shall be placed on the lateral within five feet (5') of the building to be serviced.
- d. A cleanout brought to grade shall be placed immediately upstream from each deviation from straight grade.
- e. The cleanout cover shall be installed to match finished grade and shall be supported with compacted earth or a cement base as needed to maintain cover at finished grade.
- f. Cleanouts shall be connected to the house line with "wye" fittings with the cleanout leg pointing upstream.
- g. All cleanouts shall be plugged to prevent infiltration of ground or surface water.

C. PIPE SIZE

- 1) No gravity type house connection shall be less than six inches (6") internal diameter from main to property line, four inches (4") to house.
- 2) Each house connection shall be laid on an even grade and straight line, where feasible.
- 3) The grade of a house connection wherever possible shall not be less than two percent (2%) nor greater than ten percent (10%); but in every case shall be subject to the judgement of the City.

D. GREASE TRAP

- 1) A properly designed ventilated grease trap shall be interposed between the house connection and the kitchen and pantry sinks of every hotel, eating house, restaurant, cooking establishment or gasoline service station.
- 2) No trade wastes, such as those from factories, laundries, dairies, etc., shall be discharged into the sanitary sewer except by special permission from the City of Harrington.
- 3) Grease trap design and installation shall be as per current Kent County, Delaware Standards.

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E. INSPECTION

- 1) Sewer inspection is available from 8:00 A.M. to 4:00 P.M., Monday through Friday except for holidays.
- 2) Requests for sewer inspection shall be made at least 48 hours in advance by calling 422-1110.

F. PIPE CLASSIFICATION AND PIPE REQUIREMENTS

The pipe used for either house connections or sewer extensions must meet the requirements of most recent ASTM specifications and good engineering practice.

G. HOUSE CONNECTIONS

Polyvinyl Chloride - PVC Schedule 40 with cemented coupling joints, rubber compression joints or SDR-35 pipe shall be used for sewer house connections.

H. STREAM CROSSING

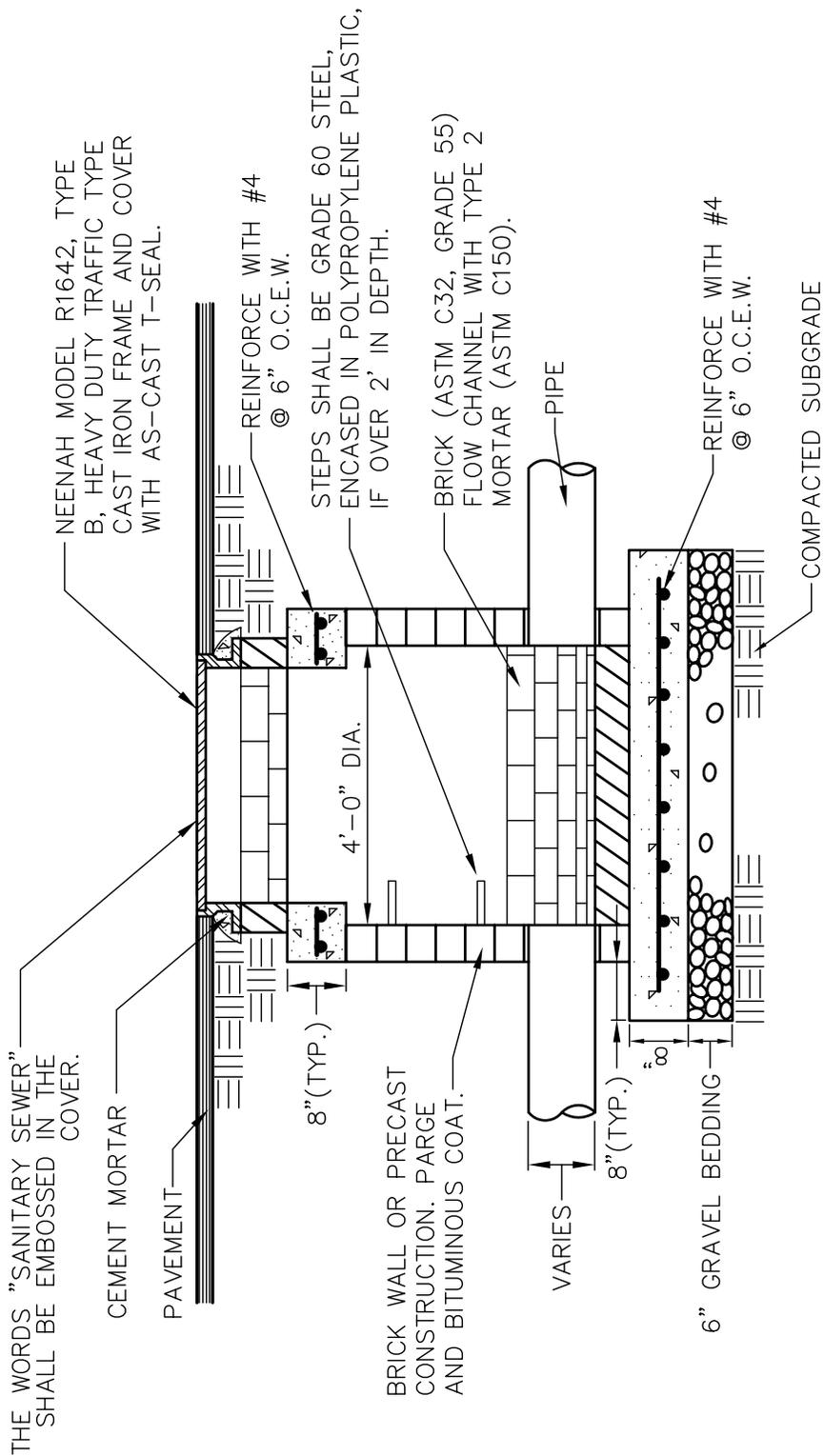
The pipe used for stream crossing shall be ductile iron encased in concrete within the limits of the stream and to a point ten feet (10') from each bank. All pipe located within ten feet of a stream shall be ductile iron. Wherever possible, the line shall be located three feet (3') below the stream bed at stream crossing.

I. RESIDENTIAL SEWER CONNECTIONS

Taps and sewer laterals shall be situated to maintain a minimum of ten feet (10') of separation from any water service or water supply.

END OF SECTION

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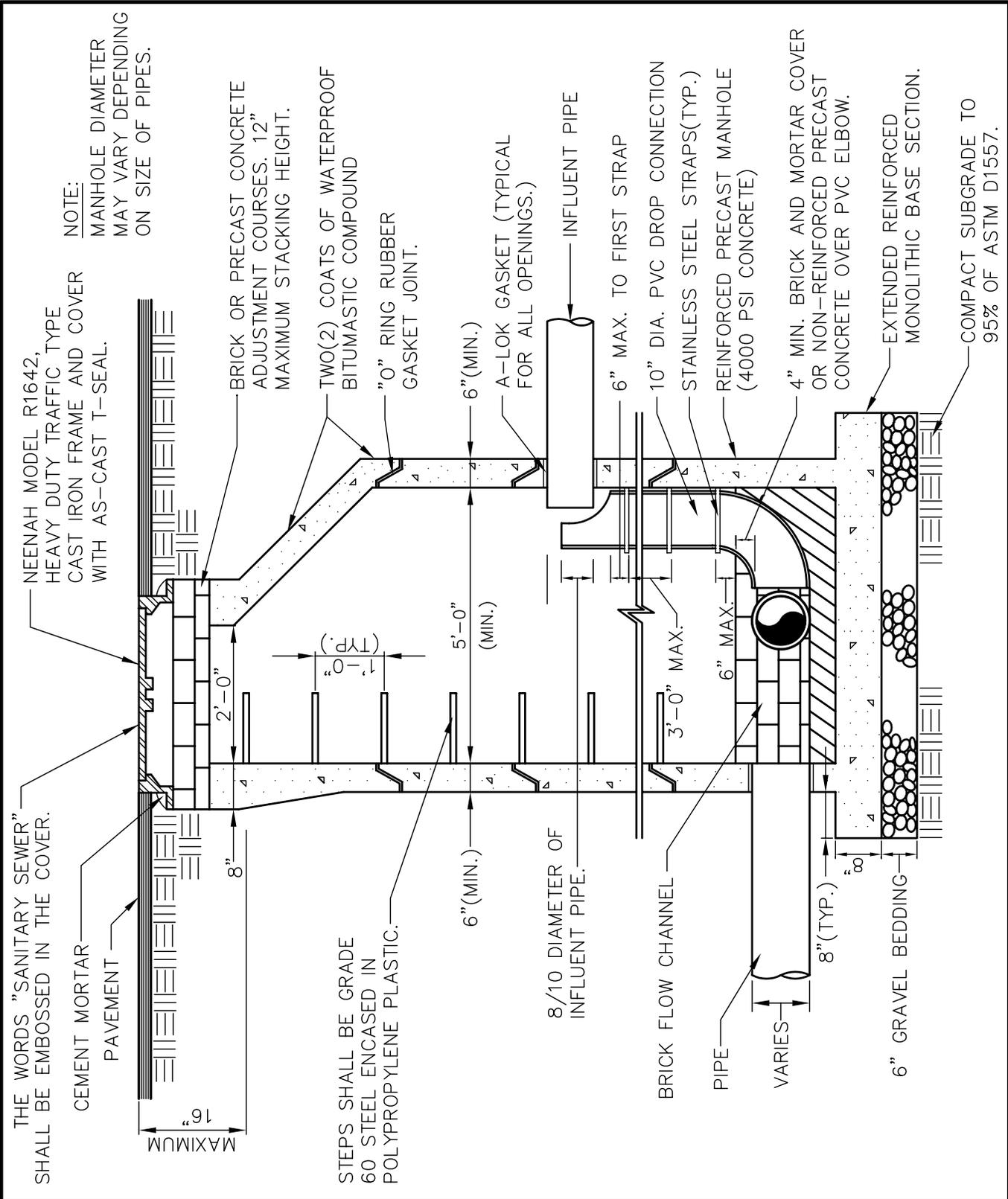


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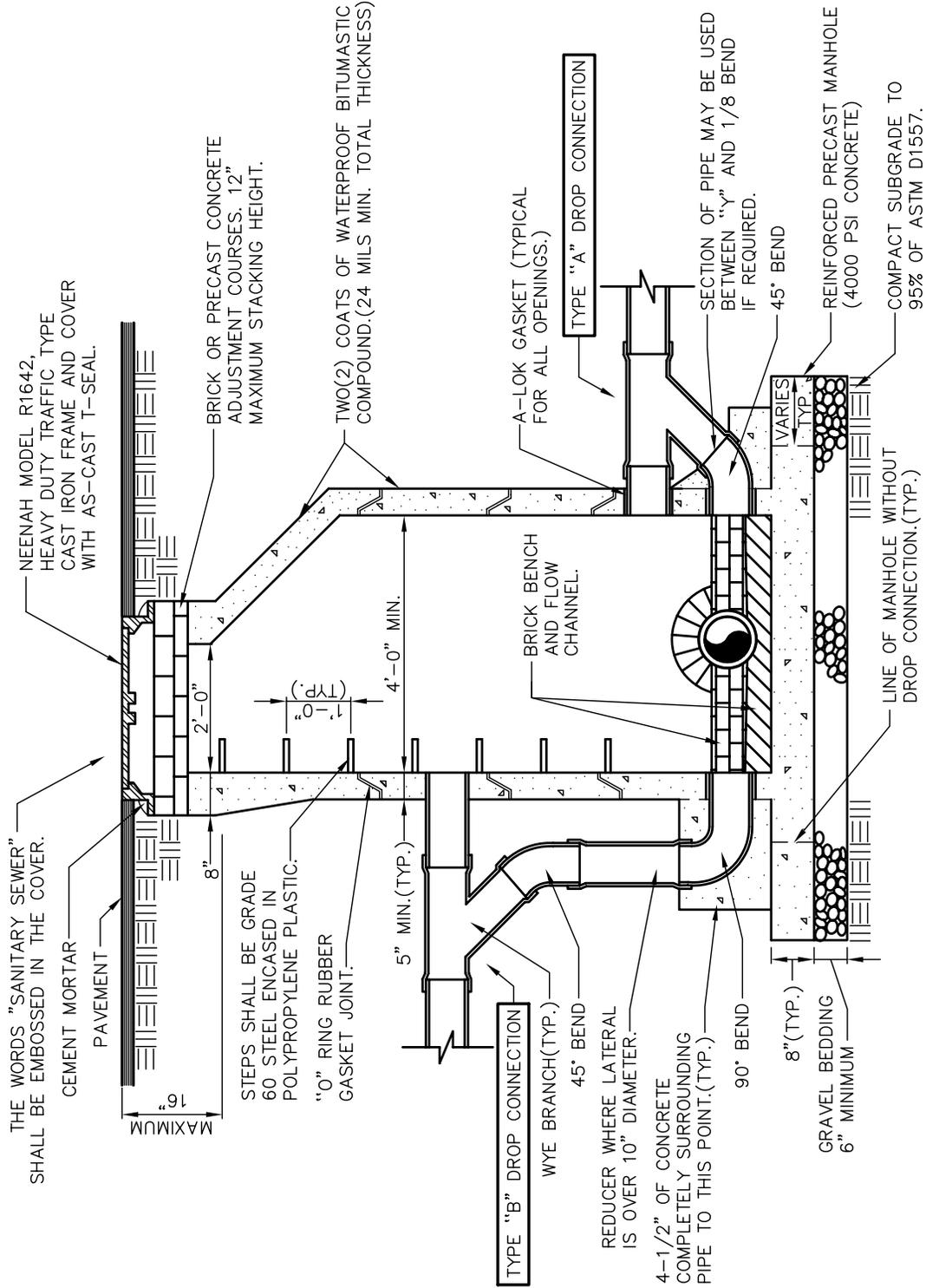
CITY OF HARRINGTON
 DEPARTMENT OF PUBLIC WORKS
 WATER & WASTEWATER DIVISION
 CONSTRUCTION STANDARDS

SHALLOW MANHOLE DETAIL
 NO SCALE

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CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		INSIDE DROP MANHOLE DETAIL NO SCALE
SECTION - 3		DRAWING: D3-3

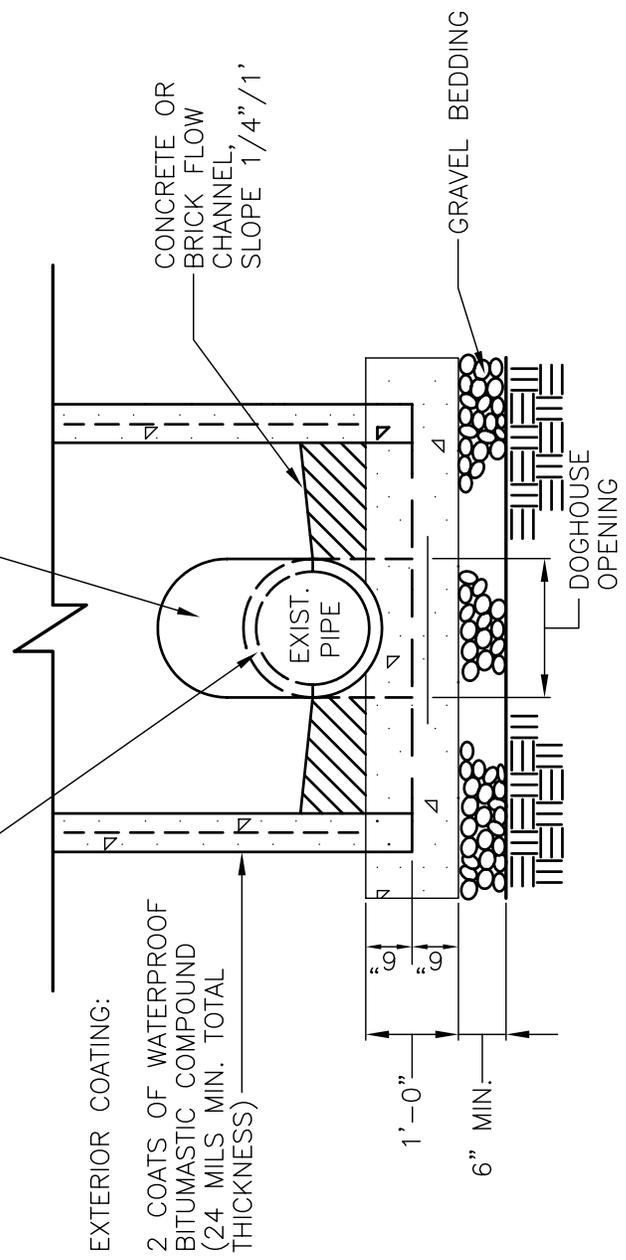


DROP CONNECTIONS			
SIZE OF SEWER	TYPE "A"		TYPE "B"
	MAX.DROP	MIN.DROP	MIN.DROP
6" OR 8"	3'-9"	1'-9"	3'-9"
10"	4'-0"	2'-0"	4'-0"
12"	6'-0"	2'-6"	6'-0"

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CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		OUTSIDE DROP MANHOLE DETAIL NO SCALE
		SECTION - 3 DRAWING: D3-4

REMOVE TOP HALF OF EXISTING PIPE AFTER COMPLETION OF BRICK CHANNEL WORK.

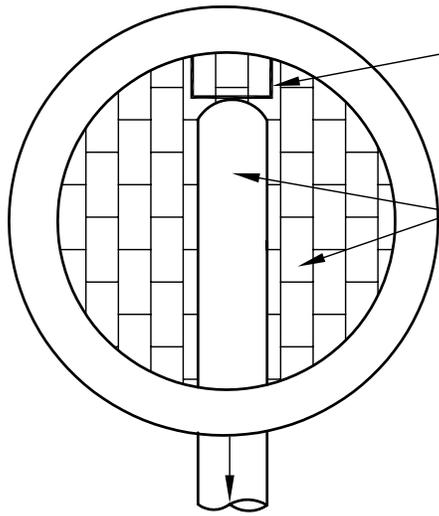
WALL AREA BETWEEN EXISTING PIPE AND DOGHOUSE OPENINGS SHALL BE FILLED WITH BRICK AND NON-SHRINK MORTAR.



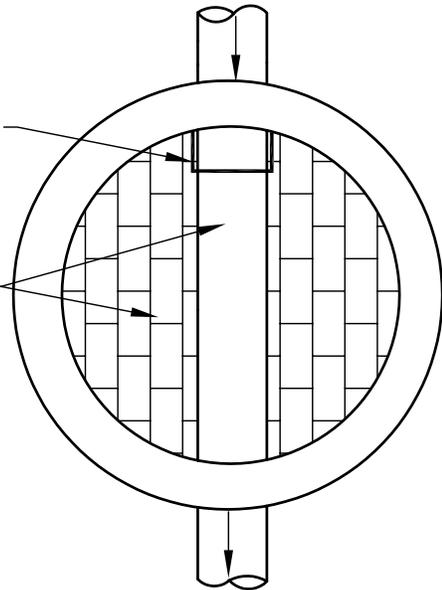
NOTES:

1. CONCRETE COMPRESSIVE STRENGTH SHALL BE 4,000 P.S.I.
2. MANHOLE SHALL CONFORM TO ASTM-C478, LATEST REVISION.
3. ALL PORTIONS OF MANHOLE SHALL BE CONSTRUCTED AS DETAILED FOR PRECAST CONCRETE MANHOLE.

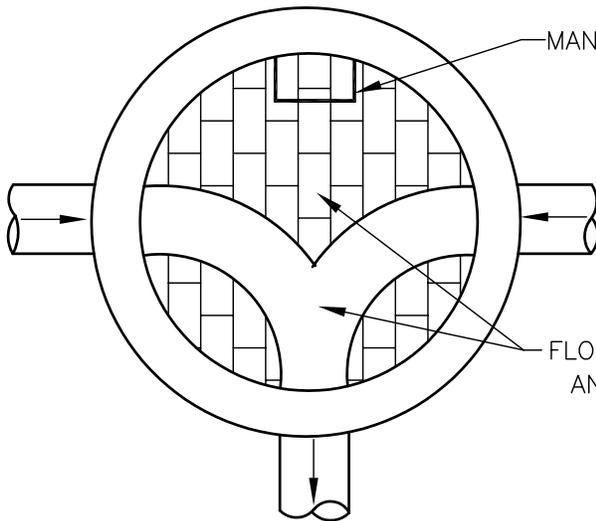
DATE:	REVISION NO.:	APPROVED:	
<p>CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS</p>		<p>DOGHOUSE MANHOLE DETAIL NO SCALE</p>	
		SECTION - 3	DRAWING: D3-5



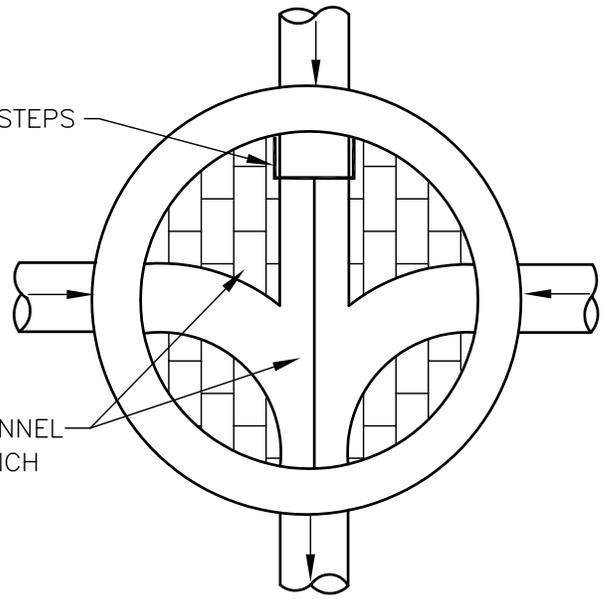
TERMINAL



1-WAY



2-WAY



3-WAY

MANHOLE STEPS

BRICK
FLOW CHANNEL
AND BENCH

MANHOLE STEPS

BRICK
FLOW CHANNEL
AND BENCH

DATE:

REVISION NO.:

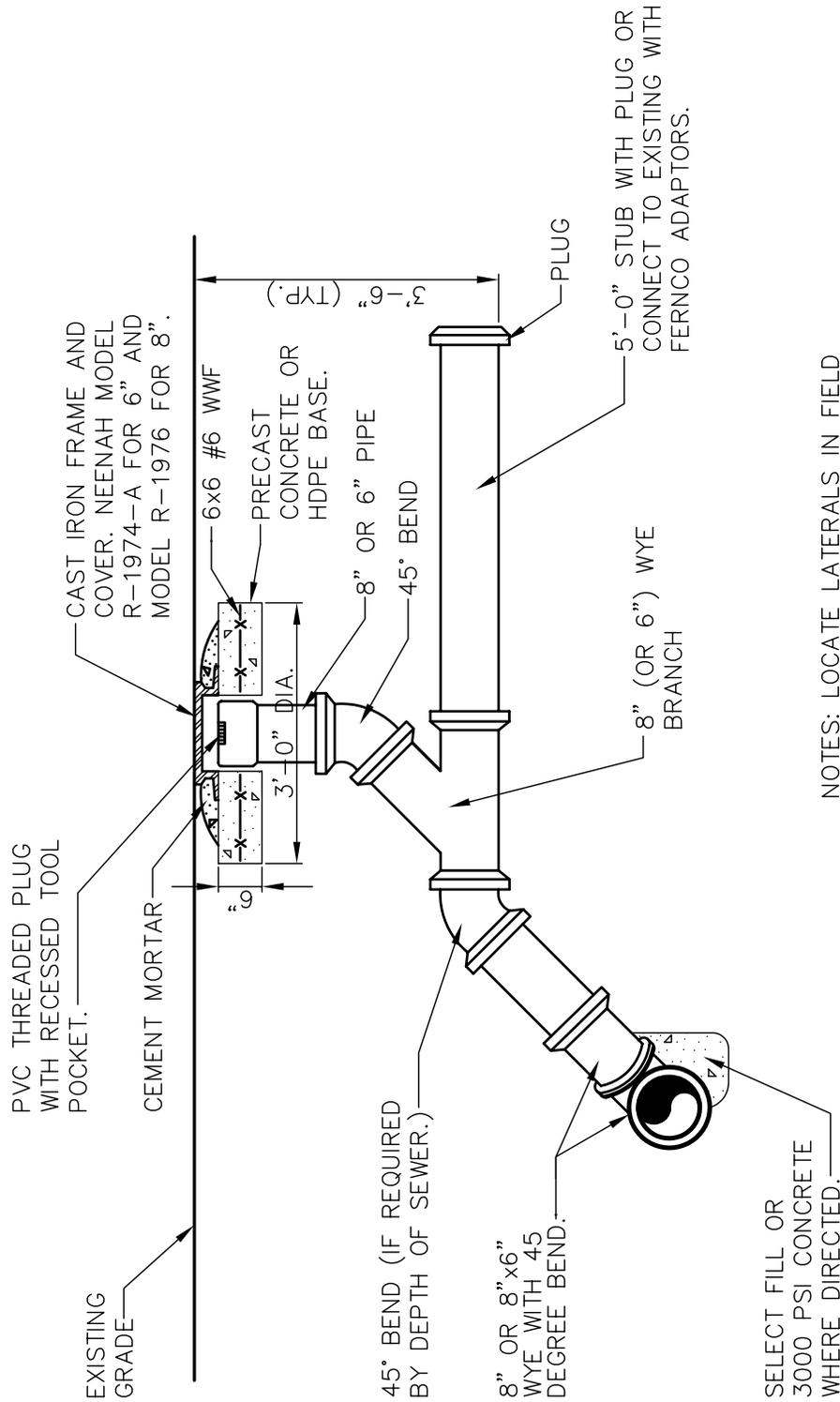
APPROVED:

CITY OF HARRINGTON
DEPARTMENT OF PUBLIC WORKS
WATER & WASTEWATER DIVISION
CONSTRUCTION STANDARDS

TYPICAL MANHOLE FLOW CHANNEL DETAIL
NO SCALE

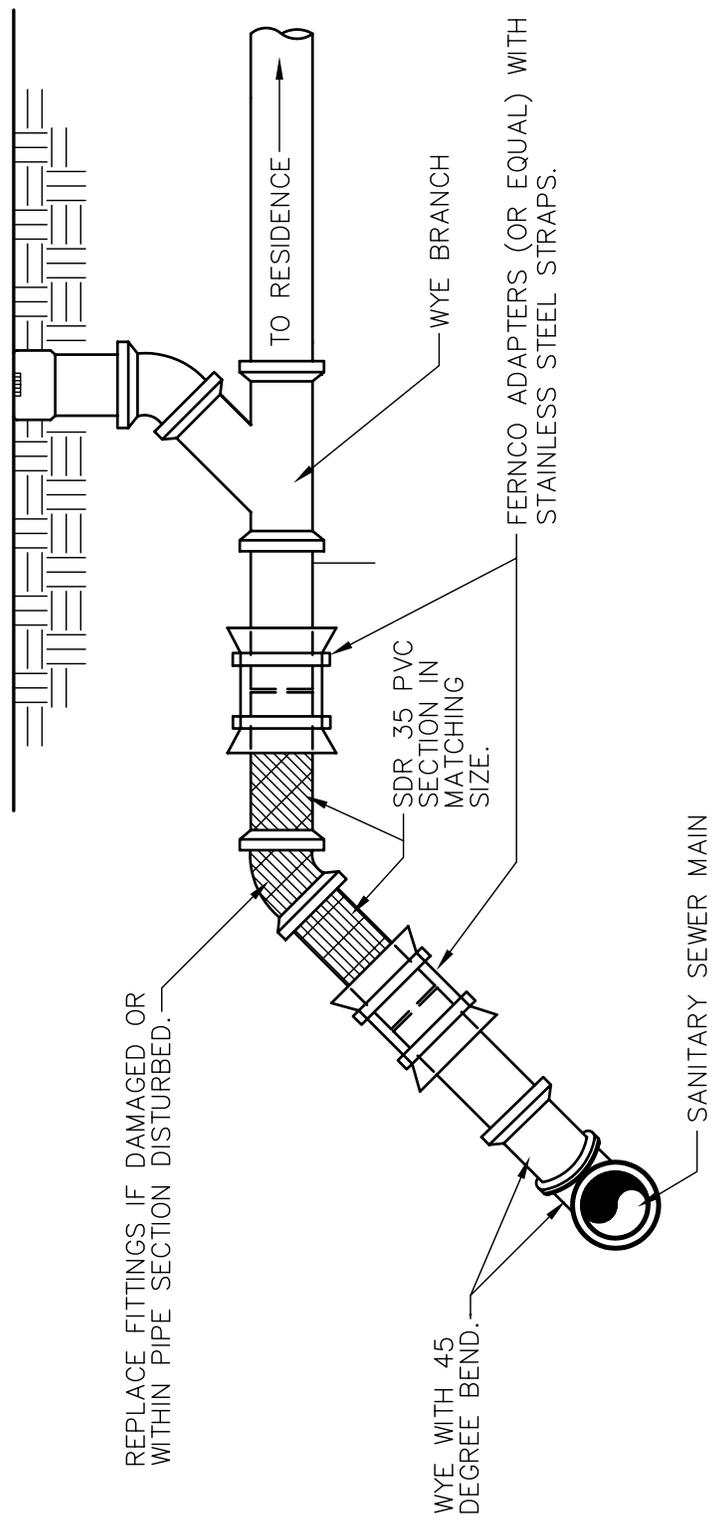
SECTION - 3

DRAWING: D3-6



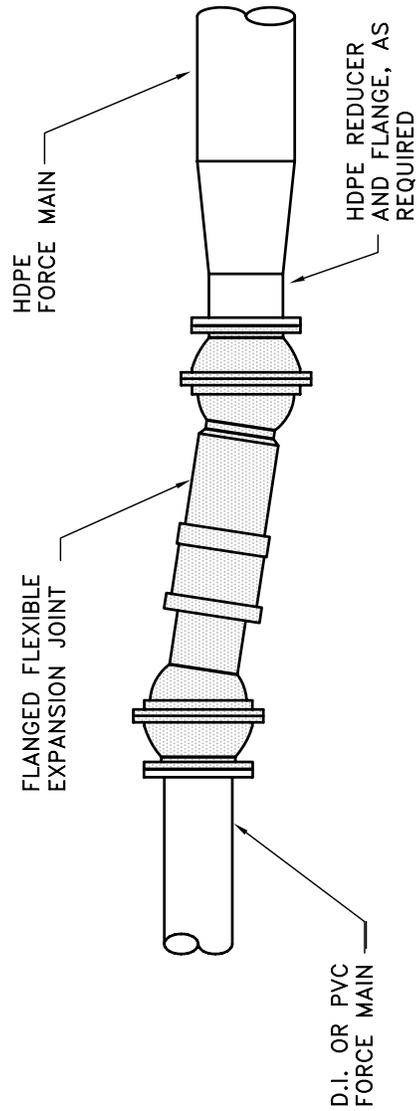
NOTES: LOCATE LATERALS IN FIELD AS DIRECTED BY CITY OF HARRINGTON.

DATE:	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		BUILDING LATERAL CLEANOUT DETAIL NO SCALE
SECTION - 3		DRAWING: D3-7



- NOTES:
1. LOCATE LATERALS IN FIELD AS DIRECTED BY CITY OF HARRINGTON.
 2. CAST IRON FRAME AND COVER, AND CONCRETE OR HDPE BASE NOT SHOWN, BUT REQUIRED. SEE DETAIL D3-7.

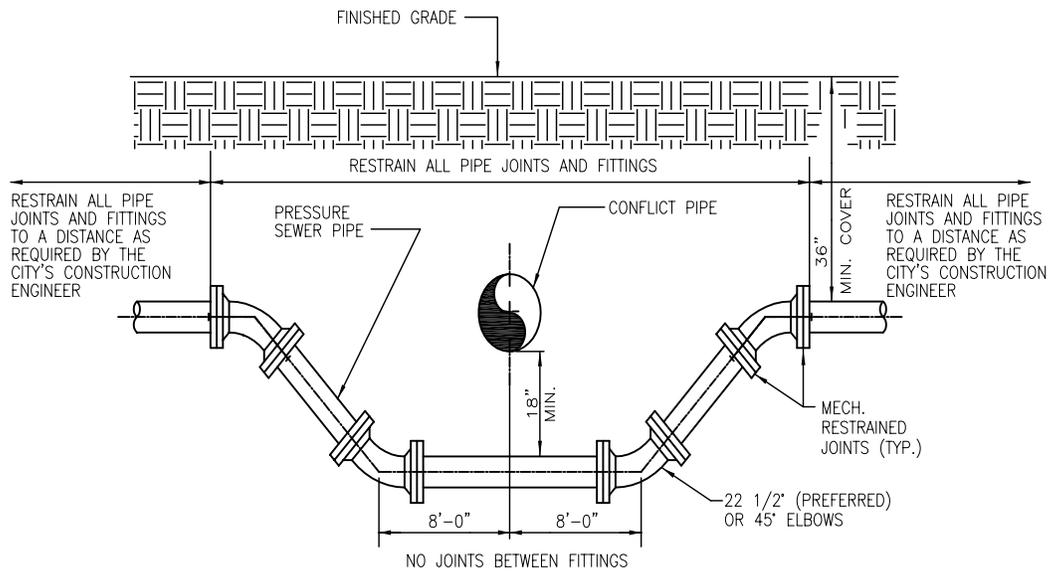
DATE:	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		SEWER LATERAL RESTORATION DETAIL NO SCALE
		SECTION - 3 DRAWING: D3-8



NOTE: EXPANSION JOINT SHALL BE "FLEXTEND" AS MANUFACTURED BY EBAA, OR APPROVED EQUAL.

DIRECTIONAL BORE
TERMINAL END EXPANSION JOINT

DATE:	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		DIRECTIONAL BORE TERMINAL END EXPANSION JOINT NO SCALE
		SECTION - 3 DRAWING: D3-9



SECTION

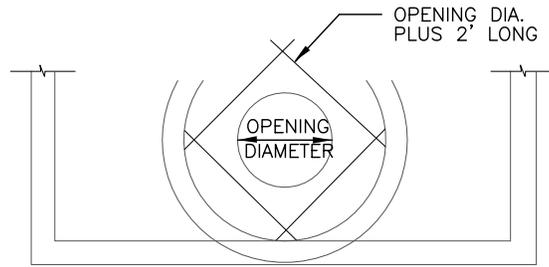
NOTES:

1. THESE METHODS ARE TO BE USED WHEN INSUFFICIENT COVER EXISTS TO ALLOW PRESSURE PIPE TO CROSS ABOVE/BELOW CONFLICT PIPE WHILE MAINTAINING A MINIMUM VERTICAL SEPARATION OF 18" FROM WATER AND 12" FROM OTHER AND A MINIMUM COVER OF 36" TO FINISHED GRADE.
2. ALL PRESSURE SEWER PIPE JOINTS AND FITTINGS SHALL BE RESTRAINED.

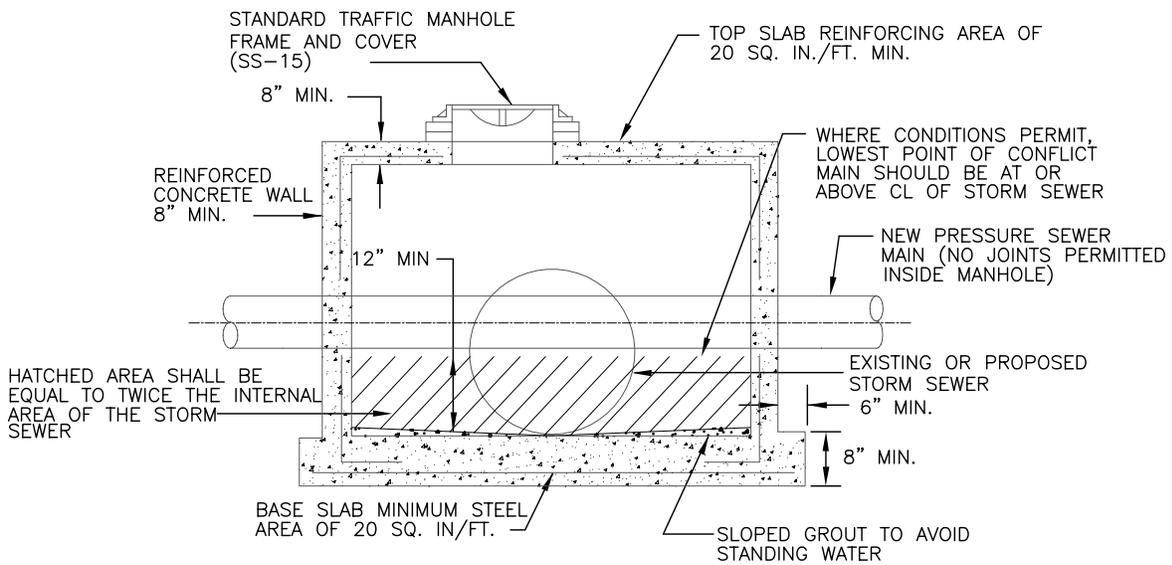
PRESSURE SEWER PIPE CONFLICT DETAIL

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:	
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		PRESSURE SEWER PIPE CONFLICT DETAIL	
		SECTION -	DRAWING: PS-01



CONFLICT MANHOLE—PARTIAL PLAN

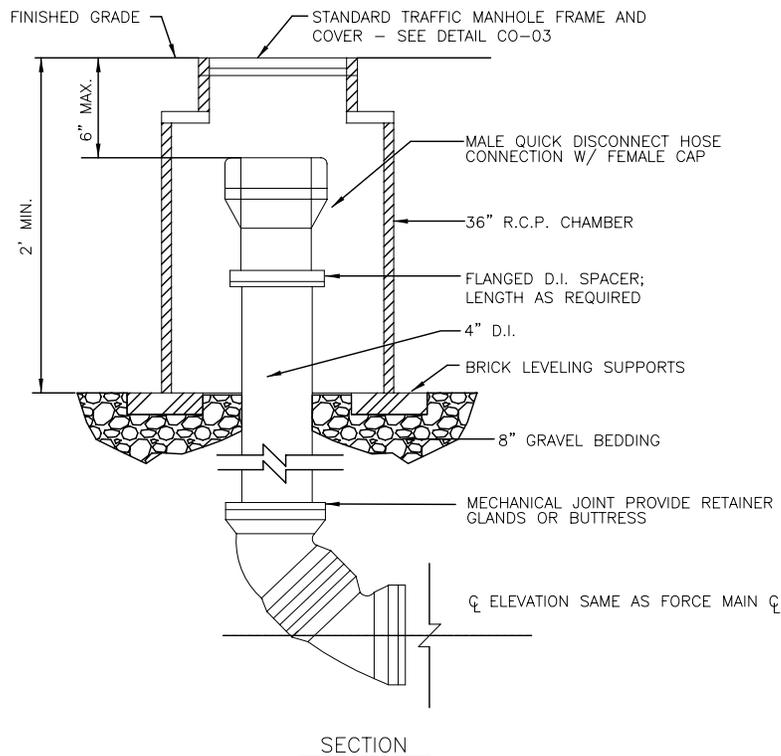
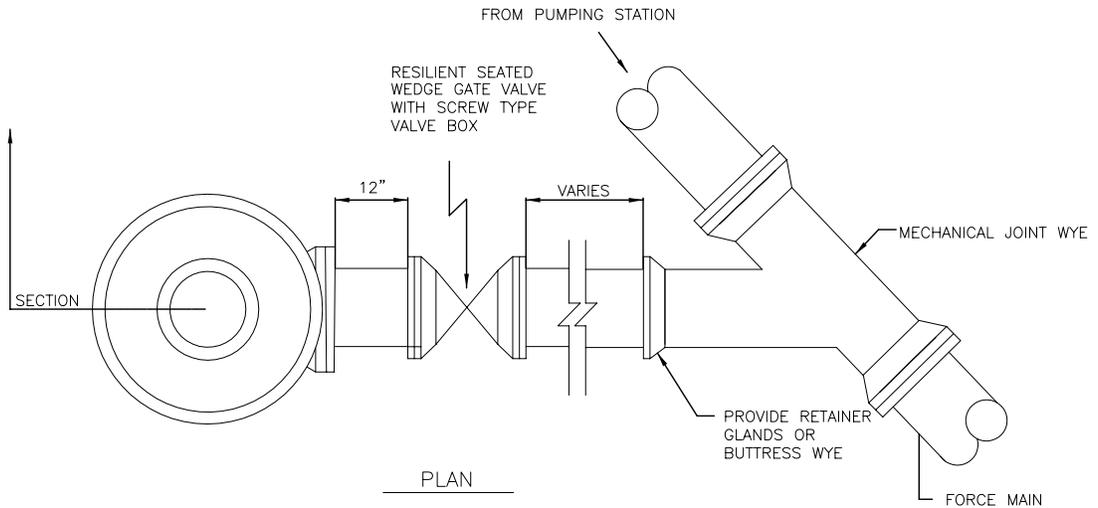


NOTES:

1. CONFLICT MANHOLE WILL BE ALLOWED WHERE DESIGN PROBLEMS AND ECONOMICS PROVE THEM TO BE THE ONLY VIABLE SOLUTION AS APPROVED BY THE CITY OF HARRINGTON DEPT. OF PUBLIC WORKS.
2. CONFLICT MANHOLES ARE NOT PERMITTED FOR WATER MAINS CONFLICTING WITH SANITARY SEWER SYSTEMS.

CONFLICT MANHOLE—SECTION
NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		PRESSURE SEWER AND STORM DRAIN CONFLICT MANHOLE DETAIL
		SECTION - DRAWING: PS-02

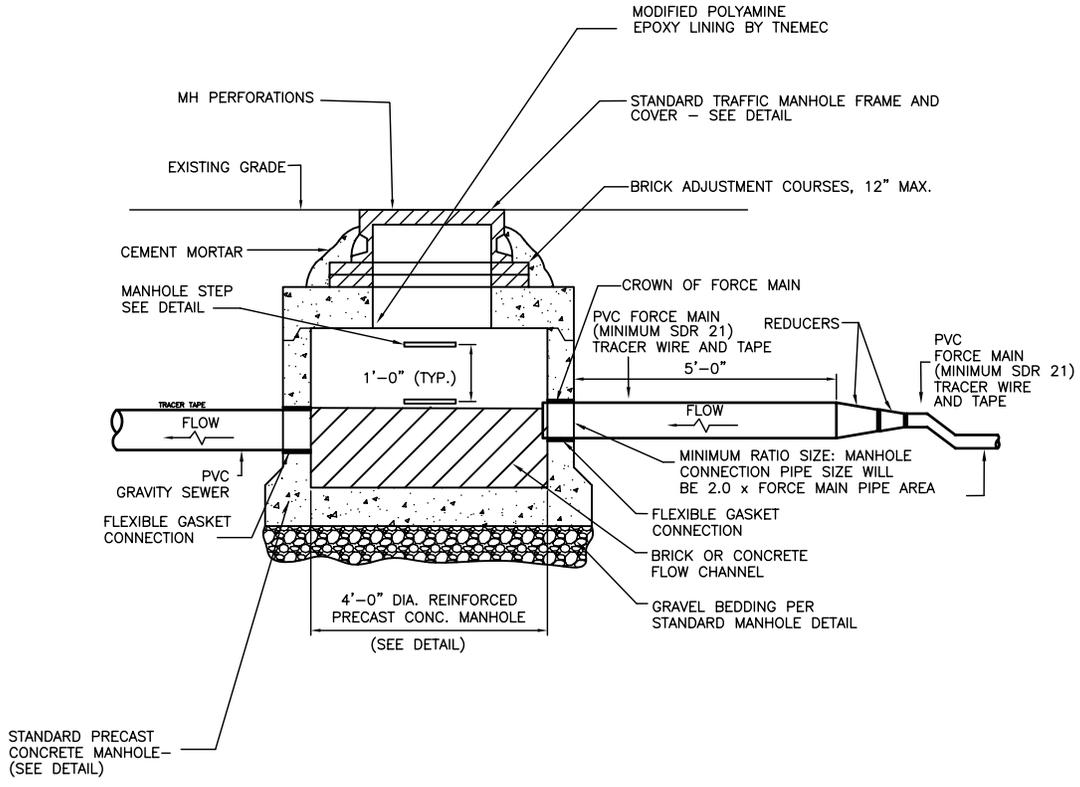


EMERGENCY PUMPING CONNECTION DETAIL
NOT TO SCALE

DATE: 3/27/2003	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		EMERGENCY PUMPING CONNECTION DETAIL
		SECTION - DRAWING: PS-03

NOTES:

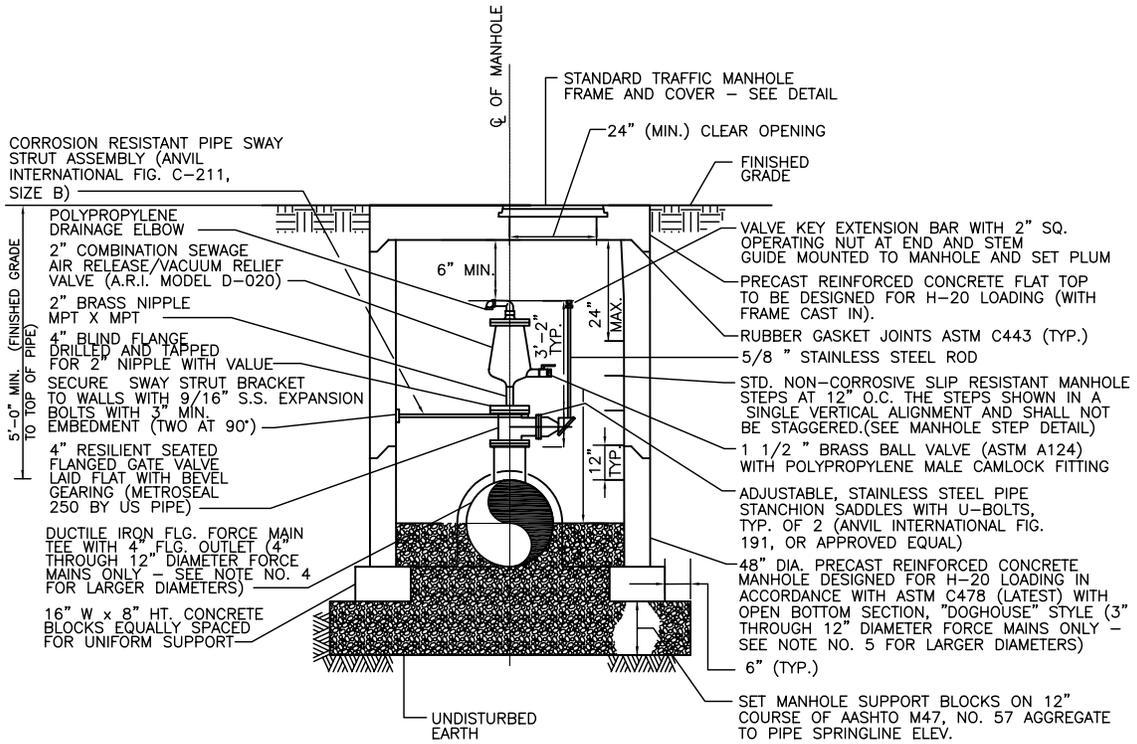
1. LINE MANHOLE INTERIOR 3 COAT SYSTEM MODIFIED POYAMINE EPOXY BY (TNEMEC)
2. ELEVATION OF GRAVITY SEWER INVERT SHALL BE MINIMUM 3" ABOVE ELEVATION OF FORCE MAIN CROWN.
3. PROVIDE SMOOTH UPWARD SLOPING BRICK OR CONCRETE CHANNEL FROM FORCE MAIN TO GRAVITY SEWER.



FORCE MAIN DISCHARGE MANHOLE DETAIL

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:	
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		FORCE MAIN DISCHARGE MANHOLE DETAIL	
		SECTION -	DRAWING: PS-05



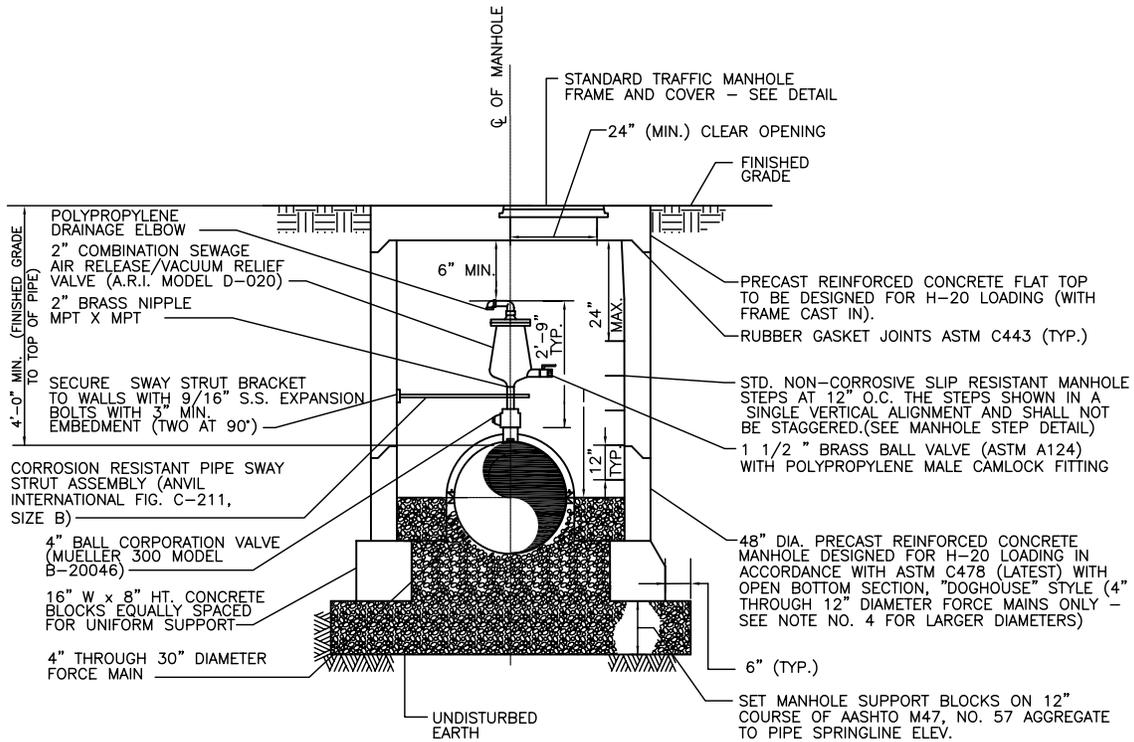
NOTES:

1. COAT MANHOLE INTERIOR/EXTERIOR, FRAME AND COVER AND APPURTENANCES EXCEPT IRON PIPE WITH/TNEMEC.
2. INSTALL COMPLETE SET OF MANUFACTURER-FURNISHED BACKWASH ACCESSORIES ON EACH VALVE PER MANUFACTURER DRAWINGS.
3. ALL HARDWARE, RODS, TIES AND ASSEMBLIES SHALL BE STAINLESS STEEL.
4. 14" THROUGH 30" DIAMETER FORCE MAINS SHALL BE THICKNESS CLASS 55 DUCTILE IRON PIPE WITH A 4" DIAMETER FLG. WELDED-ON OUTLET. DUCTILE IRON PIPE SHALL EXTEND THROUGH THE MANHOLE WALLS.
5. MANHOLE INSIDE DIAMETER SHALL BE 60" FOR 14" THROUGH 30" DIAMETER FORCE MAINS.

COMBINATION SEWAGE AIR RELEASE/VACCUM RELIEF VALVE
AND MANHOLE DETAIL – GRASS/NON-TRAFFIC AREAS

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		COMB. SEWEGE AIR RELEASE/ VACUUM RELIEF VALVE & MH DETAIL-GRASS/NON-TRAFFIC AREAS
		SECTION - DRAWING: PS-06



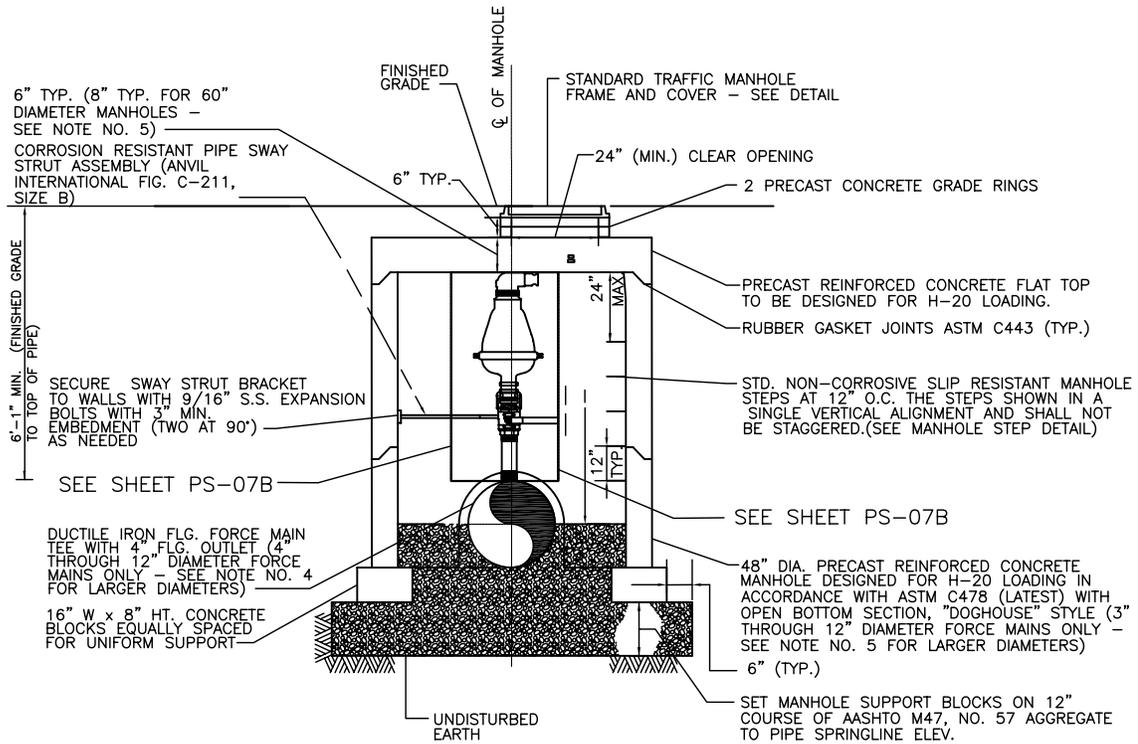
NOTES:

1. COAT MANHOLE INTERIOR/EXTERIOR, FRAME AND COVER AND APPURTENANCES EXCEPT IRON PIPE WITH/COAL TAR EPOXY COATING.
2. INSTALL COMPLETE SET OF MANUFACTURER-FURNISHED BACKWASH ACCESSORIES ON EACH VALVE PER MANUFACTURER DRAWINGS.
3. ALL HARDWARE, RODS, TIES AND ASSEMBLIES SHALL BE STAINLESS STEEL.
4. MANHOLE INSIDE DIAMETER SHALL BE 60" FOR 14" THROUGH 30" DIAMETER FORCE MAINS.

MODIFIED COMBINATION SEWAGE AIR RELEASE/VACUUM RELIEF VALVE
AND MANHOLE DETAIL - GRASS/NON-TRAFFIC AREAS

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		MODIFIED COMB. SEWAGE AIR RELEASE/VACUUM RELIEF VALVE & MH DETAIL-GRASS/NON-TRAFFIC AREAS
		SECTION - DRAWING: PS-06A



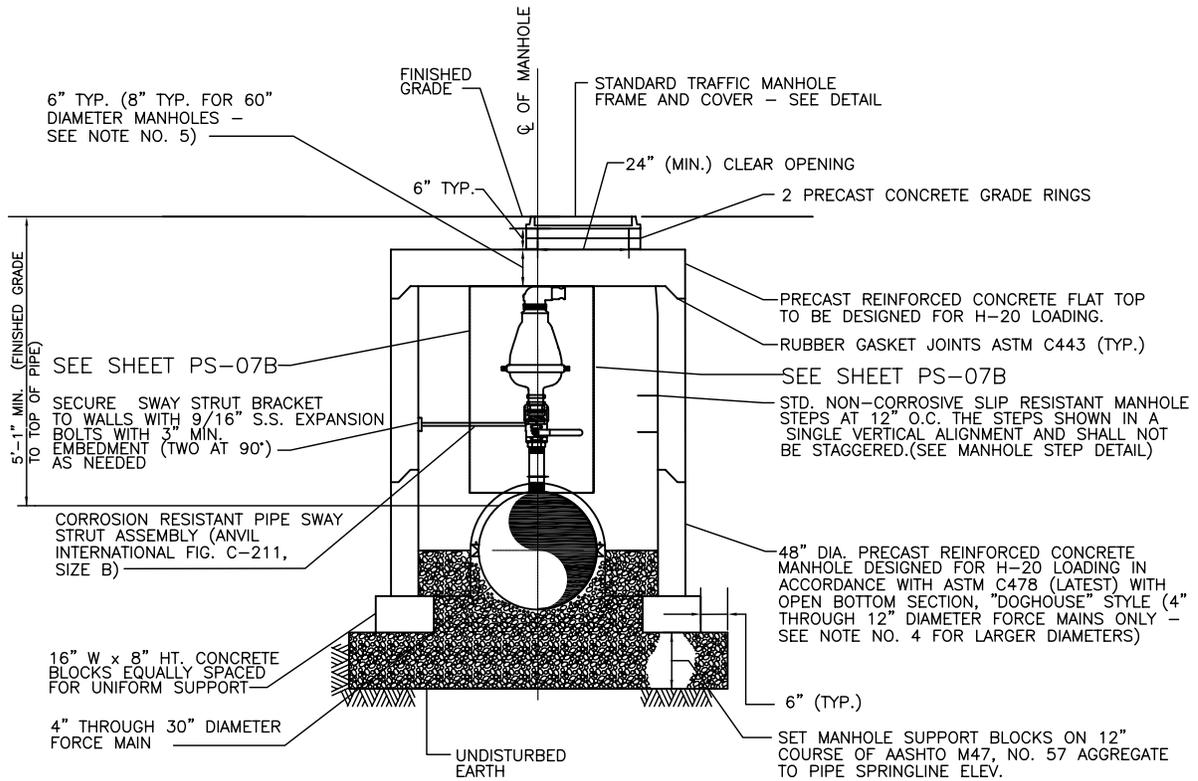
NOTES:

1. COAT MANHOLE INTERIOR/EXTERIOR, FRAME AND COVER AND APPURTENANCES EXCEPT IRON PIPE WITH/COAL TAR EPOXY COATING.
2. INSTALL COMPLETE SET OF MANUFACTURER-FURNISHED BACKWASH ACCESSORIES ON EACH VALVE PER MANUFACTURER DRAWINGS.
3. ALL HARDWARE, RODS, TIES AND ASSEMBLIES SHALL BE STAINLESS STEEL.
4. 14" THROUGH 30" DIAMETER FORCE MAINS SHALL BE THICKNESS CLASS 55 DUCTILE IRON PIPE WITH A 4" DIAMETER FLG. WELDED-ON OUTLET. DUCTILE IRON PIPE SHALL EXTEND THROUGH THE MANHOLE WALLS.
5. MANHOLE INSIDE DIAMETER SHALL BE 60" FOR 14" THROUGH 30" DIAMETER FORCE MAINS.

COMBINATION SEWAGE AIR RELEASE/VACUUM RELIEF VALVE
AND MANHOLE DETAIL - PAVED/TRAFFIC AREAS

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		COMB. SEWAGE AIR RELEASE/VACUUM RELIEF VALVE & MH DETAIL-PAVED/TRAFFIC AREAS
		SECTION - DRAWING: PS-07



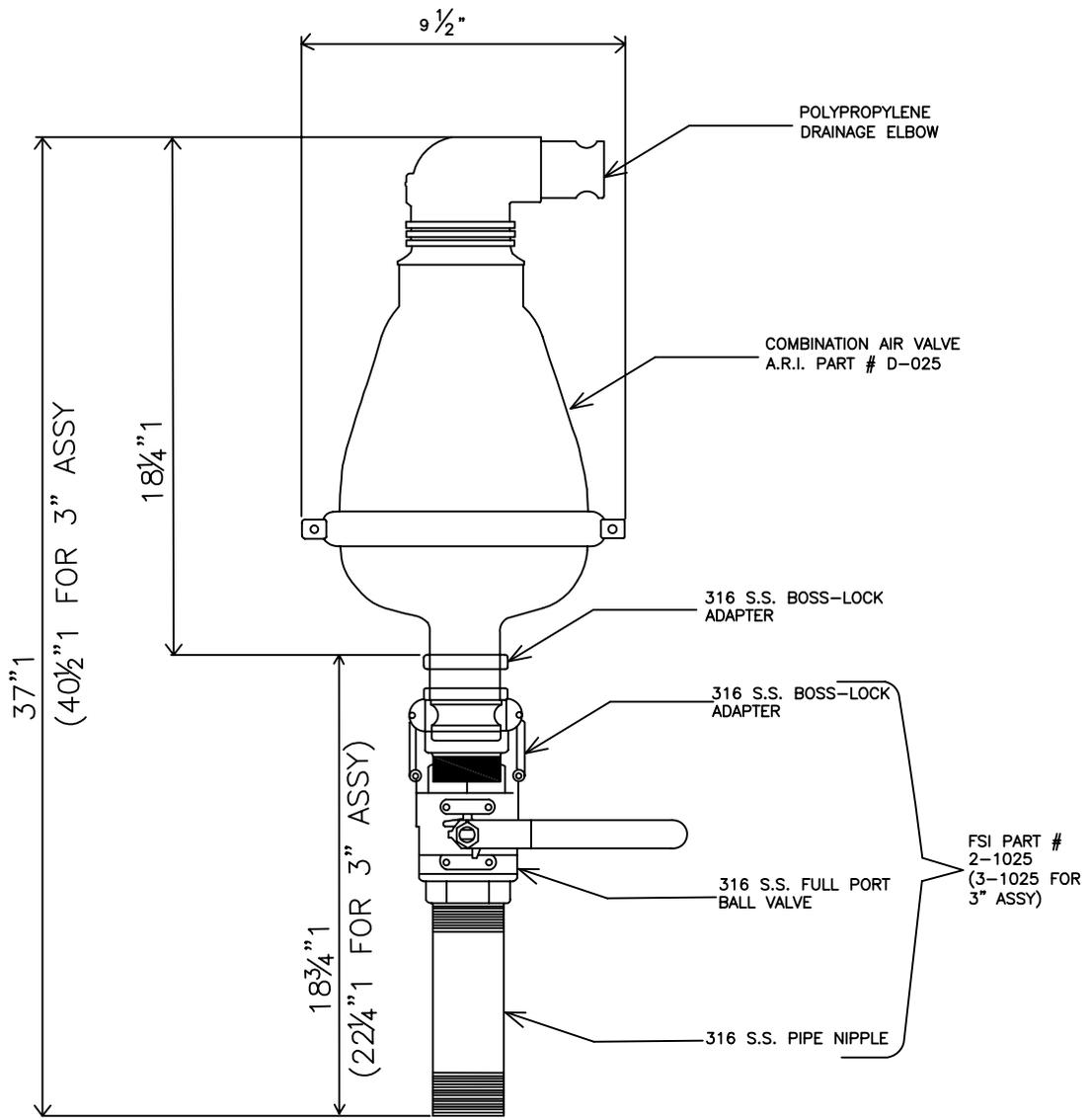
NOTES:

1. COAT MANHOLE INTERIOR/EXTERIOR, FRAME AND COVER AND APPURTENANCES EXCEPT IRON PIPE WITH/COAL TAR EPOXY COATING.
2. INSTALL COMPLETE SET OF MANUFACTURER-FURNISHED BACKWASH ACCESSORIES ON EACH VALVE PER MANUFACTURER DRAWINGS.
3. ALL HARDWARE, RODS, TIES AND ASSEMBLIES SHALL BE STAINLESS STEEL.
4. MANHOLE INSIDE DIAMETER SHALL BE 60" FOR 14" THROUGH 30" DIAMETER FORCE MAINS.

MODIFIED COMBINATION SEWAGE AIR RELEASE/VACUUM RELIEF VALVE AND MANHOLE DETAIL - PAVED/TRAFFIC AREAS

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		MODIFIED COMB. SEWAGE AIR RELEASE/VACUUM RELIEF VALVE & MH DETAIL-PAVED/TRAFFIC AREAS
		SECTION - DRAWING: PS-07A



NOTE: IF AIR RELEASE VALVE IS A TIGHT FIT YOU CAN USE
A 2" CLOSE NIPPLE AND CUT THE LEVER

2" AIR RELEASE VALVE ASSEMBLY
WITH 316 STAINLESS STEEL
QUICK COUPLER ASSEMBLY

NOT TO SCALE

DATE: 3/27/2007	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		2" AIR RELEASE VALVE ASSEMBLY
		SECTION - DRAWING: PS-07B

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TYPICAL PUMP STATION SITE B	M04	3B
TYPICAL PUMP STATION SITE C	M05	3C
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MEDIUM DETAIL PS WITH VFD & SINGLE LINE ENCLOSURE	E02	5
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DATE:	REVISION NO.:	APPROVED:
CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		TABLE OF CONTENTS
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GENERAL NOTES

1. THE CONTRACTOR SHALL PROVIDE SEDIMENT CONTROL MEASURES TO PROTECT STOCKPILE AREAS AND STORAGE AREAS. ALL AREAS USED BY THE CONTRACTOR FOR STAGING OPERATIONS SHALL BE FULLY RESTORED BY THE CONTRACTOR UPON COMPLETION OF THE PROJECT. IF THE STAGING AREA IS PAVED, IT SHALL BE RESTORED TO ITS ORIGINAL CONDITION AND FINISHED SURFACE SHALL BE IDENTICAL TO THE ORIGINAL SURFACE AND MULCHED TO THE SATISFACTION OF THE ENGINEER. ALL COSTS ASSOCIATED WITH RESTORATION OF THE STAGING AREA SHALL BE AT THE CONTRACTOR'S EXPENSE. IF THE ENGINEER DETERMINES THAT A SATISFACTORY STAND OF GRASS DOES NOT EXIST AT THE TIME OF FINAL INSPECTION, ALL COSTS ASSOCIATED WITH RE-ESTABLISHING A SATISFACTORY STAND OF GRASS SHALL BE AT THE CONTRACTOR'S EXPENSE.
2. EQUIPMENT AND/OR STOCKPILE MATERIAL SHALL NOT BE STORED IN THE DRAINAGE AREA OF ANY TREE.
3. THE CONTRACTOR SHALL CONTACT THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS AT LEAST 48 HOURS IN ADVANCE OF STARTING CONSTRUCTION.
4. THE CONTRACTOR SHALL CONTACT MISS UTILITY OF DELAWARE AT 1-800-282-8855 FOR UTILITY LOCATIONS WITHIN AND SURROUNDING CONSTRUCTION AREAS NOT LESS THAN 3 DAYS BEFORE PERFORMING ANY EXCAVATION.
5. THE CONTRACTOR SHALL ESTABLISH BENCHMARK ELEVATION DATUM IN ACCORDANCE WITH THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
6. THE CONTRACTOR SHALL PROVIDE TEMPORARY SEED AND MULCH FOR ALL AREAS WHERE SOIL IS EXPOSED AND SILT FENCE IS NOT SPECIFIED, IN ACCORDANCE WITH KENT CONSERVATION DISTRICT REQUIREMENTS.
7. THE CONTRACTOR SHALL MAINTAIN PUBLIC ROADS AND STREETS IN A BROOM SWEEP CONDITION AT ALL TIMES.
8. PIPE JOINTS TO BE RESTRAINED ARE SHOWN ON THE DRAWINGS.
9. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS, AND PRODUCTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE INTENDED WORK.
10. MAINTENANCE OF TRAFFIC - ALL WORK SHALL BE PERFORMED IN A MANNER THAT WILL ENSURE THE LEAST PRACTICABLE OBSTRUCTION TO TRAFFIC CONSISTENT WITH SAFETY AND SHALL COMPLY WITH THE DEPARTMENT MANUAL ENTITLED "TRAFFIC CONTROLS FOR STREETS AND HIGHWAY CONSTRUCTION, MAINTENANCE, UTILITY AND EMERGENCY OPERATIONS". THE MOST CURRENT VERSION OF THIS MANUAL IN EFFECT AT THE TIME OF THE PROJECT SHALL BE USED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMISSION FROM THE PROPERTY OWNER AND HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
11. ALL UTILITIES PLOTTED ON THE DRAWINGS ARE FROM THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF UTILITIES PRIOR TO EXCAVATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF UTILITIES PRIOR TO EXCAVATION. IF A CONFLICT EXISTS, ANY CONFLICTS SHALL BE COORDINATED BY THE CONTRACTOR WITH THE ENGINEER AND THE UTILITY INVOLVED. THE ENGINEER SHALL DETERMINE THE LOCATION, EXCAVATING, BACK FILLING AND RESTORATION OF THE UTILITIES AS REQUIRED FOR THE INSTALLATION OF THE UTILITIES AS SHOWN ON THE PLANS.
12. CONTRACTOR SHALL OBTAIN ALL THE NECESSARY PERMITS FOR THE EXECUTION OF THIS CONTRACT.
13. ALL CONSTRUCTION SHALL BE PERFORMED TO THE SATISFACTION OF THE ENGINEER, CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS (OPW), DELAWARE DEPARTMENT OF TRANSPORTATION (DELDOT) AND ALL RESPECTIVE UTILITY OWNERS/ IN ACCORDANCE WITH ALL APPLICABLE CONTRACT DRAWINGS AND SPECIFICATIONS.
14. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES, REGULATIONS AND ORDERS OF ANY PUBLIC BODY HAVING JURISDICTION. THE CONTRACTOR SHALL ERRECT AND MAINTAIN, AS REQUIRED BY THE CONDITIONS AND PROGRESS OF THE WORK, ALL NECESSARY SAFEGUARDS FOR SAFETY AND PROTECTION IN ACCORDANCE W/ APPLICABLE OSHA REGULATION.
15. THE CONTRACTOR SHALL INSTALL THE PROPOSED SANITARY SEWER AND FORCE MAINS WITH A MINIMUM OF 3 FT. OF CLEARANCE FROM OTHER EXISTING AND PROPOSED UTILITIES. THE CONTRACTOR SHALL MAINTAIN A MINIMUM HORIZONTAL CLEARANCE OF 10 FT. BETWEEN WATER MAINS AND SANITARY SEWERS (BOTH EXISTING AND PROPOSED MAINS). IN CASES WHERE THIS MINIMUM HORIZONTAL CLEARANCE IS NOT SHOWN OR FEASIBLE, THE CONTRACTOR SHALL MAINTAIN A MINIMUM HORIZONTAL CLEARANCE OF 10 FEET FROM EXISTING WATER LINES, PROVIDED ALL EXISTING WATER MAINS REMAIN ON AN UNDISTURBED EARTH SHELf IN A SEPARATE TRENCH FROM THE PROPOSED SANITARY SEWER MAINS AND THERE IS AT LEAST 18 INCHES OF VERTICAL CLEARANCE WITH THE WATER MAIN HIGHER THAN THE SEWER. IF VERTICAL CLEARANCE BETWEEN PROPOSED SANITARY SEWER AND EXISTING WATER MAINS IS LESS THAN 18 INCHES, THE CONTRACTOR SHALL MAINTAIN A MINIMUM OF 10 FT. ON EACH SIDE OF THE WATER MAIN CROSSING OR 10 FT. BEYOND THE LIMITS WHERE VERTICAL CLEARANCE IS NOT MAINTAINED.
16. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL MATERIALS FOR APPROVAL TO THE ENGINEER PRIOR TO COMMENCEMENT OF CONSTRUCTION. ALL MATERIALS ORDERED SHALL BE SHOWN TO THE OWNER'S REVIEW AND ACCEPTANCE WILL BE AT THE CONTRACTOR'S RISK.
17. THE CONTRACTOR SHALL OPEN ONLY THAT SECTION OF TRENCH OR ACCESS PITS WHICH CAN BE BACKFILLED AND STABILIZED AT THE END OF EACH WORKING DAY. STEEL PLATES SHALL BE USED ON ANY TRENCH OR ACCESS PITS WHICH MUST REMAIN OPEN THROUGHOUT THE PROJECT. ALL TRENCH OR ACCESS AREAS MUST BE PROPERLY COVERED AND SECURE FROM VEHICULAR OR PEDESTRIAN TRAFFIC.
18. "MANHOLE" SHALL INCLUDE PRECAST STRUCTURE, BEDDING, CONNECTION TO EXISTING AND PROPOSED SANITARY PIPING, FRAME AND COVER AND RELATED APPURTENANCES. SEE MANHOLE DETAILS AND APPLICABLE SPECIFICATIONS.
19. SANITARY SEWER PIPE AND FITTINGS SHALL BE TYPE PSM, POLYVINYL CHLORIDE (PVC) MATERIAL WITH A MINIMUM CELL CLASSIFICATION OF 124648 AND COMPLYING WITH ASTM D1784, INSIDE NOMINAL DIAMETER AS INDICATED ON THE DRAWINGS, BELL AND SPIGOT STYLE RUBBER RING SEALED ELASTOMERIC LOOKED-IN GASKET JOINT COMPLYING WITH ASTM F477.
20. SANITARY SEWER PIPE AND FITTINGS - 4 INCHES THROUGH 15 INCHES: ASTM D3034 AND F1336 WITH A MINIMUM WALL THICKNESS OF SDR 35. IF THE PIPE COVER EXCEEDS 15 FEET A MIN. OF PVC SDR 26 SHALL BE USED.
21. SANITARY SEWER PIPE AND FITTINGS - 18 INCHES THROUGH 27 INCHES: ASTM F679 AND F1336 WITH A MINIMUM WALL THICKNESS OF T-1.
22. SANITARY SEWER FLEXIBLE COUPLINGS SHALL BE RESILIENT, CHEMICAL-RESISTANT, THERMOPLASTIC OR WPC APPROVED EPDM RUBBER COUPLING, TWO SERIES 316 STAINLESS STEEL CLAMPS AND STAINLESS STEEL SPOKES AND HOUSINGS.
23. SAOULETS SHALL BE PVC CORRECTLY CONTOURED FOR OUTSIDE DIAMETER OF PIPE AND INCORPORATING RING GASKET BELL OUTLET.
24. PIPE PLUGS SHALL BE DESIGNED FOR PERMANENT INSTALLATION AND SHALL BE REMOVABLE. OBTAIN PLUGS FOR VARIOUS TYPES OF PIPE USED FROM THE RESPECTIVE PIPE MANUFACTURER.
25. ALL PVC SANITARY SEWER AND FORCE MAINS SHALL BE MARKED WITH LOCATOR TAPE, LABELED "SANITARY SEWER", INSTALLED 18" ABOVE THE PIPE.
26. FINAL APPROVED SET OF PLANS AND SPECIFICATIONS SHALL BE MAINTAINED ON THE JOB SITE. FAILURE TO COMPLY WITH THIS PROVISION SHALL BE CONSIDERED CAUSE TO STOP THE WORK.
27. THE CONTRACTOR SHALL MAINTAIN ONE COMPLETE SET OF CONTRACT DRAWINGS ON WHICH HE SHALL NOTE, IN RED, THE ALIGNMENTS AND VERTICES OF ALL UNDERGROUND UTILITIES AT A MINIMUM OF 10 FEET FROM THE EXISTING AND PROPOSED UTILITIES. THE CONTRACTOR SHALL MAINTAIN ONE COMPLETE SET OF CONTRACT DRAWINGS BETWEEN THE PLAN LOCATIONS AND ELEVATIONS OF BOTH THE EXISTING AND PROPOSED UTILITIES SHALL BE SHOWN ON THE AS-BUILT DRAWINGS TO BE MAINTAINED BY THE CONTRACTOR IN THE FIELD.

GENERAL NOTES (CONTINUED)

26. ALL SANITARY SEWERS AND MANHOLES SHALL BE TESTED IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. IN ADDITION ALL MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH ASTM C1244 AND AS DESCRIBED BELOW:
 - VACUUM TESTING SHALL BE CARRIED OUT IMMEDIATELY AFTER ASSEMBLY AND PRIOR TO BACKFILLING. ALL LIFT HOLES SHALL BE PLUGGED WITH AN APPROVED NON-SHRINK GROUT, OR RUBBER PLUG. GROUT SHALL NOT BE PLACED IN THE HORIZONTAL JOINTS BEFORE TESTING. ALL PIPES ENTERING THE MANHOLE SHALL BE PLUGGED, TAKING CARE TO SECURELY BRACE THE PLUGS FROM BEING DRAWN INTO THE MANHOLE.
 - ALL MANHOLES SHALL BE VACUUM TESTED FOR LEAKAGE. A VACUUM OF TEN (10) INCHES OF MERCURY SHALL BE PLACED ON THE MANHOLE AND THE TIME MEASURED FOR TEN (10) INCHES OF MERCURY TO BE MAINTAINED FOR AT LEAST FIVE (5) MINUTES. THE VACUUM SHALL NOT DROP BELOW NINE (9) INCHES OF MERCURY FOR THE FOLLOWING TIME PERIODS FOR EACH SIZE OF MANHOLE:
 - FOURTY-FOUR (44) INCHES DIAMETER - SIXTY (60) SECONDS
 - SEVENTY-TWO (72) INCHES DIAMETER - NINETY (90) SECONDS
 - FOURTY-EIGHT (48) INCHES DIAMETER - SIXTY (60) SECONDS
 - CONTRACTOR SHALL PROVIDE ALL MATERIAL AND EQUIPMENT NECESSARY FOR TESTING. IF TESTING FAILS, THIS TESTING SHALL BE PERFORMED BEFORE BACKFILLING SO THAT ANY LEAKS CAN BE FOUND AND FIXED IMMEDIATELY. THE MANHOLE FRAME AND ADJUSTING RINGS SHALL BE IN PLACE WHEN TESTING.
 - ROUTINE PERIODIC INSPECTIONS DURING CONSTRUCTION WILL BE PROVIDED BY THE OWNER. THESE INSPECTIONS DO NOT RELIEVE THE CONTRACTOR FROM HIS OBLIGATION AND RESPONSIBILITY FOR CONSTRUCTING A SANITARY SEWER SYSTEM IN STRICT ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE OWNER.
 - AFTER TESTING IS COMPLETE AND ALL COMPONENTS OF THE SANITARY SEWER SYSTEM ARE DETERMINED ACCEPTABLE TO THE OWNER, THE CONTRACTOR SHALL SUBMIT THE AS-BUILT DRAWINGS TO THE OWNER. ANY DISCREPANCIES NOTED DURING THE FINAL INSPECTION SHALL BE CORRECTED BY THE CONTRACTOR WITHIN 30 DAYS.
 - THE PROPERTY AND RIGHT OF WAY LINES SHOWN ON THESE DRAWINGS ARE APPROXIMATE, AND ARE NOT BASED ON METES AND BOUNDS FIELD RUN SURVEYS OR PROPERTY RECORDS.
 - THE CONTRACTOR SHALL TAKE PRECAUTIONS TO LOCATE PROPERTY LINES AND RIGHT OF WAY LINES PRIOR TO CONSTRUCTION AND AVOID CONSTRUCTION ACTIVITIES ON PRIVATE PROPERTY AND/OR RIGHTS OF WAYS WHERE SAID CONSTRUCTION IS PROHIBITED. THE CONTRACTOR MAY CONDUCT CONSTRUCTION ACTIVITIES ON PRIVATE PROPERTY PROVIDED HE HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE PROPERTY OWNER AND HAS SUBMITTED A COPY OF SAID WRITTEN PERMISSION TO THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
 - ANY REQUIRED EXPENSES, PERMITS AND APPROVALS SHALL BE ACQUIRED BY THE DEVELOPER PRIOR TO COMMENCEMENT OF SANITARY SEWER CONSTRUCTION.
 - STRUCTURES AND/OR THRUST BLOCKING HAVE BEEN DESIGNED BASED ON THE FOLLOWING:
 - A. A MINIMUM 3,000 PSF PASSIVE SOIL BEARING CAPACITY
 - B. A MINIMUM 28 DAY CONCRETE COMPRESSIVE STRENGTH OF 3,500 PSI (EXCEPT FOR PRECAST CONCRETE).
 - C. TEST PRESSURE (WORKING PLUS SURGE) IS 100 PSI.
 - D. DEPTH FROM FINISHED GRADE TO TOP OF PIPE ASSUMED TO BE 2.5 FT. OR DEEPER.
 - E. EXISTING SOIL CONDITIONS ARE NOT SOFT OR ORGANIC.
 - DIFFERING SITE CONDITIONS AND/OR DIFFERING MATERIAL PROPERTIES SHALL REQUIRE THE CITY OF HARRINGTON DEPT APPROVAL OF SPECIAL DESIGN DETAILS PREPARED BY THE ENGINEER PRIOR TO INITIATING OR RESUMING CONSTRUCTION ACTIVITIES.
 - THE CONTRACTOR SHALL ALLOW SUFFICIENT TIME FOR THE FOLLOWING EXCAVATIONS FOR INSPECTION AND BACKFILLING:
 - 1. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 2. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 3. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 4. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
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 - 12. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
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 - 14. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 15. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 16. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 17. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 18. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
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 - 32. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 33. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
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 - 35. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 36. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 37. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 38. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - 39. EXCAVATION OF UNDERGROUND UTILITIES TO VERIFY LOCATION AND DEPTH.
 - PVC PRESSURE SEWER PIPE 12" AND SMALLER NOMINAL PIPE SIZE DIAMETER SHALL CONFORM TO ASTM D2241, PIG 1120 (12464-B); SDR 21.
 - DUCTILE IRON PRESSURE SEWER PIPE 3 INCHES TO 12 INCHES NOMINAL PIPE SIZE DIAMETER SHALL CONFORM TO AWMA C151; PRESSURE CLASS 250 PSI; DOUBLE CEMENT MORTAR LINED PER AWMA C104 WITH AN INTERIOR OF PROTECTO 401 LINED-CERAMIC EPOXY COATING, MINIMUM THICKNESS OF 40 MILS.
 - DUCTILE IRON PRESSURE SEWER FITTINGS 3 INCHES TO 24 INCHES NOMINAL PIPE SIZE DIAMETER SHALL CONFORM TO AWMA C153; DOUBLE CEMENT MORTAR LINED PER AWMA C104 WITH AN INTERIOR OF PROTECTO 401 LINED-CERAMIC EPOXY COATING, MINIMUM THICKNESS OF 40 MILS.
 - RUBBER GASKET JOINTS, LUBRICANTS, GLANDS, BOLTS AND NUTS FOR DUCTILE IRON PRESSURE PIPE AND FITTINGS SHALL CONFORM TO AWMA C111, WITH MECHANICAL JOINTS FOR BURIED FITTINGS AND MECHANICAL OR PUSH-ON JOINTS FOR BURIED PIPING.
 - ALL PRESSURE SEWER PIPE JOINTS AND FITTING JOINTS SHALL BE RESTRAINED.
 - PRESSURE SEWER PIPE AND FITTINGS LOCATED INSIDE STRUCTURES SHALL BE FLANGED (SPECIAL THICKNESS CLASS 50 CONFORMING TO AWMA C110/C115, AND DOUBLE CEMENT MORTAR LINED PER AWMA C104 WITH AN INTERIOR SEAL COAT OF BITUMINOUS MATERIAL. PIPING SHALL BE COATED WITH AN EXTERIOR TWO COAT EPOXY PAINT SYSTEM, AFTER INSTALLATION.
 - CONTRACTOR SHALL AT ALL TIMES MAINTAIN A SAFE AND DRY EXCAVATION. AT A MINIMUM THAT INCLUDES SHEETING AND SHORING FOR TRENCHES IN ACCORDANCE W/ OSHA REGULATIONS AND SUFFICIENT Dewatering FOR A DRY SUBGRADE.

EXISTING UNDERGROUND UTILITIES COORDINATION NOTES:

1. THE LOCATION OF UNDERGROUND UTILITIES AS INDICATED ON PLANS HAS BEEN OBTAINED FROM EXISTING RECORDS. NEITHER THE OWNER OR THE ARCHITECT/ENGINEER ASSUMES ANY LIABILITY FOR THE ACCURACY OF THESE RECORDS. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMISSION FROM THE PROPERTY OWNER AND HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
2. THE CONTRACTOR SHALL NOT START EXCAVATION UNTIL ALL UTILITY LINE LOCATIONS HAVE BEEN VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMISSION FROM THE PROPERTY OWNER AND HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
3. THE CONTRACTOR SHALL NOT START EXCAVATION UNTIL ALL UTILITY LINE LOCATIONS HAVE BEEN VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMISSION FROM THE PROPERTY OWNER AND HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETERMINE LOCATION OF EACH UTILITY WITHIN THE EXISTING RECORDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMISSION FROM THE PROPERTY OWNER AND HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
5. WHERE EXISTING UNDERGROUND UTILITIES OR OTHER CONSTRUCTION ARE EXPECTED TO BE IN PROXIMITY TO PROPOSED CONSTRUCTION, OR WHEN APPROACHING EXISTING UTILITIES OR OTHER CONSTRUCTION, THE CONTRACTOR SHALL TAKE PRECAUTIONS TO AVOID CONSTRUCTION ACTIVITIES ON PRIVATE PROPERTY AND/OR RIGHTS OF WAYS WHERE SAID CONSTRUCTION IS PROHIBITED. THE CONTRACTOR MAY CONDUCT CONSTRUCTION ACTIVITIES ON PRIVATE PROPERTY PROVIDED HE HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE PROPERTY OWNER AND HAS SUBMITTED A COPY OF SAID WRITTEN PERMISSION TO THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
6. WHEN IT IS NECESSARY TO EXCAVATE NEAR OR INTERFERE WITH ANY SEWER LINE, WATER SERVICES, DRAIN PIPE, CATCH BASIN, CULVERT, OR OTHER STRUCTURES, THE CONTRACTOR SHALL MAINTAIN THE SAME IN WORKING ORDER AND SHALL REPAIR AND MAKE GOOD ANY DAMAGE DONE DURING THE PROGRESS OF THE WORK.
7. WHERE EXISTING UTILITIES CROSS THE TRENCH EXCAVATION, THEY SHALL BE ADEQUATELY SUPPORTED AND PROTECTED FROM DAMAGE DUE TO CONSTRUCTION. ALL METHODS FOR SUPPORTING AND MAINTAINING EXISTING UTILITIES SHALL BE SUBJECT TO REVIEW BY OWNER. CARE SHALL BE TAKEN TO ENSURE THAT THE EXISTING UTILITIES GRASSES AND ALIGNMENT ARE MAINTAINED AND THE PIPE JOINTS ARE NOT DISTURBED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMISSION FROM THE PROPERTY OWNER AND HAS OBTAINED PRIOR WRITTEN PERMISSION FROM THE DIRECTOR OF THE CITY OF HARRINGTON DEPARTMENT OF PUBLIC WORKS.
8. ANY UNPROTECTED CABLE (DIRECT BURIED) ENCOUNTERED THAT IS VERIFIED AS NOT ABANDONED IN PLACE SHALL BE PROTECTED. THE UTILITY OWNER HAS DIRECTED THE CABLE BE PLACED IN SPLIT DUCT OR TAKE ALL REASONABLE MEASURES TO AVOID HAVING TO CUT AND SPlice DIRECT BURIED CABLE. THE CONTRACTOR SHALL NOTE SPLIT DUCT PORTIONS ON AS-BUILTS.
9. ALL EXCESS EXCAVATED MATERIALS SHALL BE DISPOSED OF OFF CITY/STATE PROPERTY, EXCEPT FOR CONTAMINATED SOILS OR LIQUIDS. ALL CONTAMINATED SOILS AND LIQUIDS SHALL BE TRANSPORTED TO AN APPROVED RECEIVING SITE AS DIRECTED BY THE ENGINEER, OR FINAL DISPOSITION.
10. INTERRUPTION OF EXISTING UTILITIES SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND/OR AT THE DIRECTION OF THE UTILITY OWNER/S.

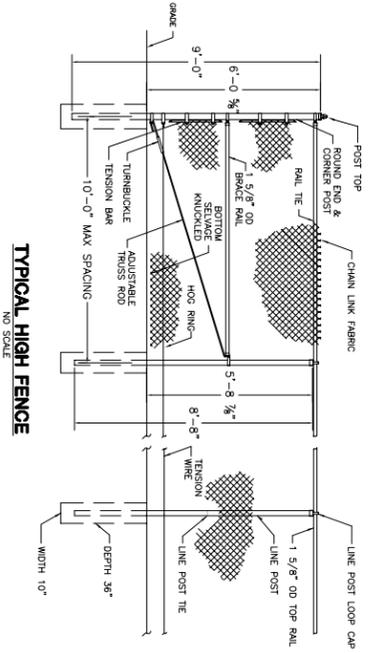


City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

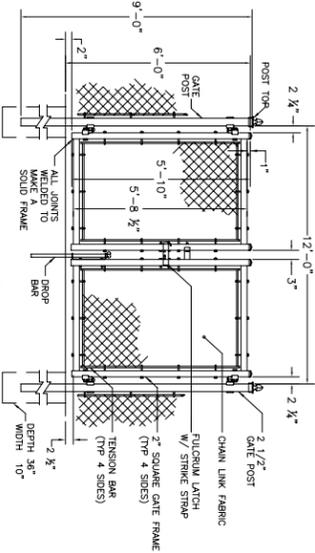
GENERAL NOTES FOR PUMP STATION

GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE

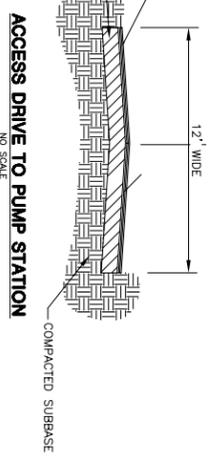
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Dwg No.:	G01



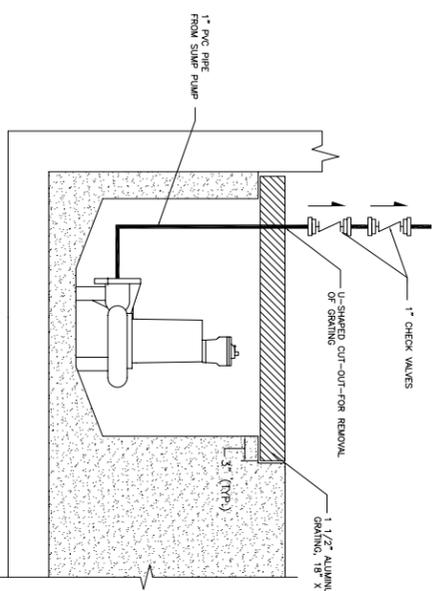
GATE PLAN
NO SCALE



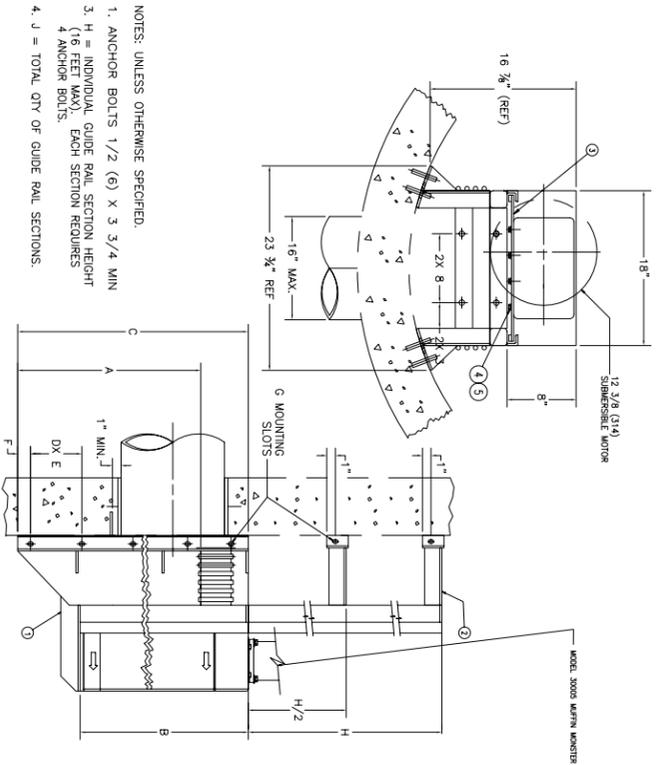
TYPICAL DOUBLE WING GATE DETAIL
NO SCALE



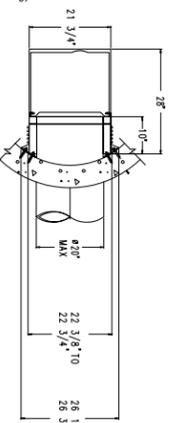
ACCESS DRIVE TO PUMP STATION
NO SCALE



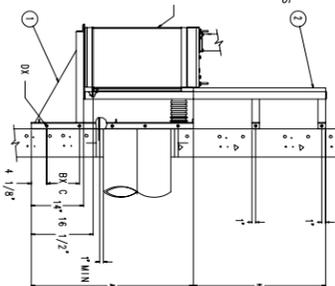
SLUMP PUMP DETAIL
NO SCALE



GRINDER MOUNTING DETAIL
(FOR PUMPING STATIONS WITH LESS THAN 1000 GPM CAPACITY)
NO SCALE



GRINDER MOUNTING DETAIL
(FOR PUMPING STATIONS WITH LESS THAN 1000 GPM CAPACITY)
NO SCALE

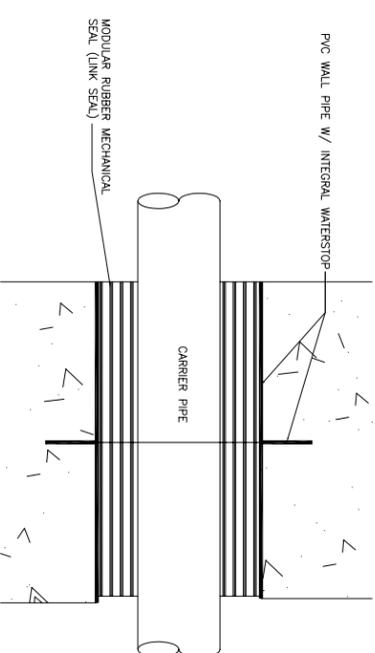


GRINDER MOUNTING DETAIL
(FOR PUMPING STATIONS WITH LESS THAN 1000 GPM CAPACITY)
NO SCALE

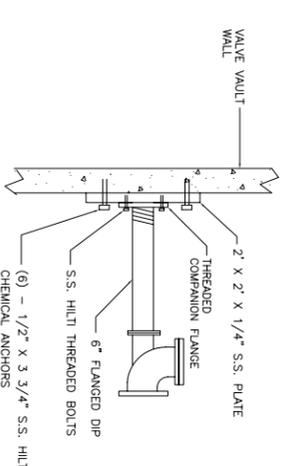
TAB BLOCK					
PUMP STATION	A	B	C	D	E
# 4-2	24 7/8	23 5/8	30 7/8	8	6 13/16
					2
					10 + 4 1/4

ITEM NO.	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL
5	8	30140	LOCKWASHER, SPLIT 3/8	SST
4	8	30249	HHCS 3/8-16 X 3/4	SST
2	1	32523	GUIDE PLATE	
2	1	32598R	GUIDE RAIL-ROUND WALL MOUNT	
1	1	32538R	FRAME-ROUND WALL MOUNT	

TAB BLOCK					
MODEL NO.	PART NO.	A	B	C	D
CM018-10-AD	CMC1103R-1820-000-ZZ	43 1/4	8	8 3/4	10 + 4 1/4
CM024-10-AD	CMC1103R-2420-000-ZZ	48 9/16	8	10 1/16	10 + 4 1/4
CM032-10-AD	CMC1103R-3220-000-ZZ	56 11/16	8	12 1/8	10 + 4 1/4
CM040-10-AD	CMC1103R-4020-000-ZZ	64 5/8	10	11 1/4	12 + 4 1/4
CM050-10-AD	CMC1103R-5020-000-ZZ	74 5/8	10	13 1/4	12 + 4 1/4
CM080-10-AD	CMC1103R-6020-000-ZZ	85	10	15 3/8	12 + 4 1/4

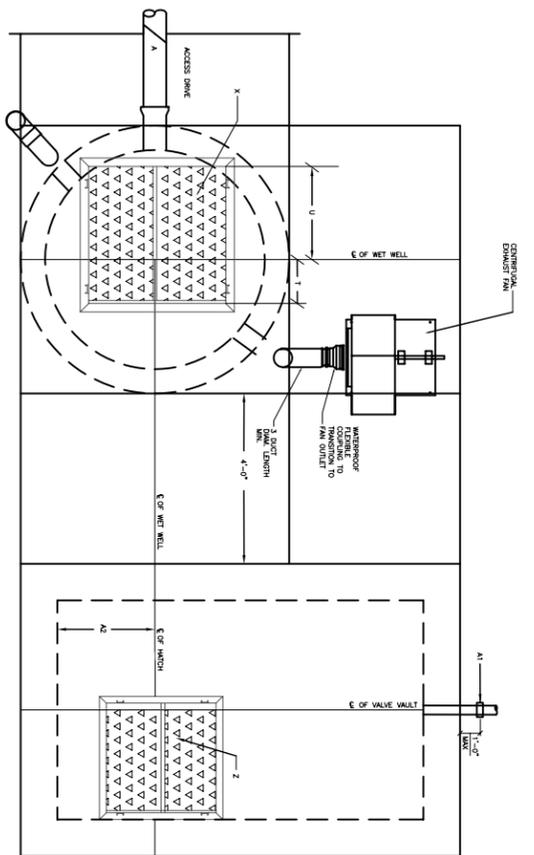


PIPE PENETRATION DETAIL
NO SCALE

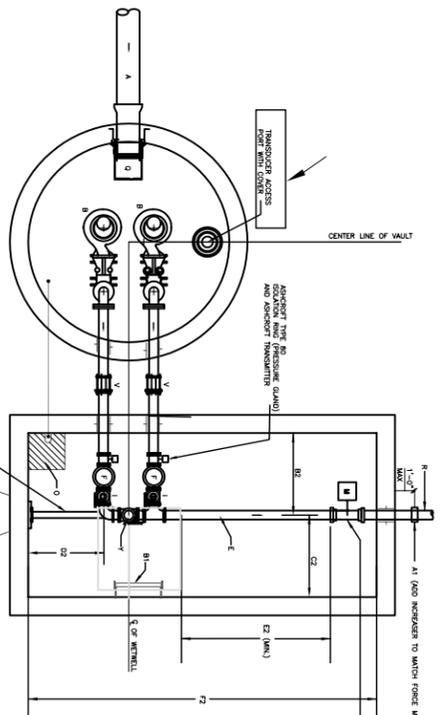


VALVE VAULT PIPE ANCHOR
NO SCALE

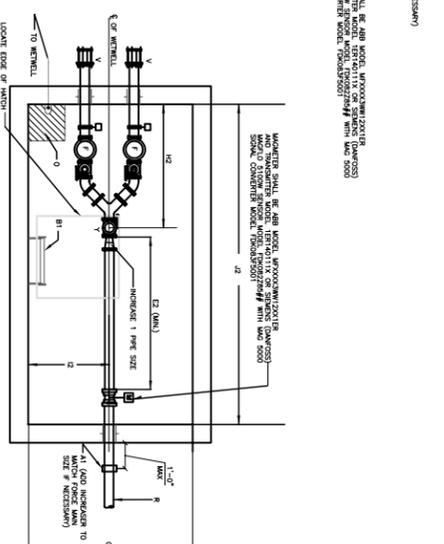
GRINDER MOUNTING DETAIL
(FOR PUMPING STATIONS WITH LESS THAN 1000 GPM CAPACITY)
NO SCALE



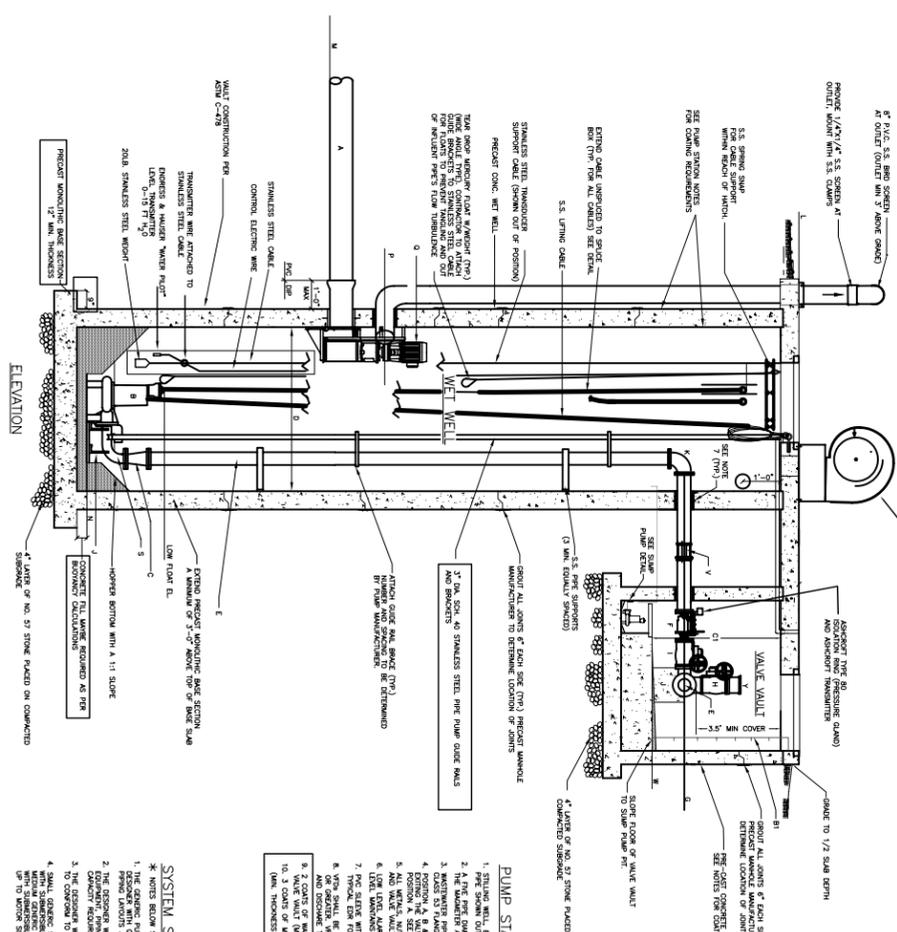
PLAN - TOP SLAB
NOT TO SCALE



PLAN - BELOW TOP SLAB (POSITION A)
NOT TO SCALE



PLAN - BELOW TOP SLAB (POSITION B)
NOT TO SCALE



GENERIC PUMP STATION
NOT TO SCALE

- PUMP STATION NOTES**
1. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 2. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 3. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 4. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
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 6. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 7. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 8. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 9. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.
 10. PUMP SHALL BE PROVIDED IN ALL "MINIMUM" PUMP STATIONS WITH 20 HP AND DISCHARGE TO A FORCE MAIN. SEE ELECTRICAL PLANS FOR DETAILS.

DESIGNATION	DESCRIPTION	MEDIUM PUMP STATION	SMALL PUMP STATION
A	PVC INFLUENT PIPE SIZE	*	*
B	PUMP SIZE, MANUFACTURER & MODEL NUMBER	*	*
C	DP PUMP DISCHARGE MONITOR	*	3" X 4"
D	WET WELL DIMENSIONS	*	6'-0"
E	DP FORCE MAIN SIZE	*	4" DP
F	CHECK VALVE	*	4"
G	VALVE VAULT PIPE ELEVATION	*	4"
H	FLUID VALVE	*	4"
I	CONCRETE BASE PIPE SUPPORT	*	6" X 6"
J	DP 90 DEGREE ELBOW	*	4"
K	TOP OF SLAB ELEVATION	*	*
L	INFLUENT PIPE INLET ELEVATION	*	*
M	WET WELL INLET	*	*
N	1 1/2" ALUMINUM SLAB PUMP MOUNTING	2'-0" X 2'-0"	2'-0" X 2'-0"
O	REARER PIPE GUNLET ELEVATION (CONCRETE SHOP)	*	*
P	SPARKER (FOR MEDIAN PUMP STATIONS)	N/A	N/A
Q	PVC FORCE MAIN SIZE	*	4"
R	PUMP DISCHARGE BASE ASSEMBLY	*	3"
S	WET WELL HATCH DIMENSION (FROM CENTERLINE)	6'-0"	1'-0"
T	WET WELL HATCH DIMENSION (FROM CENTERLINE)	4'-0"	2'-0"
U	RESURFACING ALL SURFACE	*	4"
V	WALK WALK TOP OF CONCRETE FILL	*	*
W	WET WELL HATCH SIZE	3'X7' DOUBLE LIFT HATCH	3'X7' SINGLE LIFT HATCH
X	S.S. WALK (CON-LOCK CONNECTOR (MIN. CAP))	*	4"
Y	VALVE VAULT ACCESS HATCH	5'X7' DOUBLE LIFT HATCH	5'X7' DOUBLE LIFT HATCH
Z	DP TO PVC TRANSITION CURBING	*	4"
AA	ALUMINUM LADDER	*	*
BB	VALVE VAULT DEPTH	5'-0"	5'-0"
CC	DIMENSION FROM CENTER TO CENTER DISCHARGE PIPES	5'-0"	5'-0"

PUMP OPERATING LEVELS

PIPE SIZE	42	48	60	72	84	96	108	120
HIGH LEVEL ALUMINUM FLOAT	*	*	*	*	*	*	*	*
LOW PUMP ON	*	*	*	*	*	*	*	*
BOTH PUMPS OFF	*	*	*	*	*	*	*	*
LOW LEVEL ALUMINUM FLOAT	*	*	*	*	*	*	*	*

WETWELL AND VALVE VAULT DIMENSIONS

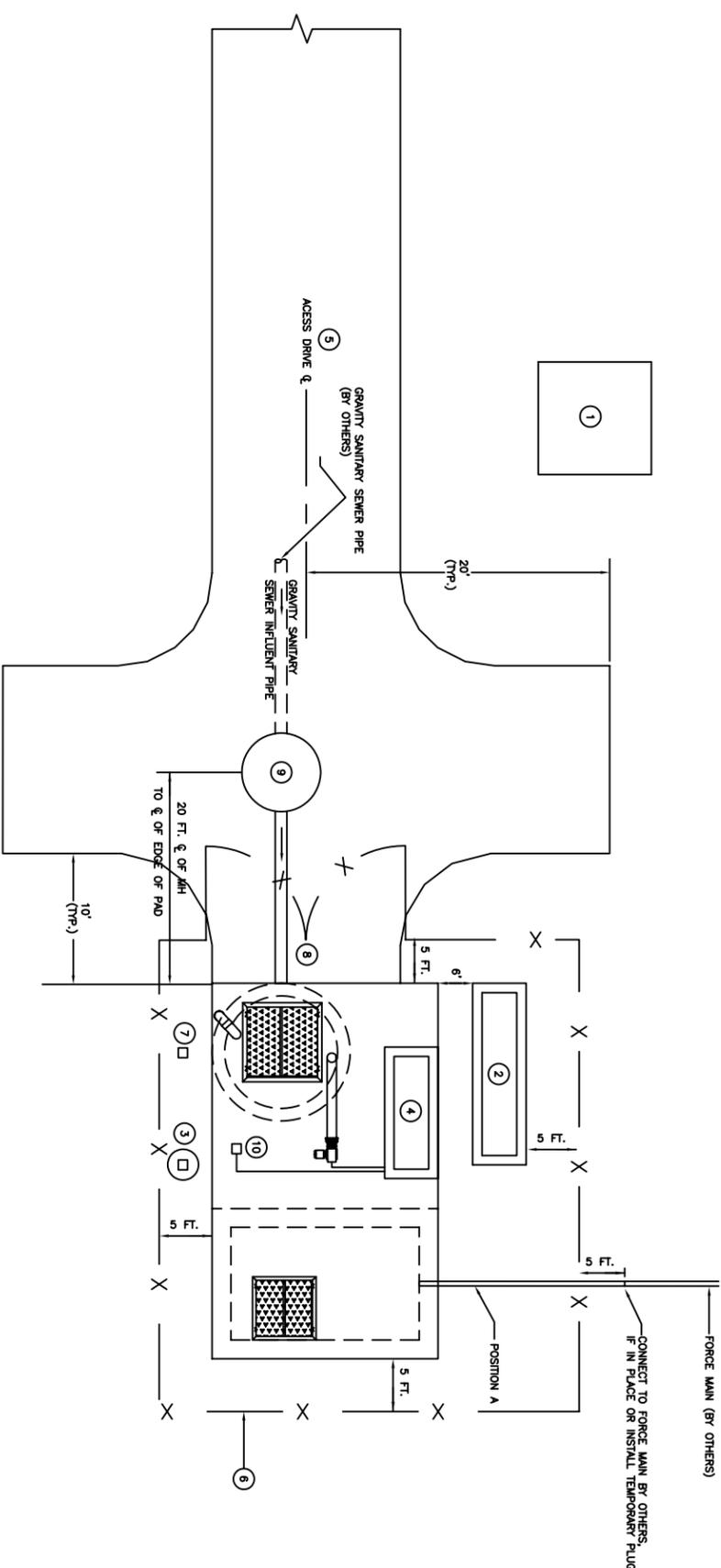
PIPE SIZE	42	48	60	72	84	96	108	120
4"	3'-0"	3'-0"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"
6"	3'-0"	3'-0"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"
8"	3'-0"	3'-0"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"
10"	3'-0"	3'-0"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"
12"	3'-0"	3'-0"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"

THIS SYMBOL STANDS FOR NEW CHANGES


City of Harrington
 106 Dorman St.
 Harrington, Delaware (302) 398-3530
GENERIC PS PLAN & ELEVATION

GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE

Date: **1/17/2007**
 Scale:
 Dwn. By:
 Proj. No.:
 Dwg. No.: **M02**



TYPICAL PUMP STATION SITE PLAN
NOT TO SCALE

DRAWING NOTES

- ① TRANSFORMER PAD BY UTILITY COMPANY
- ② STANDBY GENERATOR ON CONCRETE PAD (MEDIUM SIZE PUMP STATION ONLY)
- ③ LIGHT POLE
- ④ SERVICE CABINET ENCLOSURE ON CONCRETE SLAB
- ⑤ ACCESS DRIVE TO PUMP STATION
- ⑥ 6 FT. HT. CHAIN LINK FENCE
- ⑦ YARD HYDRANT
- ⑧ 12 FT. WIDE DOUBLE LEAF GATE
- ⑨ PRECAST MANHOLE
- ⑩ SPLICE BOX

GENERAL NOTES

- 1. REFER TO GENERAL NOTES ON SHEET 1.

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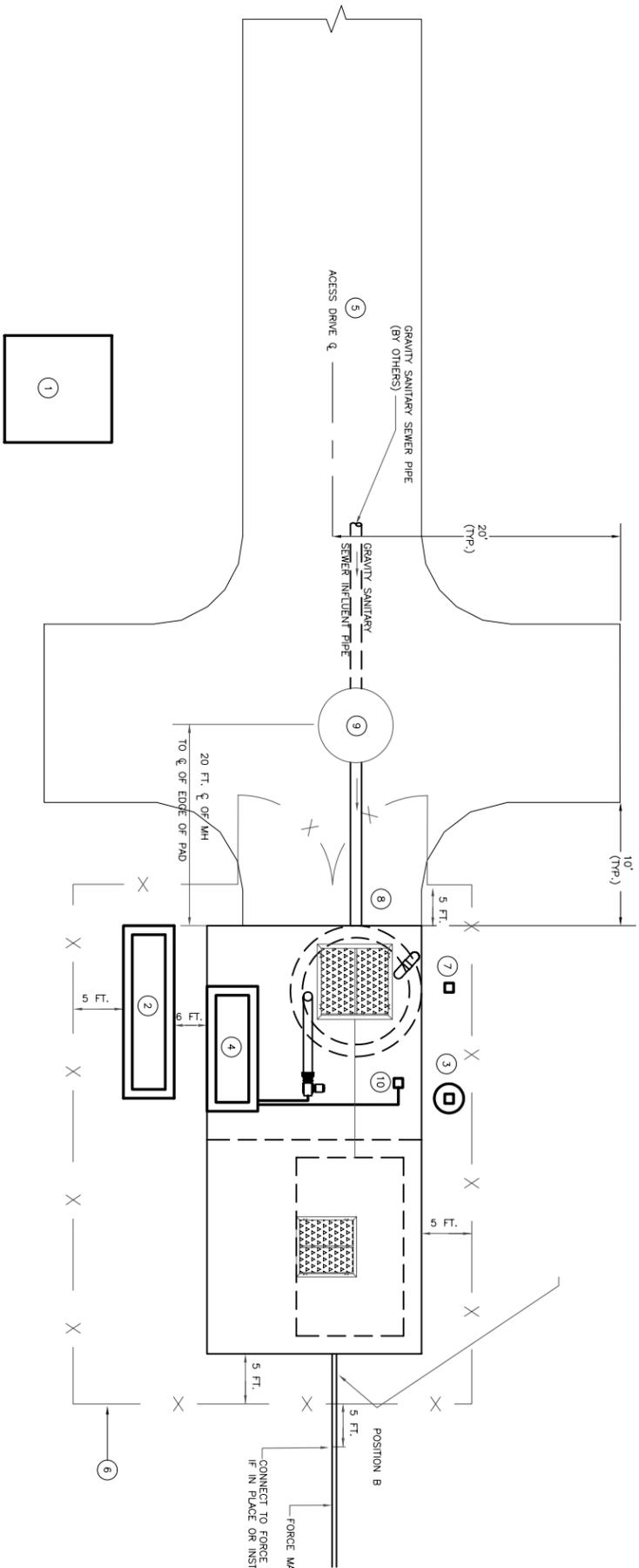
City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

TYPICAL PUMP STATION SITE PLAN

**GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE**

Date:	3/27/2007
Scale:	
Drawn By:	
Project No.:	
Draw No.:	

M03



TYPICAL PUMP STATION SITE PLAN
NOT TO SCALE

DRAWING NOTES

- ① TRANSFORMER PAD BY UTILITY COMPANY
- ② STANDBY GENERATOR ON CONCRETE PAD (MEDIUM SIZE PUMP STATION ONLY)
- ③ LIGHT POLE
- ④ SERVICE CABINET ENCLOSURE ON CONCRETE SLAB
- ⑤ ACCESS DRIVE TO PUMP STATION
- ⑥ 6 FT. HT. CHAIN LINK FENCE
- ⑦ YARD HYDRANT
- ⑧ 12 FT. WIDE DOUBLE LEAF GATE
- ⑨ PRECAST MANHOLE
- ⑩ SPRUCE BOX

GENERAL NOTES

- 1. REFER TO GENERAL NOTES ON SHEET 1.

— FORCE MAIN (BY OTHERS)
— CONNECT TO FORCE MAIN BY OTHERS.
IF IN PLACE OR INSTALL TEMPORARY PLUG

POSITION B



City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

TYPICAL PUMP STATION SITE PLAN

**GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE**

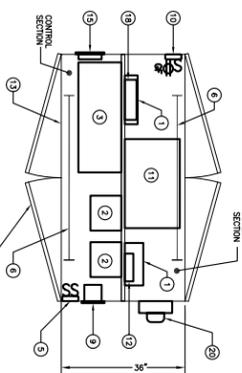
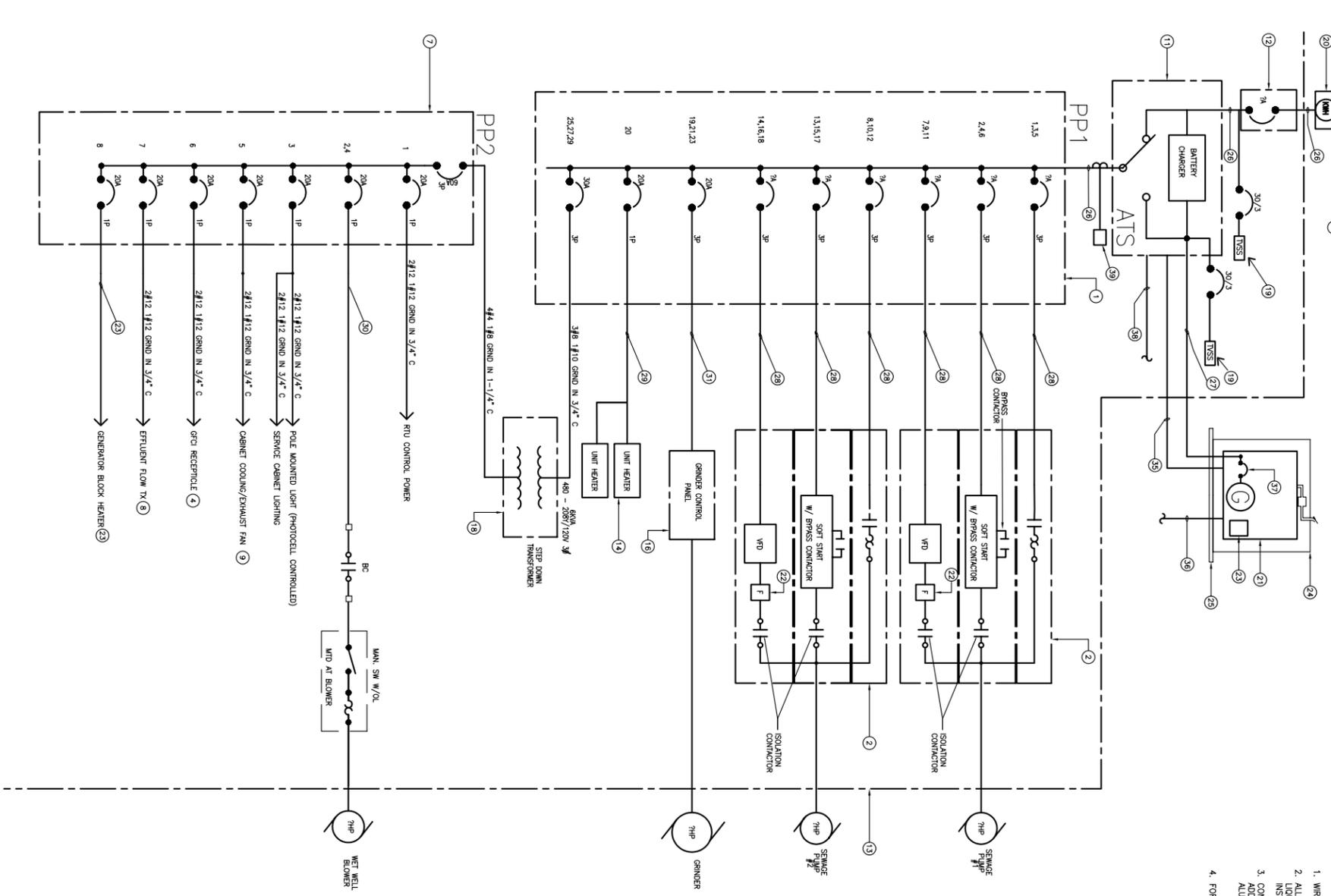
Date: **1/27/2007**
Scale:
Dwn. By:
Proj. No.:
Dwg. No.: **M04**

GENERAL NOTES

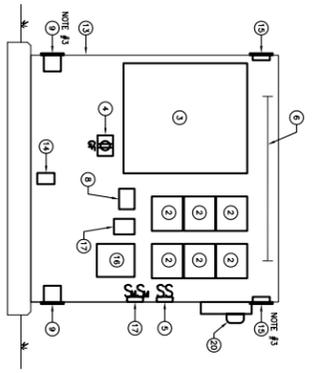
1. WIRING ENTERING FROM CONCRETE PAD SHALL BE IN RIGID GALVANIZED STEEL CONDUIT.
2. ALL INTERCONNECT WIRING WITHIN ENCLOSURE SHALL BE IN SCHEDULE 40 PVC OR RIGID ALUMINUM CONDUIT. ALL WIRING SHALL BE IN RIGID CONDUIT UNLESS OTHERWISE NOTED. CONDUIT LENGTHS NOT EXCEEDING 12' MAY BE USED WHERE INSTALLATION OF RIGID CONDUIT IS IMPRACTICAL.
3. CONTROL SECTIONS WITH VFD DRIVE CONTROLLERS INSTALLED SHALL BE VENTILATED WITH AN ADDITIONAL THERMOSTAT CONTROLLED FAN IN THE CONTROL SECTION WITH REPLACEABLE ALUMINUM FILTER. THE TERMINALS OF THERMOSTAT SHALL BE SHIELDED FROM CONTACT.
4. FOR MOTOR & GENERATOR FEEDER EQUIPMENT SIZE REFER TO SIZING CHART.

EQUIPMENT LIST

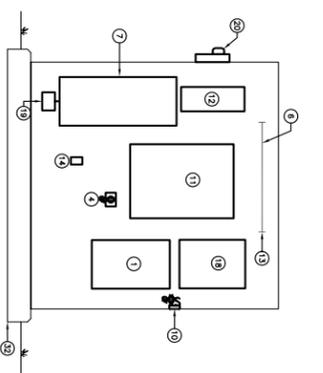
- 1 480/277 3PH, 4W PANEL - A
- 2 AC DRIVE CONTROLLER WITH BACKUP SOLID STATE SOFT START AND STAND ALONE AGGRESS THE LINE STARTERS EACH HOUSED IN A NEMA 1 ENCLOSURE. SIZE OF ENCLOSURES WILL DEPEND UPON STARTER SIZE
- 3 REMOTE TELEMETRY UNIT WITH PUMP CONTROLLER (RTU/PLC)
- 4 20A/120VAC DUPLEX GFCI RECEPTACLE IN FS BOX WITH COVER
- 5 FLOODLIGHT & ENCLOSURE LIGHT SWITCHES IN DUAL-GANG FS BOX. PROVIDE IDENTIFICATION LABELS
- 6 4' LONG SINGLE TUBE FLUORESCENT STRIP LIGHTING FIXTURE WITH LOW TEMPERATURE ELECTRONIC BALLAST
- 7 100A, 208/120 3PH, 4W, 30 CKT PANEL
- 8 EFFLUENT FLOW TRANSMITTER, 2AV DC WITH 4-20mA ANALOG OUTPUT WIRED TO ③
- 9 THERMOSTATICALLY CONTROLLED COOLING FAN
- 10 LIGHT SWITCH & 20A/120VAC DUPLEX GFCI RECEPTACLE IN DUAL-GANG FS BOX WITH COVER
- 11 3 POLE AUTOMATIC TRANSFER SWITCH (POWER MONITORING MODULES ON LOAD SIDE CONDUCTORS)
- 12 NEMA 1 ENCLOSED MAIN CIRCUIT BREAKER - A MCB - V
- 13 SERVICE CABINET ENCLOSURE; FREESTANDING NEMA TYPE 12, TYPICAL SIZE 72"H x 72"W x 36"D (ADJUST LENGTH AND NUMBER OF SECTIONS AS REQUIRED FOR INSTALLED EQUIPMENT)
- 14 THERMOSTATICALLY CONTROLLED ELECTRIC HEATER; QUANTITY/CAPACITIES AS REQUIRED FOR 30°F RISE ABOVE AMBIENT TEMPERATURE.
- 15 EXHAUST LOWER PLATE WITH REPLACEABLE ALUMINUM FILTER
- 16 GRINDER CONTROL PANEL
- 17 NOT USED
- 18 30"H x 20"W x 14"D TRANSFORMER - 6KV/4, 3Ø 480-208V/120
- 19 TRANSIENT VOLTAGE SURGE SUPPRESSOR UNIT (MODULAR) (TYPE I) FOR ≥ 400A SERVICE (TYPE II) FOR ≤ 400A SERVICE
- 20 POWER METER - CONTRACTOR TO FURNISH AND INSTALL KWH METER SOCKET
- 21 DIESEL GENERATOR WITH DUAL WALL SUB BASE FUEL TANK
- 22 FILTER TO REDUCE OUTPUT SIGNAL NOISE
- 23 BLOCK HEATER - 2#12 & 1#12 GND IN 3/4" C. CHECK MANUFACTURE REQUIREMENTS.
- 24 GENSET SOUND ENCLOSURE TYPE WILL BE SELECTED PER SIZING CHART
- 25 GENSET PAD - SEE DETAIL SHEET
- 26 4# - & 1# - GND IN - °C
- 27 4# - & 1# - GND IN - °C
- 28 2#12 & 1#12 GND IN 3/4" C
- 29 2#12 & 1#12 GND IN 3/4" C
- 30 2#12 & 1#12 GND IN 3/4" C
- 31 3#12 & 1#12 GND IN 3/4" C
- 32 SEE STRUCTURAL DRAWING FOR SERVICE CABINET ENCLOSURE PAD
- 33 DIRECT BURY FROM UTILITY TRANSFORMER TO POWER METER. PROVIDED BY THE UTILITY COMPANY. THE CONTRACTOR WILL FURNISH & INSTALL (SIZE & TYPE AS DIRECTED BY THE UTILITY) EMPTY CONDUIT FROM THE BOTTOM OF THE CONCRETE PAD AS DIRECTED BY THE UTILITY.
- 34 TRANSFORMER, PAD AND GROUNDING PROVIDED BY UTILITY COMPANY
- 35 GENERATOR START SIGNAL WIRING IN 3/4" C. NO. & SIZE OF WIRES PROVIDED BY MANUFACTURER
- 36 GENERATOR CONTROL PANEL ALARM SIGNAL TO PLC
- 37 GENERATOR MCB PROVIDED BY GENERATOR MANUFACTURER
- 38 CONTROL WIRE TO PLC
- 39 POWER LOGIC P-650 DIGITAL METER IN SEPARATE NEMA 1 ENCLOSURE PROVIDE CTS IN PP1 BACKBOX



PLAN VIEW-SERVICE CABINET ENCLOSURE
N.T.S.



CONTROL SIDE ELEVATION-SERVICE CABINET ENCLOSURE
N.T.S.



POWER SIDE ELEVATION-SERVICE CABINET ENCLOSURE
N.T.S.

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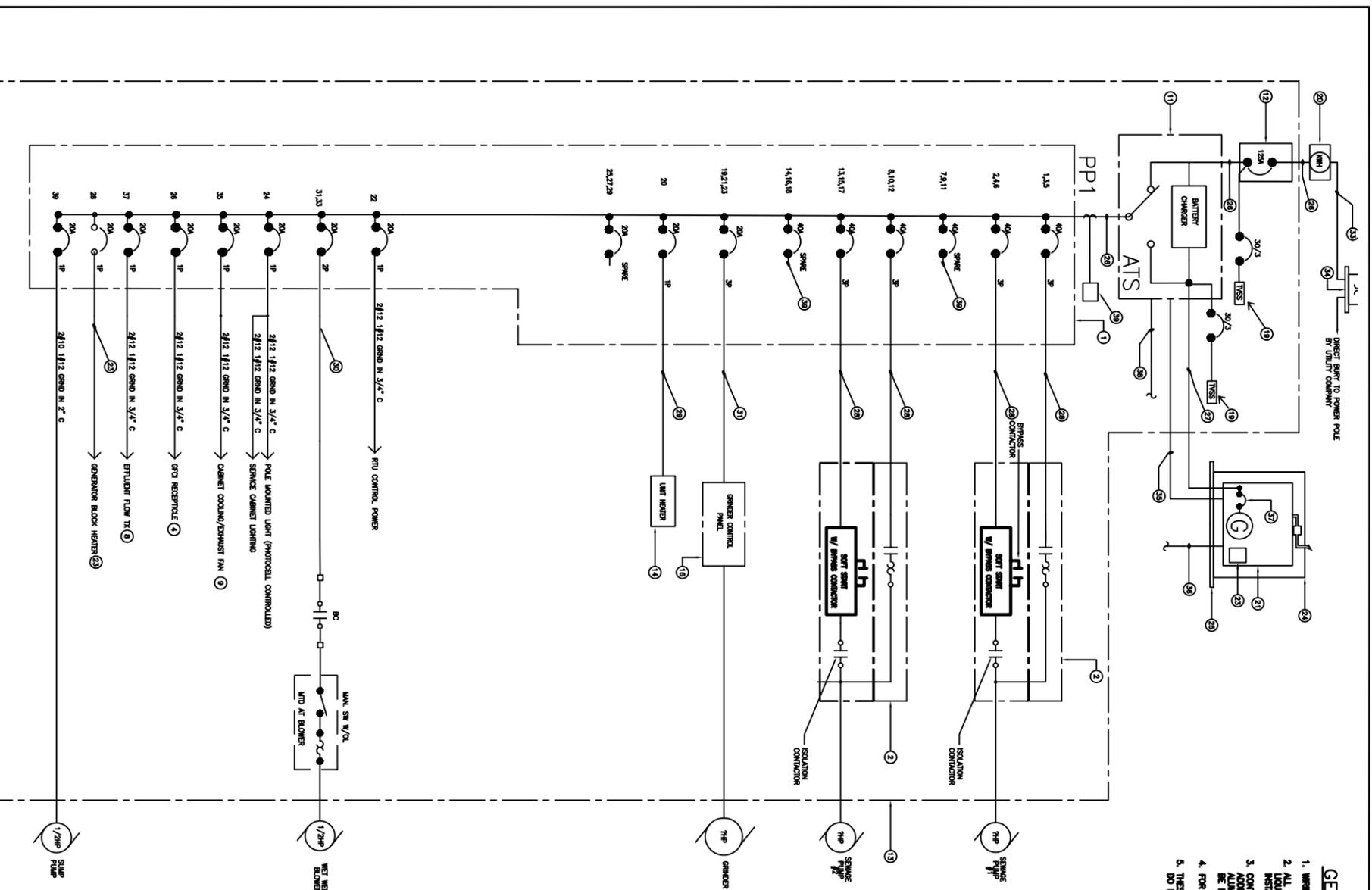


City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

MEDIUM PS WITH VFD & SINGLE LINE ENCLOSURE

GENERIC MEDIUM PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE

Date: 3/27/2007
Scale:
Dwn/By:
Proj/No.:
Dwg/No.:
E02

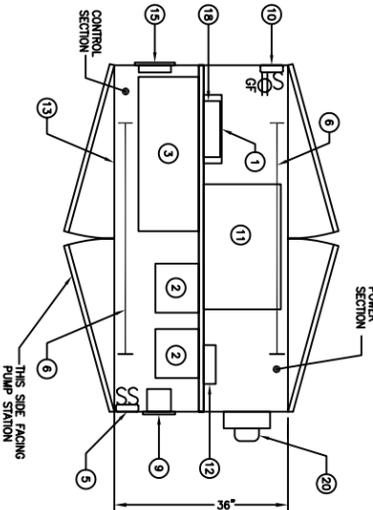


GENERAL NOTES

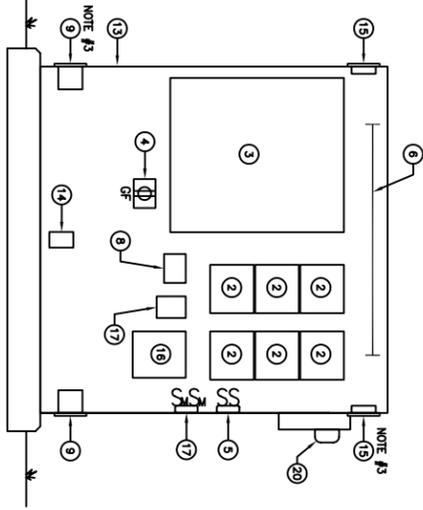
1. WIRING ENTERING FROM CONCRETE PAD SHALL BE IN RIGID GALVANIZED STEEL CONDUIT.
2. ALL INTERCONNECTING WIRING WITHIN ENCLOSURE SHALL BE IN SCHEDULE 40 PVC OR RIGID ALUMINUM CONDUIT. LEAD-TESTED FEEDER NONMETALLIC CONDUIT IN TRENCHES NOT EXCEEDING 12" MAY BE USED WHERE INSULATION OF RIGID CONDUIT IS IMPROVED.
3. CONTROL SECTIONS WITH COMPANION 40 RING TERMINALS INSTALLED SHALL BE VENTILATED WITH AN ALUMINUM FILTER. LIVE TERMINALS OF THERMOSTAT SHALL BE SHIELDED FROM CONTACT. FAN WIRING SHALL BE INSTALLED IN NONMETALLIC TUBING.
4. FOR MOTOR & GENERATOR FEEDER EQUIPMENT SIZE REFER TO SIZING CHART.
5. THESE DRAWINGS APPLY TO MEDIUM PUMP STATIONS GREATER THAN 5 HP AND LESS THAN 20 HP THAT DO NOT DISCHARGE TO FORCE MAIN (DOES NOT INCLUDE VFD STATIONS).

EQUIPMENT LIST

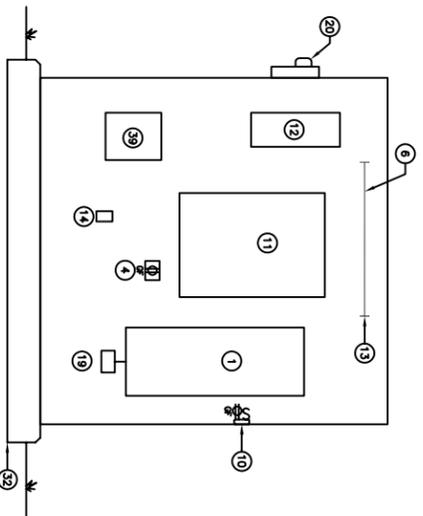
- 1 208/120V, 3PH, 4W PANEL PP1, A
- 2 AC DRIVE CONTROLLER WITH BACKUP SOLID STATE SOFT START RATED 22.75HP, SOLUTION CONTACTORS AND START ALONE ACROSS THE LINE STARTERS NEMA/SIZE EACH HOUSED IN A NEMA 1 ENCLOSURE.
- 3 REMOTE TALKBACK UNIT WITH PUMP CONTROLLER (RTU/PS)
- 4 208/120VAC DUPLEX GFCI RECEPTACLE IN FS BOX WITH COVER
- 5 FLOORLIGHT & ENCLOSURE LIGHT SWITCHES IN DUAL-DMG FS BOX, FRONT IDENTIFICATION LABELS
- 6 4' LONG SINGLE TUBE FLUORESCENT STRIP LIGHTING FIXTURE WITH LOW TEMPERATURE ELECTRONIC BALLAST NOT USED
- 7 EFFLUENT FLOW TRANSMITTER 24V DC WITH 4-20mA ANALOG OUTPUT WIRED TO 3
- 8 THERMISTORALLY CONTROLLED COOLING FAN
- 9 LIGHT SWITCH & 208/120VAC DUPLEX GFCI RECEPTACLE IN DUAL-DMG FS BOX WITH COVER
- 10 3 POLE 125A 200V 3PHASE AUTOMATIC TRANSFER SWITCH (SQUARE D POWER LOGIC POWER MONITORING MODULES ON LOAD SIDE CONDUCTORS).
- 11 NEMA 1 ENCLOSED LVM CIRCUIT BREAKER NEMA/SIZE 125A MCB
- 12 SERVICE CABINET ENCLOSURE PRESTRESSING NEAR TYPE 12, TYPICAL SIZE 72" X 72" X 36" TO BE LARGED IF REQUIRED
- 13 THERMISTORALLY CONTROLLED ELECTRIC HEATER, QUANTITY/CAPACITIES AS REQUIRED FOR SOFT RISE ABOVE AMBIENT TEMPERATURE
- 14 EXHAUST LOWER PLATE WITH REPLACEABLE ALUMINUM FILTER
- 15 GROUND CONTROL PANEL
- 16 NOT USED
- 17 NOT USED
- 18 TRANSFER VOLTAGE SENSE SUPPRESSOR UNIT (AR0044)
- 19 POWER METER - CONTRACTOR TO FURNISH AND INSTALL KWH METER SOCKET (TYPE D) FOR > 400A SERVICE
- 20 350W 3/4HP 208V/120V DIESEL GENERATOR WITH DUAL WALL SUB BASE PREG. TANK NOT USED
- 21 BLOCK HEATER - 2412 & 1412 GND IN 3/4" C
- 22 GENSET SOUND ENCLOSURE TYPE WILL BE SELECTED PER SIZING CHART
- 23 GENSET PAD - SEE DETAIL SHEET
- 24 41/0 & 149 GND IN 2" C
- 25 41/0 & 149 GND IN 2" C
- 26 3/46 & 1410 GND IN 3/4" C
- 27 2412 & 1412 GND IN 3/4" C
- 28 2412 & 1412 GND IN 3/4" C
- 29 SEE STRUCTURAL DRAWING FOR SERVICE CABINET ENCLOSURE PAD
- 30 DIRECT BATTERY FROM UTILITY TRANSMITTER TO POWER METER, PROVIDED BY UTILITY COMPANY. THE CONTRACTOR WILL FURNISH & INSTALL (SIZE & TYPE AS DIRECTED BY THE UTILITY EXPERT CONSULTANT) THE CONCRETE PAD AS DIRECTED BY THE UTILITY.
- 31 TRANSFORMER, PAD AND GROUNDING PROVIDED BY UTILITY COMPANY
- 32 GENERATOR START SIGNAL WIRING IN 3/4" C. NO. & SIZE OF WIRES AS RECOMMENDED BY MANUFACTURER
- 33 GENERATOR CONTROL PANEL ALARM SIGNAL TO PLC
- 34 GENERATOR MCB PROVIDED BY GENERATOR MANUFACTURER
- 35 CONTROL WIRE TO PLC
- 36 POWER LOGIC P-460 DIGITAL METER IN SERVICE NEMA 1 ENCLOSURE, PROVIDE GTS IN PP1 BACKBOX



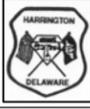
PLAN VIEW-SERVICE CABINET ENCLOSURE
N.T.S.



CONTROL SIDE ELEVATION-SERVICE CABINET ENCLOSURE
N.T.S.



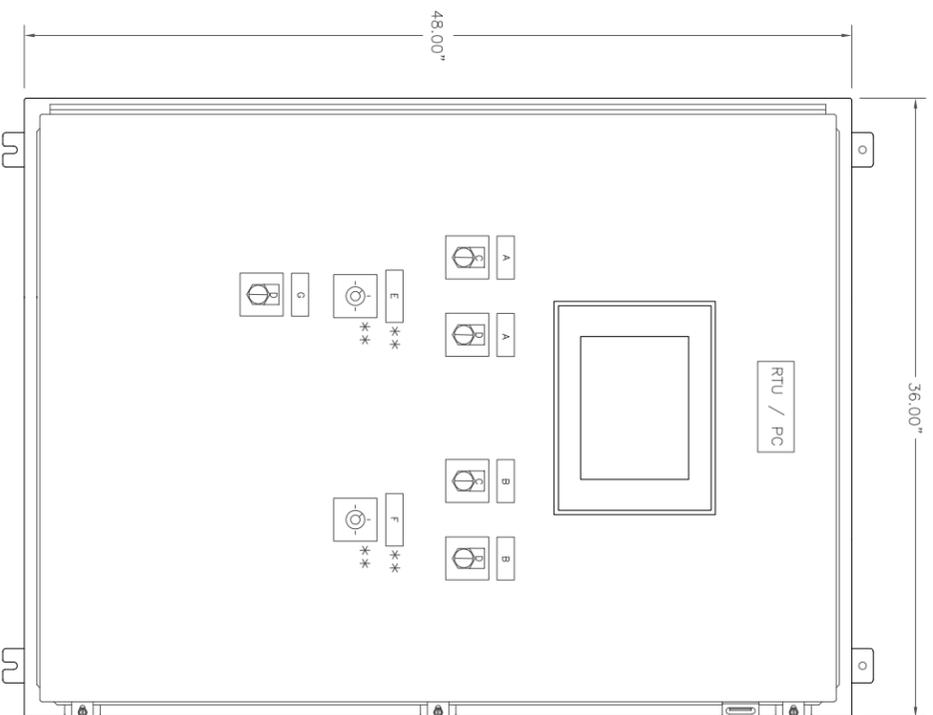
POWER SIDE ELEVATION-SERVICE CABINET ENCLOSURE
N.T.S.


City of Harrington
 106 Dorman St.
 Harrington, Delaware (302) 398-3530
MEDIUM PS WITH SOFT START, SINGLE LINE & ENCLOSURE

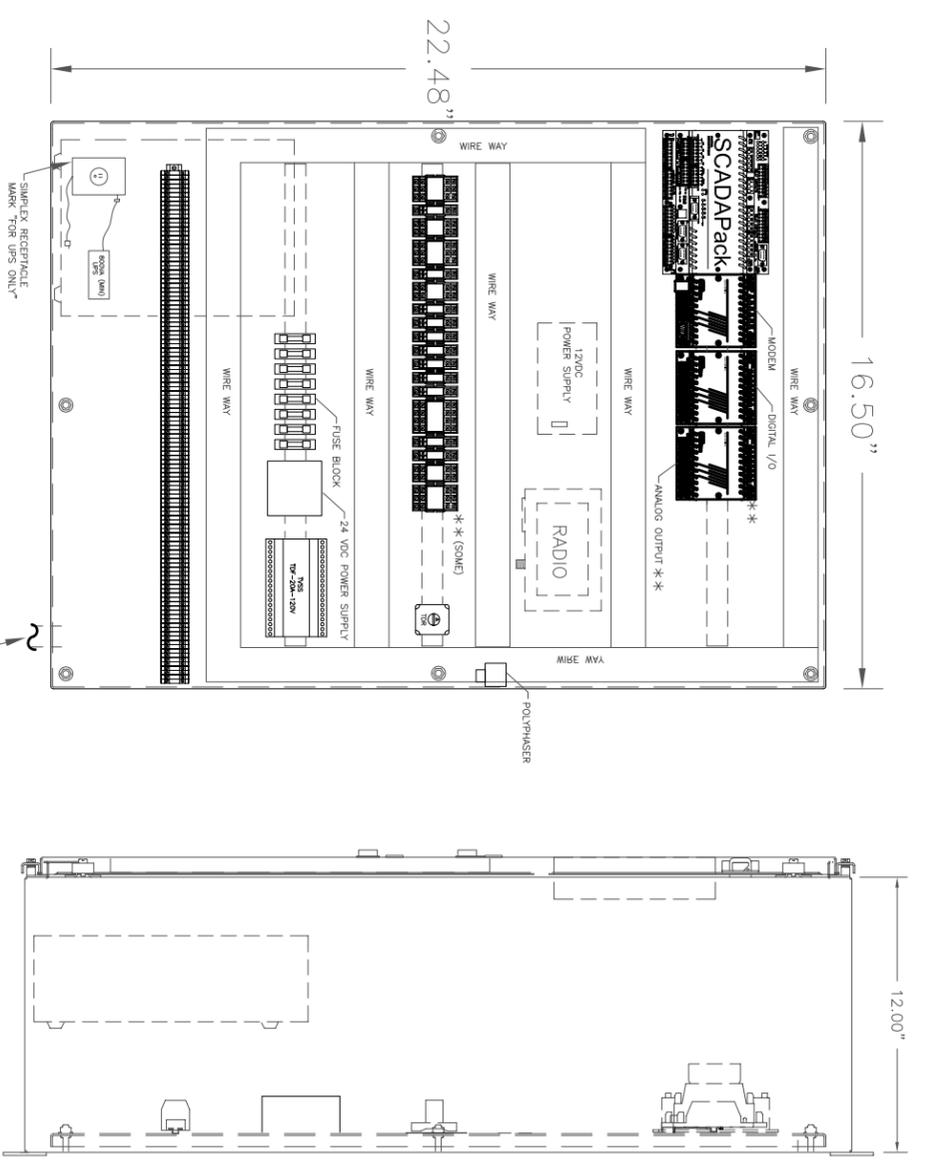
MEDIUM PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE

Date: 3/27/2007
 Scale:
 Drawn By:
 Project No.:
 Draw No.: **E03**

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FRONT VIEW
NEMA 12 ENCLOSURE



BACK PANEL VIEW

END VIEW
WIREWAY OMITTED FOR CLARITY

MATERIAL SCHEDULE

QTY	DESCRIPTION	CATALOG NUMBER	MANUFACTURER
1	ENCLOSURE NEMA 12	N12483616	WIEGMANN
1	BACK PANEL	NP-4836	WIEGMANN
1	SCADAPACK 32 24VDC INPUTS	P4-100-01-0-0	CMS
1	16 PT MODULE DIGITAL INPUT 120VAC	5401	CMS
1	4 PT ANALOG OUTPUT	5302	CMS
1	LIGHTING SUPPRESSOR	IS-50NX-C2	POLYPHASER
1	RADIO		SEE COUNT ENG FOR MODEL #
1	POWER SUPPLY 12VDC*		SEE COUNT ENG FOR MODEL #
A/R	GLASS FUSES	C383THS	CUTLER HAMMER
1	SURGE PROTECTOR (TVSS)	TPF-20A-120V	ERICO OR EQUAL
A/R	DT RELAY W/ BASE	TYPE RH	IDEC
1	BELL 202 MODEM W/ 1602998B TIMER CHIP*	5902	CONT. MICRO SYS.
A/R	TERMINALS	UK5N	PHOENIX
A/R	WIRE WAY	2X3, 1.5X3	TYTON
58	TERMINALS	UKK5	PHOENIX
1	POWER SUPPLY	PS5R-024	IDEC
1	HMI	MMI-7501	KEP
1	TOR	330-12-300S	TIME MARK
A/R	FUSES	3AG1A313, 3AG3A313	LITELUSE
A/R	TERMINAL	US1K05	PHOENIX
1	UPS	PULSTAR 800/560 VA/W	MGE SYSTEMS

*ONLY WITH 450MHZ RADIO

FIELD INSTRUMENT SCHEDULE

QTY	DESCRIPTION	CATALOG NUMBER	MANUFACTURER
1	MAGNETIC FLOW METER	MAGMASTER OF MAGELLO	ABB or SIEMENS
1	LEVEL TRANSMITTER	WATER PILOT 0-15'H0	ENDRESS & HAUSER
2	PRESSURE TRANSMITTER	0-30 PSI	ASHCROFT
2	PRESSURE GLAND	TYPE 80 ISOLATION RING	ASHCROFT
2	FLOAT SWITCHES	ALL NORMALLY OPEN	HYDROMATIC

ENGRAVING SCHEDULE *

ID	FIRST LINE / SECOND LINE
A	PUMP 1
B	PUMP 2
C	VFD SS AUX (SS AUX)
D	HAND OFF AUTO
E	PUMP 1 / SPEED POT
F	PUMP 2 / SPEED POT
G	BLOWER

* DESCRIPTIONS IN PARENTHESIS APPLY TO "SMALL" PUMP STATIONS.

NOTES:

1. RTU/PC PANEL AND ASSOCIATED CONTROL COMPONENTS SHALL BE PROVIDED AND CONFIGURED BY THE SYSTEMS INTEGRATOR WHO SHALL BE CONTROL TECHNOLOGIES COMPANY OR TEDDER CONTROLS.
2. THE SYSTEMS INTEGRATOR SHALL PROVIDE AS-BUILT DRAWINGS DOCUMENTING FINAL INSTALLATION, WIRING, AND PLC CONFIGURATION IN HARD COPY AND ELECTRONIC FORMATS.
3. THE SYSTEMS INTEGRATOR SHALL DEVELOP 4 OR MORE HMI SCREENS FOR GRAPHICAL REPRESENTATION OF CONTROL AND STATUS OF PUMPS, WET WELL LEVEL, FLOW, EMERGENCY GENERATOR, GRINDER (IF INCLUDED) AND ALARMS. PROVIDE BAR GRAPHS AND NUMERIC DISPLAY FOR ANALOG SIGNAL INDICATION.
4. PLC LOGIC SHALL START AND STOP PUMPS BASED ON WET WELL LEVEL ANALOG INPUT UNDER NORMAL CONDITIONS.
5. PLC LOGIC SHALL REQUIRE A MINIMUM OF 30 SECONDS BETWEEN STARTING OF SEPARATE MOTORS UNDER NORMAL AND EMERGENCY POWER. TIMER WILL PROVIDE SIMILAR FUNCTION FOR PUMPS UNDER HARDWIRED (BACK-UP) FLOAT CONTROL.
6. THE VFD AND SOFTSTART WIRING SCHEMATICS ARE BASED ON SQUARE D COMPONENTS. IF CUTLER-HAMMER EQUIPMENT IS PROVIDED, THE CONTRACTOR SHALL MAKE ANY NECESSARY MODIFICATIONS FOR A COMPLETE AND WORKING SYSTEM, EQUAL TO THE SCHEMATICS AS SHOWN.
7. LEVEL, FLOW AND PRESSURE TRANSMITTERS SHALL BE 24VDC LOOP POWERED.
8. SEE TYPICAL MECHANICAL PLANS, ELEVATION AND DETAILS DRAWING FOR LOCATIONS OF COMPONENTS.

DESIGNER NOTES:

1. VFDs ARE NOT REQUIRED FOR "SMALL" PUMP STATIONS. ITEMS MARKED WITH A DOUBLE ASTERISK (**) ON THIS DRAWING ARE NOT REQUIRED FOR MEDIUM AND CONTROL SCHEMATIC DRAWINGS ARE NOT REQUIRED FOR MEDIUM PUMP STATIONS GREATER THAN 5 HP & LESS THAN 20 HP THAT DO NOT DISCHARGE TO A FORCE MAIN.
2. DESIGNER SHALL SPECIFY ALL REQUIRED DATA TO BE COMMUNICATED FROM VFDs AND POWER LOGIC MONITOR TO PLC VIA MODBUS.
3. SCADA PROGRAMMING AT THE WASTEWATER PLANT WILL BE PROVIDED UNDER SEPARATE CONTRACT.
4. DATA REGISTER ASSIGNMENT WILL BE PROVIDED BY CITY OF HARRINGTON.

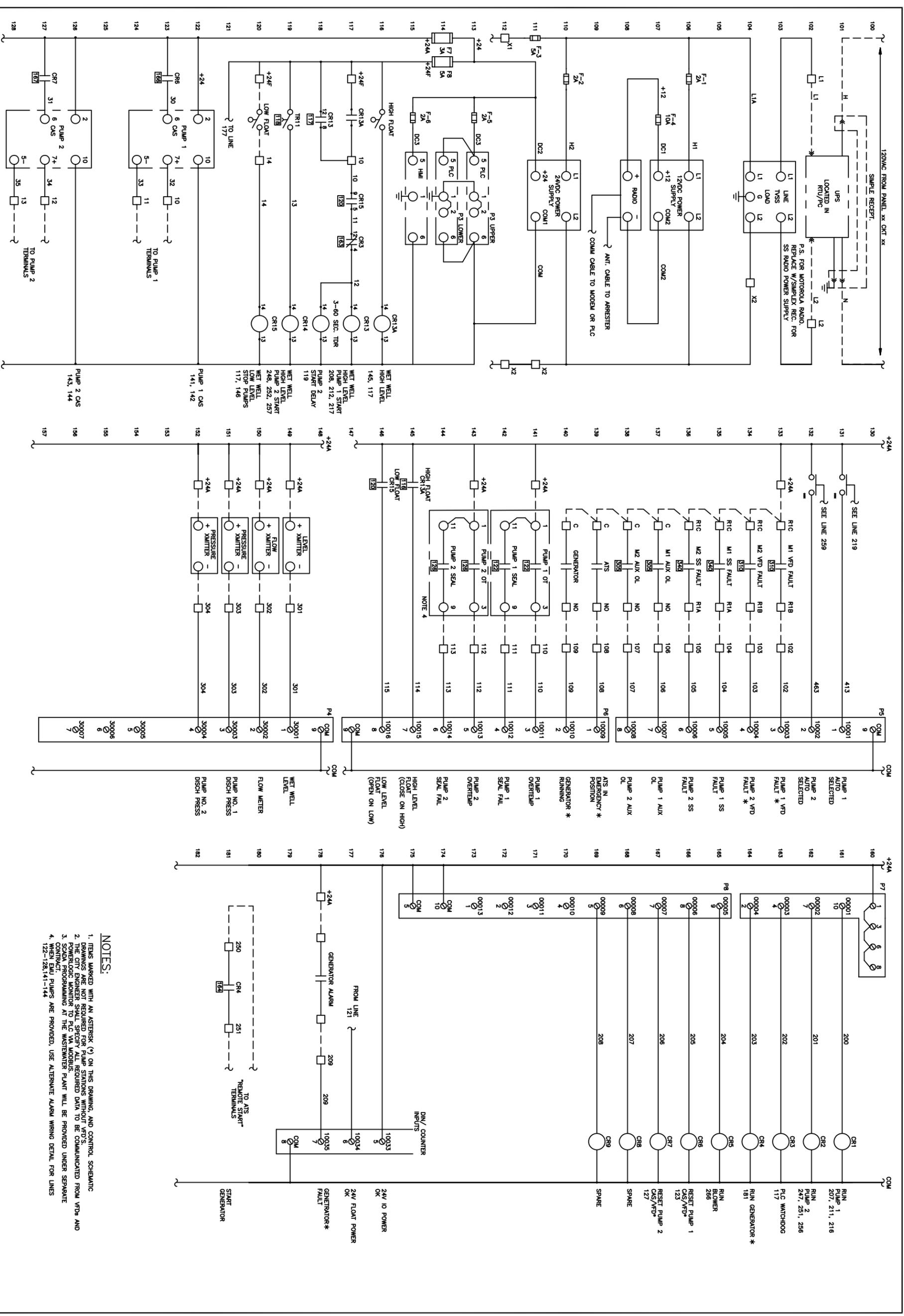


City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

RTU AND PC ENCLOSURE

GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE

Date:	1/27/2007
Scale:	
Drawn By:	
Project No.:	
Draw No.:	E04



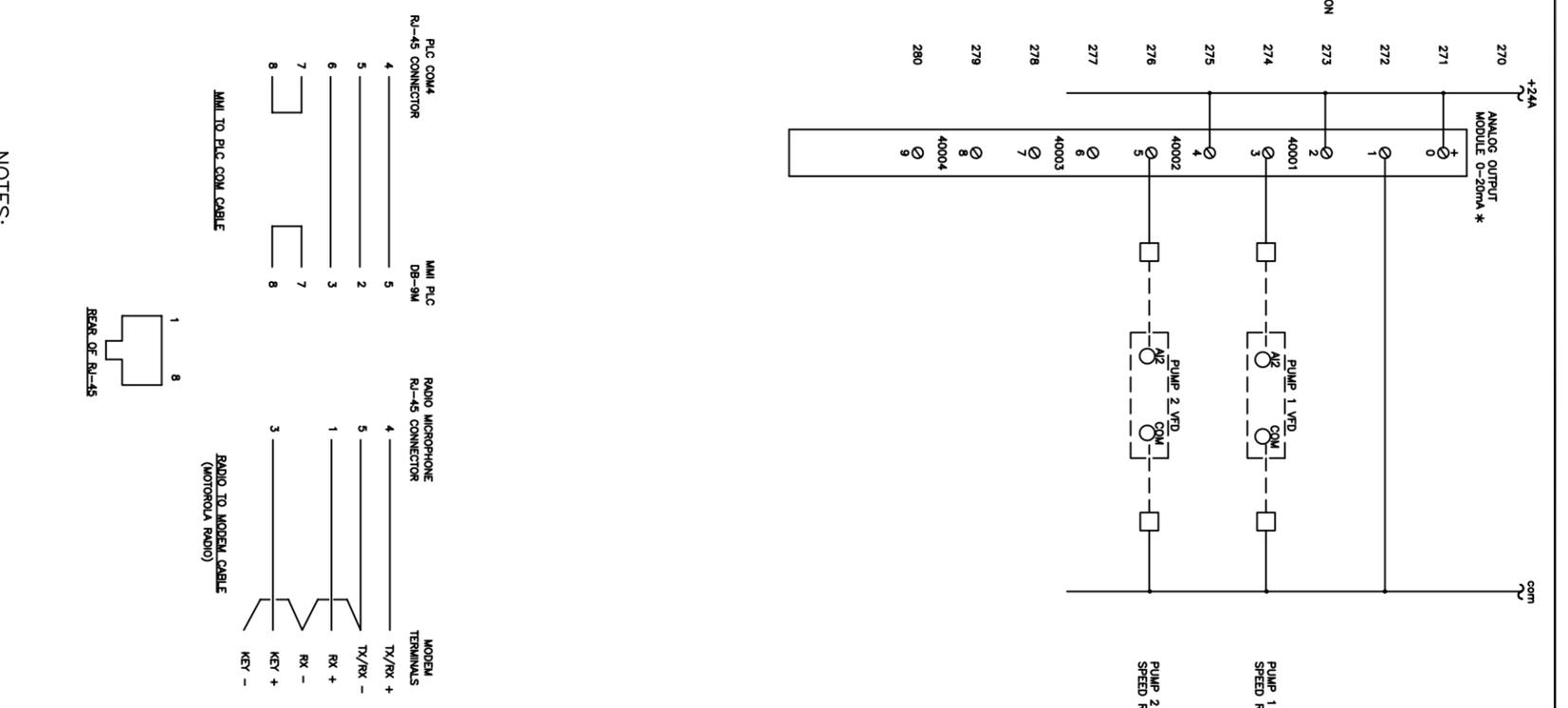
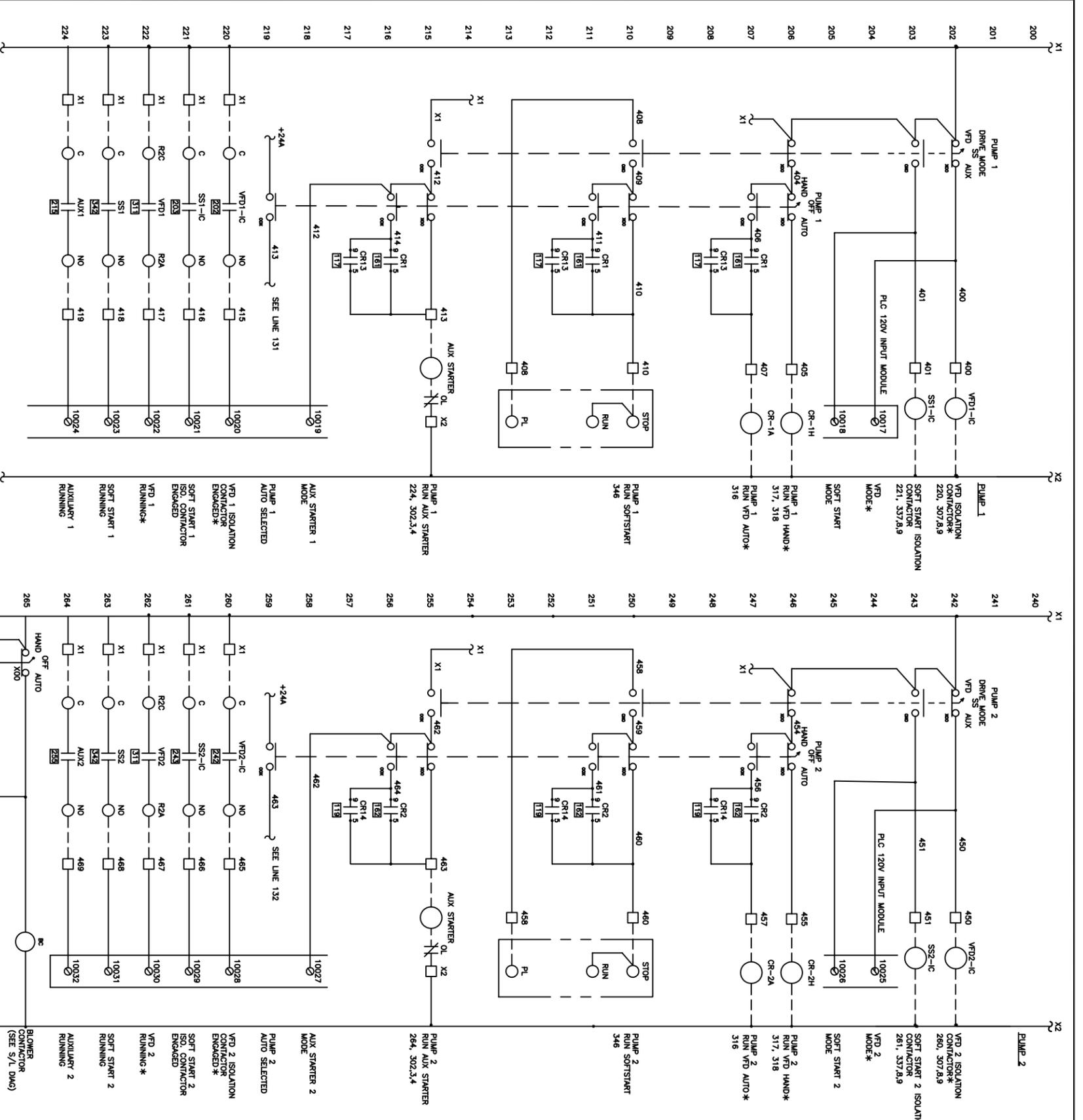
- NOTES:**
1. ITEMS MARKED WITH AN ASTERISK (*) ON THIS DRAWING, AND CONTROL SCHEMATIC DRAWINGS, ARE FIELD WIREABLE. THE CITY ENGINEER SHALL SPECIFY ALARM AND DISCH PRESSURE MONITOR TO PLC VIA MODBUS.
 2. THE CITY ENGINEER SHALL SPECIFY ALARM AND DISCH PRESSURE MONITOR TO PLC VIA MODBUS.
 3. SCADA PROGRAMMING AT THE WASTEWATER PLANT WILL BE PROVIDED UNDER SEPARATE CONTRACT.
 4. WET WELL PUMPS ARE PROVIDED. USE ALTERNATE ALARM WIRING DETAIL FOR LINES 122-128, 141-144.

**GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE**

City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

PUMP CONTROL SCHEMATIC

Date: 3/27/2007
Scale:
Proj No.:
Dwg No.:
E05



NOTES:

1. ITEMS MARKED WITH AN ASTERISK (*) ON THIS DRAWING, AND CONTROL SCHEMATIC DRAWINGS ARE NOT REQUIRED FOR PUMP STATIONS WITHOUT VFD'S.
2. THE CITY ENGINEER SHALL SPECIFY ALL REQUIRED DATA TO BE COMMUNICATED FROM VFD'S AND PERIODIC MONITOR TO PLC VIA MODBUS.
3. CONTRACTOR SHALL PROVIDE ALL REQUIRED DATA TO BE COMMUNICATED FROM VFD'S AND PERIODIC MONITOR TO PLC VIA MODBUS AT THE WASTEWATER PLANT WILL BE PROVIDED UNDER SEPARATE CONTRACT.

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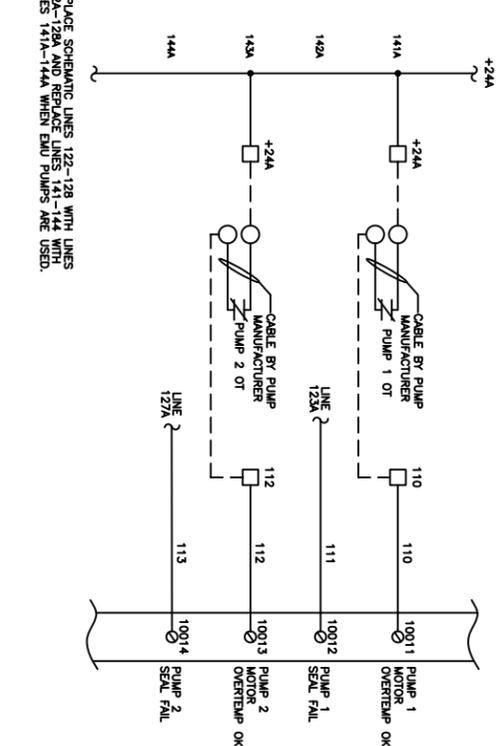
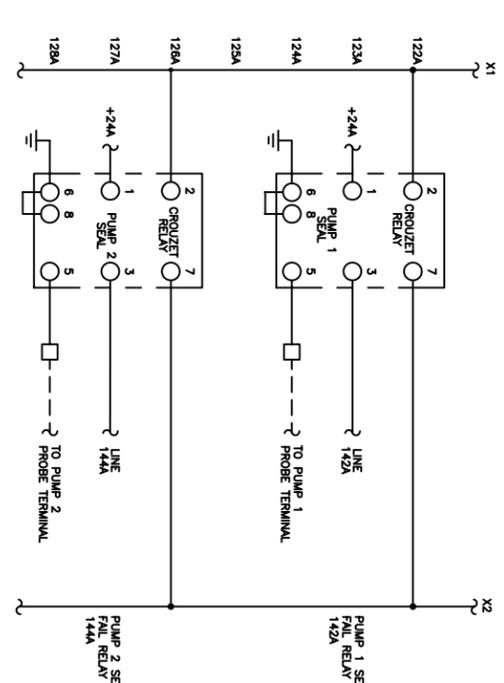
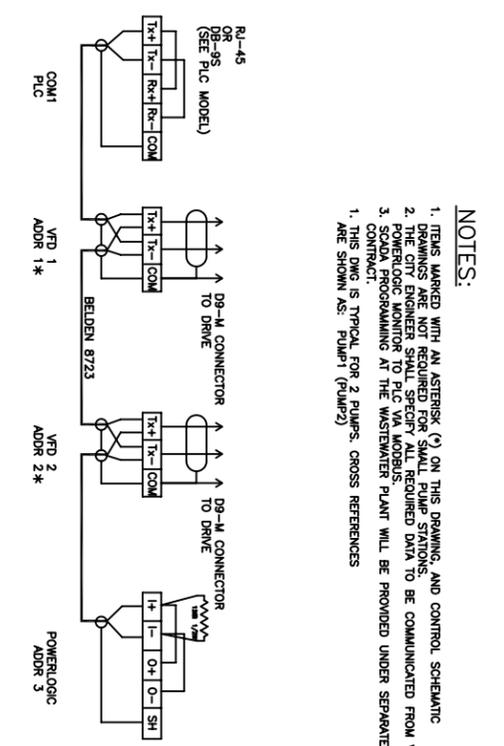
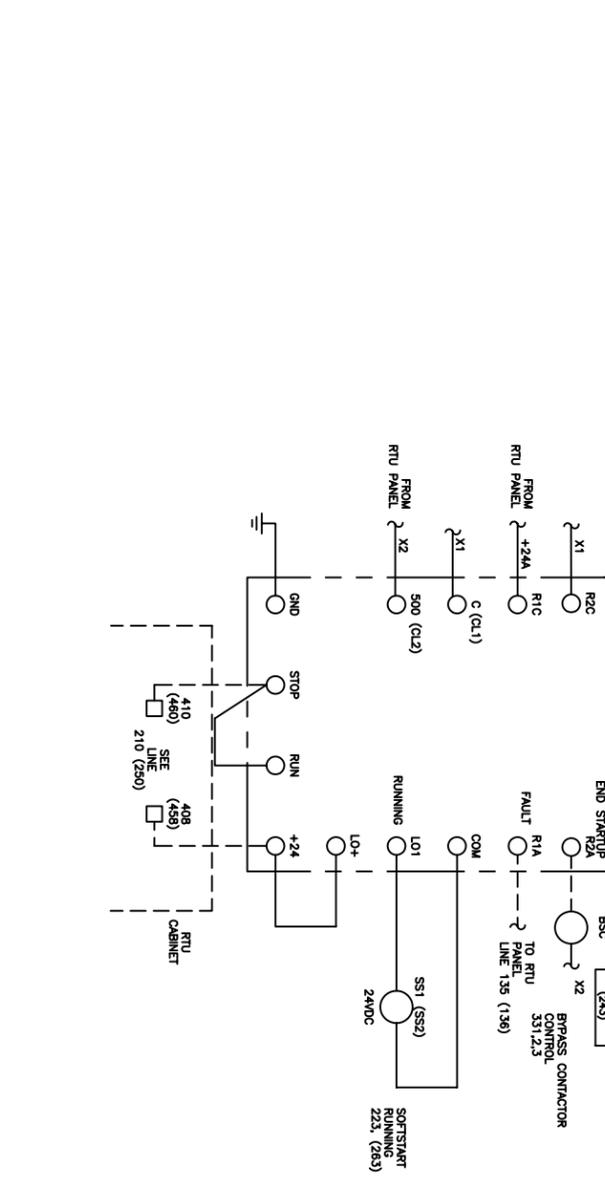
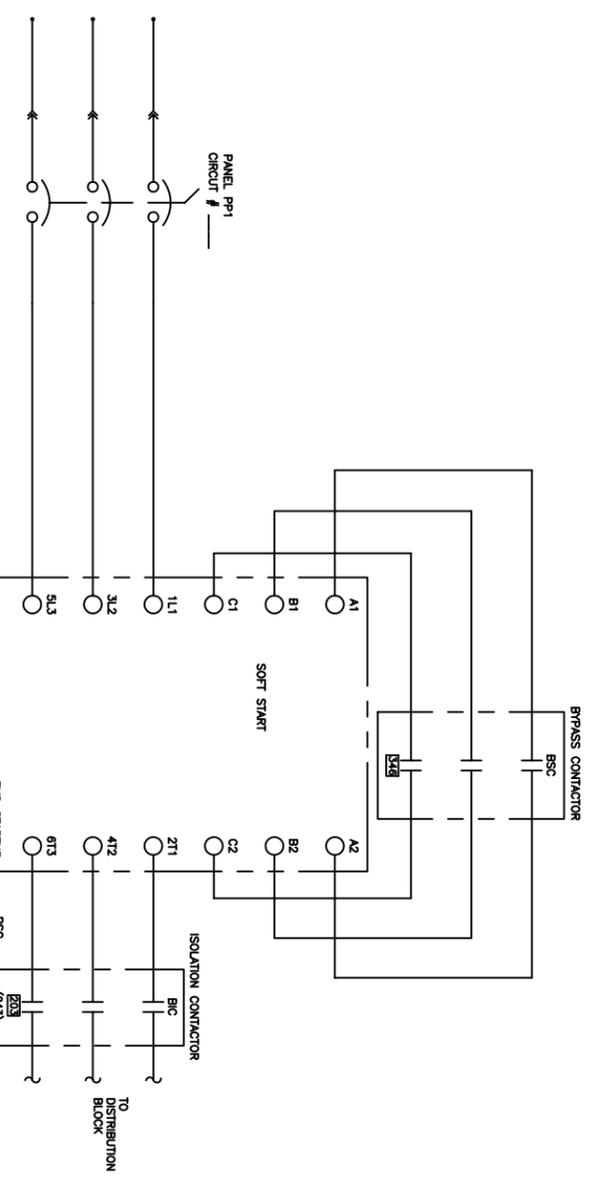
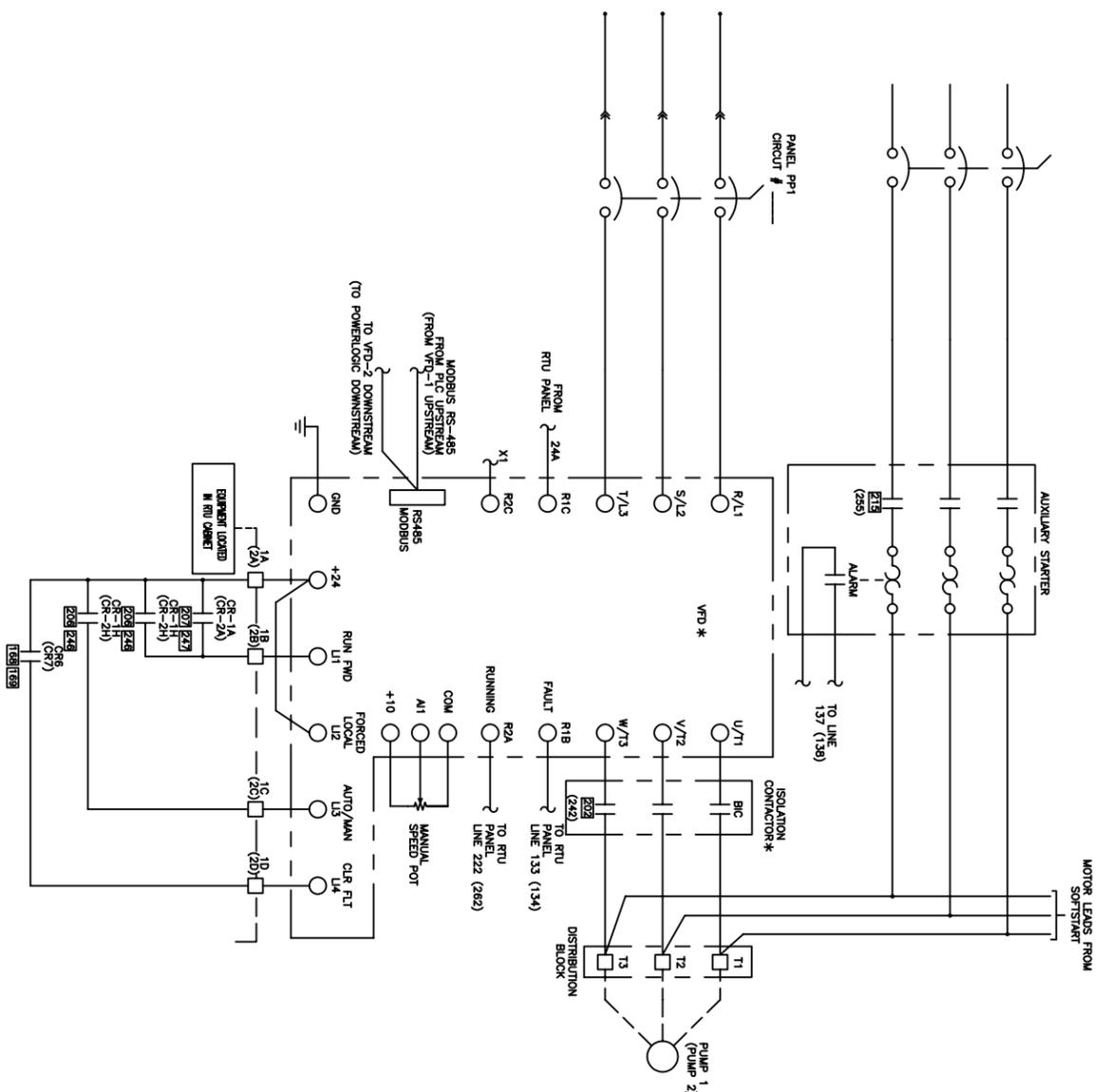


City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

PUMP CONTROL SCHEMATIC

**GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE**

Date: 3/27/2007
Scale:
Des. By:
Proj. No.:
Dwg. No.: **E06**

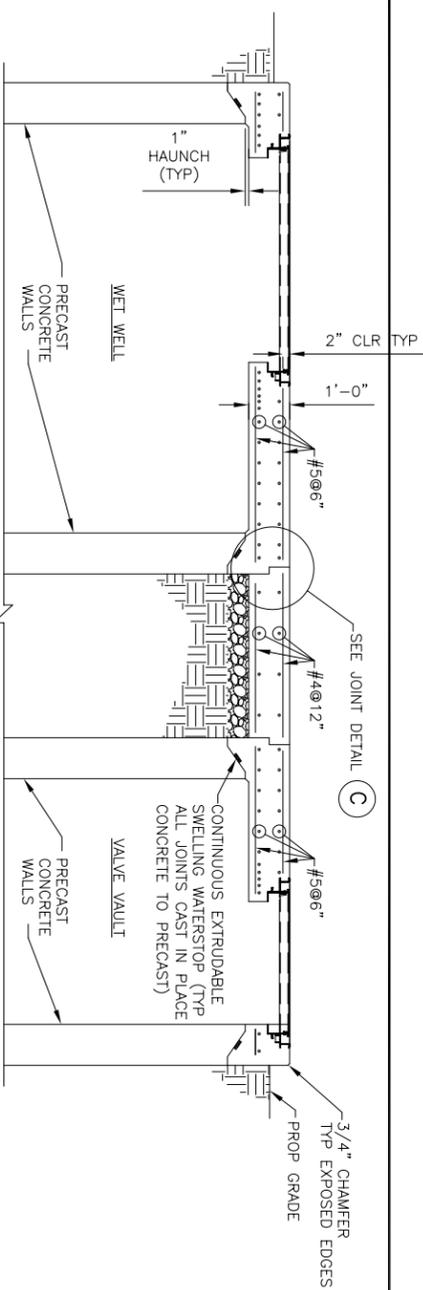


- NOTES:**
1. ITEMS MARKED WITH AN ASTERISK (*) ON THIS DRAWING, AND CONTROL SCHEMATIC ARE TO BE PROVIDED BY THE MANUFACTURER.
 2. THE CITY ENGINEER SHALL SPECIFY ALL REQUIRED DATA TO BE COMMUNICATED FROM VFDs AND POWERLOGIC MONITOR AT THE WASTEWATER PLANT VIA MODBUS.
 3. SCADA PROGRAMMING AT THE WASTEWATER PLANT WILL BE PROVIDED UNDER SEPARATE CONTRACT.
1. THIS DWG IS TYPICAL FOR 2 PUMPS. CROSS REFERENCES ARE SHOWN AS: PUMP1 (PUMP2)

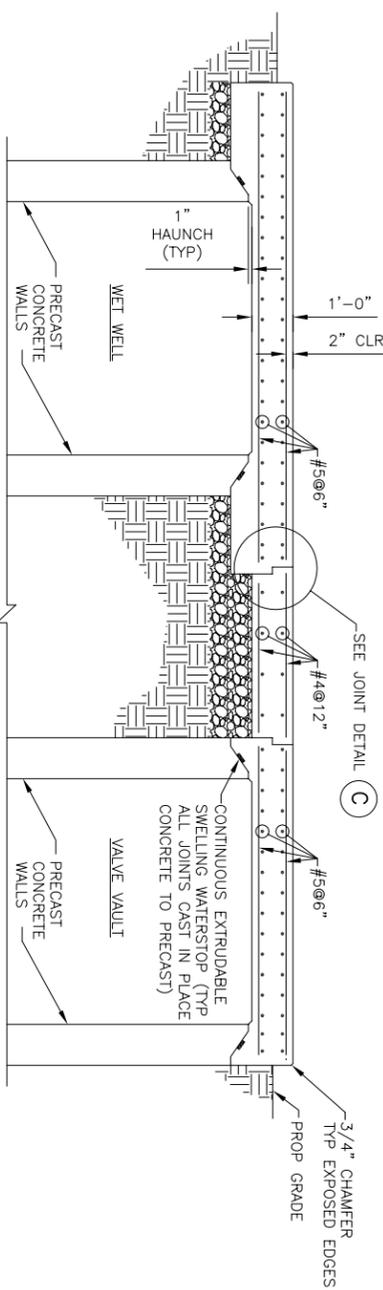
MODBUS COMMUNICATIONS WIRING

ALT. ALARM WIRING DETAIL FOR EMU PUMPS

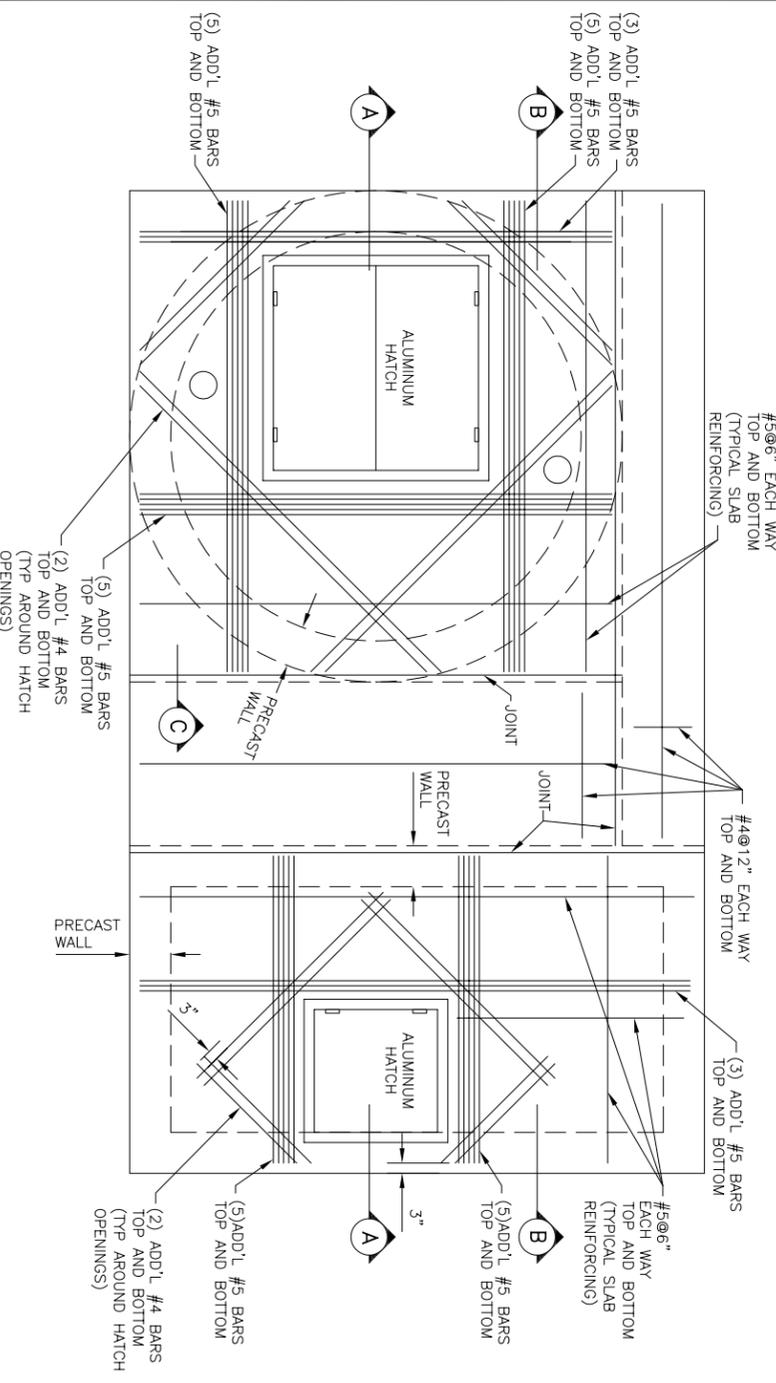
NOTE: REPLACE SCHEDULING LINES 122-129 WITH LINES 122-129 AND LINES 141A-144 WITH LINES 141A-144 WHEN EMU PUMPS ARE USED.



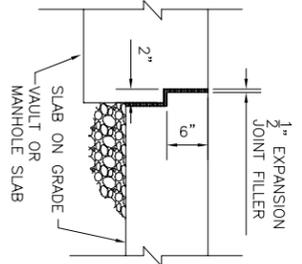
A SECTION THROUGH WETWELL AND VALVE VAULT
NOT TO SCALE



B SECTION THROUGH WETWELL AND VALVE VAULT
NOT TO SCALE

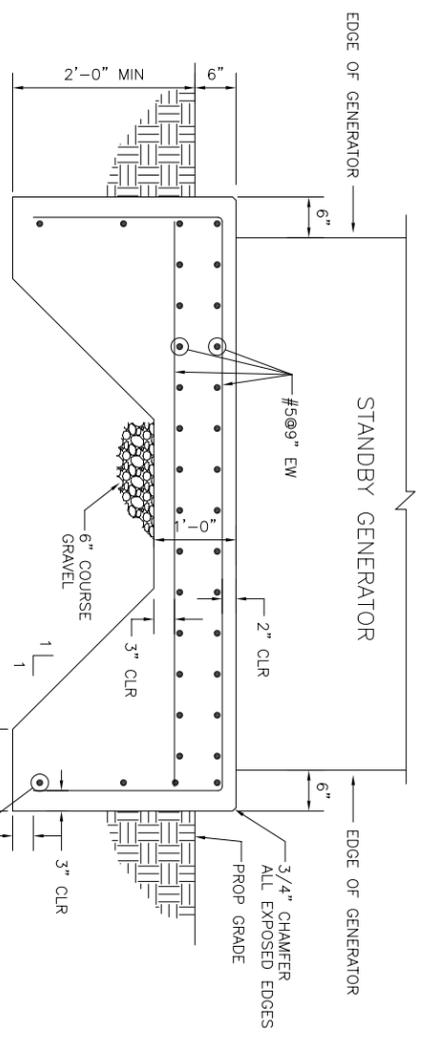


PLAN - TOP SLAB FOR VALVE VAULT AND WETWELL
NOT TO SCALE

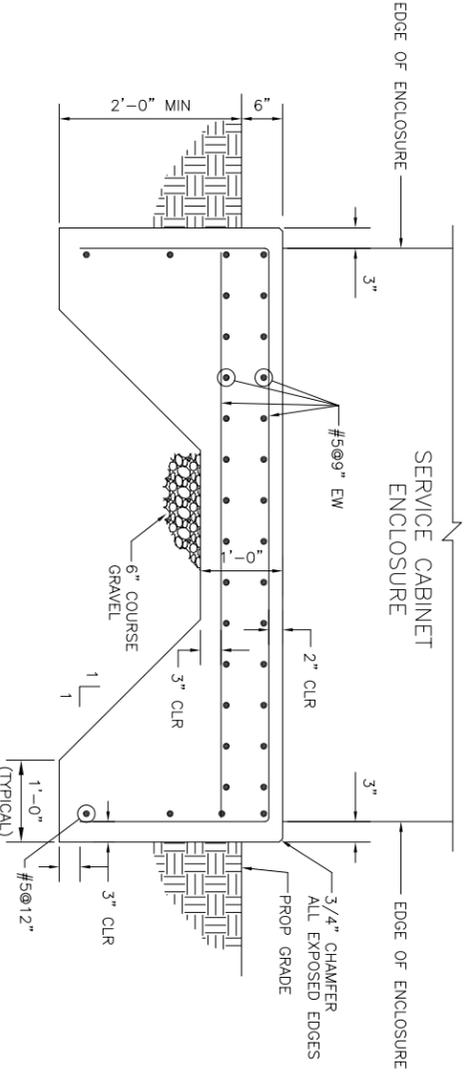


C JOINT DETAIL
NOT TO SCALE

- CAST IN PLACE CONCRETE
1. ALL CONCRETE WORK, INCLUDING FORMING, MIXING, PLACING, AND CURING, SHALL BE IN ACCORDANCE WITH ACI-318.
 2. MINIMUM COMPRESSIVE STRENGTH, UNLESS NOTED OTHERWISE ON PLANS, AND MAXIMUM WATER CEMENT RATIO SHALL BE AS FOLLOWS:
 - FRAMED SLABS: 3,500 PSI (0.45)
 - EXTERIOR EXPOSED PAVEMENT: 3,500 PSI (0.50)
 3. ALL CONCRETE REINFORCING SHALL CONFORM TO ASTM A615, GRADE 60.
 4. WELDED WIRE MESH SHALL CONFORM TO ASTM-A185.
 5. REINFORCING SHALL HAVE THE FOLLOWING COVER UNLESS OTHERWISE NOTED:
 - FOOTINGS AND OTHER CONCRETE POURED AGAINST EARTH: 3"
 - FORMED CONCRETE EXPOSED TO EARTH: 1 1/2" FOR #5 BARS AND SMALLER OR 2" FOR BARS LARGER THAN #5
 - INTERIOR FACES OF WALLS: 2"
 - SLAB ON GRADE: REINFORCING TOP THIRD OF THICKNESS
 - BEAMS, COLUMNS: 2"
 - SLABS: 2"
 6. ALL EXTERIOR EXPOSED CONCRETE SHALL HAVE A MINIMUM OF 5% ENTRAINED AIR, +/- 1.5%.



STANDBY GENERATOR FOUNDATION
NOT TO SCALE



SERVICE CABINET ENCLOSURE FOUNDATION
NOT TO SCALE



City of Harrington
106 Dorman St.
Harrington, Delaware (302) 398-3530

STRUCTURAL PLANS AND DETAILS

GENERIC PUMP STATION
CITY OF HARRINGTON
KENT COUNTY, DELAWARE

Date: 3/27/2007
Scale:
Dwn.By:
Proj.No.:
Dwg.No.:
ST01