

**CITY OF ROCKLAND, WASTEWATER TREATMENT
FACILITY**

**SEWER CONNECTION DETAILS FOR
HOMES AND SMALL BUSINESSES**



September 2008

CITY OF ROCKLAND, MAINE

SEWER CONNECTION DETAILS FOR HOMES AND BUSINESSES

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INTRODUCTION

The City of Rockland has developed these minimum standards to assist homeowners and small business persons with their connections to the City's sewer system. These were not developed for larger projects, developments, pump station installations (other than individual grinder pump stations), or industrial connections. For those types of projects please see the Director of the Pollution Control Department for further assistance.

This document is not intended to design the project for the home/business owner. Instead, it is intended to provide the minimum standards that the project must comply with. The City requires that the design of the project be completed by a Professional Engineer, licensed by the State of Maine, unless otherwise approved by the Director of the Pollution Control Department.

Not every project will utilize all of these details. In fact, most will only use a few. If your design professional is unsure of which details are required for a project have them contact the Pollution Control Department for further guidance. In addition, if you feel there is a detail/standard that has been omitted from this document please contact the Pollution Control Department for further guidance. Not having a detail listed in this document does not mean a standard does not exist.

Finally, all work performed in the City must comply with Federal, State, and City regulations and permit requirements.

CITY INSPECTION REQUIREMENTS

The City may require that a City approved inspector is onsite to ensure the project is built to these standards. The costs for inspection services, if required, will be born by home/business owner. It should be noted that this inspector will be representing the City's interests alone, which may or may not coincide with the home/business owner.

RECORD DRAWING REQUIREMENTS

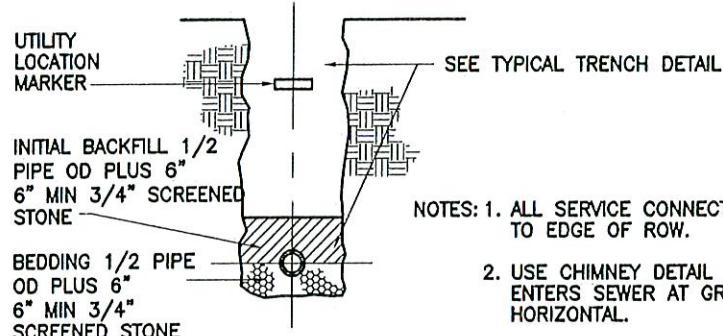
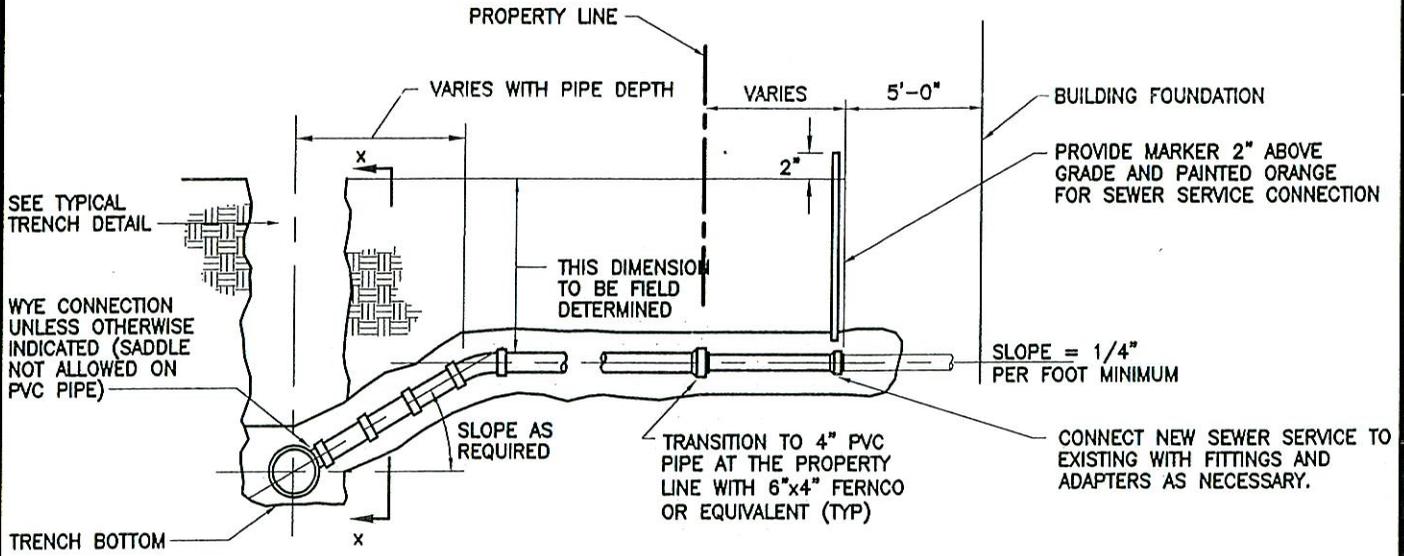
The City will require documentation of what has been installed, and submit this documentation to the City for their records. To assist in this process three standard forms have been included in this document. These should be completed and submitted, as applicable, no later than 30 days after the completion of the project. If you have any questions on how to complete these forms please contact the Pollution Control Department for further assistance.

WARRANTY REQUIREMENTS

Project warranty requirements are the following.

- A. Provide the City with a copy of a signed letter from the Contractor that provides a general Guarantee/ Warranty for the entire project for one year from the date of project completion.
- B. Provide the City copies of any specified extended warranties (i.e. those which run longer than one year). These shall become effective after the general one year warranty.

- C. The Contractor will be required to handle warranty problems during the general one year warranty. Extended warranties shall meet the requirements specified in the relevant Section.
- D. Equipment that is supplied by a system supplier and is intended to function as a complete and integrated system shall be warranted accordingly.
- E. Any part of a mechanical equipment system that shows undue or excessive wear, or that fails due to normal operational conditions during the general one year warranty shall be considered as evidence of defective material or defective workmanship, and it shall be replaced by the Contractor with equipment or parts to meet the specified requirements.



SECTION X-X

- NOTES: 1. ALL SERVICE CONNECTIONS TO BE 6" DIAMETER TO EDGE OF ROW.
 2. USE CHIMNEY DETAIL WHERE SERVICE CONNECTION ENTERS SEWER AT GREATER THAN 60° TO THE HORIZONTAL.
 3. MAGNETIC DETECTION TAPE SHALL BE INSTALLED OVER ALL SERVICE CONNECTIONS.

SEWER SERVICE CONNECTION DETAIL
 NTS

| | |
|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE PIPE NOTES | |
| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE | |
| Engineering a Better Environment | |
| 2.1 | |

2.2- PIPE & PIPE FITTINGS NOTES

1. PIPE SCHEDULE

| SYMBOL | DESCRIPTION | LOCATION ⁽¹⁾ | SIZE RESTRICTIONS | MATERIAL | JOINT SYSTEM | PRESSURE TESTING CLASS (PRESSURE) ⁽³⁾ |
|--------|-------------|-------------------------|-------------------|------------------|---------------|--|
| FM | FORCE MAIN | INTERIOR | LESS THAN 3" | SCH 80 PVC OR | SOLVENT WELD | CLASS I |
| | | | LARGER THAN 3" | CLASS 53 D.I. | FLANGED | CLASS IV |
| | | | 4" & LARGER | CLASS 51 D.I. | MJ OR PUSH-ON | CLASS IV |
| | | EXTERIOR | LESS THAN 4" | SDR 17 PE (DIPS) | THERMAL WELD | |
| S | SEWER | EXTERIOR | LESS THAN 20" | SDR 35 PVC | PUSH-ON | CLASS II |
| | | | 4" & LARGER | CLASS 51 D.I. | PUSH-ON | |
| | | | LESS THAN 4" | SDR 40 PVC | SOLVENT WELD | |

(1) PIPE CONTAINED WITHIN TANKAGE SHALL BE CONSIDERED "INTERIOR" PIPING FOR THE PURPOSES OF THE PIPE SCHEDULE (UNLESS OTHERWISE SPECIFICALLY DESIGNATED).

(2) TYPE L COPPER MAY BE USED IN LIEU OF D.I. FOR 3" DUCTILE IRON PIPE.

(3) IF A SPECIFIC PRESSURE IS NOT INDICATED IN PARENTHESES AFTER THE PRESSURE TESTING CLASS, USE THE TEST PRESSURE INDICATED IN THE SPECIFICATION WRITE UP FOR THAT GENERAL PIPE PRESSURE TESTING CLASS.

2. QUALITY ASSURANCE

A. PVC Pipe:

1. Polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM standard specification for PVC Sewer Pipe and Fittings, Designation D 3034 (SDR 35) (4" to 15"), F679 (18" to 27").
2. Straight pipe shall be furnished in lengths of not more than 13 feet.
3. Saddles will not be allowed.
4. Joints:
 - a. Joints for the polyvinyl chloride pipe shall be push-on joints using factory installed elastomeric ring gaskets.
 - b. The gaskets shall be securely fixed into place by the manufacturer so that they cannot be dislodged during joint assembly.
 - c. The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and ground water, and which will endure permanently under the conditions of the proposed use.
 - d. The joints shall conform to ASTM Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals, Designation D3212-76.

B. HDPE Pipe:

1. Pipes shall be DIPS with SDR ratings.
2. Polyethylene compounds utilized in the manufacture of products furnished under this specification shall be listed in PPI TR-4, have a grade of PE34 with a minimum cell classification of PE 334434[C, D, or E] for PE 3408 materials, as defined in ASTM D3350. Pipe shall be in conformance with AWWA C901, AWWA C906, or CSA B137.1. They shall have a PPI recommended Hydrostatic Design Basis (HDB) of 1600 psi (PE3408) at a temperature of 73.4°F (23°C).
3. All materials which come in contact with water, including lubricants, shall be evaluated, tested and certified for conformance with NSF/ANSI Standard 61.
4. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed in a concentration of not less than 2%.
5. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by procedure detailed in ASTM D 1693 with sample preparation by procedure C of ASTM D 1928 of not less than 40 hours.
6. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
7. Polyethylene fittings shall have the same pressure rating as the pipe itself for all pressurized pipeline applications.
8. Polyethylene fittings shall be molded style for diameters up to 12 inches and fabricated style for diameters larger than 12 inches.
9. Joints:
 - a. Thermal Butt-Fusion:
 - i. Join the pipe to itself, or to the polyethylene fittings or to the flange connections by means of thermal butt-fusion.

- ii. Have all fusion performed by personnel trained by the pipe supplier or other qualified persons, using tools approved by the pipe supplier.
- iii. The polyethylene fittings and flanged connections to be joined by thermal butt-fusion shall be from the same type, grade and class of polyethylene compound as the polyethylene pipe unless otherwise approved.
- iv. Joint strength must be equal to that of the adjacent pipe
- b. Polyethylene Mechanical Joint Adapter
 - i. For joining IPS or DIPS size polyethylene pipe to any ANSIAWWA C153 ductile iron fitting and valve.
 - ii. Molded from NSF listed PE 3408 resin.
 - iii. Adaptor shall meet requirements of AWWA C901, 906.
 - iv. Adaptor kit to include anchor fitting, retainer gland ring, gasket, and long tee-bolts, and rubber gasket. All hardware components shall be Type 316 stainless steel.
 - v. Provide stiffeners as necessary
- c. Polyethylene Electrofusion Coupling
 - i. For joining plain ends of polyethylene pipe where butt fusion is not practical as approved by the City of Rockland.
 - ii. Molded from NSF listed PE 3408 resin or fabricated from pipe meeting NSF requirements with an integral heating element and electrical leads to connect the heating element power supply.
 - iii. Pressure rating and size shall be the same as the required pipe and fitting SDR
- C. For all other pipe types see the City of Rockland, Pollution Control Department for standards

3. INSTALLATION

A. General:

1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as specified herein.
2. Install all pipes and fittings in accordance with the lines and grades as required for the installation.
3. Install adapters, acceptable to the City of Rockland's Director of the Pollution Control Department, when connecting pipes constructed from different materials.
4. All service connections to new pipe shall utilize a wye fitting
5. All service connections must enter the top half of the mainline pipe
6. Firmly support the pipe and fittings on bedding material
7. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
8. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
9. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
10. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.

11. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
 12. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
 13. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Detail
 14. Take all necessary precautions to prevent floatation of the pipe in the trench.
- B. Temporary Plugs:
1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.
 2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
 3. Do not use the pipelines as conductors for trench drainage during construction.

3.3 CLEANING AND TESTING

- A. When the installation is complete, test all pipelines, in the presence of a City of Rockland Pollution Control Department representative, in accordance with the requirements of the local and state plumbing codes. When requested by the City of Rockland or building gravity drains shall be tested prior to backfilling or concealing. All other piping must be tested after backfilling.
- B. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.
- C. For Force Mains perform pressure and leakage test at 1-½ times the maximum system pressure or 100 psi which ever is greater (based on the elevation of the lowest point of the section under test and corrected to the gauge location).
- D. For Gravity Sewer Pipe Testing:
 1. After the sewer pipe has been cleaned and the pneumatic plugs checked, place the plugs in the sewer line at each manhole and inflate them.
 2. Introduce low pressure air into the sealed sewer pipeline until the air pressure reaches 4 psig greater than the average groundwater pressure.
 3. Allow a minimum of 2 minutes for the air pressure to stabilize to a minimum of 3.5 psig greater than the groundwater pressure. Groundwater is assumed to be at ground surface unless it can be proved otherwise by test pitting.
 4. After the stabilization period, disconnect the air hose from the control panel to the air supply.
 5. The pipeline will be acceptable if the pressure decrease is not greater than 1/2 psig in the time stated in the following table for the length of pipe being tested:

| <u>Pipe Diameter (inches)</u> | <u>Time (Min.) for Length of Pipe</u> | | | |
|-------------------------------|---------------------------------------|-------------------|-------------------|-------------------|
| | <u>0-100 ft</u> | <u>101-200 ft</u> | <u>201-300 ft</u> | <u>301-400 ft</u> |
| 4 | 2.0 | 2.0 | 2.0 | 2.0 |
| 6 | 3.0 | 3.0 | 3.0 | 3.0 |
| 8 | 4.0 | 4.0 | 4.0 | 5.0 |
| 10 | 5.0 | 5.0 | 6.0 | 8.0 |
| 12 | 5.5 | 5.5 | 8.5 | 11.5 |
| 15 | 7.0 | 8.5 | 13.0 | 17.0 |
| 18 | 8.5 | 12.0 | 19.0 | 25.0 |
| 21 | 10.0 | 17.5 | 26.0 | 35.0 |
| 24 | 11.5 | 23.0 | 34.0 | 45.5 |
| 27 and larger | 14.5 | 29 | 43.0 | 58.0 |

E. For Gravity Sewer Pipe with active services

1. Test all new gravity sewer lines with active services by conducting a low-pressure air test on all joints using a packer after all services have been connected or capped at the property line and all trenches backfilled but before the surface course of permanent pavement is installed.
2. Testing Sewer Pipeline Joints:
 - a. Test all joints except those with visible infiltration.
 - b. Procedure:
 - (1) Pull television camera through sewer line in front of the packer.
 - (2) Position the packer on each joint to be tested.
 - (3) Inflate the sleeves on each end of the packer.
 - (4) Apply four (4.0) psi pressure above the existing hydrostatic pressure on the outside of the joint to the void area created around the inside perimeter of the joint.
 - (5) Shut off the supply of air once the pressure has stabilized at the required amount.
 - (6) Monitor the void pressure for thirty (30) seconds.
 - (7) Repair the joint if the pressure drops more than one half (1/2) psi in the thirty (30) seconds.
 - c. Water or chemical pressure testing may be used in lieu of air testing subject to review and approval by the City of Rockland.
 - d. Re-clean, re-inspect, and retest all lines not approved by the City of Rockland
 - e. Repairing of Joints:
 1. When a joint fails the pressure test, excavate and repair the failed joint. Repairing joints with chemical grout will not be permitted.
 - f. The City of Rockland may request checking of the testing equipment for accuracy.

7'-0" MINIMUM DEPTH OF COVER FROM GROUND SURFACE TO TOP OF CHIMNEY

SEE TYPICAL TRENCH DETAIL

CAP OR PLUG

SEE SERVICE CONNECTION DETAIL

WYE FITTING

SCREENED STONE

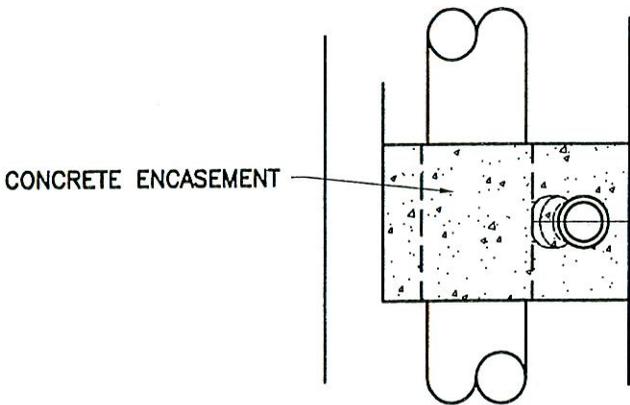
TEE CONNECTION (SADDLE NOT ALLOWED)

SEWER MAIN

PIPE BEDDING MATERIAL

CONCRETE ENCASEMENT

2"



CONCRETE ENCASEMENT

NOTES:

1. MINIMUM CHIMNEY HEIGHT SHALL BE 3.0 V.F.
2. SEE TYPICAL TRENCH DETAIL FOR BEDDING AND BACKFILL REQUIREMENTS.
3. CHIMNEY CONSTRUCTION SHALL BE USED WHENEVER A SERVICE CONNECTION ENTERS THE SEWER 30° OR LESS FROM VERTICAL.

SECTION

SCALE: NTS



CHIMNEY DETAIL

NTS

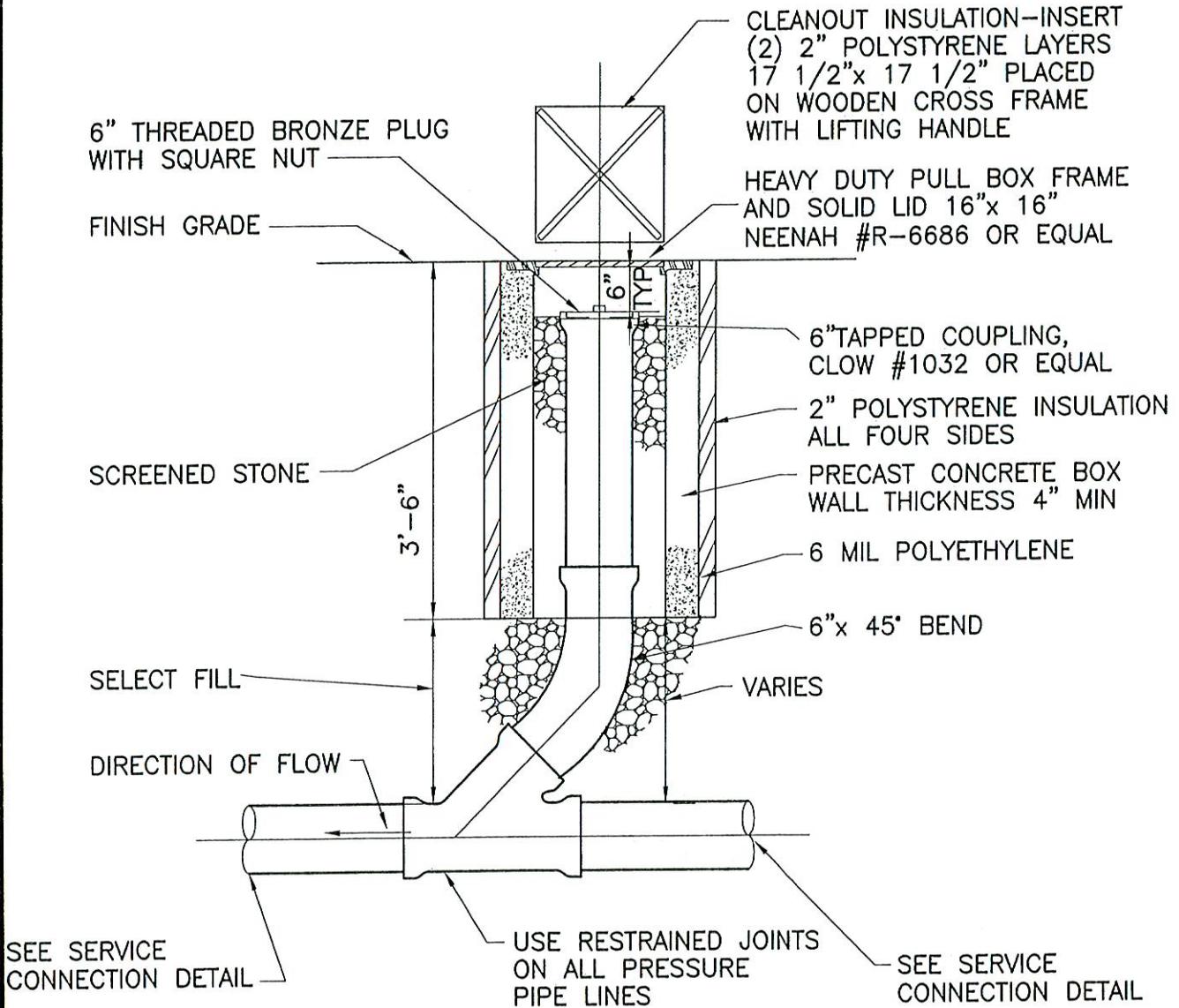
CITY OF ROCKLAND
 ROCKLAND, MAINE
 CHIMNEY DETAIL

PROJ NO: 11090C

DATE: JULY 2008

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 Engineering a Better Environment

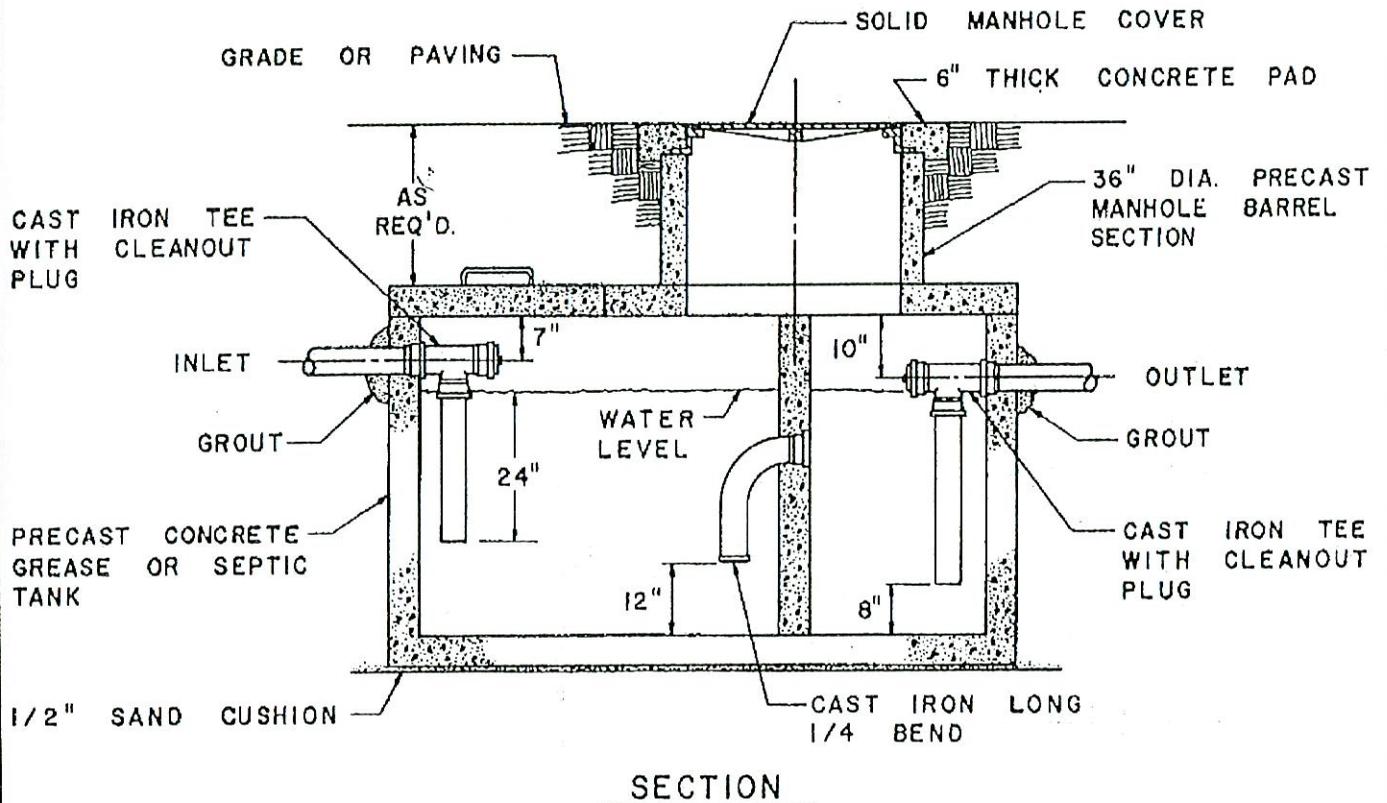
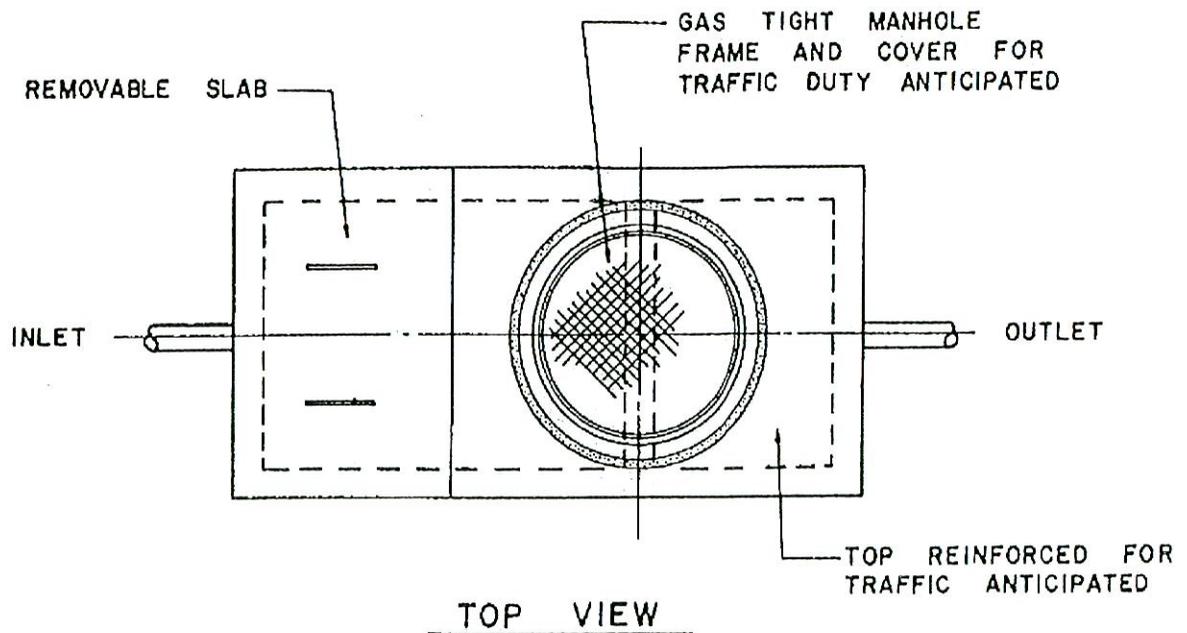
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TYPICAL CLEANOUT DETAIL

NTS

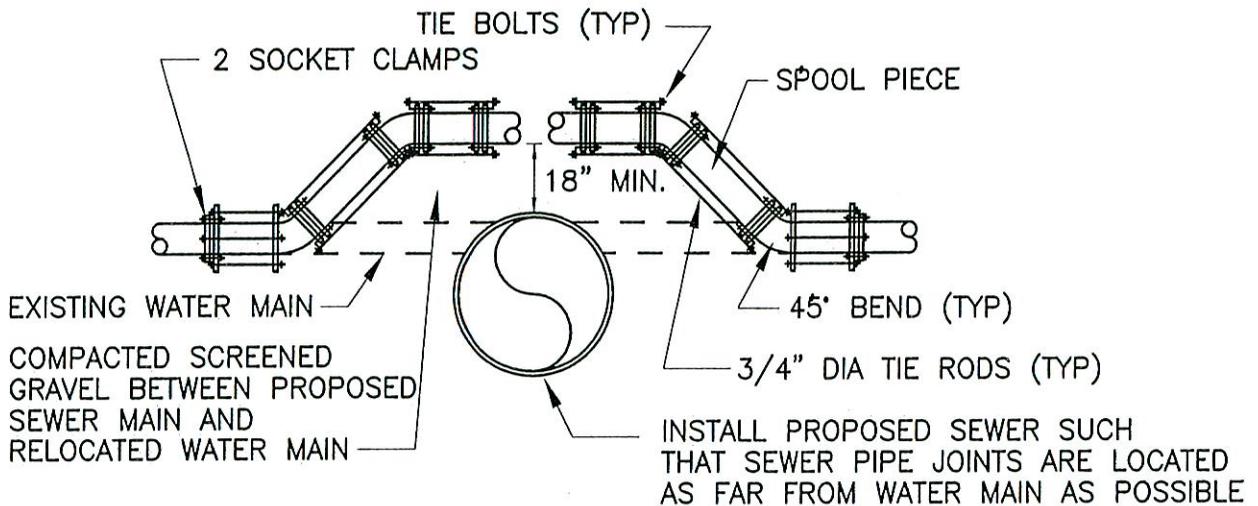
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| CITY OF ROCKLAND ROCKLAND, MAINE TYPICAL CLEANOUT DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE  Engineering a Better Environment | |
| 2.4 | |



NOTES:

1. FOR FOOD SERVICES BUSINESSES OR AS DIRECTED BY THE DIRECTOR OF POLLUTION CONTROL DEPARTMENT.
2. OR SUBMIT COMPARABLE DETAIL TO THE DIRECTOR OF POLLUTION CONTROL DEPARTMENT FOR APPROVAL.

| | |
|---|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE GREASE TRAP DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE 2.5 Engineering a Better Environment | |



- NOTES: 1. WATER MAIN MATERIALS TO BE CLASS 52 DUCTILE IRON. JOINT RESTRAINT TO BE BY MECHANICAL JOINT WITH RETAINER GLANDS, OR WITH TIE BOLTS AS SHOWN.
2. TIE RODS, TIE BOLTS, SOCKET CLAMPS AND BRIDLES SHALL BE COATED WITH A BITUMINOUS PAINT AFTER ASSEMBLY OR IF NECESSARY PRIOR TO ASSEMBLY.
3. TIE RODS: 10" DIA WATER MAIN OR LARGER - 4 REQUIRED.
8" DIA WATER MAIN OR SMALLER - 2 REQUIRED.
4. EXISTING WATER MAINS TO BE RELOCATED OVER NEW SEWERS WHEREVER SUFFICIENT GROUND COVER EXISTS (5' MINIMUM COVER).
5. COORDINATE REQUIREMENTS WITH WATER DISTRICT.

WATER MAIN RELOCATION DETAIL

NTS

CITY OF ROCKLAND

ROCKLAND, MAINE

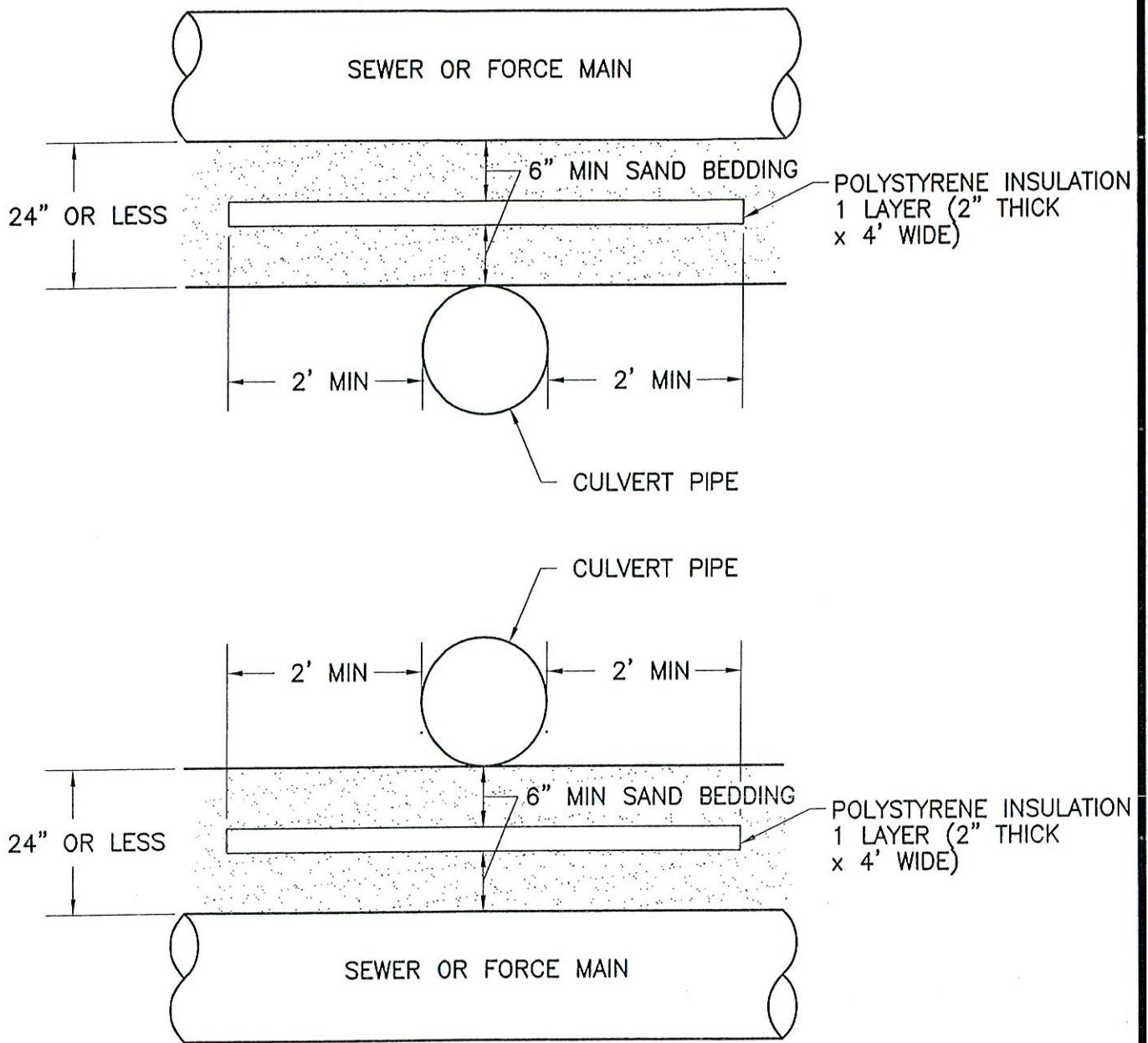
WATER MAIN RELOCATION DETAIL

PROJ NO: 11090C

DATE: JULY 2008

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Engineering a Better Environment

2.6



NOTE: INSULATION TO BE USED WHERE PIPE SEPARATION IS 24" OR LESS.

CULVERT CROSSING DETAIL

NTS

CITY OF ROCKLAND

ROCKLAND, MAINE

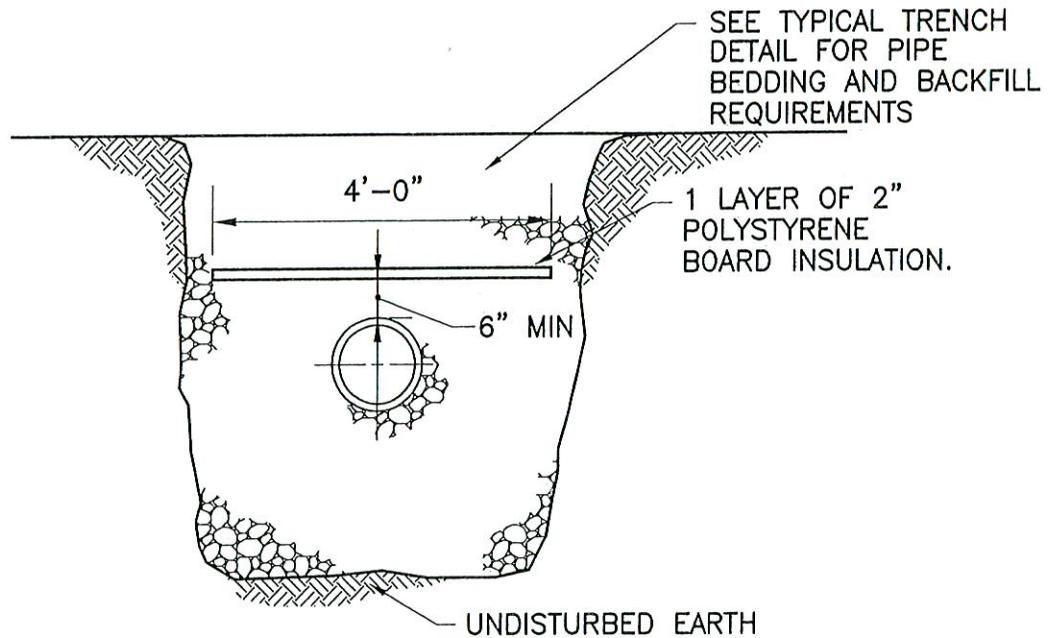
CULVERT CROSSING DETAIL

PROJ NO: 11090C

DATE: JULY 2008

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Engineering a Better Environment

2.7

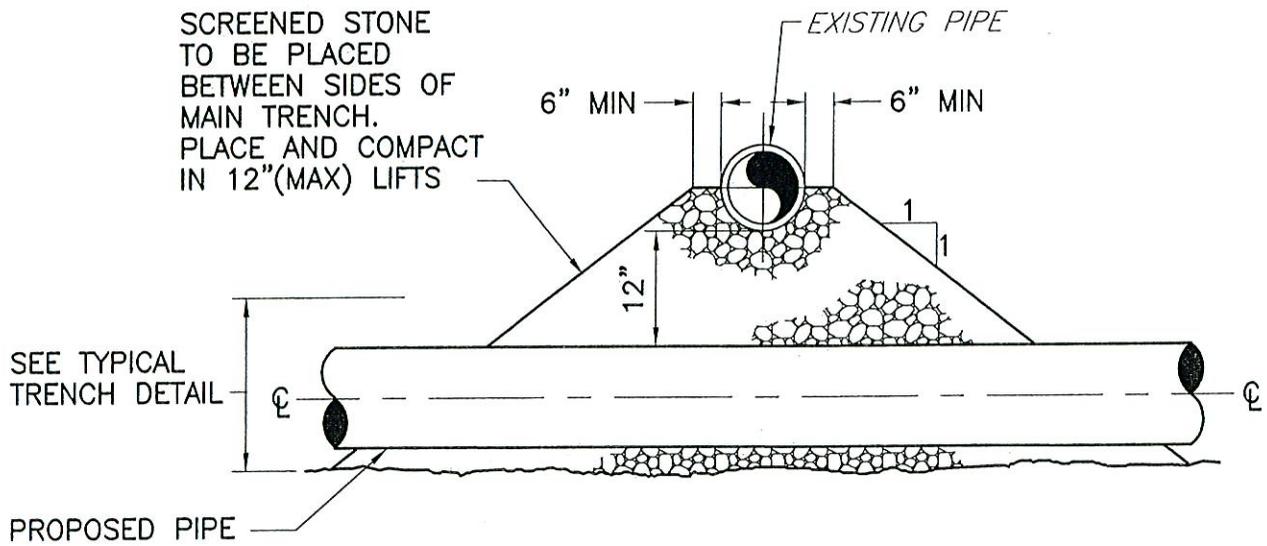


NOTE: TRENCH PIPE INSULATION TO BE USED WHERE
DEPTH OF COVER IS LESS THAN 5 FEET OR
AS DIRECTED BY THE CITY.

TRENCH PIPE INSULATION DETAIL

NTS

| | | |
|--|--------|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE TRENCH PIPE INSULATION DETAIL | | |
| PROJ NO: | 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE  | | 2.9 |
| Engineering a Better Environment | | |



SCREENED STONE
TO BE PLACED
BETWEEN SIDES OF
MAIN TRENCH.
PLACE AND COMPACT
IN 12"(MAX) LIFTS

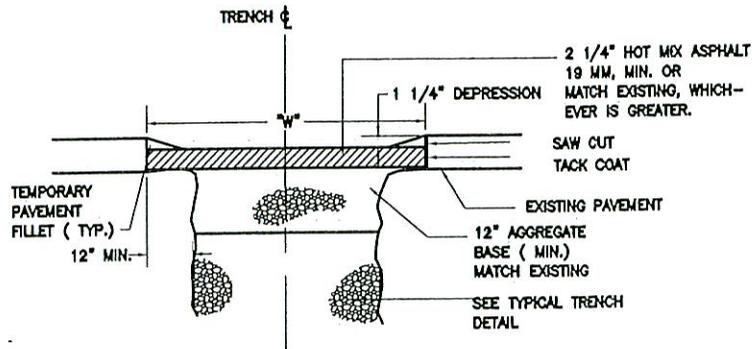
SEE TYPICAL
TRENCH DETAIL

PROPOSED PIPE

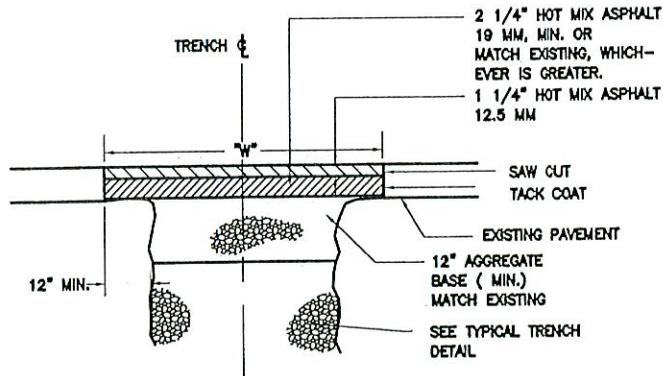
NOTE:
JOINTS ON EACH PIPE TO BE AS FAR FROM
INTERSECTION AS POSSIBLE

PIPE CROSSING DETAIL

| | |
|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE PIPE CROSSING DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE  Engineering a Better Environment | |
| 2.10 | |



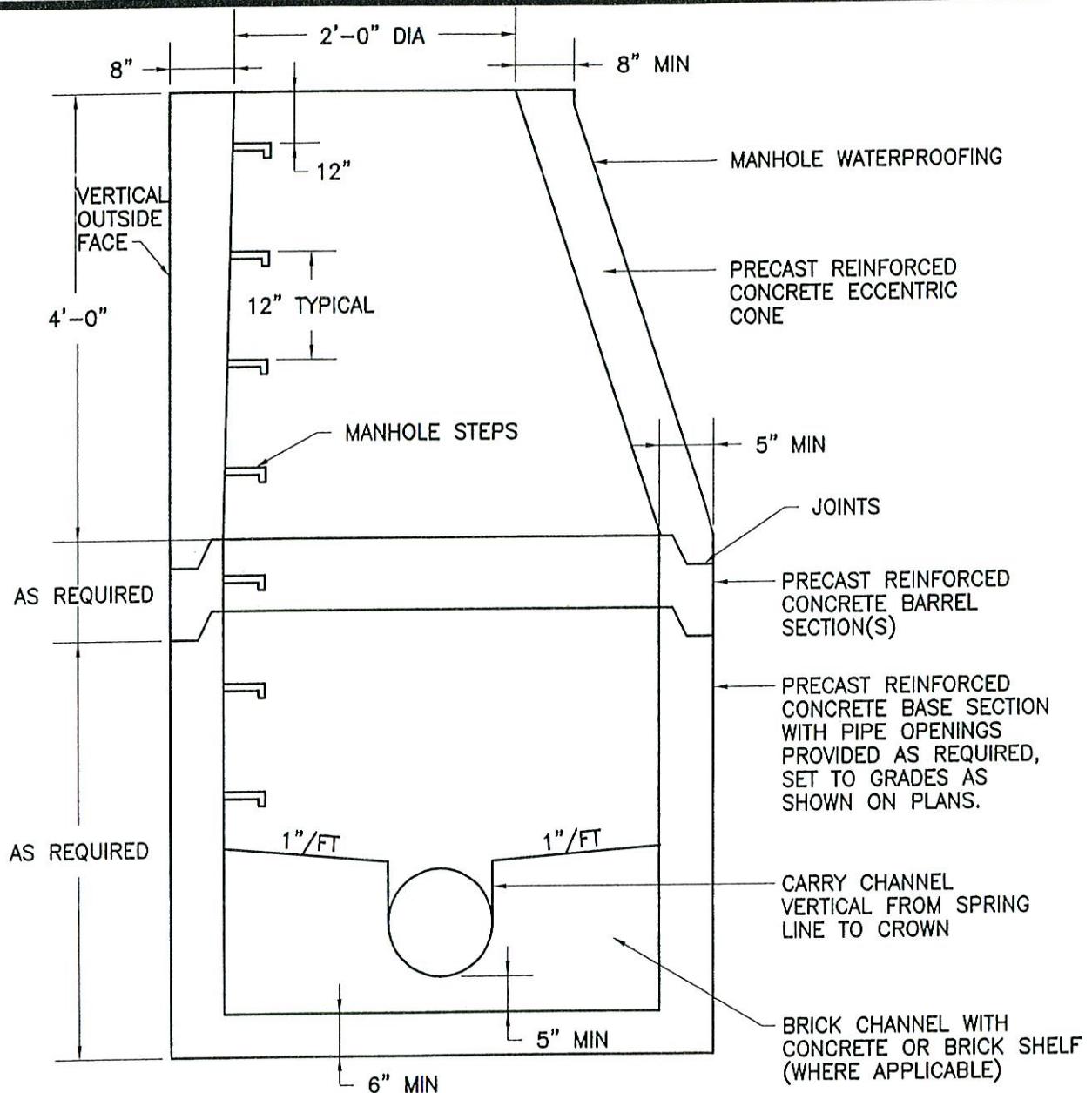
**INITIAL TRENCH PAVING
(WITHOUT OVERLAY)**



NOTE:
INITIAL TRENCH PAVING MAY BE USED
AS THE BASE COURSE FOR FINAL
PAVING IF IN GOOD REPAIR.

**FINAL TRENCH PAVING
(WITHOUT OVERLAY)**

| | |
|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE | |
| TRENCH PAVING WITHOUT OVERLAY DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
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| 2.11 | |

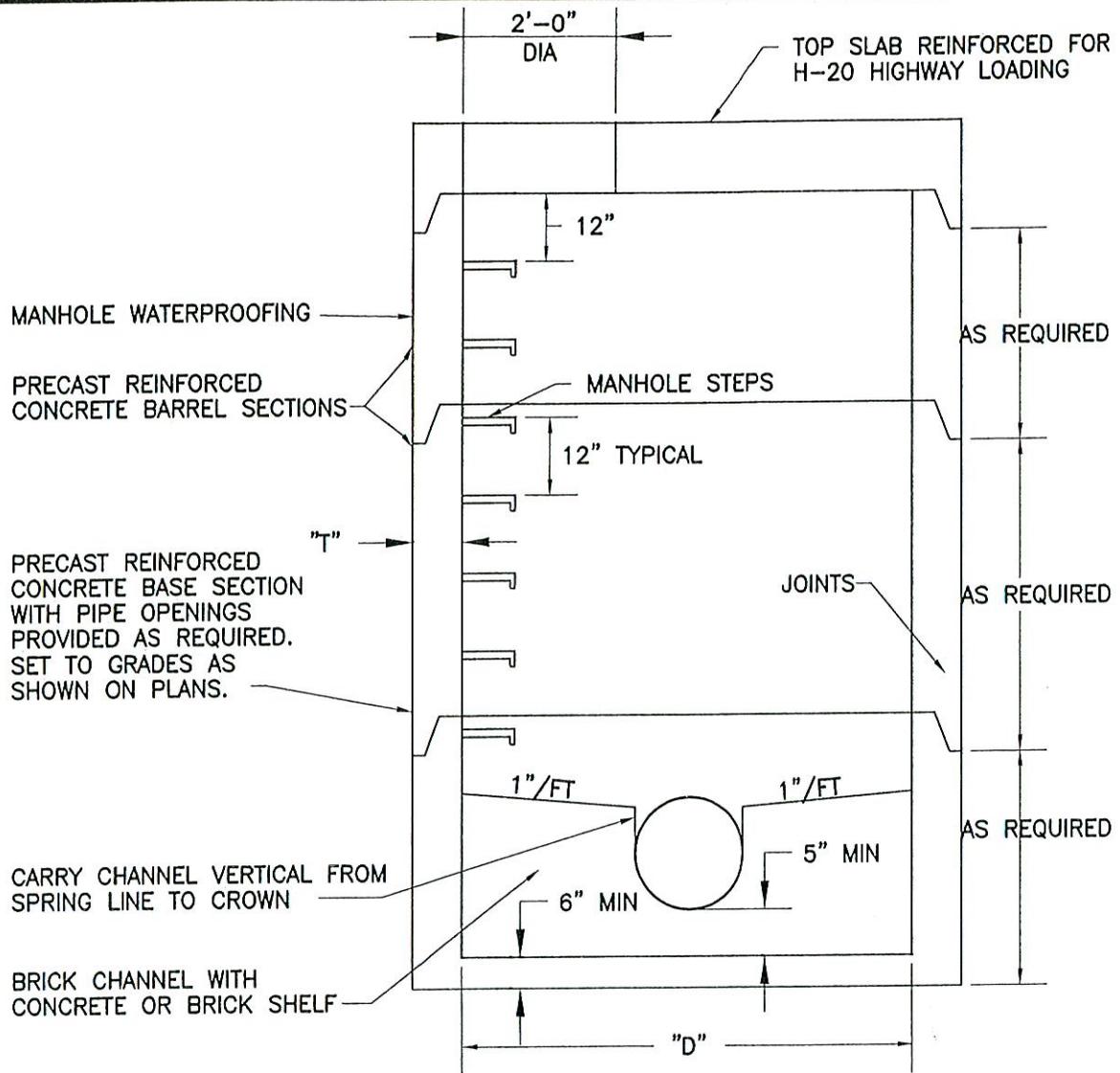


- NOTES:
1. MANHOLE CHANNELS REQUIRING CHANGE IN ALIGNMENT ARE TO BE BUILT ON A SMOOTH RADIUS. IF SIDE PIPES ENTER CHANNEL, SHAPE TO RECEIVE ADDED SIDE FLOW.
 2. USE FLAT SLAB TOP MANHOLE WHEN THE DIFFERENCE BETWEEN INVERT AND RIM IS LESS THAN 6'-0" AND WHEN MANHOLE DIAMETER IS GREATER THAN 4'-0".
 3. BEDDING SHALL BE 6" OF 3/4" SCREENED STONE.

TYPICAL 4-FT MANHOLE

NTS

| | |
|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE TYPICAL 4-FOOT MANHOLE DETAIL | |
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| 2.12 | |



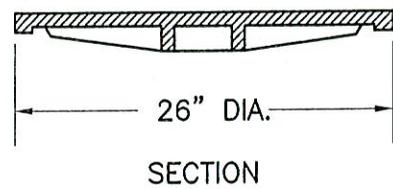
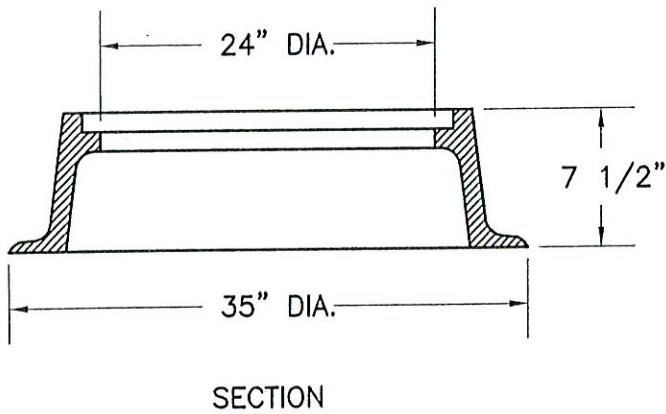
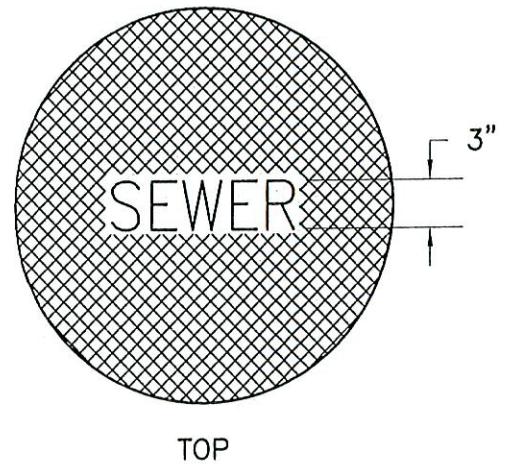
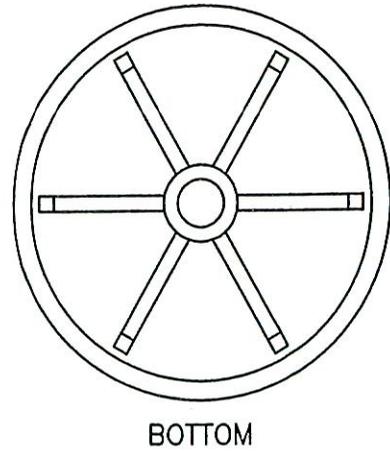
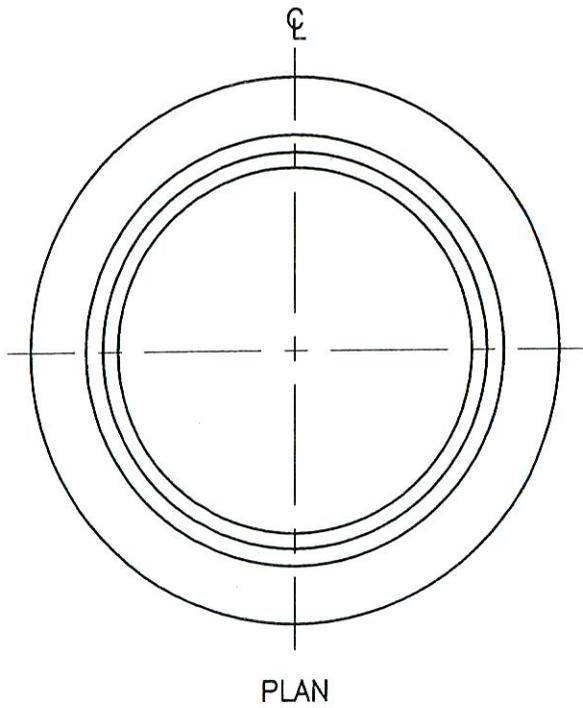
NOTE: MANHOLE CHANNELS REQUIRING CHANGE IN ALIGNMENT ARE TO BE BUILT ON A SMOOTH RADIUS. IF SIDE PIPES ENTER CHANNEL, SHAPE TO RECEIVE ADDED SIDE FLOW.

| <u>DIAMETER ("D")</u> | <u>MAX PIPE DIAMETER STRAIGHT THRU TO 45° DEFLECTION</u> | <u>MINIMUM WALL THICKNESS ("T")</u> |
|-----------------------|--|-------------------------------------|
| 48" | UP TO 30" O.D. | 5" |
| 60" | UP TO 44" O.D. | 6" |
| 72" | UP TO 51" O.D. | 7" |
| 96" | UP TO 72" O.D. | 9" |

FLAT SLAB TOP MANHOLE

NTS

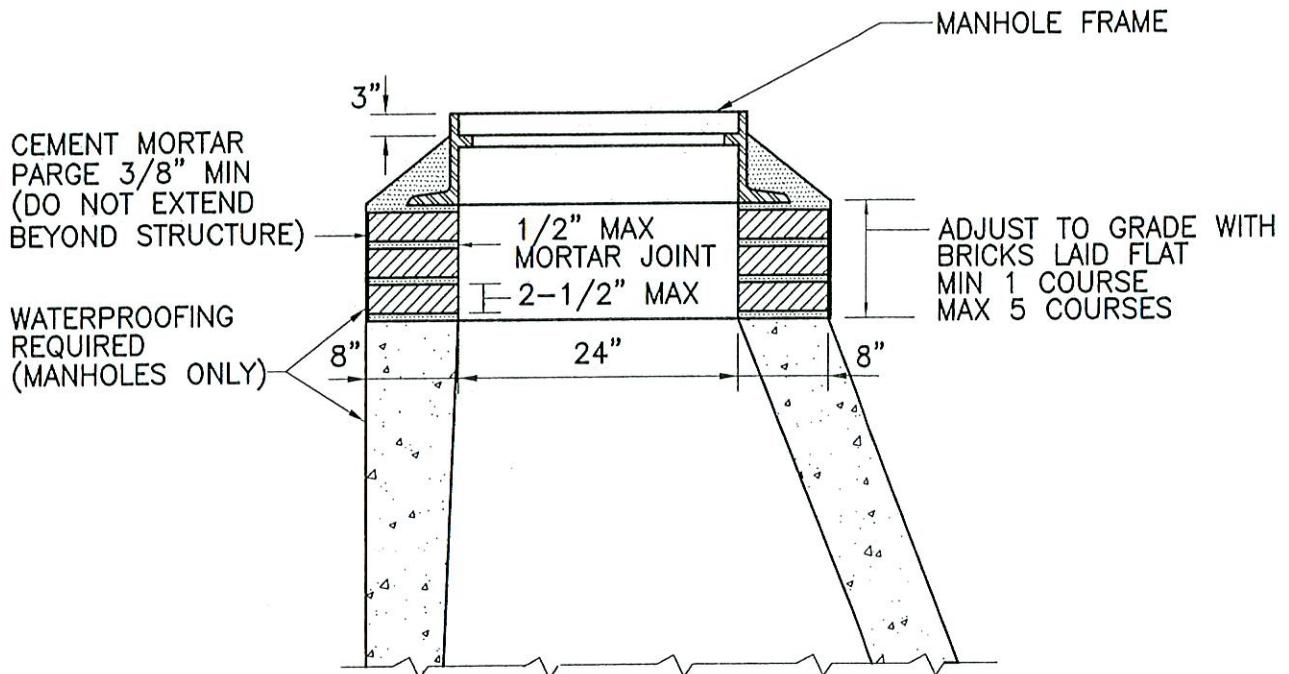
| | |
|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE FLAT TOP SLAB MANHOLE DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE  Engineering a Better Environment | |
| 2.13 | |



**MANHOLE STANDARD
COVER AND FRAME**

NTS

| | | |
|--|-----------------|-------------|
| CITY OF ROCKLAND ROCKLAND, MAINE MANHOLE FRAME DETAILS | | |
| PROJ NO: 11090C | DATE: JULY 2008 | |
| WRIGHT-PIERCE | | 2.14 |
| Engineering a Better Environment | | |



MANHOLE FRAME INSTALLATION

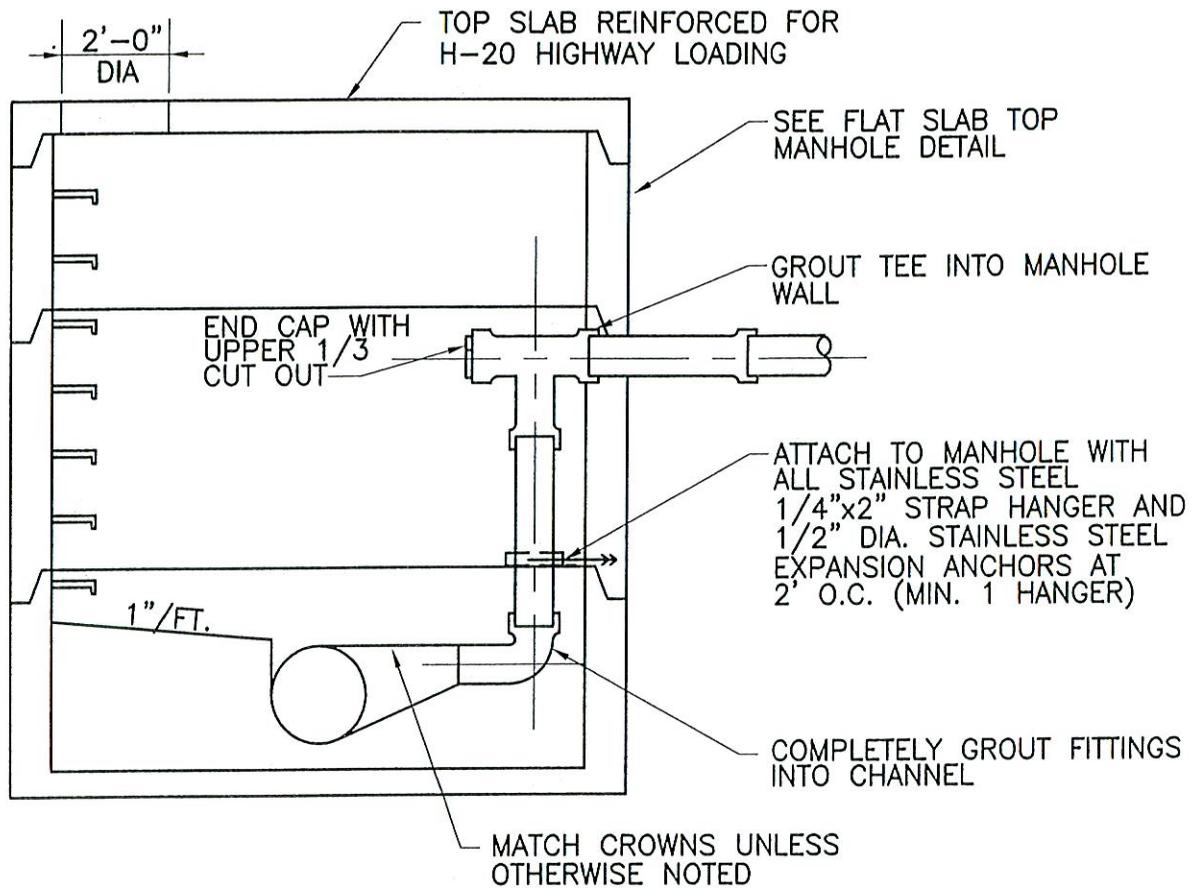
NTS

CITY OF ROCKLAND
ROCKLAND, MAINE
MANHOLE FRAME
INSTALLATION DETAILS

PROJ NO: 11090C DATE: JULY 2008

WRIGHT-PIERCE 
Engineering a Better Environment

2.15

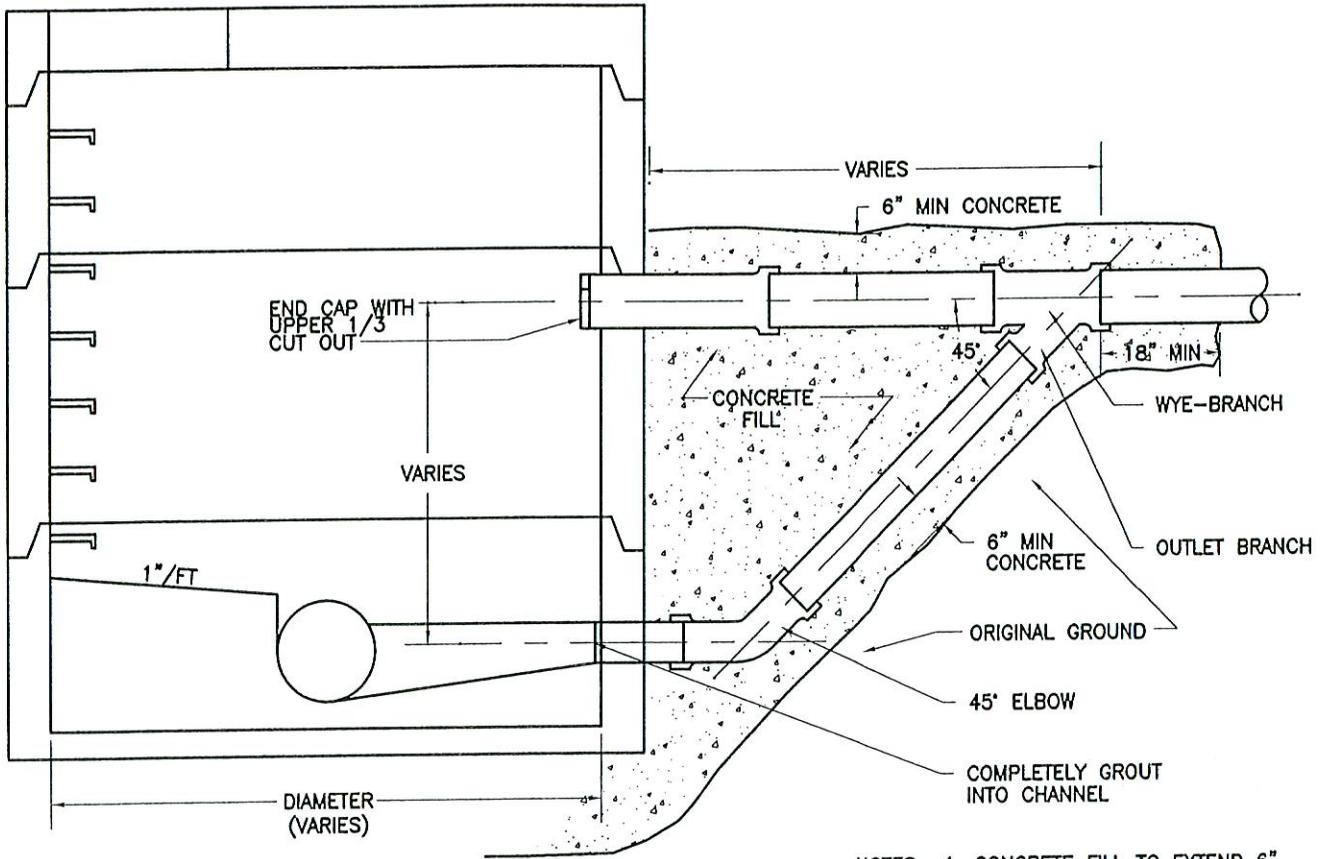


NOTE: INSIDE DROP MANHOLES SHALL BE 6' DIAMETER.

INSIDE DROP MANHOLE WITH PVC PIPE

NTS

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|--|-----------------|
| CITY OF ROCKLAND | |
| ROCKLAND, MAINE | |
| INSIDE DROP MANHOLE WITH PVC PIPE DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
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| 2.16 | |



NOTES: 1. CONCRETE FILL TO EXTEND 6" MINIMUM BEYOND ALL EXTERIOR PIPING.

**OUTSIDE DROP MANHOLE
WITH PVC PIPE**
NTS

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|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE | |
| OUTSIDE DROP MANHOLE WITH PVC PIPE DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
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| 2.17 | |

2.18- MANHOLES, COVERS AND FRAMES NOTES

1

QUALITY ASSURANCE

A. Precast Manhole Base, Barrel and Top Sections:

1. Conform to ASTM C478-97 except as modified herein.
2. Average strength of 4,000 psi at 28 days.

B. Masonry:

1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
2. Mortar
 - a. Composition (by volume): 1 part portland cement, 1/2 part hydrated lime, 4-1/2 parts sand.
 - b. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
3. Cement shall be Type II portland cement.
4. Hydrated lime shall be Type S
5. Sand:
 - a. Shall consist of inert natural sand.
 - b. Grading:

| <u>Sieve</u> | <u>Percent Passing</u> |
|------------------|------------------------|
| 3/8-inch | 100 |
| No. 4 | 95-100 |
| No. 8 | 80-100 |
| No. 16 | 50-85 |
| No. 50 | 10-30 |
| No. 100 | 2-10 |
| Fineness Modulus | 2.3 - 3.1 |

C. Frames and Covers:

1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
2. Have machined bearing surfaces to prevent rocking.
3. Castings shall be smooth with no sharp edges.
4. Constructed to support an HS-20 wheel loading.
5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the City of Rockland:
 - a. Covers - solid with sewer in 3-inch letters diamond pattern.
 - b. Frame - 24-inch diameter clear opening, with flange bracing ribs.
6. Minimum weight of frame and cover shall be 430 lbs.
7. The City currently uses the following frames: LA264, LA266, LA268, LA244, LA246, LA248. Submit proposed frame types for approval by the City.
8. The City currently uses the following covers: L26C26 and L24C32. Submit proposed covers for approval by the City.

- D. Manhole Steps:
1. Aluminum or polyethylene coated steel safety type designed with a minimum concentrated live load of 300 pounds.
 2. Aluminum surfaces to be embedded shall be given a protective coating of an approved heavy-bodied bituminous material. The steps shall become thoroughly dry before being placed into the concrete.
 3. All steps shall be cast into walls of the precast section so as to form a continuous ladder with a distance of 12-inches between steps
- E. Openings:
1. Openings shall have a flexible watertight union between pipe and the manhole base.
 2. Cast into the manhole base and sized to the type of pipe being used.
 3. Type of flexible joint being used shall be approved by the City of Rockland. Install materials according to the Manufacturer's instructions.
- F. Joints:
1. Joint gaskets to be flexible self seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
 2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
- G. Waterproofing:
1. The exterior surface of all manholes shall be given two coats of bituminous waterproofing material at a application rate of 75 to 100 square feet per gallon, per coat.
 2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
 3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.
- H. Frost Protective Wrapping:
1. The frost protective wrap shall be constructed of an ultraviolet resistant polyethylene material and shall be a minimum thickness of 6 mils.

2 INSTALLATION

- A. Precast Manhole Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the City of Rockland.
 2. Install riser sections and tops level and plumb.
 3. Make all joints watertight.
 4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops.
 5. When manhole steps are included in the Work, install barrel sections and tops so that steps are in alignment.

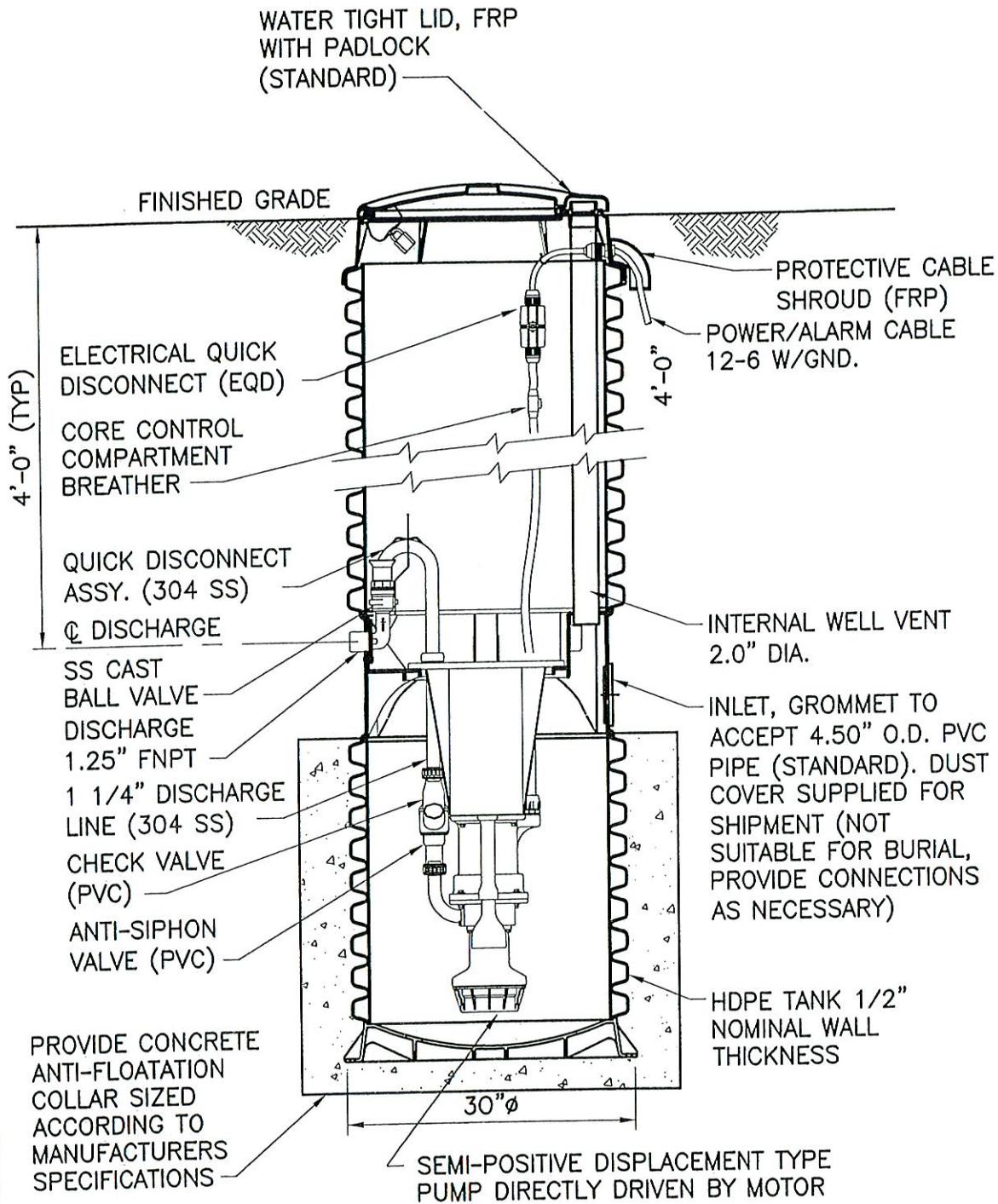
- B. Drop Manholes:
1. The difference in elevation between the invert of the inlet pipe to the invert of the outlet pipe shall not exceed 24 inches without use of a drop structure.
 2. Generally, inside drop manholes will be used for all new manholes, and outside drop will be used for existing, 4-foot, manholes. The final decision as to whether to use an inside or outside drop shall be made by the Director of the Pollution Control Department
- C. Adjust to Grade:
1. Adjust tops of manholes to grade with brick masonry, barrel block, or donut risers.
 2. Submit the intended method of adjustment, and materials used to the City for approval.
- D. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the City of Rockland.
- E. Invert Channels:
1. Smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
 2. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
 3. Stop the pipes at the inside face of the manhole where changes of direction occur.
 4. Form invert channels with brick.
 5. Shape invert to make smooth transition in vertical grade.
 6. Slope the floor of the manhole to the flow channel, as shown on the Drawings.
- F. Masonry:
1. Laying Brick:
 - a. Use only clean bricks in brickwork for manholes.
 - b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
 - c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
 - d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
 - e. Outside faces of brick masonry shall be plastered with mortar from 1/4-inch to 3/8-inch thick.
 - f. Completed brickwork shall be watertight.
 2. Curing:
 - a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
 - b. Protect brick masonry from the weather and frost as required.

- G. Frames and Covers:
1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
 2. Completely fill all voids beneath the bottom flange to make a watertight fit.
 3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
 4. Clean the frame seats before setting the covers in place.
- H. Plugging and Patching:
1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
 2. Touch up damaged water proofing.
- I. Cleaning:
1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.
- J. Bedding and Backfilling:
1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
 2. Backfill a minimum of 18 inches all around manhole with gravel borrow.
- K. Frost Protective Wrap:
1. Comply with the manufacturer's instructions for the particular conditions of installations in each case.
 2. Clean each manhole exterior of all dirt and remove any sharp protrusions.
 3. Apply two (2) 6-inch wide vertical strips of bituminous waterproofing material and/or duct tape from the top to bottom of the manhole per layer.
 4. Prior to installing pipe through each manhole, wrap each manhole to the maximum depth of frost penetration, but not less than 5 feet below grade, with four (4) layers of the polyethylene material by beginning the wrap at the adhesive strip and proceeding around the manhole, continuously by overlapping the adhesive strip by 24 inches on the final layer. Cut the polyethylene wrap to the pipe's outside diameter in areas where piping exits the manhole.
 5. Tuck and pleat the polyethylene wrap at the top of each manhole in a continuous manner, minimizing the size of each fold. Extend the polyethylene wrap past the top of the manhole frame and temporarily tuck the remainder inside the frame, until final backfill and paving.
 6. In paved areas, cut the polyethylene wrap flush with the manhole rim after the pavement is in place.
 7. In unpaved areas, pull the polyethylene wrap together, and tie around frame with galvanized wire.

3 MANHOLE TESTING

- A. General:
1. Perform a vacuum test on new manholes, or existing manholes with new penetrations. All testing must be performed in the presence of the City of Rockland.

3. Suitably plug all pipes in the manhole and brace plugs to prevent blow out.
4. Install the testing equipment according to the manufacturer's instructions.
5. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is two (2) minutes or longer. If the manhole fails the initial test, locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained, to the satisfaction of the City of Rockland.



TYPICAL SIMPLEX GRINDER PUMP STATION

NTS

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|--|-----------------|
| CITY OF ROCKLAND ROCKLAND, MAINE TYPICAL SIMPLEX GRINDER PUMP STATION DETAIL | |
| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE  Engineering a Better Environment | |
| 2.19 | |

2.20- GRINDER PUMP STATION NOTES
(For single residence pump stations only)

1 QUALITY ASSURANCE

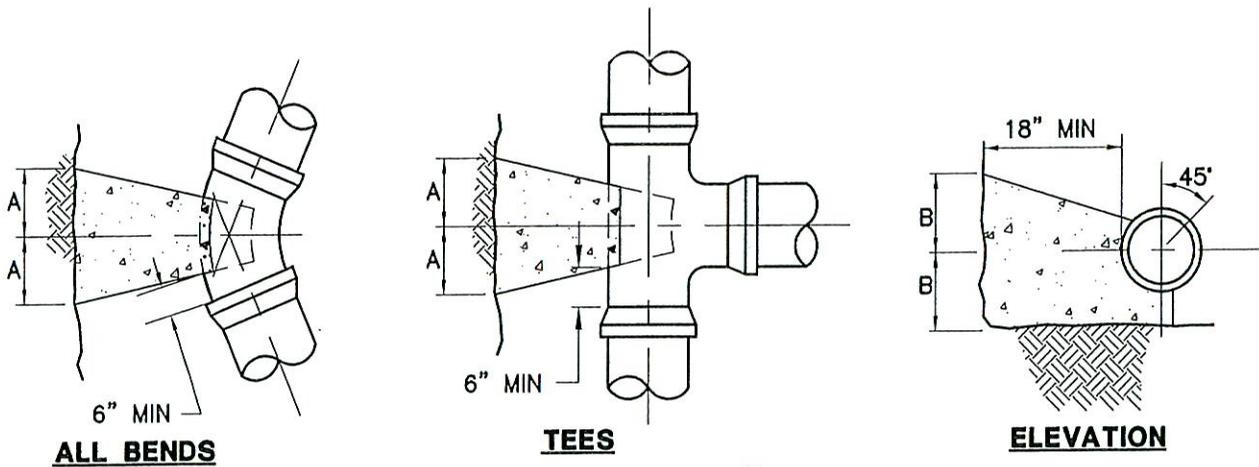
A. General:

1. Equipment design, construction and installation should be in accordance with best practice and methods and conforming to the standards of the Hydraulic Institute.
 2. Manufacturer shall have a minimum of 5 years experience in the design and manufacture of grinder pump stations, and pump station installations that have proven reliable in similar applications over the last 5 years
- B. Pumping units shall draw sewage from a wet well, grind to a slurry and discharge into a force main against the required total dynamic head. The pump shall be capable of macerating all material in normal domestic and commercial wastewater to a fine slurry that will pass freely through the pump and 2 inch discharge piping
- C. The pumps shall be controlled automatically by float switches actuated by the change in wet well level. All equipment for the station shall perform automatically.
- D. The pump station shall be an explosion-proof system.
- E. Exposed hardware shall be stainless steel.
- F. Provide ample room and fittings for inspection, repairs and adjustments.
- G. Pump Station and its installation shall meet all current Federal, State and City code requirements
- H. Pump Casing should be capable of prolonged resistance to the abrasive action of solids or foreign matter contained in the liquid passing through the pump.
- I. Impeller should be of the recessed type to provide an open, unobstructed passage through the volute for the ground solids. The impeller shall be dynamically balanced with a minimum of vanes or blades and be made of bronze. Impeller vanes should be free from sharp edges and the waterways shall be smooth contours and well-rounded entrances. The Impellers should be securely attached to shaft by a streamlined locknut or equally efficient method, capable of withstanding a pump reversal to full runaway speed, but still permit easy removal.
- J. The grinder mechanism should consist of a radial cutter securely attached to the motor shaft and a shredding ring. The shredding ring shall be reversible. Both components shall be constructed of 440C stainless steel.
- K. The Shaft should be stainless steel, accurately machined.
- L. The pump shaft seal should be of the double mechanical type, with pump seal leak detection system.
- M. The grinder sewage pump motor ratings should be as specified by your design professional. A heat sensor thermostat shall protect motor against excess heat in compliance with its U.L. Class I, Group D rating. Sensor shall reset automatically at the motor when motor cools with manual reset at the control panel.
- N. Piping and Valves should be schedule 80 PVC pipe.
- O. Automatic Control (Simplex Systems)
1. The control of the operation of the pump should be by means of a mercury float switch system which senses the wet well level.
 2. Level controls to be mercury float switches in unbreakable steel shell encased in solid polyurethane, mounted on a 3/4" galvanized steel pipe with Ty-rap

- clamps. Supply 4 mercury float switches; one for high water, one for low water, and two operating.
3. The controls should be arranged to start and stop the pump at the wet well levels indicated by your design professional.
 5. Intrinsically safe relays should be supplied to operate with level controls to reduce energy to a level where a spark is not created.
 6. Pump motor starter should be full voltage starter of the magnetic, non-reversing type.
 7. The starter should have thermal overload protection in each phase.
 8. A six digit, non-reseatable, run time meter reading 0.1 hour increments should be furnished for the pump.
 9. "Run" and "Stop" indicator lights should be provided for the pump. Lights should be controlled by means of motor starter auxiliary contacts.
- P. Waterproofing
1. Any precast concrete shall be waterproofed
- Q. Recommended Manufacturers
1. ABS Group, Malmo Sweden
 2. Or equivalent.

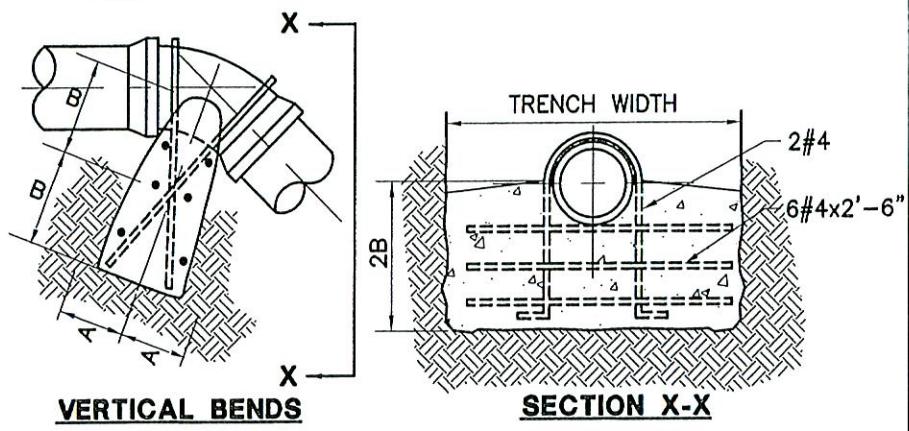
2 INSTALLATION

- A. Installation of the pump station and related appurtenances shall be done in accordance with written instructions provided by the grinder pump station manufacturer.
- B. The completed pump station shall be given a test of all equipment and piping to check for excessive vibration, for leaks in the piping or seals, for correct operation of the automatic control system and of all auxiliary equipment. All adjustments shall be made so that the station is ready for operation. All testing must be performed in the presence of a City of Rockland Pollution Control Department representative



NOTES

1. THRUST BLOCK SIZES SHOWN ARE BASED ON A SOIL BEARING CAPACITY OF 2000 PSF AND TEST PRESSURES OF 180 PSI.
2. POLYETHYLENE (6 mil) SHALL BE PLACED AROUND FITTINGS PRIOR TO CONCRETE PLACEMENT



| PIPE SIZE | 90° BEND | | 45° BEND | | 22 1/2° BEND | | 11 1/4° BEND | | TEE | | VERTICAL BEND (DOWN) | |
|-----------|----------|-----|----------|-----|--------------|-----|--------------|-----|-----|-----|----------------------|-----|
| | A | B | A | B | A | B | A | B | A | B | A | B |
| 6" | 15" | 12" | 12" | 9" | 9" | 6" | 6" | 6" | 12" | 12" | 24" | 21" |
| 8" | 20" | 15" | 14" | 12" | 9" | 9" | 9" | 6" | 18" | 12" | 33" | 24" |
| 10" | 21" | 21" | 18" | 15" | 15" | 9" | 9" | 9" | 20" | 18" | 40" | 27" |
| 12" | 27" | 24" | 23" | 15" | 15" | 12" | 9" | 12" | 25" | 18" | 48" | 30" |
| 16" | 37" | 30" | 30" | 21" | 21" | 15" | 13" | 12" | 32" | 24" | 57" | 36" |

THRUST BLOCK DETAIL
NTS

**CITY OF ROCKLAND
ROCKLAND, MAINE
TYPICAL THRUST BLOCKS DETAIL**

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| PROJ NO: 11090C | DATE: JULY 2008 |
| WRIGHT-PIERCE Engineering a Better Environment | 2.21 |

3.1 - PROJECT RECORD DOCUMENTS NOTES

General Issues:

- 1) Swing Ties, or Ties
 - a) Ties are measurements from fixed structures to the points of interest.
 - b) Ties should be taken from existing, permanent features such as utility poles, corners of houses and hydrants. Porches, sheds or other house additions should be avoided for they could be torn down. A minimum of two ties (from different structures) should be taken.
- 2) Stations (where applicable) should be recorded to the nearest foot.
- 3) Pipe and manhole inverts should be recorded to the nearest hundredth of a foot.
- 4) Elevations should be recorded to the nearest hundredth of a foot.

To Be Included in the Drawings:

Legibly record existing utilities and structures, and new work, including but not limited to the following (where applicable):

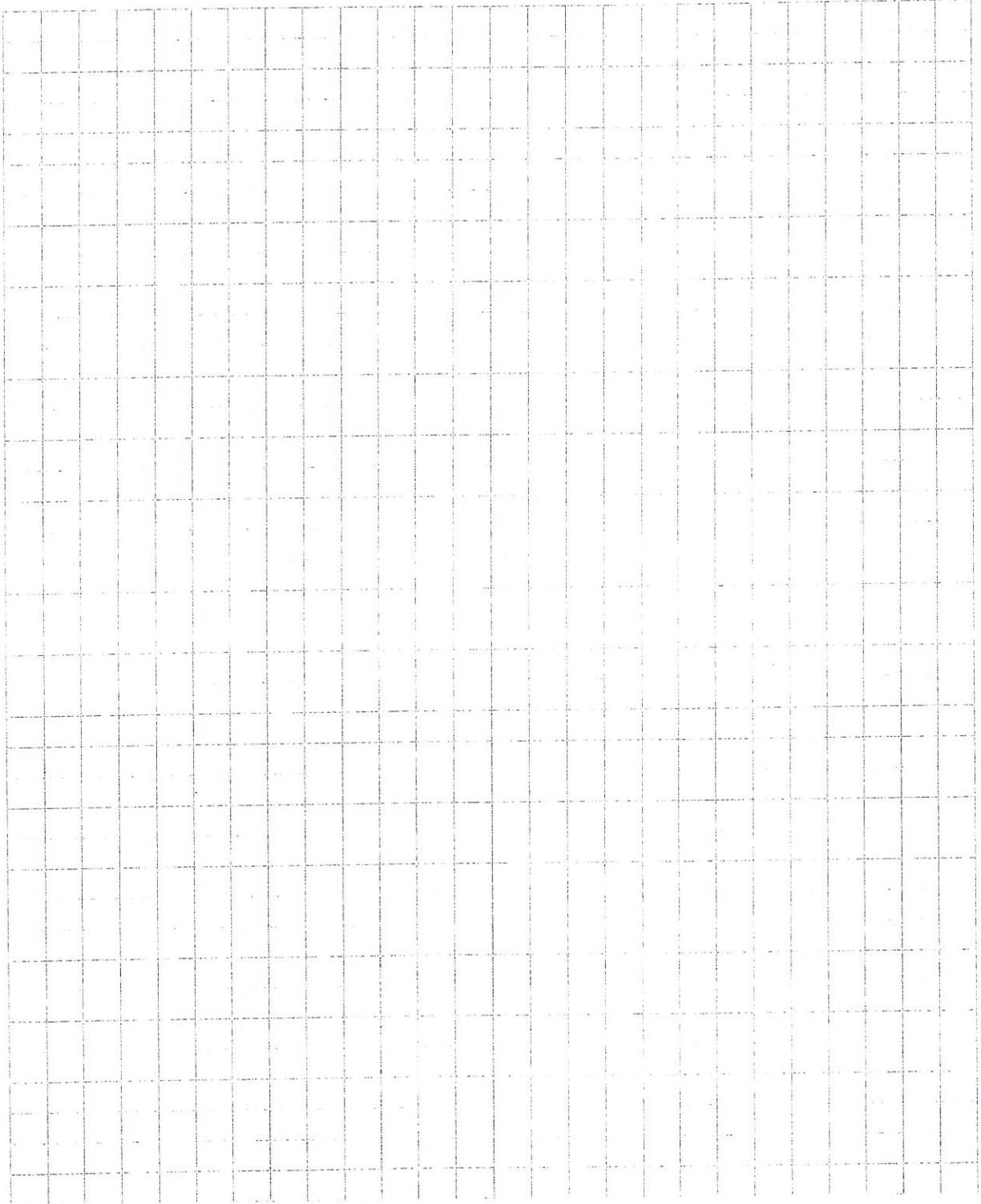
- 1) House Services
 - a) Draw all house services (even to empty lots) on plan, and show ties.
 - b) Show ties or distances to wyes from manhole.
 - c) Show chimneys heights in the profile.
 - d) "Sanitary Sewer Service Location" forms shall be used to record sewer service information.
- 2) Existing Utilities, including water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks, etc. In congested areas supplemental drawings or enlargements may be required.
 - a) Labeled showing size, material and type of utility. Ties should be shown on plan. Utility elevation should be called out
 - b) If existing utility lines are broken and repaired, ties should be taken to these locations.
 - c) If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.
- 3) New Gravity Sewer Line
 - a) Record pipe material, size and slope
 - b) Locate any changes in material or size with ties
- 4) Manholes (new or existing that are included in the work)
 - a) Complete the Manhole Form
- 5) Force Mains
 - a) Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks should be recorded.
- 6) Existing Septic Tanks
 - a) Show ties to center of tank covers.
 - b) Label size of septic tanks that are other than standard 1000 gallon capacity.
 - c) "Sanitary Sewer Service Location" forms shall be used to record septic tank information.
- 7) Roads
 - a) Show edges of pavement and call out widths
 - b) Show level spot elevations if known
 - c) Show road names

- 8) Buildings
 - a) Show location of corners and any significant features
 - b) Provide ties to sewer service entrance to building. Call out elevations
- 9) Existing rights-of-way and or easements within project area
- 10) Property Lines
- 11) Existing Curbing and Driveways
 - a) Include widths and edges
- 12) Existing Fences
- 13) Existing Trees and shrubs
- 14) All other non-movable items such as rock outcroppings, flagpoles, mailboxes, etc

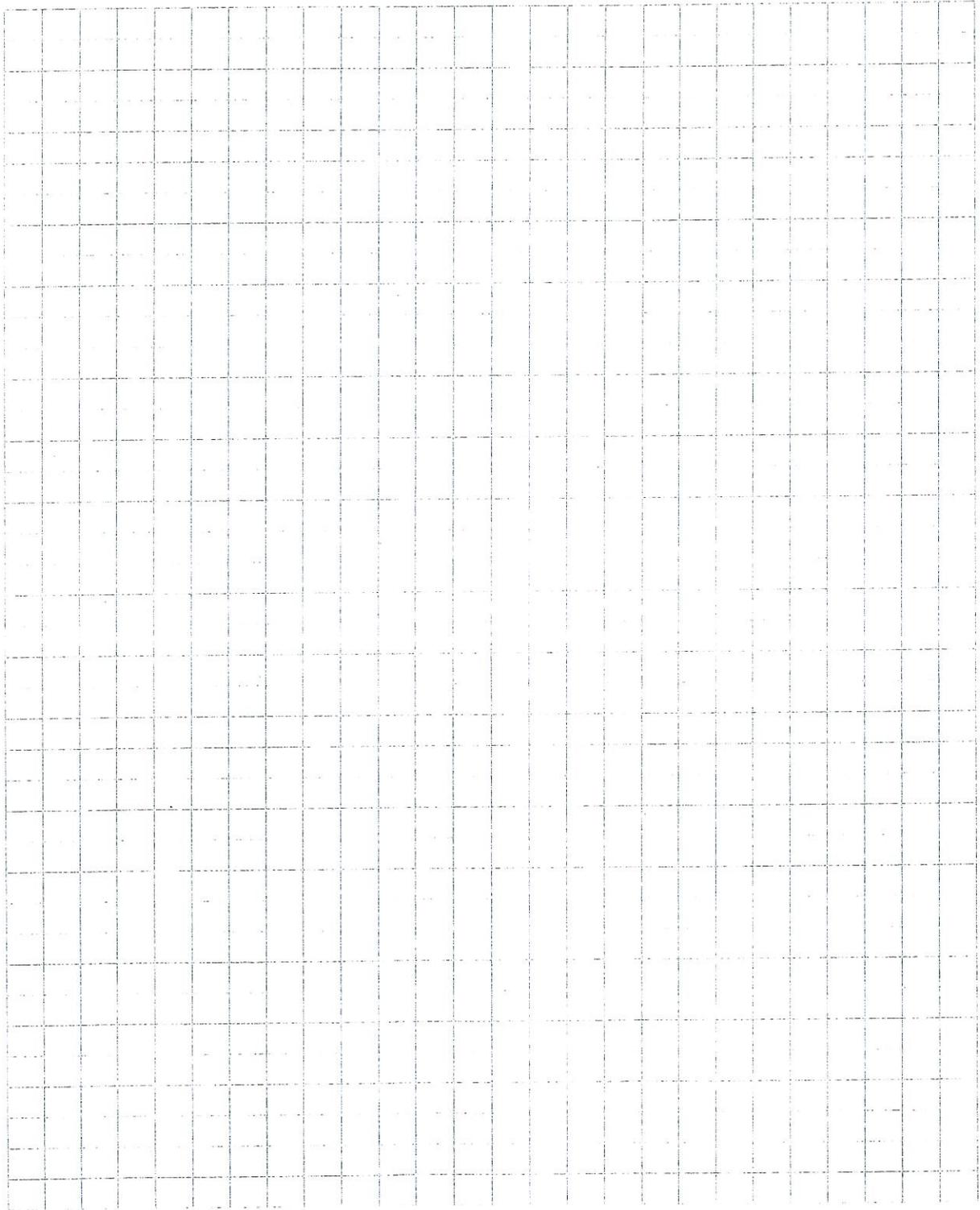
Submittals

- 1) No later than 30 days after completion of the project, deliver record documents to the City of Rockland.
- 2) Failure to supply all information as specified may result in the City charging the home/business owner for all costs associated with the City having to develop proper record drawings

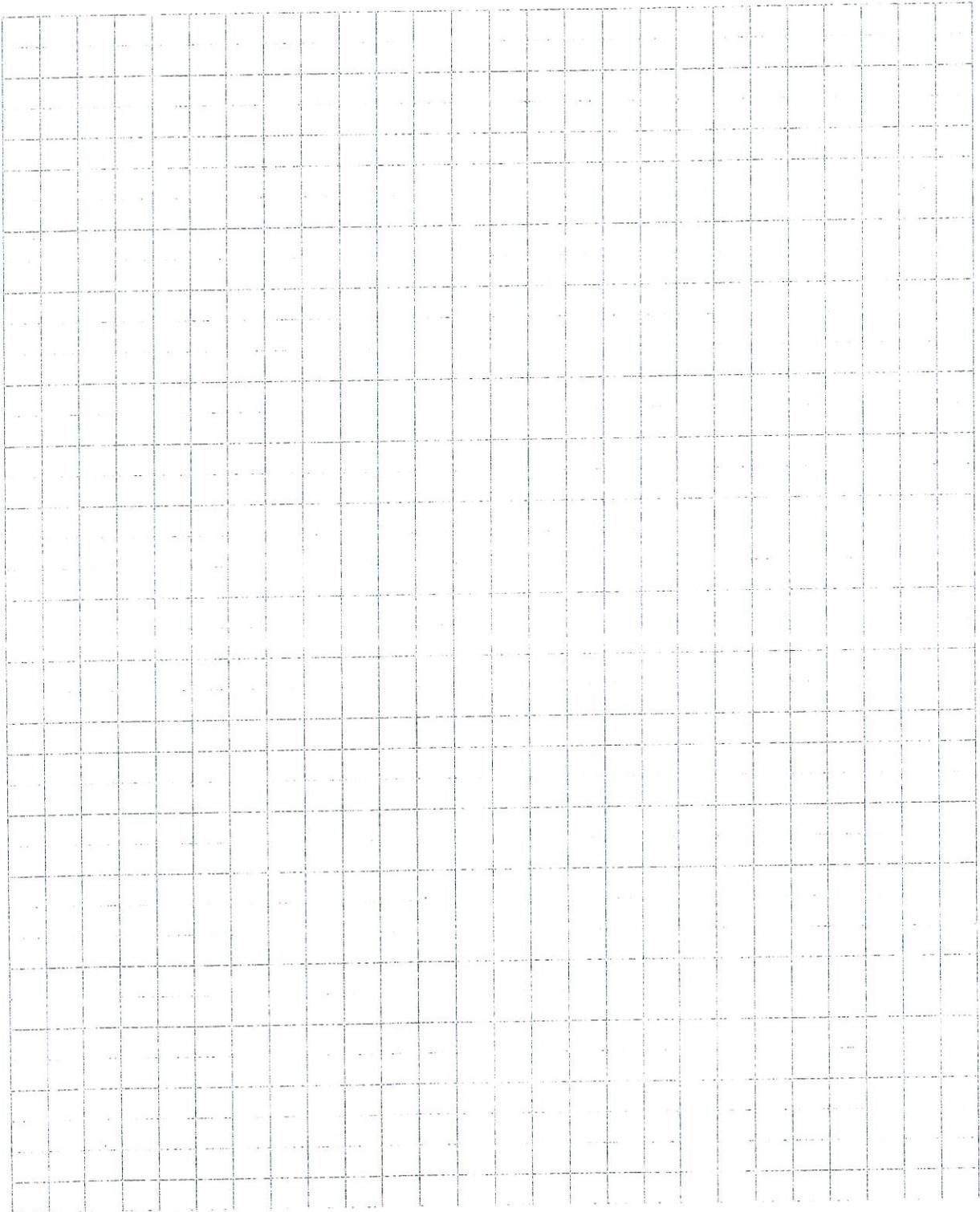
Project Sketches



Project Sketches



Project Sketches



3.2 - SANITARY SEWER SERVICE LOCATION

Project: _____ Date: _____
Date Installed: _____ City of _____
Type, Size of Service Pipe _____ Street _____
Connection at Sewer Main _____ Dwelling No. _____
Depth, End of Service _____ Occupant _____
Length of Service Pipe Laid _____ Owner _____
Measured, Located By _____ House No. _____
Project Contractor _____ Complete _____
Incomplete _____

N.T.S.

Comments: _____

Observed By:

Contractor (Date)

CITY OF ROCKLAND (Date)

Subsystem No.

MH No. _____

(To completed by the City)

Section 3.3
City of Rockland
MANHOLE REPORT

PROJECT LOCATION: _____ PROJECT NO.: _____

DATE: _____ WEATHER: _____ TIME: _____ INSPECTOR: _____

MANHOLE LOCATION DATA:

STREET: _____

BURIED: Yes/No PAVED AREA: Yes/No

MANHOLE DATA:

MANHOLE DIAMETER 4FT 5FT 6FT

MANHOLE IS: BRICK BLOCK PRECAST

DEPTH OF MANHOLE: _____

RIM ELEVATION _____

NUMBER OF SECTIONS: 2 3 4

COVER DIAMETER: 24" 30"

COVER MATERIAL: _____

FRAME MATERIAL: _____

RISER MATERIAL: _____

PIPE DATA: _____

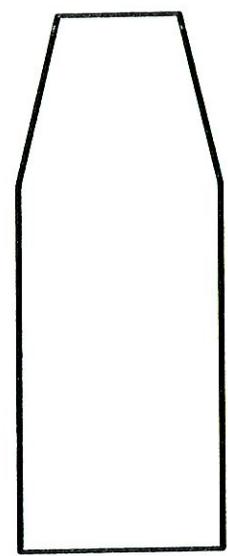
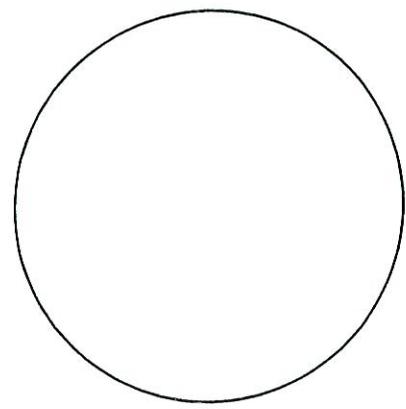
NUMBER OF PIPES IN _____

DIAMETER OF PIPES _____

PIPE MATERIAL _____

INVERT ELEVATIONS _____

COMMENTS:



Plan and Profile View
Please include all pipe details (size, elevation, angle to next pipe, etc). Include a North arrow to orient the viewer.

