

SECTION 02610

SANITARY SEWER PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

- 1. Sanitary sewer gravity pipelines
- 2. Sanitary sewer pressure pipelines and valves
- 3. Laterals/service connections

B. Related work specified elsewhere:

- 1. Boring and Jacking: Section 02150
- 2. Trenching, Backfilling, and Compaction: Section 02221
- 3. Soil Erosion and Sedimentation Control: Section 02270
- 4. Finish Grading, Seeding, and Sodding: Section 02485
- 5. Manholes: Section 02601
- 6. Sanitary Sewer Testing: Section 02651
- 7. Cement Concrete for Utility Construction: Section 03050

C. Applicable Standard Details:

- 02610-1 Lateral Detail
- 02610-2 Lateral Detail with Cleanout
- 02610-3 Subbase Drain Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

- 1. American National Standards Institute (ANSI):
 - A21.4 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings
 - A21.10 Gray-Iron and Ductile-Iron Fittings
 - A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
 - A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for water or other liquids

- D1785 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D2241 Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR series)
- D2321 Practice for Underground Installation of Termoplastic Pipe for Sewers and other Gravity-Flow Applications.
- D2564 Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
- D2855 Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- D3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- D3139 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F679 Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

3. American Water Works Association (AWWA):

- C504 Rubber Seated Butterfly Valves
- C507 Ball Valves, 6" through 48"
- C900 Poly (Vinyl Chloride) PVC Chloride (PVC) Pressure Pipe, 4" through 12" for Water Distribution

B. Materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder will be rejected.

1.03 SUBMITTALS

A. Certificates:

1. Submit 2 copies of each manufacturer's certification attesting that the pipe, pipe fittings, valves, joints, joint gaskets and lubricants and detectable warning tape meet or exceed specification requirements.

B. Manufacturer's Literature:

1. Submit 2 copies of the manufacturer's recommendations on installation, handling and storage of materials.

C. Details of bypass pumping operation and pump curves.

1.04 JOB CONDITIONS: Section not utilized.

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1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling:

1. Do not place materials on private property without written permission of the property owner.
2. During loading, transporting and unloading, exercise care to prevent damage to materials.
3. Do not drop pipe or fittings. Avoid shock or damage at all times.
4. Take measures to prevent damage to the exterior surface or internal lining of the pipe.

B. Storage:

1. Do not stack pipe higher than recommended by the pipe manufacturer.
2. Store PVC pipe and gaskets for mechanical and push-on joints in a cool, dry location out of direct sunlight and not in contact with petroleum products.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE

A. Pipe:

1. ANSI A21.51, Thickness Class as indicated on the Construction Drawings, minimum Class 50.
2. Standard cement-mortar lining, ANSI A21.4.
3. Standard bituminous coating, interior and exterior.

B. Fittings:

1. Ductile-iron or gray-iron, ANSI A21.10.
2. Provide with standard lining and coating as for ductile iron pipe.

C. Joints:

1. Where not specifically shown on the Construction Drawings, pipe joints may be either mechanical joint or push-on joint.
2. Fitting joints shall be mechanical joint, unless specified otherwise.

D. Rubber gaskets, lubricants, gland, bolts and nuts: ANSI A21.11

2.02 POLY (VINYL CHLORIDE) (PVC) SEWER PIPE

A. Gravity Sewer Pipe and Fittings:

1. Pipe 15" diameter and smaller: ASTM D3034, minimum SDR-35.
Min. lateral size = 6" diameter.
2. Pipe 18" to 27" diameter: ASTM F679.
3. Flexible Elastomeric Seals: ASTM D3212
Seal Material: ASTM F477
4. Where specifically approved by the Municipality, pipe 15" and smaller: ASTM F789 may be substituted.

B. Pressure Sewer Pipe and Fittings:

1. Pressure-Rated:
 - a. ASTM D2241, Pressure rating as indicated on the Construction Drawings, 125 psi minimum.
2. Schedule-Rated:
 - a. ASTM D1785, Schedule rating as indicated on the Construction Drawings, Schedule 40 minimum.
3. Dimension-Rated:
 - a. AWWA C900, DR 18 minimum (150 psi), for 4" diameter and larger.
 - b. AWWA DR 21 minimum (200 psi), for 2" diameter and smaller.
4. Flexible Elastomeric Seals: ASTM D3139
Seal Material: ASTM F477

2.03 CAST IRON SOIL PIPE (PLUMBING)

A. Pipe and Fittings: ASTM A74, Service Class

1. Hub and spigot or double hub

B. Joints

1. Gaskets: Double-seal compression gaskets conforming to physical requirements of ASTM C564.

2.04 STEEL CASING PIPE: Section 02150

2.05 FLEXIBLE COUPLINGS: Leakproof, PVC compound with stainless steel clamps suitable for the pipe materials as manufactured by Fernco, Inc., Davison, MI, or approved equal.

2.06 CLEANOUTS

A. Cleanout riser pipe and fitting shall be PVC SDR 35.

B. Cleanout caps:

1. Brass - Style A as manufactured by the General Engineering Company (GENECO), Frederick, MD, or approved equal.

2. PVC- Schedule 40

2.07 DETECTABLE WARNING TAPE

A. Detectable warning tape shall consist of a minimum thickness of 0.5 mils solid aluminum foil core running the full length and width encased in a protective, high visibility, green color coded inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil. Foil to be visible on unprinted side. Tape width shall be a minimum of 6 inches and have the words "Caution Buried Sewer Line Below" imprinted on the color side. Tape shall meet Office of Pipeline Safety regulations, U.S. Department of Transportation, USAS Code B31.8.

2.08 VALVES

A. Plug valves

1. Plug valves shall be of the non-lubricated, eccentric type, and shall be designed for a working pressure of 175 psi for valves 12" and smaller. Valves shall be of round port design. If a rectangular style design is employed, port area shall be a minimum of 100% of the corresponding pipe area.

2. Valves shall provide tight shut-off with rated pressure from either direction, where required. The plug valves shall be manufactured by Dezurik of Sartell, MN, Keystone Valve of Houston, TX, or approved equal.

3. Plug valves shall be furnished with replaceable permanently lubricated sleeve-type 18-8 stainless steel bearings in the upper and lower journals. Valve seats shall be nickel with raised surface completely covered to ensure that the plug face contacts only nickel.

4. Manual gear operators shall be totally enclosed worm and gear type, permanently lubricated. Manual operator components shall withstand, without damage, a pull of 80 to 200 lbs. on the handwheel, with buried service gear units capable of withstanding input torque on the operating nut as required by AWWA C504, Section 3.8.3 and AWWA C507, Section 11, Paragraph 11.9. Gear segment shall be of ductile iron, ASTM A536, Grade 56-45-12 supported on bronze bushings.

5. Plug valves shall be tested in accordance with AWWA C504, Section 5. The leakage test shall be applied to the face of the plug tending to unseat the valve. Certified copies of reports covering proof of design testing as described in Section 5.5 shall be provided to the Engineer.

B. Combination Air Release Valves

1. Cast iron body and cover, stainless steel float, orifice seat, linkage mechanism, mountings and trim. Buna-N orifice valve. 150 psi minimum rated working pressure.
2. Orifice size as indicated on Construction Drawings.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Perform trench excavation as specified in Section 02221.
- B. Unless otherwise required by the Municipality, provide for a minimum cover of 4 feet above the top of pipe laid in trenches in non-traffic areas, and 5 feet in traffic areas.
- C. Provide Type IV bedding as specified in Section 02221. Place so that the pipe can be laid to the required tolerances in accordance with ASTM D2321.
- D. Provide Type V bedding for 2" diameter and smaller pressure sewers, unless otherwise specified in Construction Drawings.

3.02 LAYING PIPE IN TRENCHES

- A. Give ample notice to the Engineer in advance of pipe laying operations, minimum twenty-four hours.
- B. Maintain no less than three batter boards or their equivalent between adjoining manholes during pipe laying operations, or use laser alignment instruments.
- C. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe or fittings.
- D. Lay pipe proceeding upgrade with the bell or groove pointing upstream.
- E. Lay pipe to a true uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.
- F. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

G. Clean and inspect each section of pipe before joining. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Use lubricant recommended by the pipe and fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe cannot be fully inserted into the bell, disassemble joint, inspect for damage, reclean joint components, and reassemble joint.

H. Assemble joints in accordance with recommendations of the manufacturer.

1. Push-on joints:

- a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.
- b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.
- c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.

2. Mechanical joints:

- a. Wash the socket and plain end. Apply a thin film of lubricant. Slip the gland and gasket over the plain end of the pipe. Apply lubricant to gasket.
- b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.
- c. Slide the gland into position, insert bolts, and finger-tighten nuts.
- d. Bring bolts to uniform tightness. Tighten bolts 180° apart, alternately.

Torque Required:

<u>Bolt Size, In.</u>	<u>Torque, Ft.-Lbs.</u>
5/8	45 - 60
3/4	75 - 90
1	100 - 120

3. Solvent cemented joints - not permitted.

4. Coupled joints - Assemble in accordance with the manufacturer's recommendations.

I. Disassemble and remake improperly assembled joints using a new gasket.

- J. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed grade as shown on the Construction Drawings, or deflection of pipe joints, will be cause for rejection.
- K. Place sufficient compacted backfill on each section of pipe, as it is laid, to hold firmly in place.
- L. Clean interior of the pipe as work progresses. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.
- M. Keep trenches and excavations free of water during construction.
- N. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.
- O. Deflection:
 - 1. When it is necessary to deflect pressure sewer mains from a straight alignment horizontally or vertically, do not exceed the following limits:
 - a. Ductile Iron Pipe: <12" diameter - 5° maximum deflection per joint
>12" diameter - 3° maximum deflection per joint
 - b. PVC Pipe: 4° maximum deflection per joint.
- P. Make connections in accordance with the Construction Drawings, and perform any adjustments and ensure a watertight installation. Connections to the existing sewers shall be made under the direct observation of the Municipality or his authorized representative. Do not permit any water, earth, debris or other materials to enter the existing sewer system.
- Q. As soon as connections are completed, install an adequately sized plumber's stopper in the existing manhole and brace to prevent a "blowout". The stopper is to prevent flow from the new line from entering the existing system and it shall not be removed until written authorization to do so is given by the Municipality. Routinely remove any accumulated ground and surface water from the line upstream and shall be totally responsible for any damages to existing facilities.

3.03 WYE BRANCHES AND TEES

- A. Install wye branches at locations designated concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed.
- B. For taps into an existing pipeline, install a wye with stainless steel clamps and watertight resilient boot.

- C. Where specifically approved by the Municipality, for taps into an existing pipeline, use a saddle wye or tee with stainless steel clamps or core drill pipe and install watertight resilient boot. Mount saddles with gasket and secure with metal bands. Lay out holes with a template and cut holes with a mechanical hole cutter.
- D. Where lateral is not to be installed, install an approved watertight plug, braced to withstand pipeline test pressure thrust.

3.04 LATERALS

- A. Construct laterals from the wye branch to a terminal point in accordance with Standard Detail 02610-1 or 02610-2 as specified. Lateral risers are not permitted.
- B. Install an approved watertight plug, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary marker stake (minimum 2" x 2") extending from the end of the lateral to 1 foot above finished grade.
- C. Laterals shall be installed at a slope of 1/8"/ft. (6" diameter) from the main to the cleanout or plug. The minimum depth under streets shall be 5'. Any deviations must be approved by the Engineer prior to installation.

3.05 CAST-IN-PLACE CONCRETE CONSTRUCTION

- A. Conform to the applicable requirements of Section 03050.

3.06 CRADLES AND ENCASEMENT

- A. Provide concrete cradles and encasement for pipeline where indicated on the Construction Drawings, or as directed by the Engineer, and in accordance with Standard Detail.

3.07 THRUST RESTRAINT FOR PRESSURE PIPELINES

- A. Provide all valves, tees, bends, caps, and plugs with concrete thrust blocks in accordance with Standard Detail 03050-3. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks to contain the resultant force and so pipe and fitting joints will be accessible for repair.
- B. Furnish and install, tie rods, clamps, set screw retainer glands, or restrained joints if indicated on the Construction Drawings or required by the Municipality. Protect metal restrained joint components against corrosion by applying a bituminous coating.

3.08 COMBINATION AIR VALVES

- A. Orient, locate and install air release or combination air release valves on force mains where shown on the Construction Drawings.
- B. Construct air release valves including valve vault. Valve and valve vault shall be vertical and plumb.

C. During project start-up, verify that there are no leaks in saddle or plumbing. Verify correct function of valves.

D. Pipe penetrations shall have a manhole boot-type seal.

3.09 CARRIER PIPE IN CASINGS: Section 02150

3.10 STREAM CROSSINGS

A. Construct sanitary sewer pipeline stream crossings in accordance with Standard Detail.

B. Provide concrete encased ductile iron pipe backfilled with minimum 3" size stone to the level of the stream bed, between the limits of the stream crossing.

3.11 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after examination of pipe by the Engineer.

B. Backfill trenches as specified in Section 02221.

C. Install the detectable warning tape along the entire length of PVC force main on top of the pipe bedding but no deeper than 48 inches below finished grade. The pipe bedding (12" cover) shall maintain sufficient separation between the tape and the line.

3.12 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

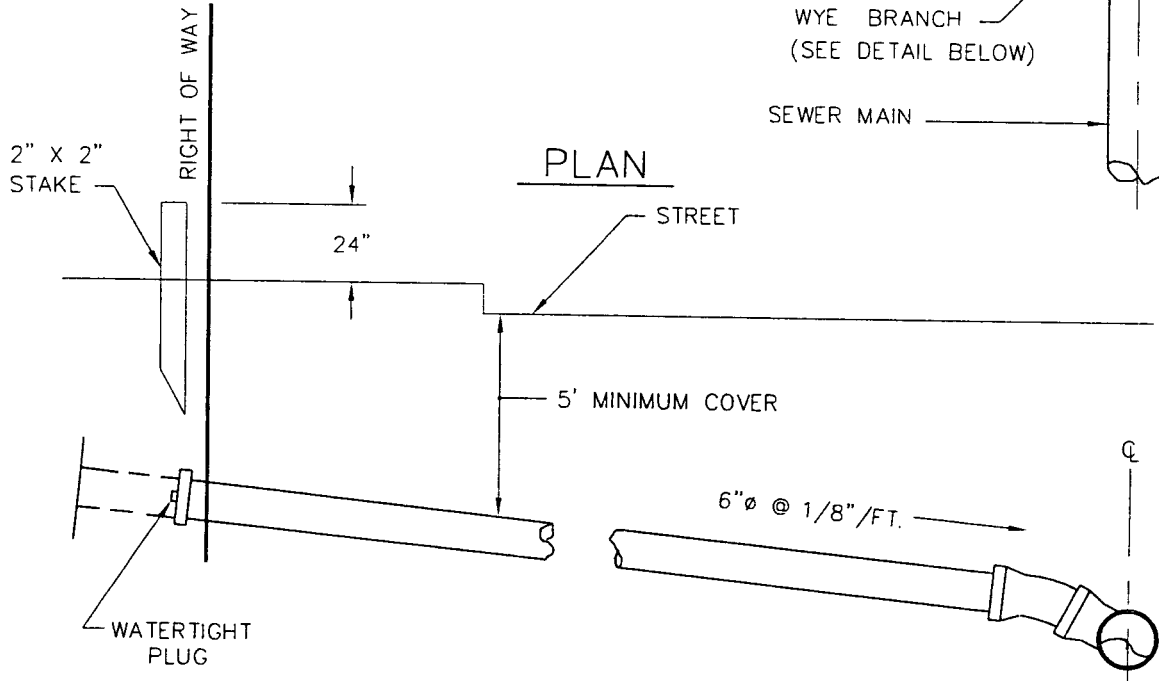
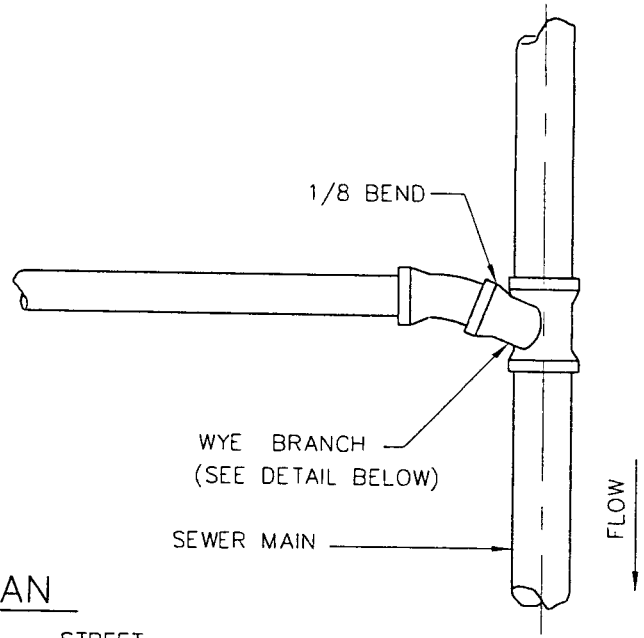
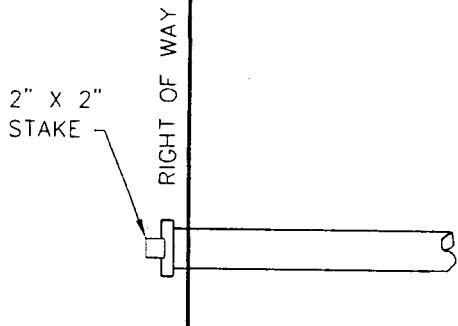
B. Restore other areas in accordance with local regulations.

3.13 BYPASS PUMPING

A. Provide one (1) reliable pump capable of handling the existing wastewater flows and daily fluctuations and enough discharge piping to bypass pump from upstream manhole to downstream manhole. Provide one (1) backup pump on-site or provide evidence of ability to obtain backup pump within 30 minutes in case of pump failure. Bypass pumping system shall not allow backup in collection system beyond two (2) manholes. Bypass piping shall be watertight and not allow any discharge to the surface. Any leaks in the system will be just cause to discontinue bypass operation and pipe installation and tie piping back into gravity flow.

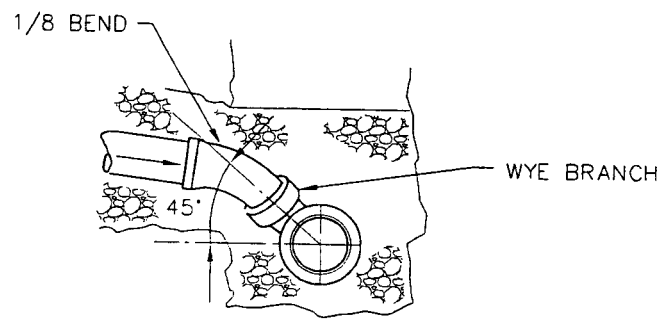
B. At the end of each workday, the bypass pumping shall stop and the new PVC piping shall be connected to the existing piping with a watertight flexible coupling. All trenches shall be properly backfilled and compacted except in the immediate area of the tie-in. Open trenches in traffic areas shall be protected with jersey barriers and steel plating and all trenches shall be protected with construction fencing.

END OF SECTION



PLAN

ELEVATION



DETAIL

NOTE: NOT TO SCALE

RED LION BOROUGH CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION BOROUGH
CENTER SQUARE, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475 FAX: (717)246-0455

LATERAL DETAIL

DATE:	9/2005
DRAWN BY:	APS
CHK. BY:	SJS
NO.	02610-1

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CLEANOUT
CAP

WATERTIGHT
PLUG

RIGHT OF WAY

CURB LINE

PLAN

WYE BRANCH
(SEE DETAIL BELOW)

SEWER MAIN

FLOW

CLEANOUT
CAP

WATERTIGHT
PLUG

RIGHT OF WAY

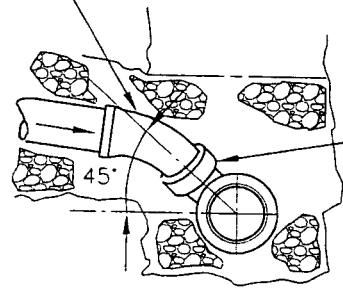
STREET

5' MINIMUM COVER

ELEVATION

6" Ø @ 1/8" / FT.

1/8 BEND



WYE BRANCH

45°

DETAIL

NOTE: NOT TO SCALE

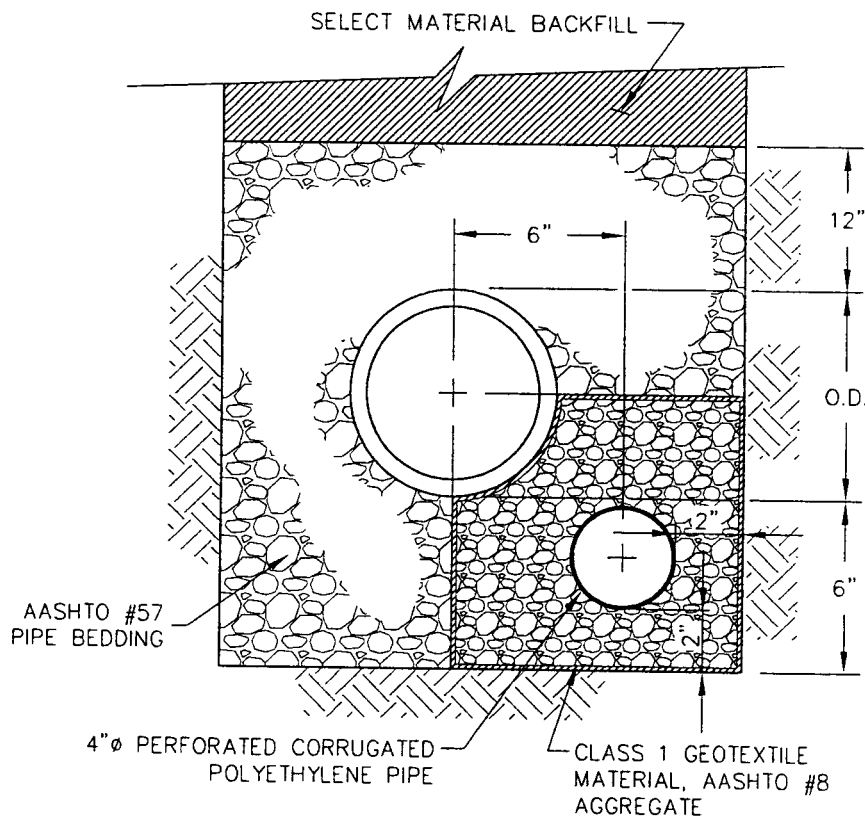
RED LION BOROUGH CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION BOROUGH
CENTER SQUARE, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475 FAX: (717)246-0455

LATERAL DETAIL
WITH CLEANOUT

DATE:	9/2005
DRAWN BY:	APS
CHK. BY:	SKA
NO.	02610-2

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NOTE:
 LOCATION OF SUBBASE DRAIN IN TRENCH TO BE MODIFIED TO SUIT FIELD CONDITIONS AND TIE INTO INLETS MANHOLES, OR OTHER EXISTING PIPING. POSITIVE FLOW MUST BE MAINTAINED.

NOTE: NOT TO SCALE

RED LION BOROUGH CONSTRUCTION & MATERIALS SPECIFICATIONS

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SUBBASE DRAIN DETAIL

DATE:	9/2005
DRAWN BY:	JLD
CHK. BY:	SV7
NO.	02610-3

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