

PINE HILL BOROUGH MUNICIPAL UTILITIES AUTHORITY  
TECHNICAL SPECIFICATIONS  
WITH  
ENGINEERING DRAWINGS  
FOR  
WATER DISTRIBUTION  
AND  
SANITARY SEWER SYSTEMS

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## PREFACE TO SPECIFICATIONS

### 1.0 PURPOSE AND SCOPE

The purpose of this document is to set forth the rules, regulations, and standards to guide Applicants, Developers and Builders in the service area of the Pine Hill Borough Municipal Utilities Authority (hereinafter called the AUTHORITY), so as to promote the public health, safety, convenience, and general welfare of the municipality. These rules and specifications shall be administered by the AUTHORITY to ensure the orderly growth, development, and construction of both the water distribution and sanitary sewer systems, in accordance with the requirements of the New Jersey Department of Environmental Protection and of the AUTHORITY.

These specifications are addenda to the regularly adopted rules and regulations of the AUTHORITY. They supersede and compliment all prior rules and regulations. Any alleged conflict between any of the articles or paragraphs or rules and regulations of the AUTHORITY will be interpreted by the AUTHORITY and the AUTHORITY'S interpretation and ruling shall be final. These regulations, administered by the AUTHORITY, are minimum requirements. They are intended to apply to the usual conditions encountered during design and construction. These specifications are subject to amendment for exceptional situations. The AUTHORITY reserves the right to specify greater or less stringent requirements in any case, in their judgment, to be in the best interest of the community.

Prior to commencement of any detailed design for any water main or sanitary sewer system, it is advisable to prepare preliminary reports and plans, and in turn schedule a meeting with the AUTHORITY and/or its ENGINEER for the purpose of review and discussion of the proposal. At this time, the AUTHORITY will make comments and/or provide pertinent data applicable to these plans. The AUTHORITY will also provide the forms and information necessary to obtain approval for construction of the new facilities.

The AUTHORITY recognizes the fact that questions may arise during the planning, construction and/or testing phases of water and/or sanitary sewerage development that may or may not be covered by specifications, rules, or regulations. In these cases, the AUTHORITY will take whatever action is necessary to either clarify the meaning of the specifications or provide direction or information necessary for the Applicant, Developer, Builder or Contractor to understand and meet AUTHORITY requirements.

## 2.0 WATER DISTRIBUTION SYSTEMS

Water mains are installed to provide a means for conveying water from the wells or storage tanks to some distant point where it may be used for human consumption, fire protection, and flushing, or for many other purposes. Since this water is used for human consumption, among other things, the necessity for safe potable water is easily recognized.

In order to provide a water distribution system of high reliability, the construction of same must be inspected to ensure that all rules and regulations are being met and that workmanship in general meets minimum specifications requirements. After construction has been completed and before the lines are placed into service, all lines must pass a chlorine residual test, a pressure test, and a bacteriological test. The Contractor shall provide all test results to the AUTHORITY and the ENGINEER.

It shall be clearly understood that during construction of the water distribution system NO contractor or his representative shall open or close any valve existing or newly installed which will affect the existing AUTHORITY water distribution system. No new water distribution system shall be flushed without first notifying the AUTHORITY. No fire hydrants shall be opened without permission from the AUTHORITY. Any flushing of water system will be metered, and the contractor billed for water usage.

It shall be the responsibility of the Applicant, Developer or Owner to maintain these lines after preliminary inspection has been completed and the water mains activated. The AUTHORITY, however, reserves the right to direct the responsible party to have the water mains retested when, in the opinion of the AUTHORITY, the water mains or appurtenances have been subjected to stresses or damage to such a degree that retesting is deemed necessary.

Once all construction has been completed but prior to the AUTHORITY accepting the lines, an inspector from the AUTHORITY will perform a final inspection of all water boxes and valves to see that they are physically sound and to proper grade. All hydrants and valves will be inspected and tested to see that they operate properly and that all valves are accessible. Should any problems be encountered during this inspection, it will be the Developer's or Owner's responsibility to make the necessary repairs and/or replacements.

### 3.0 SANITARY SEWER SYSTEM

Sanitary sewer collection systems and pumping stations are installed to provide a means of conveying wastewater from its source of origin to a wastewater treatment plant. Wastewater is essentially the water supply of the community after it has been fouled by a variety of uses. Wastewater contains organic materials and numerous pathogenic or disease-causing organisms which must be immediately and safely removed from its source of origin.

In order to provide a wastewater collection system which will function properly for many years, the design must be reviewed, evaluated and approved by the AUTHORITY prior to construction. During the period of construction, the AUTHORITY will perform inspections during the installation of all approved sewer systems.

Once all construction has been completed, but prior to the AUTHORITY accepting the lines, the lines will be air tested for infiltration and exfiltration. Should any problem be encountered during the tests or any other facet of the installation process, it will be the Applicant, Developer's or Owner's responsibility to make the necessary repairs and/or replacements.

SECTION I  
GENERAL SPECIFICATIONS

1.0 PURPOSE AND SCOPE

These specifications are intended as a guide for Applicants, Developers and Builders within the Borough. They are addenda to the regularly adopted rules and regulations of the AUTHORITY, and represent the minimum acceptable requirements. The AUTHORITY reserves the right to specify greater or less stringent requirements in any case, in their judgment, to be in the best interest of the AUTHORITY.

The AUTHORITY recognizes the fact that questions may arise during the planning, construction, and/or testing phases of a project that may or may not be covered by these specifications. In these cases, the AUTHORITY will take whatever action is necessary to either clarify the meaning of the specifications or provide the necessary information for the Applicant, Builder, Contractor or Developer to understand and meet the AUTHORITY'S requirements.

Whenever and wherever the term "Standard Specifications" is used in these specifications, it shall mean the current edition of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction.

Whenever and wherever the term "ENGINEER" is used in these specifications, it shall mean the ENGINEER duly appointed by the AUTHORITY.

2.0 PRODUCT DATA

2.01 GENERAL

- A. Submit to the AUTHORITY shop drawings, product data and samples required by the specification sections.
- B. All shop drawings, product data and samples shall be reviewed and approved by the Design Engineer prior to submission to the AUTHORITY.
- C. Schedule submission for shop drawings, product data and samples at least twenty-one (21) days before reviewed submittals will be needed.

2.02 SHOP DRAWINGS

- A. Original drawings, prepared by Contractor, subcontractor, supplier, or distributor, which illustrate some portion of the work; showing fabrication, layout, setting or erection details.
- B. Minimum sheet size: 8 ½" x 11".

2.03 PRODUCT DATA

- A. Preparation:
  - 1. Clearly mark each copy to identify pertinent products or models.
  - 2. Show performance characteristics and capacities.
  - 3. Show dimensions and clearances required.
  - 4. Show wiring or piping diagrams and controls.

- B. Manufacturer's standard schematic drawings and diagrams:
  - 1. Modify drawings and diagrams to delete information not applicable to the work.
  - 2. Supplement standard information to provide information specifically applicable to the work.
- C. Manufacturer's catalog sheets, brochures, diagrams, illustrations and other standard descriptive data:
  - 1. Clearly mark each copy to identify pertinent materials, products or models.
  - 2. Show dimensions and clearances required.

#### 2.04 SAMPLES

- A. Office samples:

Of sufficient size and quantity to clearly illustrate:

- 1. Functional characteristics of product or material with integrally related parts and attachment devices.
- 2. Full range of color, texture, and pattern.
- 3. After review, samples will be retained by ENGINEER. Upon completion of the work, Contractor may submit written request for return of samples.

#### 2.05 MANUFACTURER'S RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission.
- B. Determine and verify:
  - 1. Field measurements.
  - 2. Field construction criteria.
  - 3. Catalog numbers and similar data.
  - 4. Conformance with specifications.
- C. Coordinate each submittal with requirements of the work and of the AUTHORITY'S standards.
- D. Contractor's responsibility for errors and omissions in submittals is not relieved by the AUTHORITY'S or ENGINEER'S review of submittals.
- E. Contractor's responsibility for deviation in submittals from requirements of AUTHORITY'S specifications is not relieved by the AUTHORITY'S or ENGINEER'S review of submittals, unless the AUTHORITY gives written acceptance of specific deviations.

#### 2.06 SUBMISSION REQUIRMENTS

- A. Make submittals so as to cause no delay in the work or in the work of any other Contractor.
- B. Number of submittals required:

Shop drawings: submit the number of opaque reproductions which the Contractor requires, plus three (3) copies, two of which will be retained by the ENGINEER and one by the AUTHORITY.



C. Accompany submittals with transmittal letter, in duplicate, containing:

1. Date of submission and dates of any previous submissions.
2. Project title and number.
3. Contractor's name and address.

D. Submittals shall include:

1. Date and revision date.
2. Project title and number.
3. The names of:
  - a. Design Engineer.
  - b. Contractor.
  - c. Subcontractor.
  - d. Supplier.
  - e. Manufacturer.
  - f. Separate details when pertinent.
4. Identification of product or materials.
5. Field dimensions, clearly identified as such.
6. Specification section number.
7. Relation to adjacent or critical features of the work or materials.
8. Applicable standards, such as AWWA, ASTM or Federal specification numbers.
9. Identification of deviations from AUTHORITY standards.
10. Identification of revision on resubmittals.
11. Any 8" by 3" blank space for Contractor and ENGINEER stamps.
12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and of the AUTHORITY'S standards.
13. Design Engineer's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and of the AUTHORITY'S standards.

### 3.0 INSPECTIONS

The AUTHORITY requires forty-eight (48) hours notice for utility markouts, except in case of emergency condition.

The ENGINEER'S Inspection Department shall be notified at least forty-eight (48) hours in advance that inspection is required. Notification may be made either in writing or verbally, but in either instance, notification must be received by Inspection Dept. prior to the said forty-eight (48) hours.

A. Written notification shall be directed to:

Pine Hill MUA  
907 Turnerville Road  
Pine Hill, NJ 08021

Pennonni Associates, Inc.  
515 Grove Street, Suite 20  
Haddon Heights, NJ 08035

Atten: Executive Director

Attn: Chief Inspector

B. Verbal notification shall be made to the above at:

(856) 783-0739

(856) 547-0505

The request for inspection is the direct responsibility of the Developer or Builder and should they neglect to request same (or request same less than 48 hours prior to need, and inspection cannot be scheduled), all work accomplished without inspection will automatically be considered unacceptable. Extreme care should be taken to avoid this situation since:

1. All construction not accessible for complete visual inspection must be re-established in such a manner as to allow for same before it will be accepted.
2. All construction which is subject to curing and hardening and/or which must be compacted (e.g. Portland grade, etc.) must be tested in such a manner as to allow for complete evaluation before it will be accepted.
3. A complete schedule of the required tests, examinations, etc. required in specific instance will be provided by this office.

The work described in 1, 2, and 3 above must be done at the Developer's or Builder's expense since, by proceeding without inspection, they will have assumed the total burden of proof of acceptability of the subject construction.

#### 4.0 TRENCH EXCAVATING, BACKFILLING AND COMPACTING

##### 4.01 DESCRIPTIONS

A. Description of the work:

Trenching, backfilling, and compaction includes, but is not limited to:

1. Excavation for trenches and trench backfilling;
2. Rough and finish grading of the work; and
3. Furnishing and installing trench stabilization material and select backfill material.

B. Definitions:

1. Trench excavation: removal and disposal of all material encountered when establishing required grade elevations, including pavements, concrete slabs and other obstructions.
2. Unauthorized excavation: removal of materials beyond specified subgrade elevations without approval of the Engineer.

##### 4.02 MATERIALS

A. Trench backfill material from on-site excavation:

All on-site backfill materials shall be subject to the approval of the Engineer, and to the following requirements:

1. Free from deleterious substances, stumps, brush, weeds, roots, sod, rubbish, garbage and matter that may decay.
  2. Backfill to a height of two feet (2') above the top of pipes, culverts and other structures with material free from stones or rock fragments larger than two inches (2") in greatest dimension.
  3. Free of large rocks or lumps that, in the opinion of the Engineer, may create voids or prevent proper compaction.
- B. Select backfill material: Select backfill material shall be as designed on the plans. Soil aggregate select backfill materials, when designated, shall conform to the Standard Specifications.
- C. Stone for trench stabilization material for bedding under pipes and structures shall be broken stone conforming to the Standard Specifications. Size shall be as shown on the plans.
- D. Other materials: All other materials, not specifically described but required for a complete and proper installation shall be as selected by the Contractor and approved by the Engineer.

#### 4.03 METHODS OF CONSTRUCTION

A. Requirements of regulatory agencies:

1. Prior to excavating any street, sidewalk, or other area within Borough, County, or State right-of-way, the contractor shall obtain any required permits/approvals. No excavations shall be left open after normal working hours unless approved by the Engineer.
2. All excavations shall be in compliance with Federal Occupational Safety and Health Act and Rules and Regulations of the State of New Jersey Department of Labor and Industry, Bureau of Engineering and Safety, N.J.A.C. 12:180.
3. Any excavation below 4-feet must use OSHA compliant shoring or sloping.
4. Excavation work shall be in compliance with applicable requirements of other governing authorities having jurisdiction.

B. Reference standards included in this specification section:

1. New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as currently revised.
  - a. Aggregate, Coarse.
  - b. Broken Stone.
  - c. Soil Aggregate.
2. American Society for Testing and Materials (ASTM):
  - a. D-1556-64 (Reapproved 1974): Density of Soil in Place by the Sand-Cone Method.
  - b. D-1557-78: Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. Rammer and 18-inch Drop.
  - c. D-2049-69: Relative Density of Cohesionless Soils.
  - d. D-2922-78: Density of Soil and Soil Aggregate in-place by Nuclear methods (Shallow Depth).

C. Submittals:

Test reports: When directed by the Engineer, submit test reports on all select backfill material in accordance with the following standards.

Particle Size Analysis of Soils: ASTM D-422-63 (82).

D. Job Conditions:

1. Existing utilities: Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.
- E. Use of explosives: The use of explosives is not permitted unless approved by the Authority
- F. Protection of persons and property:
1. Traffic Safety must conform to NJDOT and MUTCD (Manual on Uniform Traffic Control Devices) requirements.
  2. Barricade open excavations occurring as part of this work and post with warning lights as required to protect persons on site. Operate warning lights as recommended by authorities having jurisdiction.
  3. Protect trees, shrubs, lawns and other features remaining as part of final landscaping.
  4. Protect structure, utilities, sidewalks, pavement, sand and other facilities from damage caused by settlement, lateral movement, undermining, washout & other hazards created by earthwork operations.
  5. In the event of damage, immediately make all repairs and replacements to the approval of the Engineer at no cost to the Owner.
- G. Dust control: Use all means necessary to control dust on and near the work if such dust is caused by the Contractor's operations during performance of the work or if resulting from the conditions in which the Contractor leaves the site.
- H. Weather conditions: Do not place, spread, roll or compact fill material during freezing, raining or otherwise unfavorable weather conditions. Do not resume work until conditions are favorable as determined by the Engineer.
- I. Inspection by Contractor: Examine the areas and conditions under which trenching, backfilling, compacting and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- J. Preparation:
1. Prior to commencement of work, establish location and extent of all utilities in the work areas. Maintain and protect, as required, existing utilities which pass through the work area.
  2. Prior to excavation in pavement areas, cut existing pavement vertically with a sharp tool on a straight line to the limits of excavation shown on the plans or as directed by the Engineer. Maintain cut straight and neat, or recut and dress as directed by the Engineer.
- K. Lines and depth:
1. Trenches shall be excavated along the lines and at a depth necessary for laying the pipe to the grade given, as designated by the Engineer. Excavation shall not be carried below the required level except where unstable soil is encountered. Whenever excavation has been made below the required level, it shall be replaced with  $\frac{3}{4}$  inch crushed stone and shall be thoroughly tamped. The Engineer shall determine the depth of removal of unstable soil encountered.
  2. Excavation for manholes and other structures shall have a twelve inch (12") minimum clearance and twenty-four inch (24") maximum clearance on all sides. The width of trenches for pipe shall equal the pipe outside diameter plus two feet (2') unless otherwise provided by the Engineer. Excavations shall be confined within the narrowest possible limit and made as nearly as possible in a vertical line, and any sheathing, shoring, bracing and timbering which is necessary to obtain this result shall be done as hereinafter specified.
  3. Preliminary excavation shall be made only to a depth of three inches (3") above the final depth of any trench or other excavations. The remaining depth shall be carefully excavated, shaped, and formed

with hand tools immediately preceding laying of pipe or placing concrete. Trench bottoms shall be accurately formed to receive and support the bottom of the barrel of the pipe. Additional excavation shall be made in pipe trenches at the pipe joints and to prevent any possibility of a pipe resting on the bell rather than the barrel.

4. In rock, the bottom shall be excavated six inches (6") below the normal support grade and refilled with compacted granular material.

L. Materials excavated:

1. The materials excavated shall be stored compactly on the side of the trench and kept trimmed to be of as little inconvenience as possible to travel and adjoining properties. All streets shall be kept open for travel unless otherwise directed by the Engineer. All bituminous gravel, stone surface, gravel base course and topsoil shall be kept separate from other excavated materials and shall be used as the final layer in the backfill operation where appropriate.
2. Before excavating any existing surface, topsoil shall be stripped to a minimum depth of six inches (6") and stored for reuse as final grade where planting is proposed.
3. The Contractor shall not remove from the site any sand, gravel or other soil excavated from the trench which may be suitable for backfilling until backfilling is completed.
4. Surplus material remaining after the proper backfilling of trenches shall be used to fill in low areas or where shown on the profiles. Other surplus material shall be transported and placed by the Contractor at his expense, at a location within the Borough as determined by the Engineer.

M. Removal of water:

1. The Contractor shall at all times provide and maintain ample means and devices to promptly remove and disperse all water or sewage entering excavations and structures. Excavations shall be kept dry until all work therein is completed.
2. The Contractor shall dispose of the water from the trenches and excavation in a manner satisfactory to the Owner, Developer and/or AUTHORITY inspector, without damage to adjacent property. In no case, shall water or sewage be allowed to enter new lines.
3. If groundwater and subsoil conditions along the line of the work are such that the Contractor cannot successfully remove water or provide a stable trench by ordinary trench pumping and bailing, or when necessary to protect the work, workmen, public, under or above ground utilities and structures, pavements and public and private property, the Contractor shall, where designated by the Engineer, furnish and provide the necessary equipment, power and labor to employ the well point method of trench dewatering. The well point system or portions thereof shall be removed by the Contractor upon the completion of backfill, and the holes remaining from the points shall be backfilled and thoroughly compacted.

N. Shoring and sheathing:

1. The Contractor shall be responsible for the installation of shoring and sheathing on all faces of the excavation where it is necessary to ensure a suitable, dry, and/or safe excavation, to eliminate settlement of, or damage to structures or items adjacent to the excavation, to preserve the bearing capacity of the soil, to keep the excavation within the narrowest possible limits, to protect work from damage, and to provide conditions acceptable to the Engineer and all interested agencies.
2. Bracing shall be installed so that there is no stress on or displacement of any part of the completed work until the construction thereof has proceeded far enough to provide the necessary strength, as determined by the Engineer.

3. Any damage to pipelines, road structures, etc., occurring through settlement, soil pressure, cave-ins, shift of sheathing, or any other causes associated with the Contractor's activities, shall be repaired or the damaged items replaced by the Contractor without cost thereof to the respective owners.

O. Backfill and compaction:

1. After each joint has been made, inspected, and approved, backfill shall proceed immediately. The space between the pipe and the bottom sides of the trench shall be backfilled by hand and thoroughly compacted with a light tamper. Fill shall be placed uniformly on both sides of the pipe in six-inch (6") layers using the material obtained from on-site excavating, except use select backfill material where indicated on the plans or as directed by the Authority's inspector.
2. Backfill to a height of two feet (2') above the top of the pipe with earth free from stones, rock fragments, dirt clods or frozen material greater than two inches (2") in largest diameter, and thoroughly compact.
3. The remainder of the trench shall be backfilled in twelve-inch (12") layers, loose measure, each layer thoroughly compacted. Dampening of the material to be compacted may be required by the Engineer.
4. In light soils such as sand, loam, or light gravel, the trench may be backfilled carefully with a front end loader at a maximum rate of one cubic yard per load. Each load shall be placed immediately on the previous load.
5. Backfilling prior to approvals:
  - a. Any work enclosed or covered up before it has been approved will be considered unacceptable.
  - b. The Contractor shall, at his own expense, uncover all such work for inspection and approval prior to backfilling.

5.0 CONCRETE ENCASEMENT

5.01 DESCRIPTION

- A. Provide concrete encasement in areas designated on plans, or as directed by the Engineer.

5.02 MATERIALS

- A. Concrete:
  1. Use concrete developing a minimum compressive strength of 3,000 psi at twenty-eight (28) days.
  2. Use air-entrained concrete.
  3. Cement, aggregates, water and air-entrainment methods and materials shall comply with the Standard Specifications.

5.03 METHODS OF CONSTRUCTION

- A. Reference standards included in this specification section (New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction as currently revised):
  - a. Portland Cement, Mortar and Grout Concrete.
  - b. Concrete Structures.

B. Submittals:

Certificates: All deliveries of concrete shall be accompanied by delivery slips, copies of which shall be provided to the Engineer by the Contractor.

C. Location:

1. Provide concrete encasement in areas designated on plans.
2. Notify the Engineer when the following conditions are encountered. Subject to the Engineer's approval, concrete encasement shall be provided at these locations. All materials, methods and equipment shall be subject to the approval of the Engineer.
  - a. At all locations where a proposed sanitary sewer main is located closer than ten feet (10') to a water main (measured horizontally).
  - b. At all crossings of sanitary sewer lines and water lines where the vertical separation is less than eighteen inches (18").
  - c. At all other locations where the vertical or horizontal separation between proposed and existing utility pipes is less than eighteen inches (18").
3. Concrete encasement shall conform to the plan details. When a situation is encountered for which there is no plan detail, concrete encasement shall conform to the following requirements or as otherwise approved by the Engineer.
  - a. Minimum thickness: Six inches (6").
  - b. Length: At utility crossings, extend concrete encasement a minimum of ten feet (10') on both sides of the center line of the crossing. At all other locations, extend concrete encasement until the allowable vertical or horizontal separation between utility pipes is achieved.
  - c. Concrete-encased pipe shall be ductile iron. At a minimum, the ductile iron pipe will extend 6-feet beyond the end of the encasement to protect against a shear failure. Greater distances may be required at the discretion of the Engineer.

D. Performance:

The method of construction for concrete encasement shall conform to the Standard Specifications except as modified by the Supplemental Requirements below:

Earth cuts may be used as forms provided the horizontal and vertical earth surfaces can be shaped to the proper dimensions.

## SECTION II

### WATER DISTRIBUTION SYSTEMS SPECIFICATIONS

#### 1.0 GENERAL

##### 1.01 MISCELLANEOUS CONSTRUCTION NOTES

- A. Water mains shall be laid in straight lines except when otherwise specifically approved by drawings or directed by the Authority Inspector. When deviation from a straight line is permitted, the deflection of each joint shall not exceed the manufacturer's recommended maximum for the type of joint and size of pipe being installed. Pipe shall be laid with at least four feet (4') of cover over the pipe to proposed finished grade or to the future finished grade when such is lower. Along extensions of roads which are unimproved, the pipe shall be laid with at least five feet (5') of cover over the top of the pipe to the existing grade. The depth of pipe may be increased locally to pass obstructions. Grade changes shall be accomplished by fittings and/or dividing the necessary deflection among several joints, but shall not be greater than the maximum deflection recommended by manufacturer and as approved by the inspector.
- B. Special care shall be exercised to remove all dirt, stones and other materials from each pipe as it is laid, and to prevent any such materials from entering the pipeline. The Contractor shall see that the entire line is maintained absolutely clean on the inside and that all valves and hydrants are clean and in good working order when installed. Open ends shall be adequately protected at all times and shall be securely sealed with approved plugs whenever work is stopped for any reason whatsoever. After removing a plug, the interior of the pipeline shall be inspected and cleaned before resuming pipe laying operations.
- C. Before placing each length of pipe, the Contractor shall carefully examine it for breaks, cracks or other defects and shall discard any sections which appear in any way to be defective. All pipe and fittings shall be handled and installed with care to avoid damage.
- D. Each section of pipe shall be solidly bedded in the trench bottom and shall be supported for its full length.
- E. Before making a connection, the ends of the pipes and all joint members shall be thoroughly cleaned. All mating shall be done in strict accordance with the manufacturer's recommendations and the requirements of the Authority Inspector.
- F. The Contractor shall do all necessary pipe cutting and shall locate valves, fittings and fire hydrants in the exact positions indicated on approved drawings. He shall provide and use cutting tools of an approved type and in good order, so as to ensure clean, square cuts to exact measurements.
- G. All meter pits shall be approved by the Authority. The water meter pits shall be as described in Section 5.0.
- H. Water and sewer mains shall be separated by a distance of at least ten feet (10') horizontally. If such lateral separation is not possible, the pipes shall be in separate trenches with the sewer at least eighteen inches (18") below the bottom of the water main; or such other separation as approved by the Authority shall be made. In general, the vertical separation at a crossing of water and sewer line shall be at least eighteen inches (18").

Where this is not possible, the sewer shall be constructed of ductile iron pipe using mechanical or slip-on joints, or hot poured lead joints for a distance of at least ten feet (10') on either side of the crossing or other suitable protection shall be provided, such as concrete encasement of the sanitary sewer for ten feet (10') either side of the water pipe. This encasement is to be six inches (6") thick.



- I. Tapping of the main shall not be permitted until the following charges, fees and/or levies are paid:
  - 1. Connection fees.
  - 2. Filing and escrow fees.
  - 3. Water meter charge.
- J. Water main valves shall be located as close to tees or other fittings as possible. They must receive retaining glands and be rodded to the fitting. Rods must be coated with bitumastic sealant.
- K. Retaining glands shall be used at all mechanical joint fittings.

1.02 PRIOR TO CONSTRUCTION

Prior to starting construction of any water mains within the Borough, the Applicant, Developer or Owner must have in his possession a set of Authority approved drawings. In addition, he must have paid all the necessary charges and fees as well as obtaining the necessary bonding. When easements are necessary, all paperwork must be in order; and if Road Opening Permits are required, these must also be obtained before work can start.

2.0 DUCTILE IRON PIPE AND FITTINGS

2.01 DESCRIPTION

Provide ductile iron pipe for water main.

2.02 MATERIALS

Water main:

- 1. Ductile iron pipe shall:
  - a. Conform to ANSI/AWWA A21.51 latest revision.
  - b. Be manufactured in eighteen or twenty foot nominal lengths.
  - c. Have the following pipe thicknesses:

<u>Size</u>	<u>Class</u>	<u>Thickness (in.)</u>	<u>Wt of Barrel (Ft.)</u>
3"	54	0.34	11.8
4"	52	0.29	12.6
6"	52	0.31	19.6
8"	52	0.33	27.7
10"	51	0.32	33.2
12"	51	0.34	42.0

- 2. Cement lining: All ductile iron pipe for water mains shall be cement lined, 1/8" thick, in accordance with ANSI/AWWA C104/A21.4 and seal coated inside.
- 3. Joints for ductile iron pipe: Push-on-joint, conforming to ANSI/AWWA C151/A21.51 and ANSI/AWWA C111/A21.11.
- 4. Ductile iron pipe fittings:
  - a. Shall be ductile iron fittings conforming to ANSI/AWWA C110/A21.10.
  - b. Shall be compact ductile iron in accordance with ANSI/AWWA C153/A21.53 for bends, tees, reducers, short sleeves, crosses and hydrant tees.
  - c. Shall be cement-lined 1/8 inch thick in accordance with ANSI/AWWA C104/A21.4 and seal coated.
  - d. Shall have push-on type joints or mechanical joints.

5. Gasket lubricant: The lubricant shall be non-toxic, shall not support growth of bacteria and shall have no deteriorating effects on gasket material and shall conform to the requirements of ANSI/AWWA C111/A21.11.

## 2.03 METHODS OF CONSTRUCTION

### A. Submittals:

1. All pipe and fittings shall be inspected and tested at place of manufacture as required by the AWWA Standards referenced in this specification. Provide Engineer with two (2) copies of certifications from each manufacturer stating the product was inspected as required, and that the test results comply with the AWWA standards.
2. Submit manufacturers' product data for pipe, fittings, and gaskets as specified in section entitled, "Product Data."
3. All manufacturers shall validate other than by certification, the ductility of each length of pipe by an Underwriters Laboratory approved method. All ductile iron pipe is to have Underwriters Laboratory approval.

### B. Inspection and quality of pipe:

1. Before being lowered into the trench, each pipe shall be carefully inspected, and those not meeting the Specifications shall be rejected and either destroyed or removed from the work within ten (10) hours. No pipe shall be laid except in the presence of the Engineer or his authorized inspector. The Engineer may order the removal and relaying of any pipe not so laid.
2. In addition to the inspection made by the Engineer, the Contractor shall carefully examine all pipe and special castings before placing the same in the trench. Any pieces which are broken or show evidence of cracks or fractures shall be rejected by him. Such inspection shall carry with it the responsibility on the part of the Contractor for the removal at his own expense of all pipe, special castings, and appurtenances, incorporated in the work, and which under test are found to be cracked or otherwise defective.

### C. Installation of pipe and fittings:

1. Excavation and backfill for pipes shall conform to the specification entitled, "Trenching, Backfilling and Compacting."
2. All piping shall be installed in a neat and workmanlike manner. All piping shall be installed to accurate lines and grades and shall be supported as shown, specified, or necessary. Where temporary supports are used, they shall be sufficiently rigid to prevent shifting or distortion of the pipe. Suitable provision shall be made for expansion where necessary.
3. No defective pipe or fitting shall be laid or placed in the piping, and any piece discovered to be defective after having been laid shall be removed and replaced by a sound and satisfactory piece by the Contractor at his own expense.
4. Every pipe and fitting shall be cleared of all dirt and other debris before being installed and shall be kept clean until accepted in the completed work.
5. No pipes shall be laid in fill or other unstable material, in wet trench, or in same trench with another pipe or other utility unless so noted on the drawings. A minimum of eighteen inch (18") clearance shall be maintained between the outside surface of pipe and outside surface of other existing pipes and structures. When this clearance cannot be maintained, contact the Engineer for instructions prior to proceeding with the pipe installation.

6. No direct contact between pipes and structures at crossings will be permitted. Pipes in place shall not be worked over or walked on until covered by layers of earth well tamped in place to a depth of twelve inches (12") over the pipe.
7. Minimum cover over water mains shall be four feet (4').
8. The interior of all pipes shall be thoroughly cleaned of all foreign material before being lowered into trench. Pipes shall be kept clean during laying operations by means of plugs or other approved methods.
9. Gas lines, storm and sanitary sewer lines shall have right-of-way and water mains shall be installed to avoid the same.

D. Piping supports:

The Contractor shall furnish and install all supports necessary to hold the piping and appurtenances in firm, substantial manner at the lines and grades indicated on the drawings or specified. Where required, bends, tees, and other fittings buried in the ground shall be backed up with concrete placed against undisturbed earth where firm support can be obtained. In addition, mechanical joint restraint shall be used at all fittings. The mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which when activated imparts multiple wedging action against the pipe, increasing its resistance as the pressure rises. The restraint joint is sized 3" to 12" shall have Underwriters approval and factory material. The mechanical joint restraining device shall have a working pressure of 350 psi and shall be Mega-lug or Equal as manufactured by Ebba Iron Inc.

E. Handling and cutting pipe:

Every care shall be taken in the handling and laying of pipe and fittings to avoid damage to the pipe, scratching or marring machined surfaces, and abrasion of the coating or lining. Pipe cuts shall be made using an abrasive wheel, rotary wheel cutter, guillotine pipe saw, milling wheel saw, oxyacetylene torch or other method approved by the Engineer. Ground cut ends and rough edges smooth. For push-on connections, bevel all cut ends.

Handling, laying, cutting and removal/disposal of asbestos lined pipe shall be completed with all proper protocols for hazardous materials.

F. Assembling pipe:

1. Clean ring groove and bell socket prior to inserting rubber gasket seal. Properly seat gasket; make sure it faces proper direction.
2. Clean and lubricate spigot end of pipe. Lubricate spigot end of pipe and rubber gasket.
3. Hold pipe securely and in proper alignment when jointing.
4. Join pipe so that reference mark on spigot end, if pipe provided by manufacturer, is flush with end of bell.

G. Protection of work:

1. Great care shall be exercised in the protection of finished work. Joints once made and disturbed shall be subjected to immediate rejection. It shall therefore be the duty of the Contractor to avoid the slightest movement in completed work, while in the act of laying the pipe, in backfilling, or in the passage of workmen up and down the trench. At all times during which pipe is not laid, the end of the pipe shall be sealed with a tight-fitting plug. In no case will the drainage of trench water through a completed pipe be permitted.

2. All curves, bends, tees, hydrants or ends of pipe shall be securely blocked with socket clamps or yokes to prevent movement. At the end of line or turn, where provision has been made for future extension or connection, fittings shall be furnished with lugs and anchored by means of socket clamps or yokes.

H. Adapters:

When it is necessary to join pipes of different types the Contractor shall furnish and install the necessary adapters. Adapters shall have ends conforming to the above specifications for the appropriate type of joint to receive the adjoining pipe. When adapters join two classes of pipe, the bodies may be of the lighter class.

3.0 GATE VALVES AND VALVE BOXES

3.01 DESCRIPTION

- A. Provide gate valves for proposed water mains. Gate valves shall be installed at each intersection or every thousand feet whichever comes first. Resilient seated gate valves shall be manufactured and tested to the requirements of AWWA standard c-509-87 and c-500-86 as applicable for a design working pressure of 250 psi. This pressure rating shall be cast on the outside of the valve.

3.02 MATERIALS: Shall be in accordance with the latest AWWA standard specifications for gate valves "Standard Specifications for Furnishing 4" to 16" Resilient Seated Gate Valves." In addition to the requirements of the AWWA standards, the valve shall meet the following specifications:

- A. Valves shall be "Metroseal 250" with Mechanical Joint ends as manufactured by U.S. Pipe and Foundry Company or approved equal. Valve boxes shall be Mueller, Kennedy, or approved equal.
- B. Valve body, bonnet and gate shall be ductile iron conforming to ASTM A-536. Shell thickness of body and bonnet components shall conform to table 2 sec. 4.4 AWWA c-509. So called "thinwall" valves, not included in this standard, are not allowed.
- C. Valve body and bonnet shall be coated on all exterior and interior surfaces with a fusion bonded epoxy conforming to the requirements of AWWA standard for protecting epoxy interior coatings for valves and hydrants; c-550-90. Manufacturer shall certify that the coating will conform to the following sections of the standard:
  - a. Section 2-materials (relating to the suitability of the coating for use in a potable water system).
  - b. Section 4-tested and inspection (relating to qualification and production testing).
- D. The valve shall be designed so that during operation, or cycling of the valve, there is no friction or abrasion or rubbing together of the gate and body that can wear away any rubber or epoxy and expose bare iron. Valve manufacturer shall provide evidence from an independent testing laboratory that its valve can operate through 1000 cycles of operation at 250 psi, unbalanced closing pressure and flow to open discharge without causing damage to the epoxy coating in body and gate and/or rubber coating on gate.
- E. Gate shall be covered with rubber over all interior and exterior ferrous surfaces. The rubber shall be securely bonded to the gate body, including the part which houses the stem nut. The stem hole through the gate shall be full opening top to bottom and shall also be covered with rubber.
- F. "O" ring stem seal shall be replaceable with the valve under pressure in the full-open position.
- G. Resilient seated tapping valves shall be furnished with the tapping flange having a raised face or lip designed to engage the correspondence recess in the tapping sleeve flange in accordance with nss-sp60. Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by a misaligned shell cutter. The interior of the

waterway in the body shall be a full opening and capable of passing a full sized shell cutter equal to the nominal diameter of the valve.

- H. In order to assure compliance with AWWA and other applicable standards and access to manufacturing facilities for inspection purposes, and assure timely shipment and delivery, all valves must be manufactured, assembled and tested in plants located within the continental United States.

### 3.03 METHODS OF INSTALLATION

- A. Submittals: Submit manufacturers' product data for valves and valve boxes as specified in the section entitled "Product Data."
- B. Prior to installation, inspect valves for direction of opening, freedom of operation, tightness of pressure, containing bolting, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Do not install dirty or defective valves.
- C. Valves shall be set and joined to the pipe in the manner specified in section entitled, "Ductile Iron Pipe and Fittings" for installing and joining ductile iron pipe.
- D. No valve shall be set under roads, pavements or walks, except where so noted. All valves shall be provided with cast iron extension boxes and covers at grade marked "WATER." Two (2) "T" handle socket wrenches of 5/8 inch round stock and long enough to extend two feet (2') above top of deepest valve box shall be provided for each size of valve furnished. The valve box shall not transmit shock or stress to the valve, with the valve box cover flush with the surface of the finished area.

## 4.0 FIRE HYDRANTS

### 4.01 DESCRIPTION

- A. Provide fire hydrants for the purpose of fire protection. Hydrants must be placed within 600 feet radius of each other and the distance between hydrants, as measured by the curb length shall be not more than 1000 feet. The contractor must provide and meet OSHA safety requirements for any work performed for the Authority.
- B. Fire hydrants shall be manufactured to comply with the American Water Works Association standard C-502 of latest revision and shall be in full compliance with these following supplementary requirements:

Type: Mueller #A423 with 5" Storz fitting.

### 4.02 FIRE SUB-CODE OFFICIAL

- A. The Pine Hill Borough Fire Sub-Code Official shall approve all fire hydrant locations and equipment. This specification is included in the Authority's standards for reference only. All plans shall be submitted directly to the Fire Marshal for approval.

### 4.03 MATERIALS

- A. All public fire hydrants shall be Mueller #A423, or approved equal, having the following characteristics:
  1. Size of hydrant: 5" minimum.
  2. Direction to open: Counterclockwise.
  3. Size and shape of operating nut: 1-7/32" from point to flat – Pentagon.
  4. Three-way hose nozzles with 5" Storz fitting on the pumper outlet.  
Two, 2 1/2" ID (National Standard) with 7 1/2 threads per inch.  
One, 5" Storz model HPHA550-45NJ/cap.
  5. Internal valve opening: 5 1/2".

- 6. Color: white body, red cap.
- 7. Depth of Bury: 4' – 0".
- 8. Size and type of connection to main: 6" – Mechanical joint.

4.04 METHOD OF INSTALLATION

- A. Fire hydrants locations shall be approved by Fire Sub-Code Official.
- B. Installation shall conform to Pine Hill MUA standard detail.
- C. The elevation of the hydrant will be such that the bottom of the steamer connection will not be less than eighteen inches (18") from the finished grade or top of curb.
- D. A stone sump two feet (2') in length, width, and depth will be installed under each fire hydrant to permit hydrant to drain after each use. (Use ¾" clean stone).
- E. A concrete thrust block will be poured behind the "tee" and the hydrant shall be thrust restrained.

4.05 WATER MAIN

- A. Shall not have more than one (1) fire hydrant on a main that is not looped, or with a dead end.
- B. Pipe of six inch (6") or larger for residential and eight inch (8") or larger for any area not residential.
- C. Comparison of pipe capacity:

<u>Size of Pipe:</u>	<u>Inches</u>	<u>Relative Capacity</u>
	6	1.0
	8	2.1
	10	3.8
	12	6.2
	14	9.3
	16	13.2

5.0 WATER SERVICES AND METER PITS

5.01 DESCRIPTION

- A. Provide meter pit and meter setter complete for proposed water service line.

5.02 MATERIALS

- A. Acceptable manufacturers:
  - 1. The products of Ford Meter Box Co., Inc., Wabash, Indiana, Mueller Company, Decatur, Illinois as Specified in the following sections are used to establish a standard of quality. Other manufacturer's materials may be used provided they are approved as an equivalent product as specified in the Specification Section entitled "Product Data".
- B. Meter-setter key type inlet valve with seal wire hole: Ford Model V71-81W-21-33 with seal wire hole in inlet valve. Meter Setter must be installed 18" below finished grade.
- C. Meter Pit – 18" dia. Plastic with cast iron frame and cover plate – Ford Meter Box Cover, Type A, single lid No. A2- 9 ½" dia. To fit 18" dia. ID pit. Pit to be 24" in depth. **Meter lid must have 1 ¾ hole to adapt touch read system.**

- D. Water Service Pipe: the minimum water service pipe shall be ¾" K-type copper pipe. All pipe between the water main and meter pit up to 2" diameter shall be copper pipe. Larger water service pipes shall be cement lined ductile iron pipe.
- E. Adapters to Plastic Pipe – Use threaded male adapter as supplied by pipe manufacturer and approved by Engineer.
- F. IPS to PVC Adapters: Use threaded male adapter as supplied by pipe manufacturer and approved by Engineer.

### 5.03 METHODS OF CONSTRUCTION

- A. Install complete meter pit and meter setter in accordance with manufacturer's instructions. Assure that the valves are installed in the proper direction and that the pit is installed plumb.
- B. Install pit in locations shown on plans.
- C. Water service lines must be blown off prior to connection to the house line.
- D. Water service shall be visually inspected by the Engineer under city pressure.

### 6.0 DISINFECTION OF WATER SUPPLY SYSTEM

#### 6.01 DESCRIPTION

- A. Disinfect water supply system, and test for bacteriological quality and chlorine residual. Test results from a certified laboratory shall be provided to the Engineer.
- B. Definitions:
  - 1. Water supply system: The water main, water service pipe, water distributing pipes and the necessary connecting pipes, fittings, control valves, pumps, and all appurtenances in or adjacent to the building or premises including wells.
  - 2. Water service pipe: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.
  - 3. Water distributing pipe: A pipe within the building or on the premises which conveys water from the water service pipe to the point of usage.
- C. The existing water supply system shall not be contaminated by allowing water with a high chlorine residual to enter the existing water supply system.

#### 6.02 MATERIALS

- A. Chlorine: High test calcium hypochlorite conforming to AWWA B300 and AWWA C651.

#### 6.03 METHODS OF CONSTRUCTION

- A. Quality assurance: Testing laboratories shall be certified by the State of New Jersey Department of Health.
- B. Requirements of regulatory agencies: Taking and analysis of water samples, and water bacteriologic quality shall conform to the requirements of the New Jersey State Department of Environmental Protection.
- C. Reference standards applying to this specification section:
  - 4. New Jersey State Department of Environmental Protection, PW-D10 – Potable Water Standards, dated December 1970, or as amended.

5. American Water Works Association:
  - a. AWWA B300: AWWA Standard for Hypochlorites.
  - b. AWWA C651-86: AWWA Standard for Disinfecting Water
  
- D. General: All disinfection procedures to include preventive measures during construction; methods of chlorine application; preliminary and final flushing; testing and procedures to follow after cutting into existing water main shall conform to AWWA C651. The method of chlorine application shall be the Tablet Method, except that if trench water or foreign material has entered the main, or if the water temperature is below 41 degrees F., the continuous Feed Method shall be used.
  1. The initial chlorine concentration in the water in the pipe shall be a minimum of 50 ppm (mg/l) available chlorine.
  2. The places where flushing shall be done, and the rates of preliminary flushing prior to disinfection when not using the Tablet Method, shall be approved by the ENGINEER.
  3. The chlorine concentration in the water main after flushing shall be no higher than that generally found in the system, or not exceeding 0.2 ppm (mg/l).
  
- E. The following test shall be made after final flushing and before the water main is placed into service:
  1. Chlorine residual: Determine chlorine residual using the Drop Dilution Method as described in the Appendix of AWWA C651.
  2. Bacteriologic quality:
    - a. Sampling: Take samples in accordance with AWWA C651 and Potable Water Standards PW-D10.
    - b. Testing: Perform testing in accordance with the rules and regulations of the New Jersey State Department of Environmental Protection.
  
- F. Bacteriological standards: Samples tested shall conform to the bacteriological standards specified in Potable Water Standards PW-D10.
  
- G. If the initial disinfection fails to produce satisfactory samples, disinfection and testing shall be repeated until satisfactory samples have been obtained. The Tablet Method shall not be used in these subsequent disinfections. The water main shall not be placed into service until satisfactory samples have been obtained.

## 7.0 TESTING WATER SUPPLY SYSTEMS

### 7.01 DESCRIPTION

- A. Test public water supply system for exfiltration.
  
- B. Definitions:
  1. Water supply system: The water main, water service pipe, water distributing pipes and the necessary connecting pipes, fittings, control valves and all appurtenances in or adjacent to the building or premises.
  2. Water service pipe: The pipe from the water main or other source of potable water supply to the water distribution system of the building served.
  3. Water distribution pipe: A pipe within the building or on the premises which conveys water from the water service pipe to the point of usage.

### 7.02 MATERIALS

- A. Furnish pumps, valves, taps, pressure gauges, water meters, and all other equipment required for testing of piping systems.



### 7.03 METHOD OF TESTING – PRESSURE TEST

#### A. General requirements:

1. The hydrostatic test pressure shall be 150 psi or 3 times the system operating pressure.
2. Provide an as-built sketch (line drawing) showing distances between all valves, fire hydrants, and fittings.
3. Perform all tests in presence of the ENGINEER.
4. Establish test section between valves, or as directed by the ENGINEER.
5. All requirements of this specification shall be met prior to acceptance of water facilities by the ENGINEER.

#### B. Procedure for pressure test – on-site piping:

1. Expel air from pipe through hydrants, blow-offs, or taps required for release of air from high points. Taps for release of air and blow-offs for filling pipe and releasing air shall be provided by the Contractor.
2. Fill each pipe section slowly with water, and subject pipe to hydrostatic pressure of 150 psi for one (1) hour.
3. When test pressure is reached, measure amount of make-up water required to maintain this pressure during the one (1) hour test period.
4. Leakage shall not exceed 12 gallons per inch of diameter per mile of pipe per day. Pipelines failing to meet this requirement shall be repaired and retested as above specified.
5. Compute leakage as follows:
  - a. Gallons of make-up water x 24 = gallons loss/day.
  - b. Gallons loss/day ft of pipe testing = 5,280 ft/mile = gallons/loss/mile/day
  - c. Gallons/loss/mile/day = pipe dia. in inches. Gallons loss/inch dia./mile/day.
  - d. Allowable exfiltration rate is 12 gallons inch/dia./mile/day.

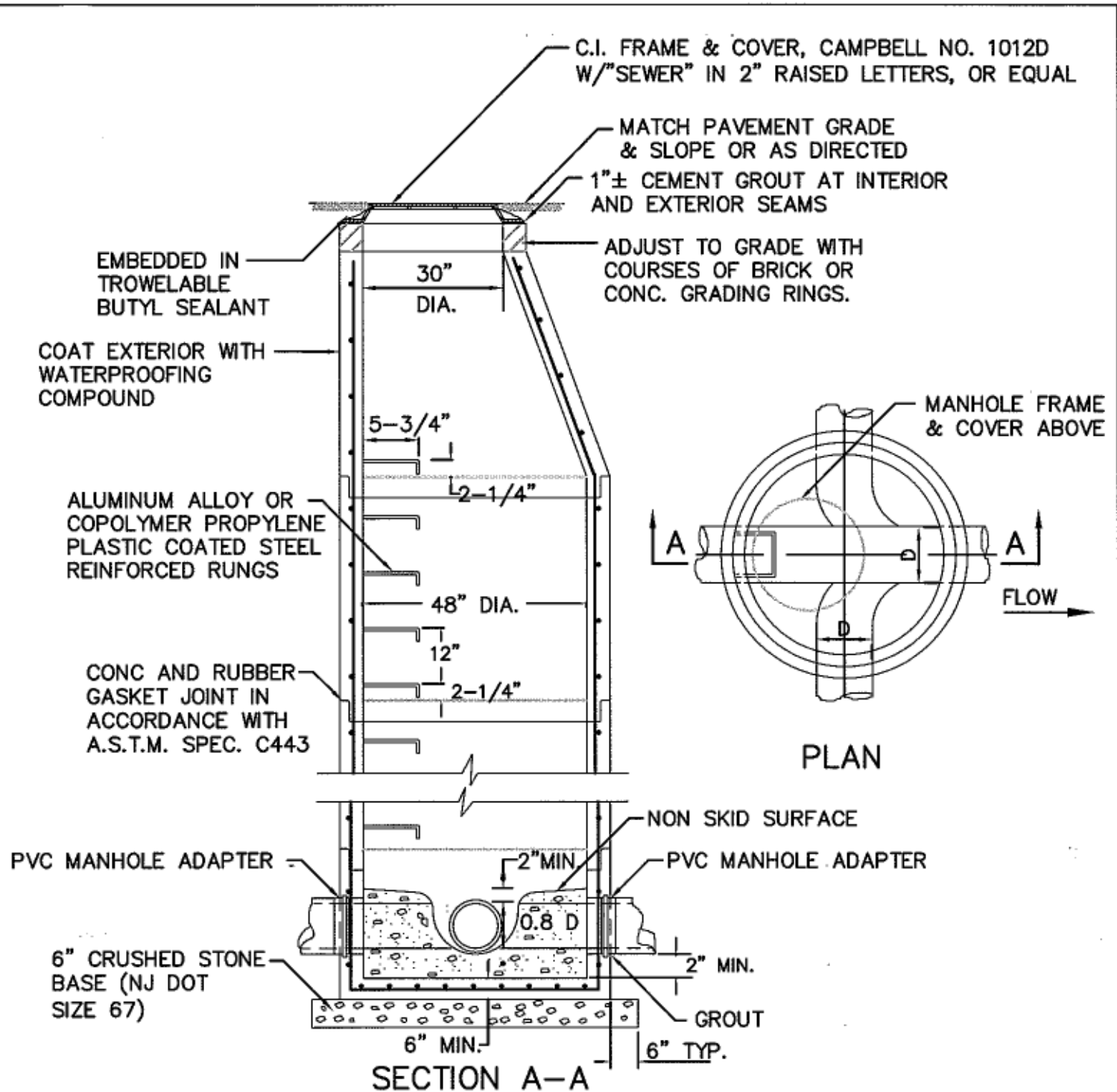
#### C. Procedure for exfiltration test – water distributing pipe within building:

Upon completion of a section or of the entire water distributing pipe, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used or as required by building plumbing code. The water used for tests shall be obtained from a potable source of supply.

### 8.0 SAFETY

#### 8.01 DESCRIPTION

- A. All Contractors must have a written safety program and All Employees' training must meet or exceed the Federal OSHA compliance CFR 1910 and 1926 Labor Laws.
- B. It shall be clearly understood that during construction of the water distribution system NO contractor or his representative shall open or close any valve existing or newly installed which will affect the existing AUTHORITY water distribution system.



NOTE: COAT ALL EXPOSED SURFACES  
OF CASTINGS & FRAMES WITH  
ONE COAT OF COAL-TAR-PITCH  
VARNISH.

D = PIPE O.D. AS NOTED ON  
PLAN OR PROFILE



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PRECAST CONCRETE STANDARD MANHOLE

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

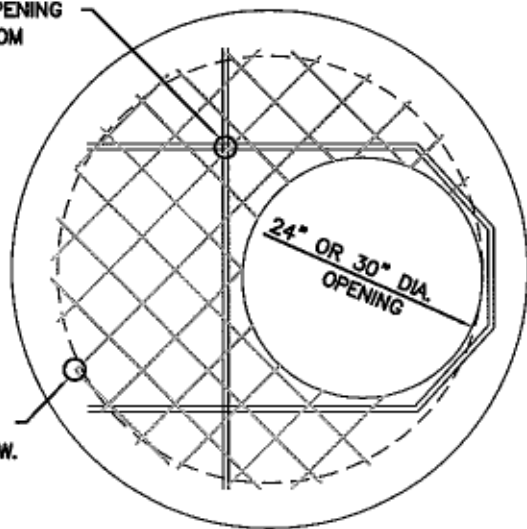
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Date: JANUARY 16, 2009

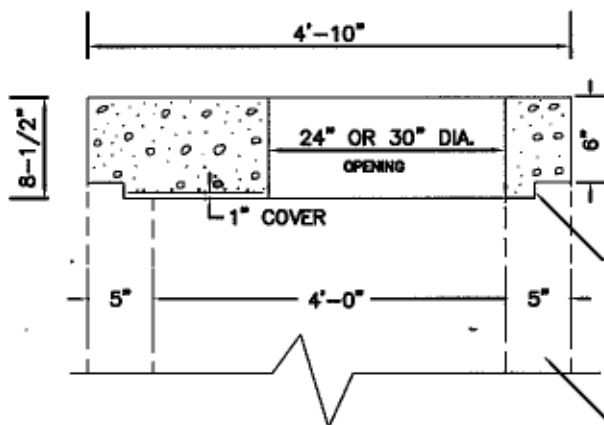
Dwg. No.:

(2) #4 AROUND OPENING  
TOP AND BOTTOM

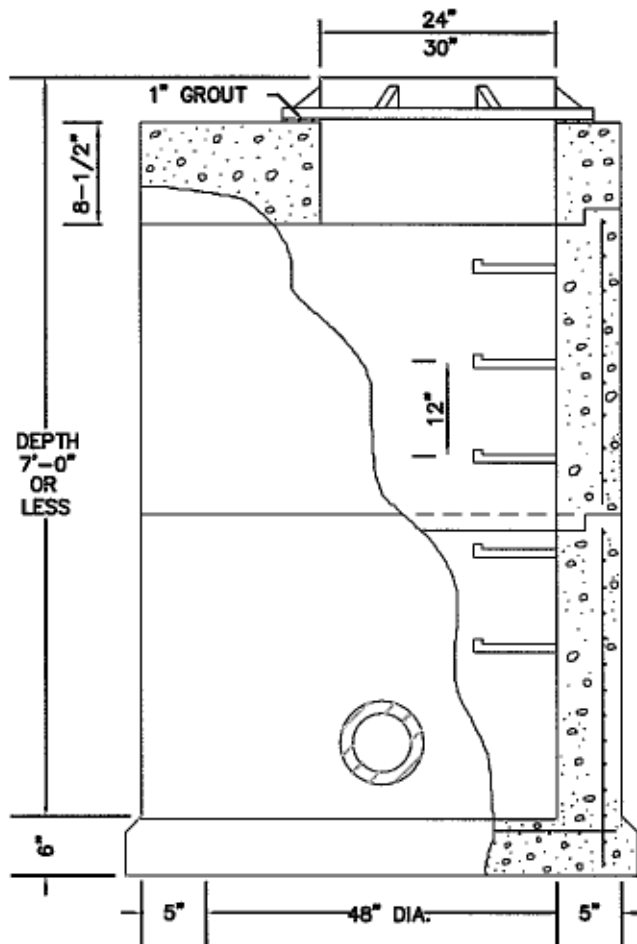
REINF. AREA =  
0.14 IN<sup>2</sup>/FT. E.W.



**PLAN VIEW**

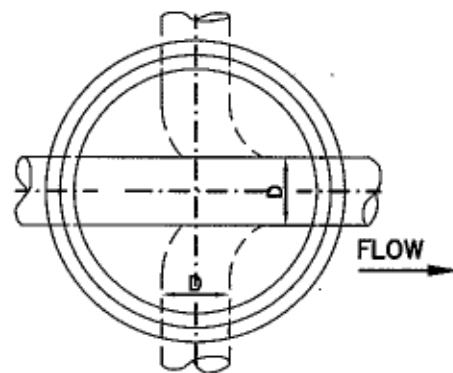


**CROSS SECTION**



JOINT CAN BE SEALED  
USING BUTYL RUBBER  
FED. SPEC. SS-S-  
210-A OR D-LOK  
RUBBER GASKET ASTM  
C-443.

STANDARD MANHOLE



**PLAN AT INVERT**

**MANHOLE SPECIFICATIONS:**

1. MANHOLE IS DESIGNED TO MEET THE LATEST REVISION OF THE ASTM SPECIFICATION NO. C478 TITLED PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
2. CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
3. REINFORCED STEEL HAS A MINIMUM YIELD STRENGTH OF 60,000 PSI.
4. CAST IRON FRAME AND COVER ADJUST TO GRADE AS REQUIRED
5. JOINTS CAN BE SEALED USING BUTYL RUBBER FED. SPEC. SS-S-210-A OR D-LOK RUBBER GASKET ASTM C-443.
6. REINFORCING ASTM A-185 2 AREA 0.12 IN /VERT. FT.
7. CONCRETE COMPRESSIVE STRENGTH 4,000 PSI



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SHALLOW MANHOLE DETAIL

**PINE HILL BOROUGH  
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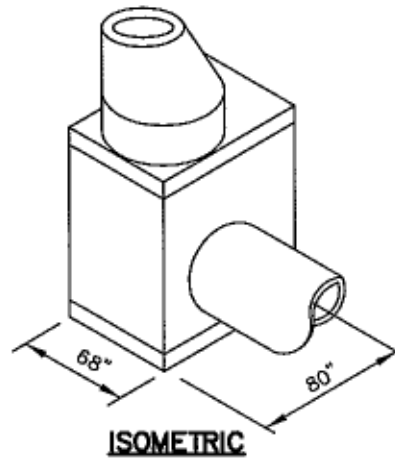
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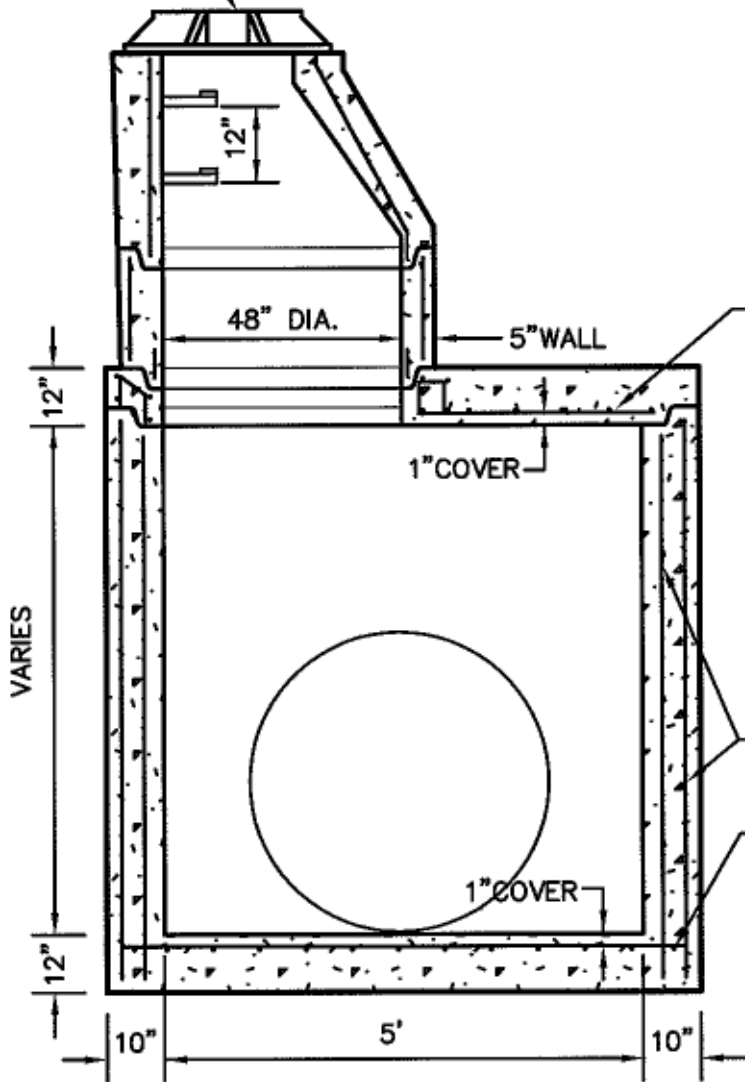
Date: JANUARY 16, 2009

Dwg. No.:

CASTING TO BE CAMPBELL FOUNDRY  
No. 1012D W/"SEWER" IN 2" RAISED  
LETTERS, OR APPROVED EQUAL



**ISOMETRIC**



REIN. #6 RE-BAR - 6" C.C.E.W.  
2 EXTRA #4 RE-BAR AROUND OPENING,  
T&B.

CAST IRON AND COVER BY CONTRACTOR  
ADJUST TO GRADE AS REQUIRED

JOINTS ARE TO BE SEALED USING BUTYL  
RUBBER FED. SPEC. SS-S210-A

EXTERIOR COATED

CONCRETE COMPRESSIVE STRENGTH 4000 PSI

CIRCUMFERENTIAL REIN. ASTM A185  
AREA 120" 0.30 IN. 2/VERT. FT.

REIN. #6 RE-BAR 12" C.C.E.W.

MANHOLE DESIGN:  
MANHOLE DESIGN SPECIFICATIONS CONFORMS  
TO "PRECAST REINFORCED CONCRETE MANHOLE  
SECTIONS" ASTM C478, LATEST REVISION.



**PENNONI ASSOCIATES INC.**  
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**60"x48"  
BOX MANHOLE DETAIL**

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

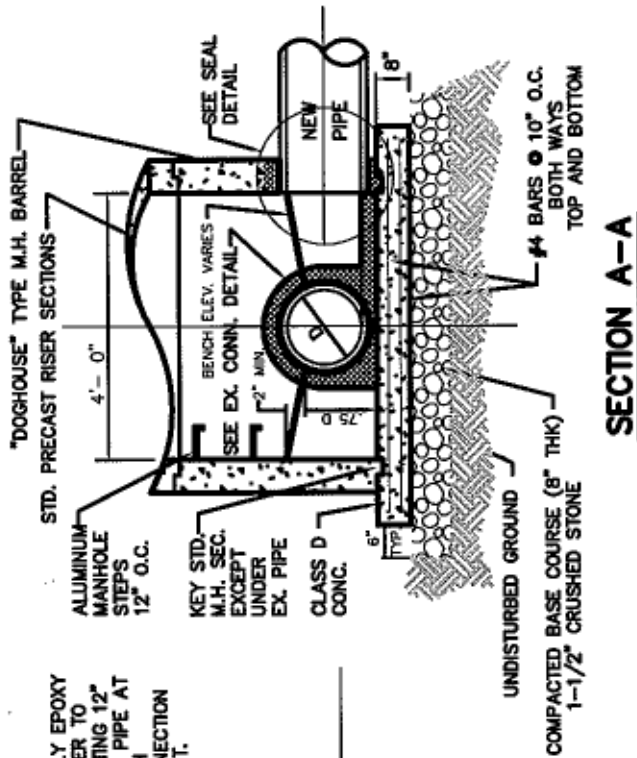
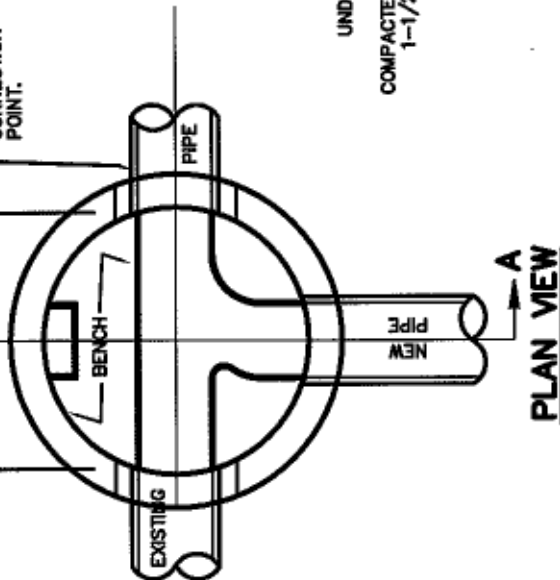
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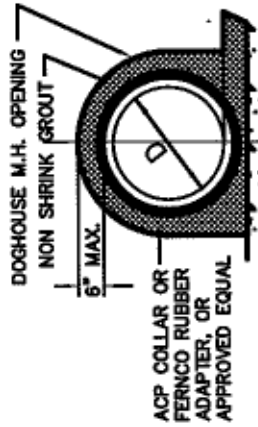
APPLY TWO SEPARATE COATS OF APPROVED BLACK BITUMASTIC WATERPROOFING COMPOUND. COAT ENTIRE EXTERIOR, INCLUDING BOTTOM.

EXISTING PIPE TO BE REMOVED AFTER ALL CONNECTIONS ARE COMPLETE

APPLY EPOXY BINDER TO EXISTING 12" WIDE PIPE AT EACH CONNECTION POINT.



**SEAL DETAIL**



**EX. CONN. DETAIL**



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DOGHOUSE MANHOLE DETAIL

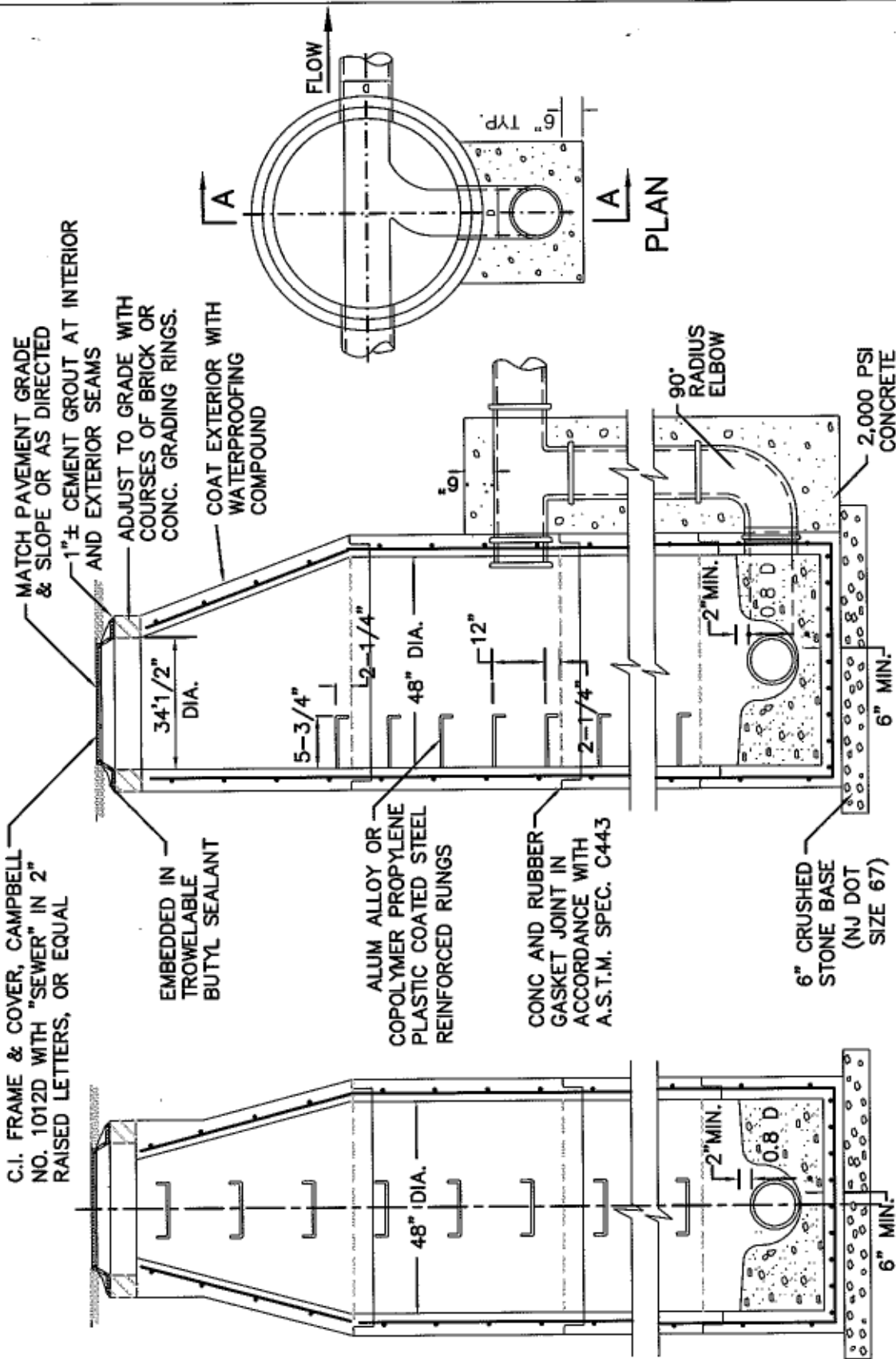
PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

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**SECTION A-A**

NOTE: COAT ALL EXPOSED SURFACES OF CASTINGS & FRAMES WITH ONE COAT OF COAL-TAR-PITCH VARNISH.  
 D = PIPE O.D. AS NOTED ON PLAN OR PROFILE



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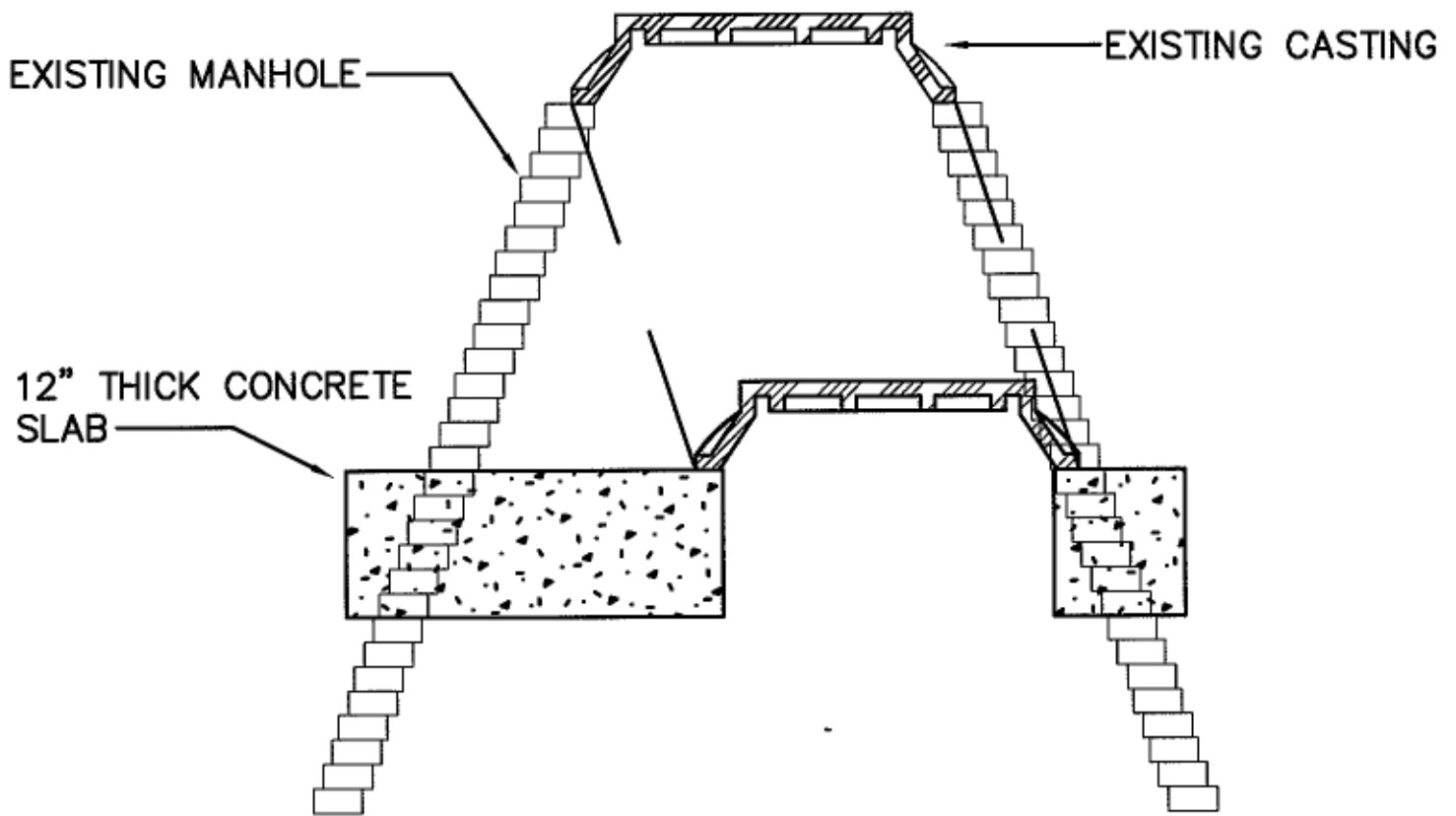
PRECAST CONCRETE DROP MANHOLE

**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813	Scale: N.T.S.	Date: JANUARY 16, 2009	Dwg. No.:
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THIS ASSEMBLY TO BE USED ONLY WHERE EXISTING CONDITIONS DO NOT PERMIT CASTINGS TO BE RESET ON THE EXISTING MANHOLE STRUCTURE.

CASTING WILL BE SET TO STAB BASE GRADE, THEN ADJUSTED TO FINISH GRADE AT TIME OF TOP PAVING.



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RESET MANHOLE CASTING  
WITH CONCRETE SLAB

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

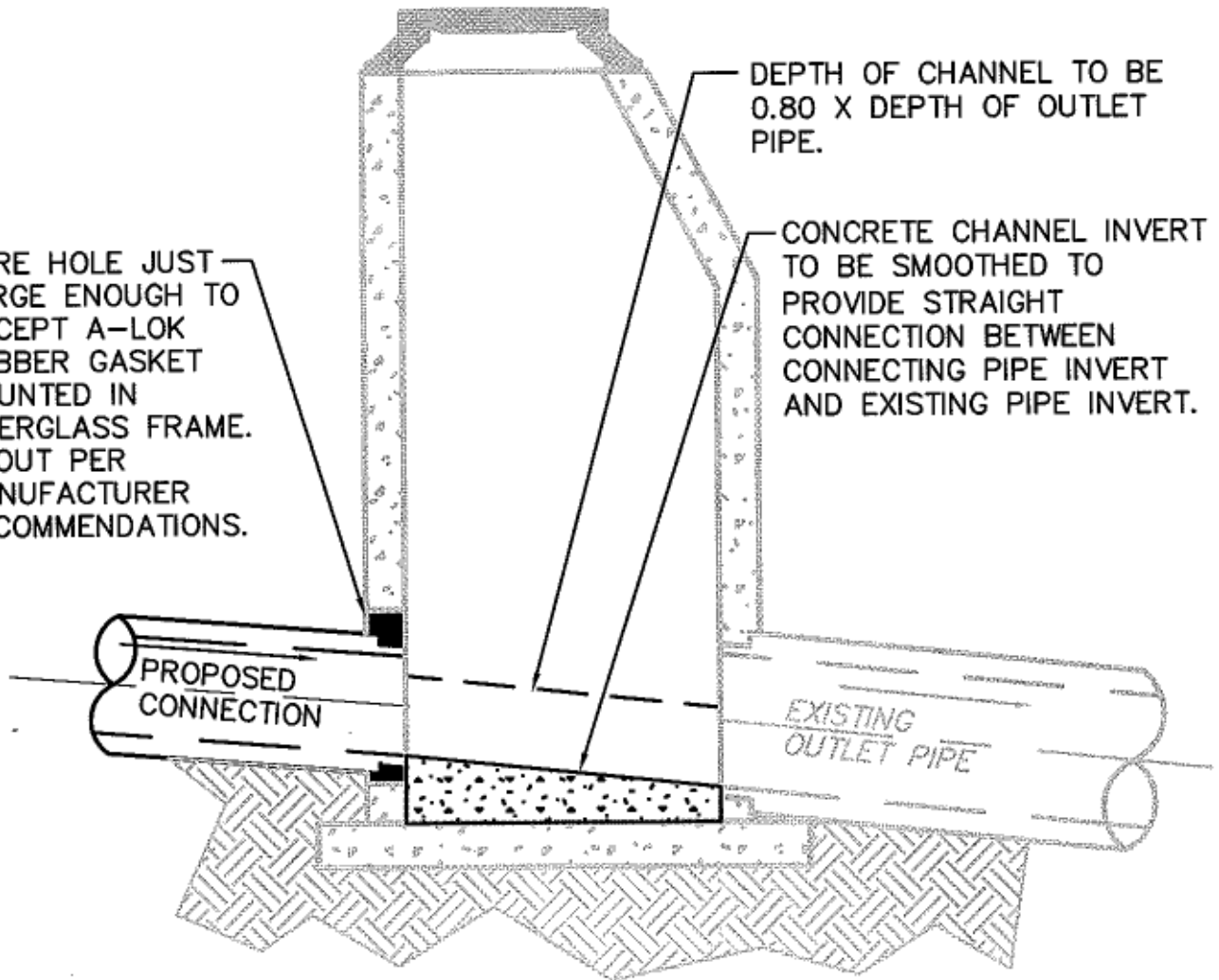
Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:

CORE HOLE JUST  
LARGE ENOUGH TO  
ACCEPT A-LOK  
RUBBER GASKET  
MOUNTED IN  
FIBERGLASS FRAME.  
GROUT PER  
MANUFACTURER  
RECOMMENDATIONS.



**Pennoni**

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CONNECTION TO  
EXISTING MANHOLE

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

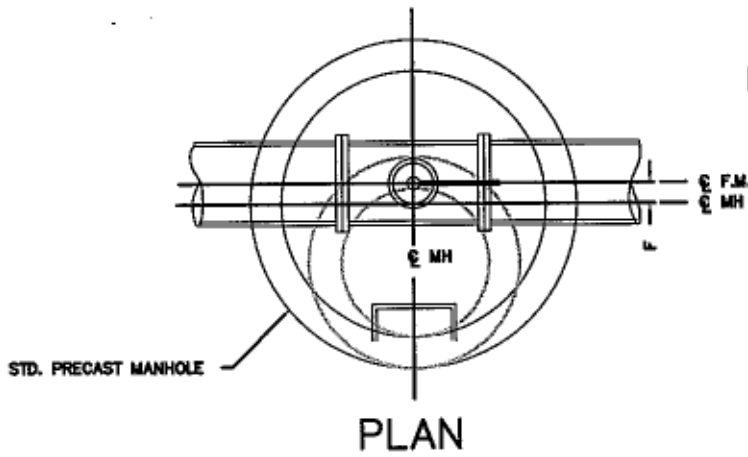
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Date: JANUARY 16, 2009

Dwg. No.:

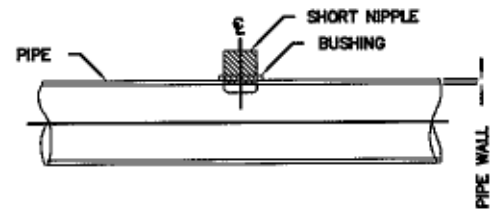
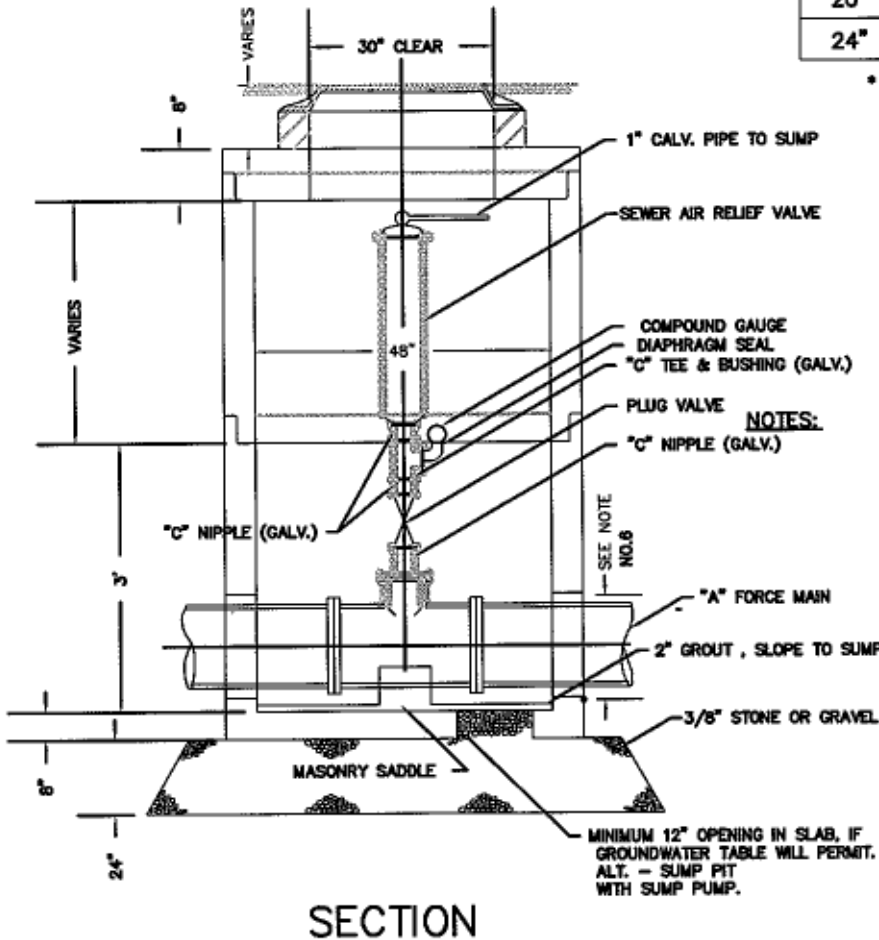


ALL GALV. STEEL PIPE SHALL BE HOT  
DIPPED IN CONFORMANCE WITH ASTM A123



"A" FORCE MAIN SIZE	"B" * OPNG. FOR F.M.	"C" FITTING SIZE	"D" FORCE MAIN Ø	"E" MANHOLE DIA. (I.D.)	"F" FORCE MAIN OFFSET
4"	10"	2"	11"	4'	-
6"	12"	2"	12"	4'	-
8"	15"	2"	13"	4'	-
10"	18"	2"	14"	4'	-
12"	20"	2"	15"	4'	-
16"	25"	3"	17"	4'	-
18"	27"	3"	18"	5'	-
20"	29"	3"	19"	5'	-
24"	33"	3"	21"	5'	3'

\* OPENING FOR BLOCK MANHOLE ONLY



DETAIL FOR 10" MAIN  
OR ABOVE

- NOTES:**
1. **STRUCTURAL STEEL**  
4" DIA. MH = 0.12 SQ. IN/FT.  
5" DIA. MH = 0.17 SQ. IN/FT.
  2. 4,000 PSI CONCRETE PRECAST MANHOLE SECTIONS.
  3. PRECAST REINFORCED MANHOLE SECTIONS TO COMPLY WITH ASTM SPECIFICATIONS C 478.
  4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING ADEQUATE BALLAST TO OFFSET FLOTATION FORCES ACTING ON MANHOLES.
  5. ALL VALVES SHALL CLOSE IN CLOCKWISE DIRECTION.
  6. "A-LOK" ON EQUAL RUBBER GASKET, PIPE TO MANHOLE SEAL, CAST INTEGRALLY IN MANHOLE WALL IF PRECAST MANHOLE IS USED. SEAL WITH NON-SHRINK GROUT OR FILLER AS REQUIRED BY ENGINEER IF MANHOLE IS OF BRICK OR BLOCK, USE "B" DIA. OPENING.



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515 GROVE STREET  
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AIR RELEASE  
MANHOLE

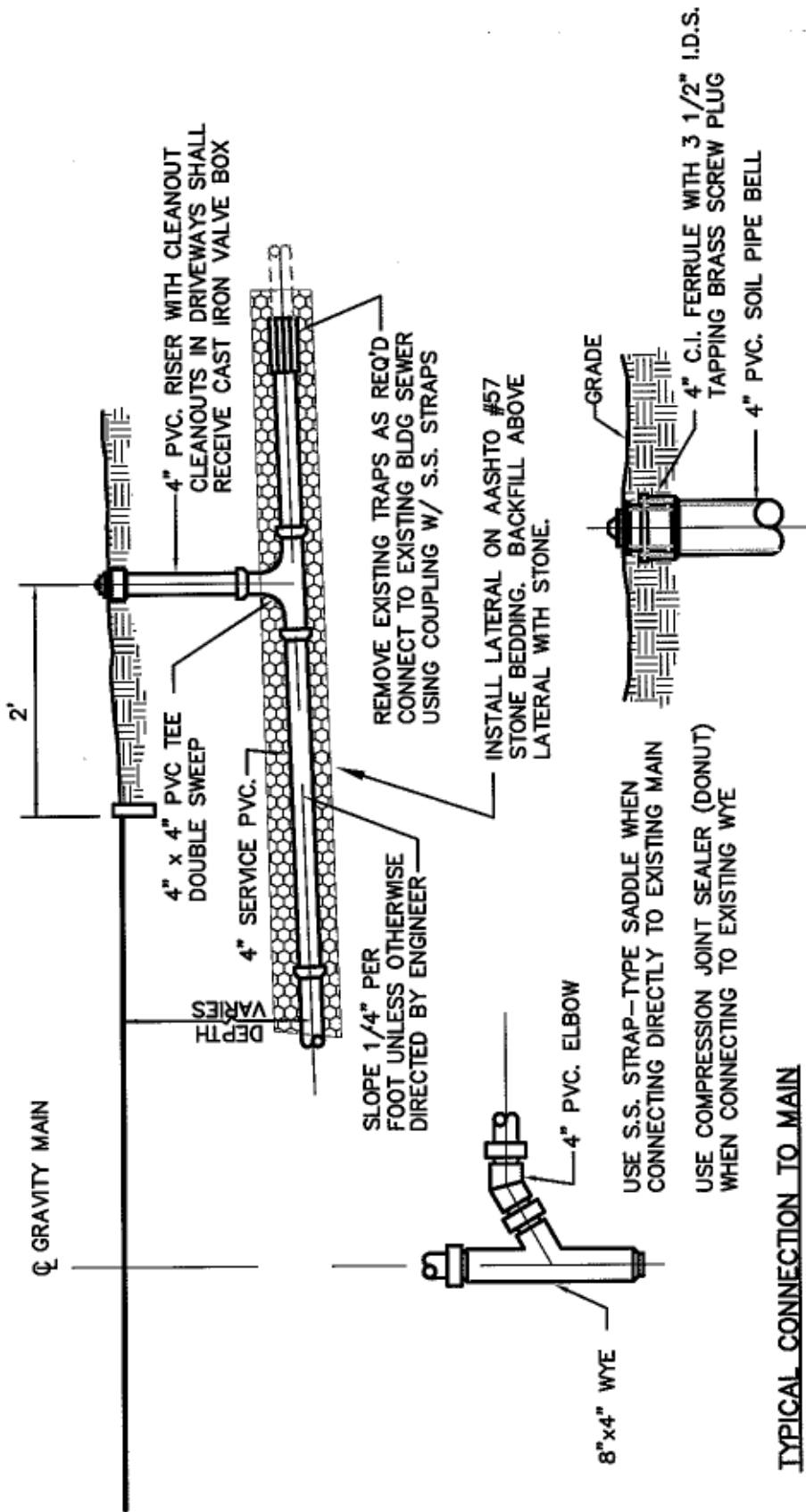
PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

TYPICAL SANITARY LATERAL CONNECTION

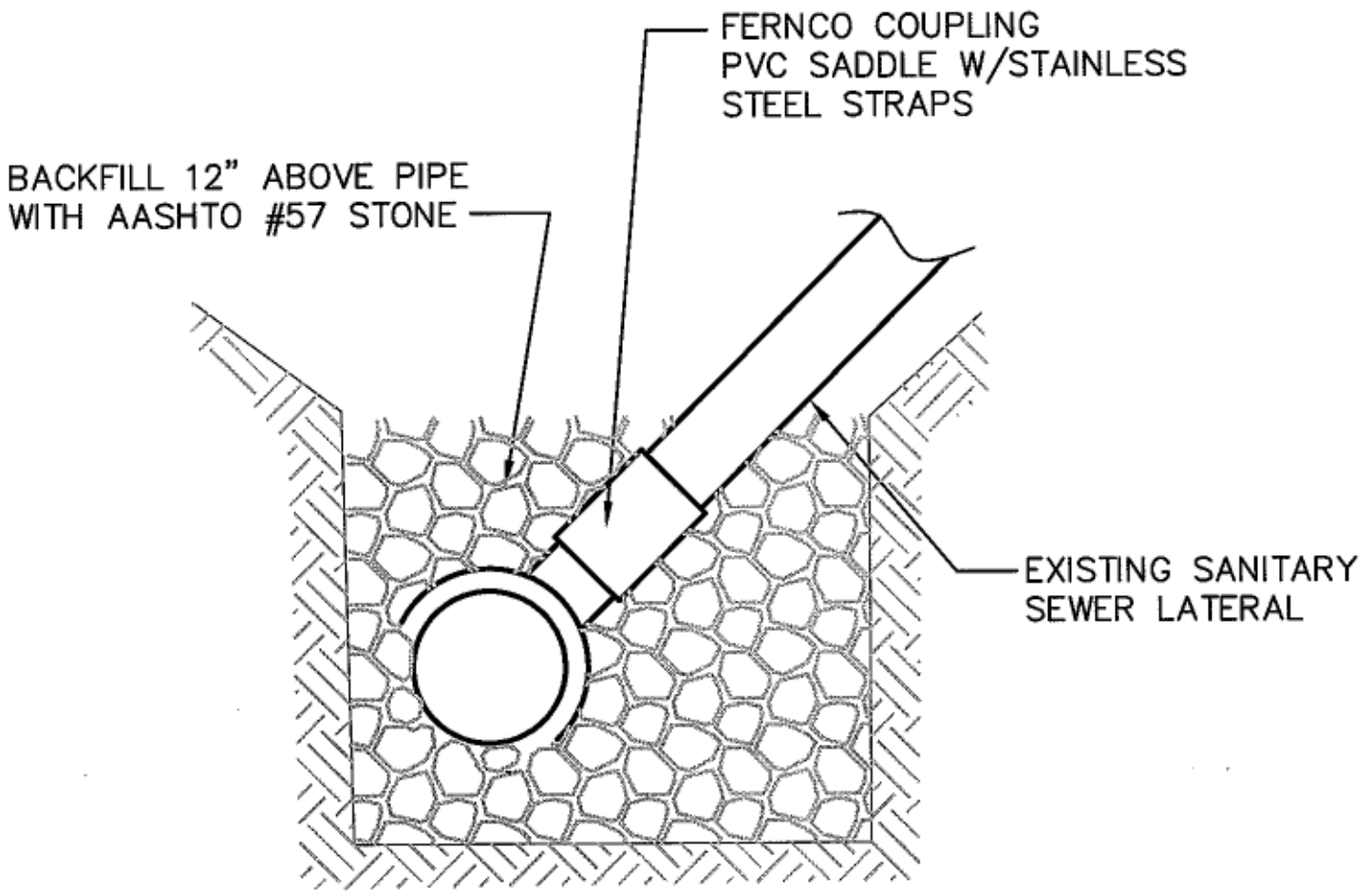
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

SANITARY LATERAL CONNECTION

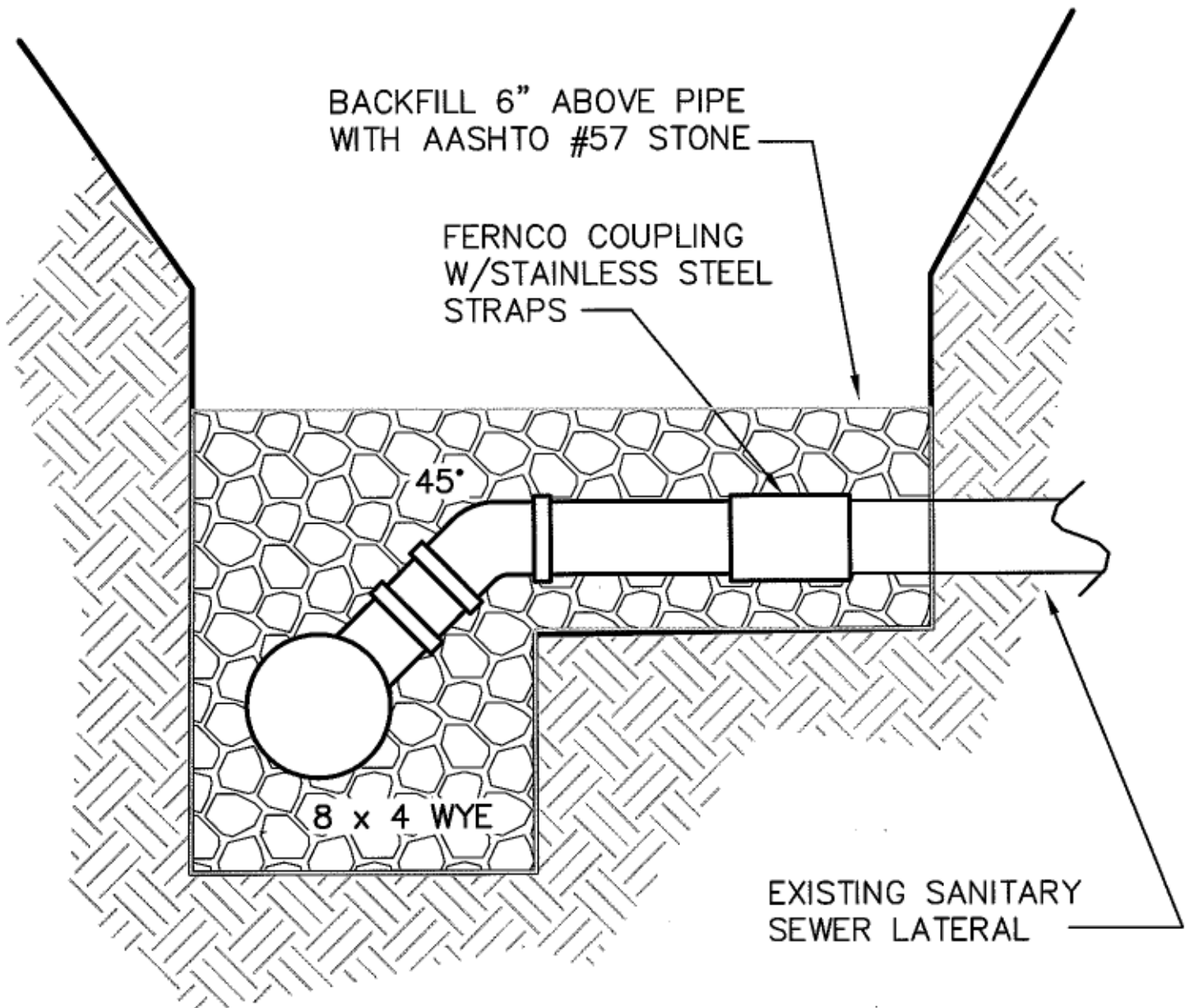
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

SANITARY LATERAL CONNECTION

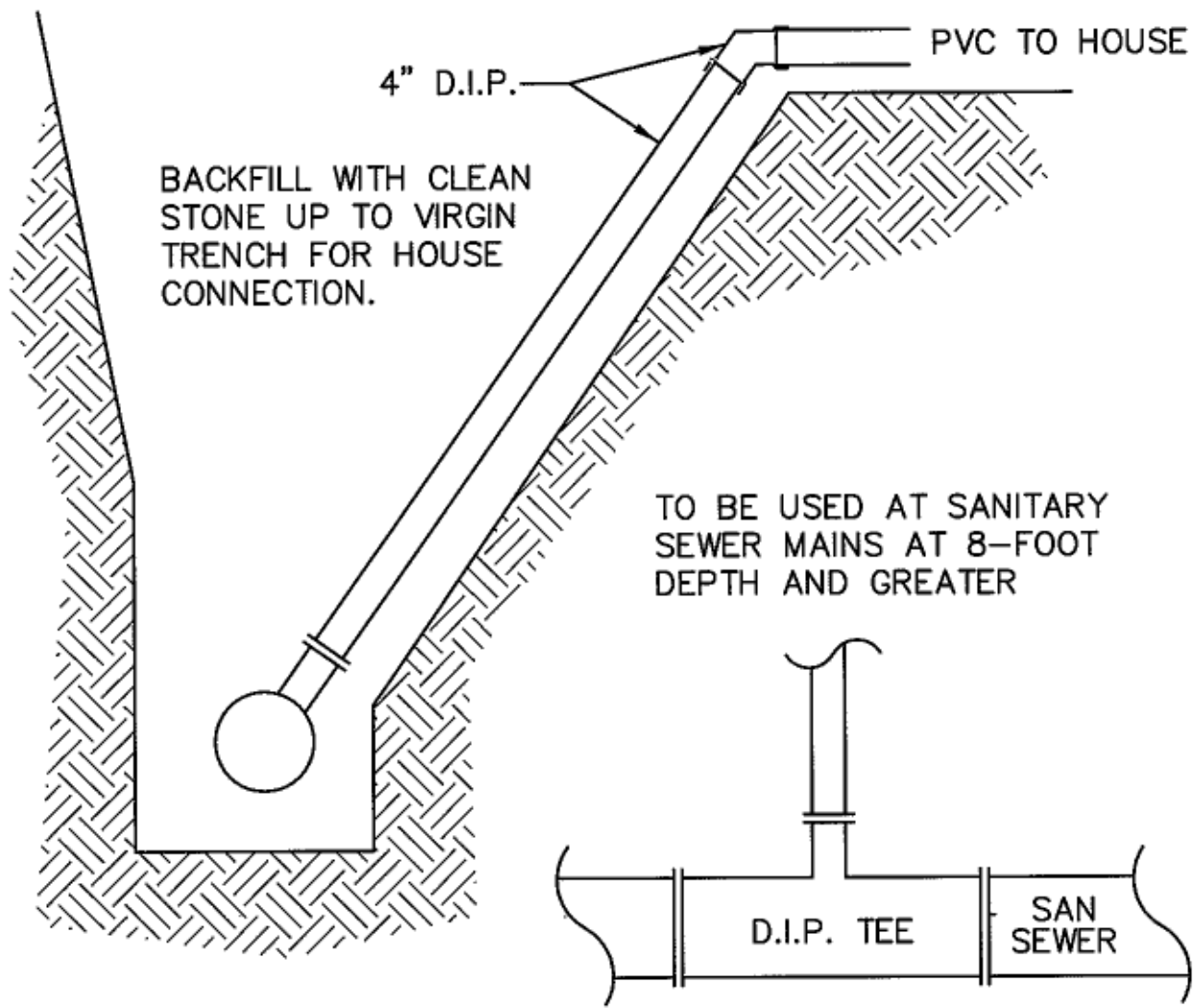
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

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NOTE: CLEANOUTS SHALL BE 2' FROM FACE OF CURB



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DEEP CUT SANITARY LATERAL

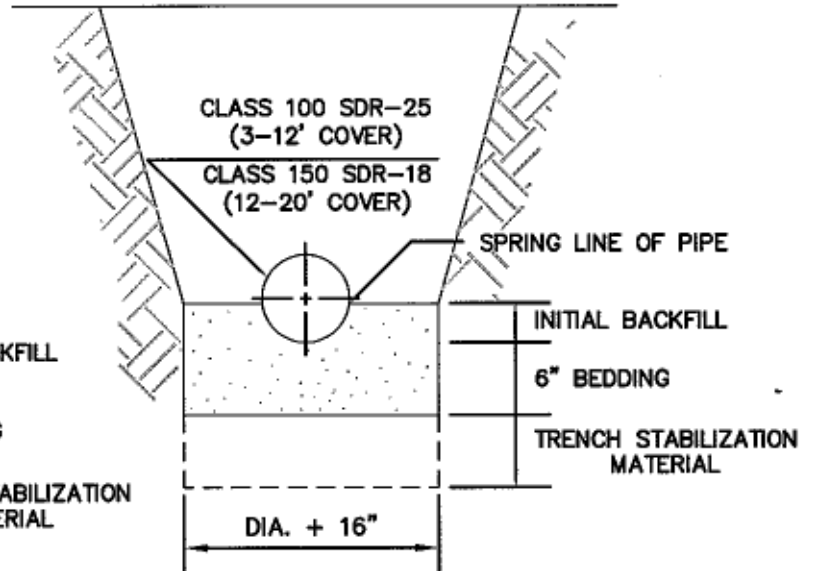
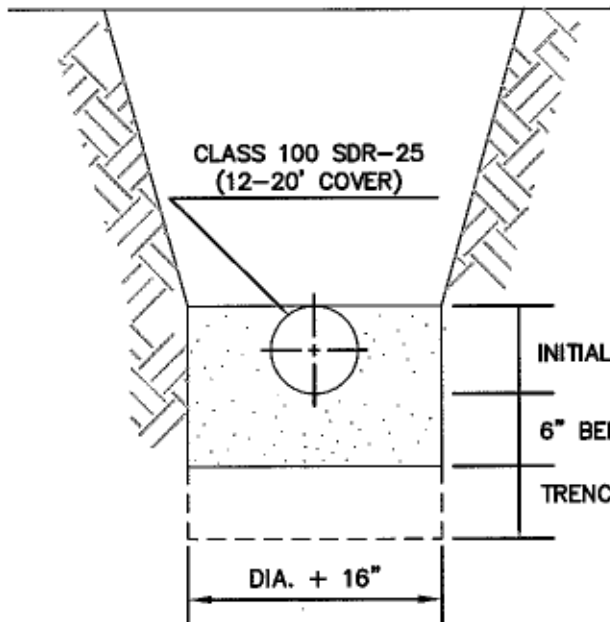
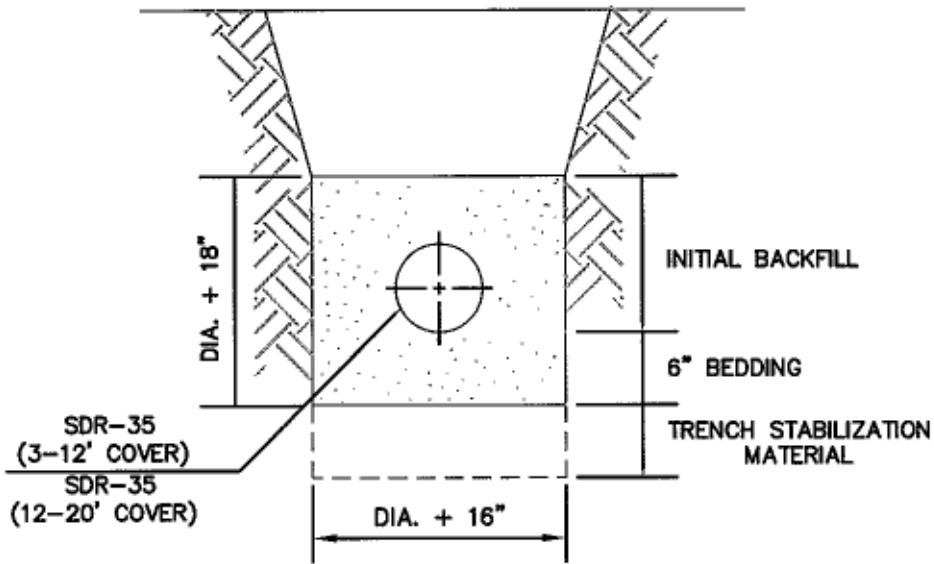
**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



**PENNONI ASSOCIATES INC.**  
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PVC GRAVITY SEWER  
 INSTALLATION

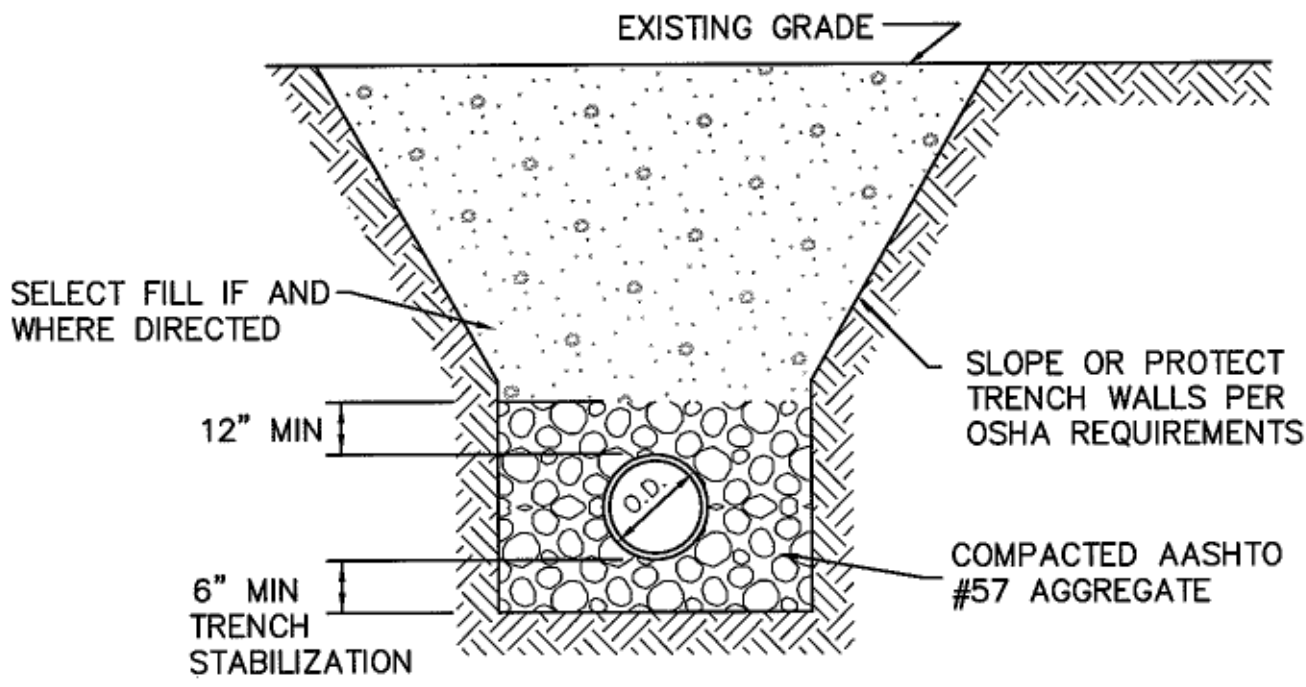
**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



- NOTES:**
1. DEPTH OF COVER OVER PVC PIPE:  
 MINIMUM: 3 FEET  
 MAXIMUM: 20 FEET
  2. DEPTH OF TRENCH STABILIZATION MATERIAL:  
 MINIMUM: 6 INCHES  
 MAXIMUM: TO BE DETERMINED BY ENGINEER

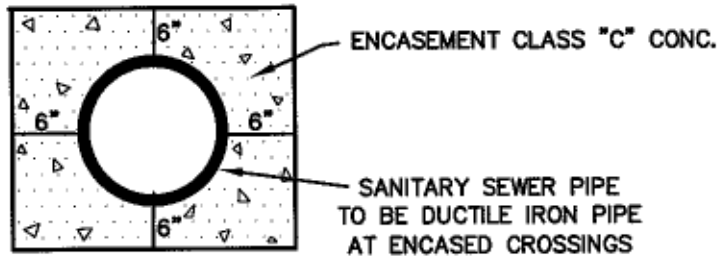


**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
 HADDON HEIGHTS, NEW JERSEY 08035

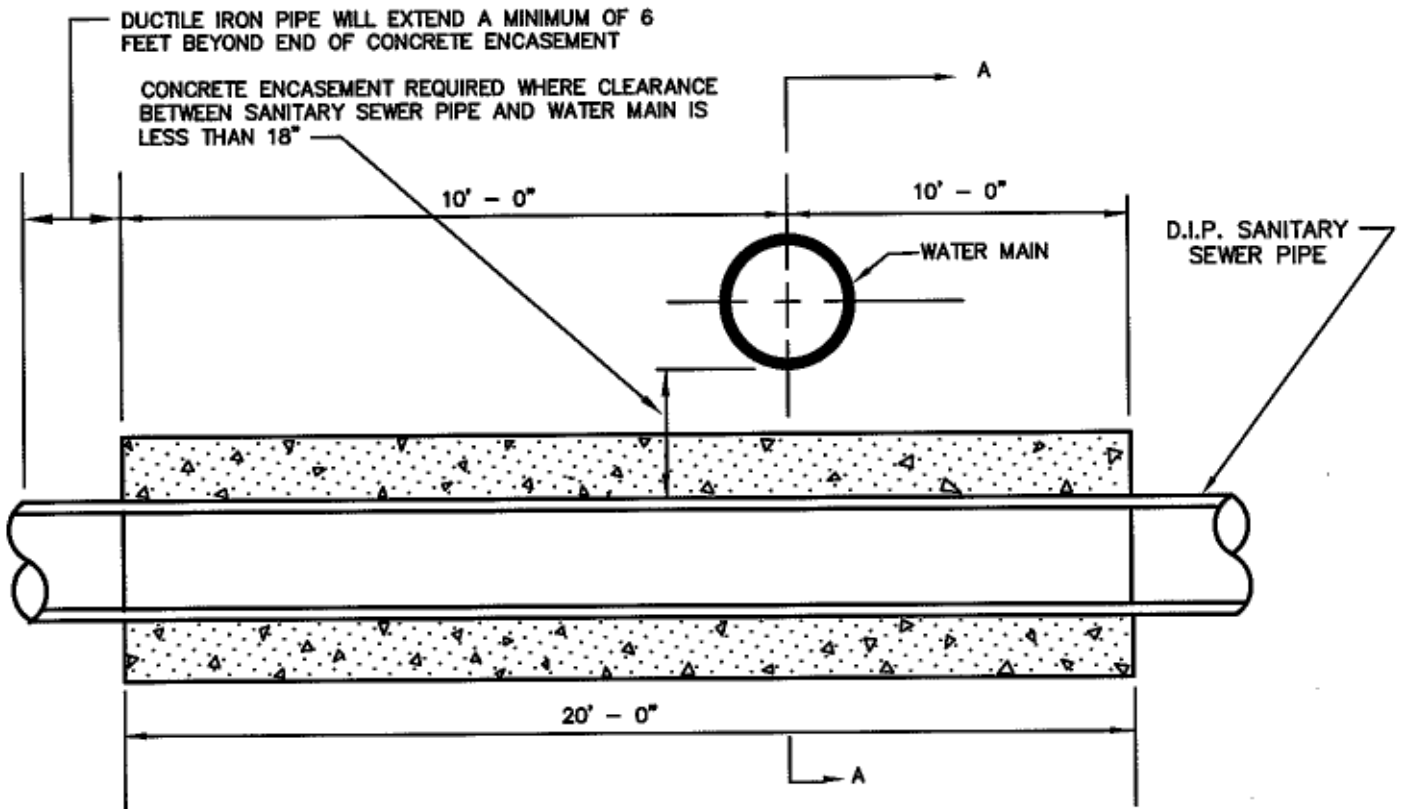
**SANITARY SEWER  
 PIPE TRENCH DETAIL**

**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813	Scale: N.T.S.	Date: JANUARY 16, 2009	Dwg. No.:
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SECTION A - A



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
 HADDON HEIGHTS, NEW JERSEY 08035

CONCRETE ENCASEMENT DETAIL

**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

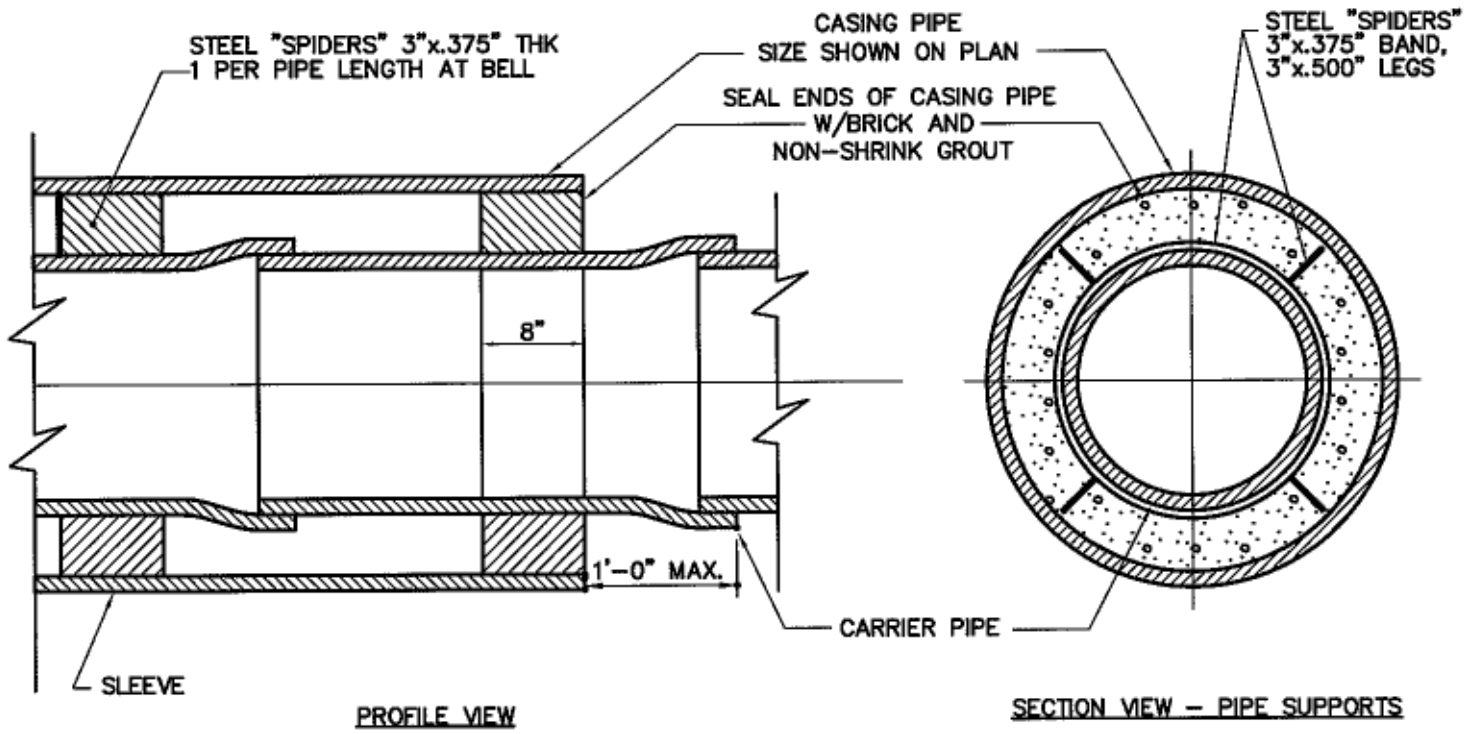
Job No. PHMU 0813

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Date: JANUARY 16, 2009

Dwg. No.:





**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

CASING PIPE DETAIL

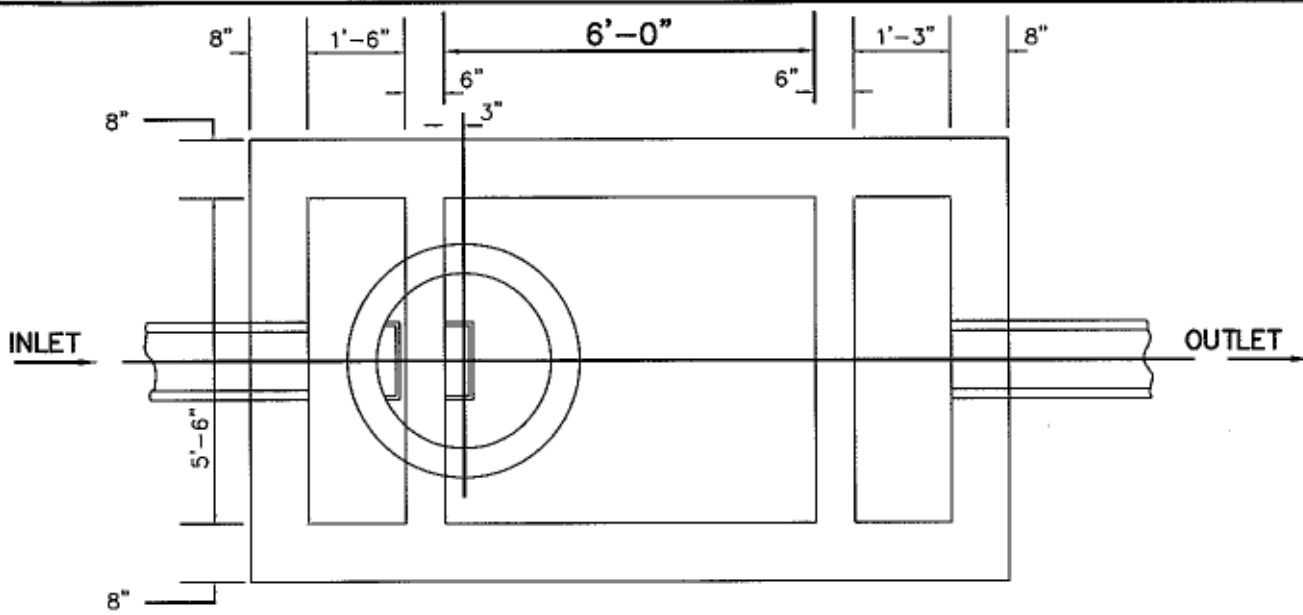
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

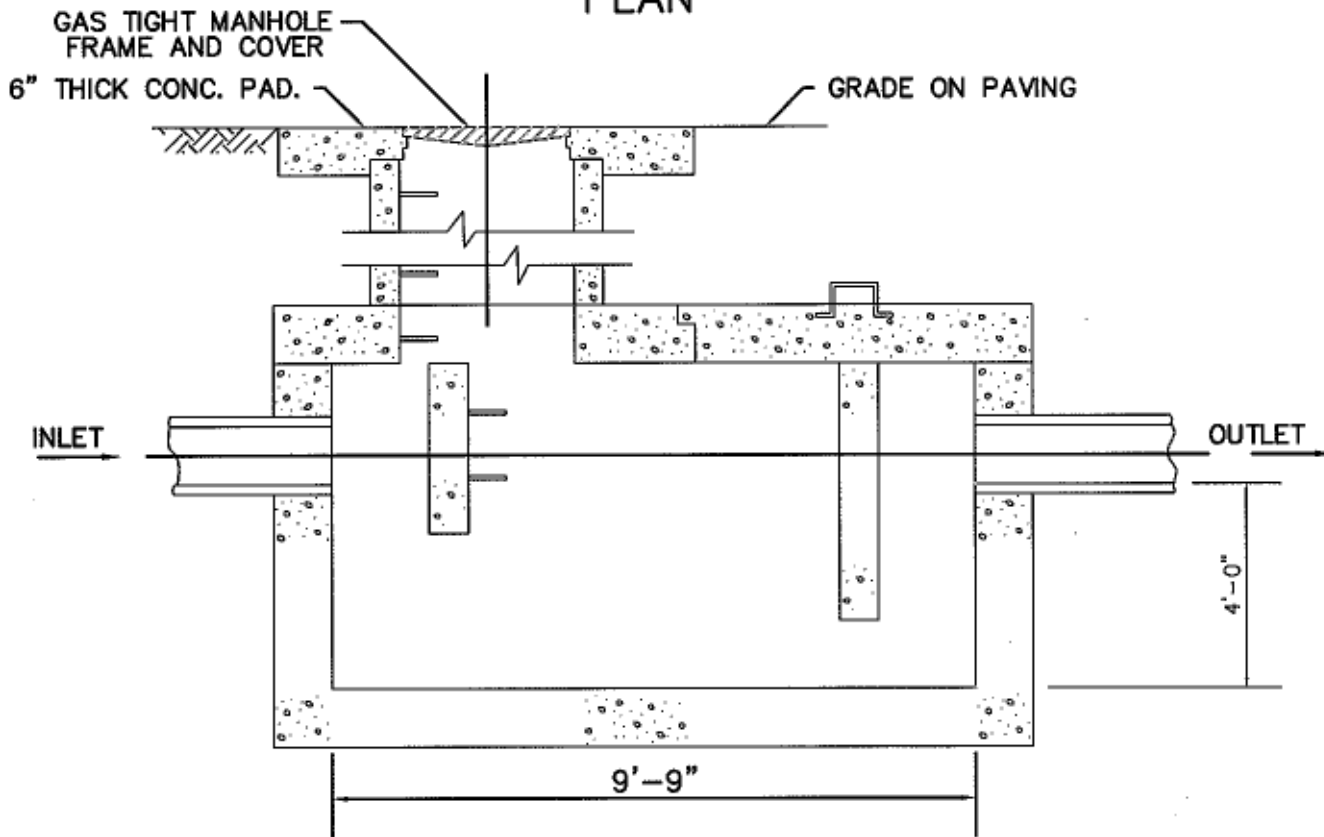
Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



PLAN



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
 HADDON HEIGHTS, NEW JERSEY 08035

EXTERIOR GREASE/WATER SEPARATOR  
 - 1,600 GALLON CAPACITY DETAIL

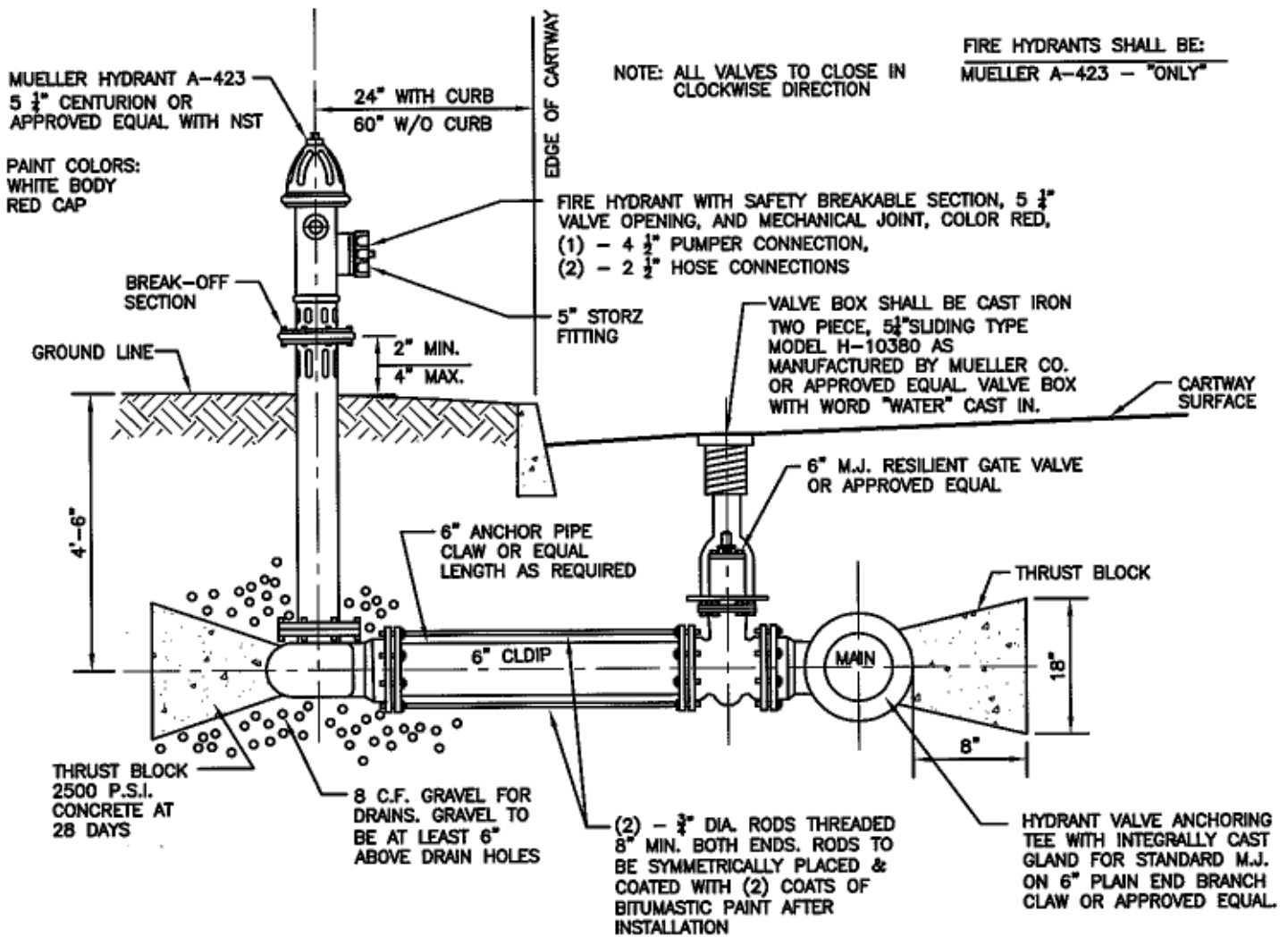
**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:

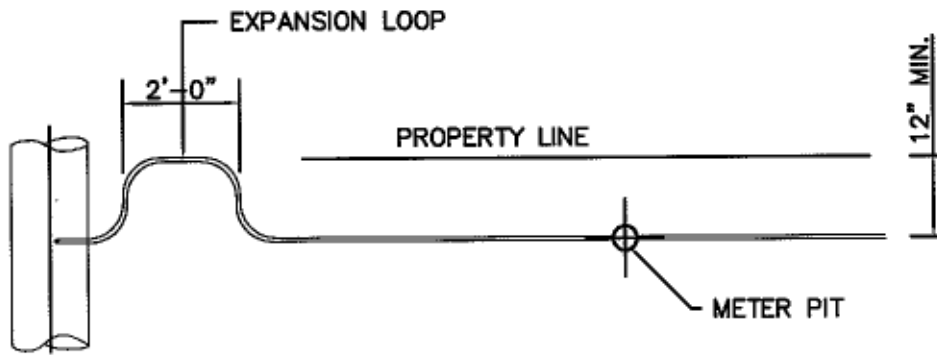


**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

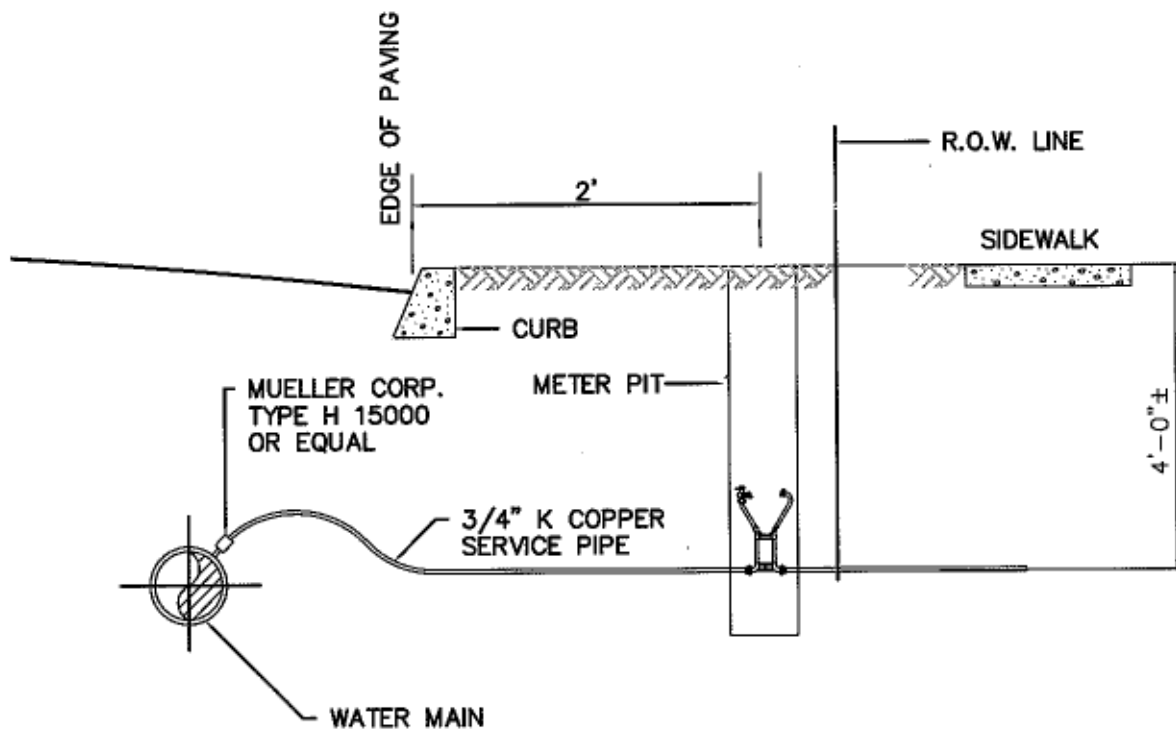
**FIRE HYDRANT  
DETAIL**

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813	Scale: N.T.S.	Date: JANUARY 16, 2009	Dwg. No.:
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PLAN



SECTION

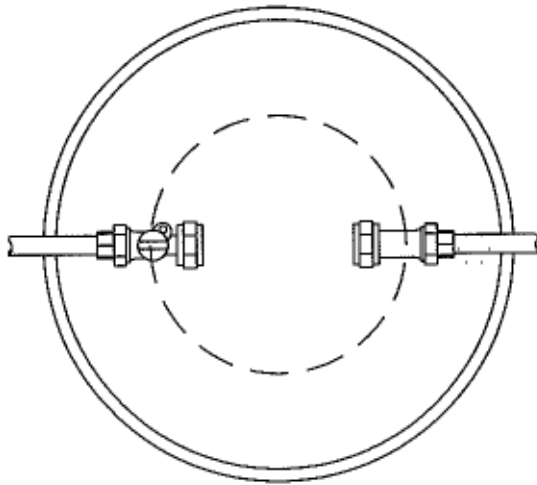
NOTE:  
 APPROVED PLASTIC PIPE ONLY PERMISSIBLE ON SERVICE SIDE OF CURB STOP BUT IN NO CASE SHALL THERE BE PLASTIC PIPE IN THE ROADWAY



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
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TYPICAL WATER SERVICE CONNECTION  
 PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES

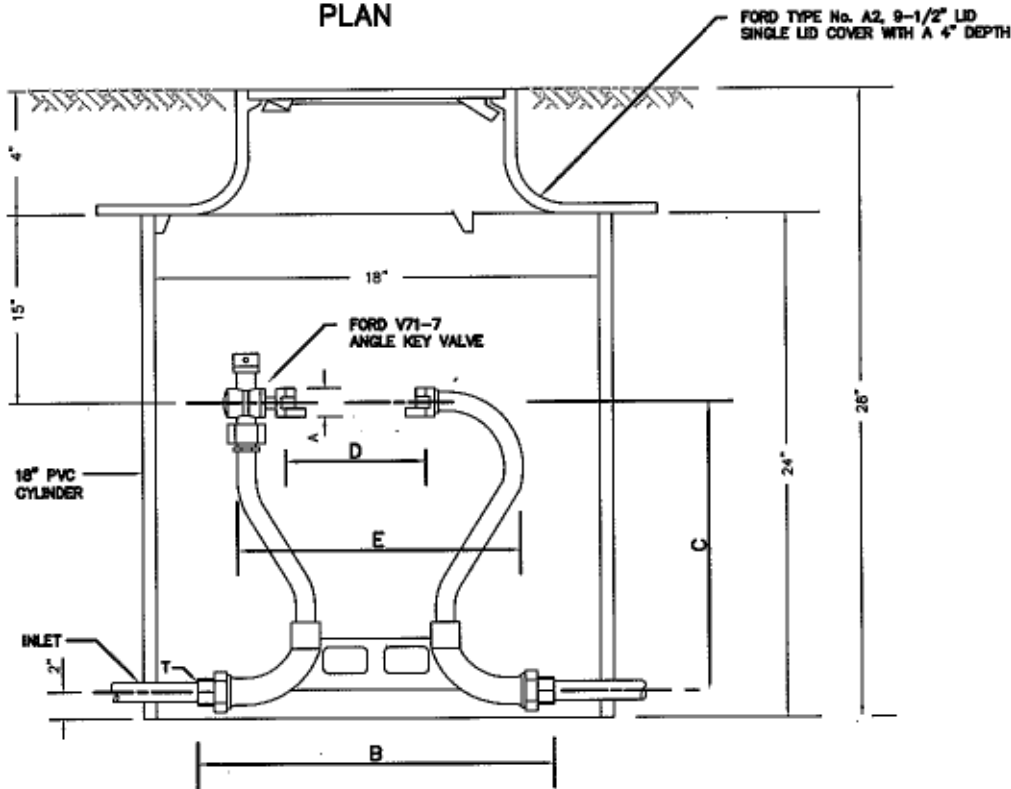
Job No. PHMU 0813	Scale: N.T.S.	Date: JANUARY 16, 2009	Dwg. No.: 32 OF
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### COPPERSETTER DIMENSIONS

DIMENSIONS	METER		SIZES	
	STD. 5/8"	5/8"x3/4"	3/4"	1"
A	1-1/16"	36"	34"	38"
B	9-1/2"	48"	46"	50"
C	HEIGHTS AS ORDERED IN ALL SIZES			
D	7-1/2"+3/8"	7-1/2"+3/8"	9"+3/8"	10-3/4"+3/8"
E	12"	12"	14-1/4"	17-1/4"
T	3/4"	3/4"	3/4"	1"

### PLAN



### SECTION



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
 HADDON HEIGHTS, NEW JERSEY 08035

FORD PLASTIC METER PIT  
 (SINGLE LID TYPE)

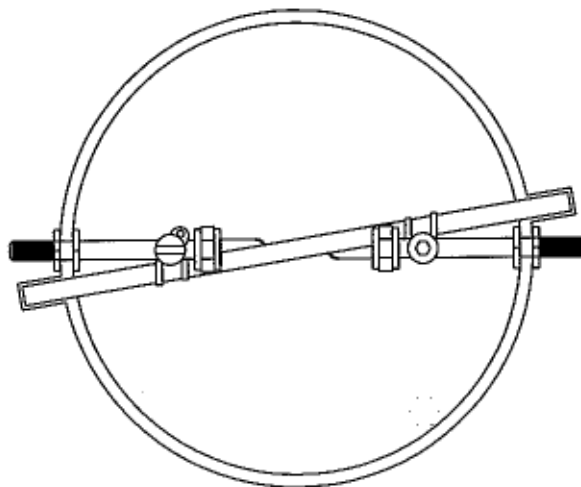
**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:

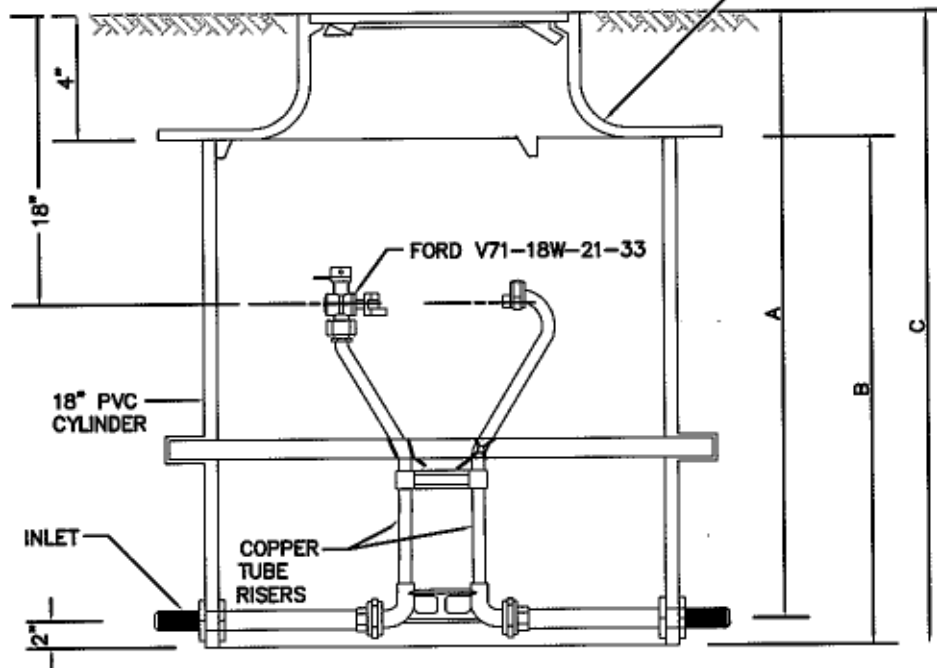


### VERTICAL MEASUREMENTS

PIT DEPTH	SERVICE LINE DEPTH "A"	PVC CYLINDER LENGTH "B"	TOTAL PIT DEPTH "C"
3 FT. PIT	36"	34"	38"
4 FT. PIT	48"	46"	50"
5 FT. PIT	60"	58"	62"
6 FT. PIT	72"	70"	74"

### PLAN

FORD TYPE "A", SINGLE LID  
NO. A2-9 1/2" DIA. COVER WITH A 4" DEPTH



NOTE:  
METER PIT LID SHALL BE DRILLED TO ACCOMMODATE REMOTE READING METER SENSOR. CONTRACTOR SHALL COORDINATE DRILLING WITH PINE HILL MUA SUPERINTENDENT TO INSURE COMPATABILITY WITH M.U.A. EQUIPMENT.

### SECTION



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

FORD PLASTIC METER PIT  
(SINGLE LID TYPE)

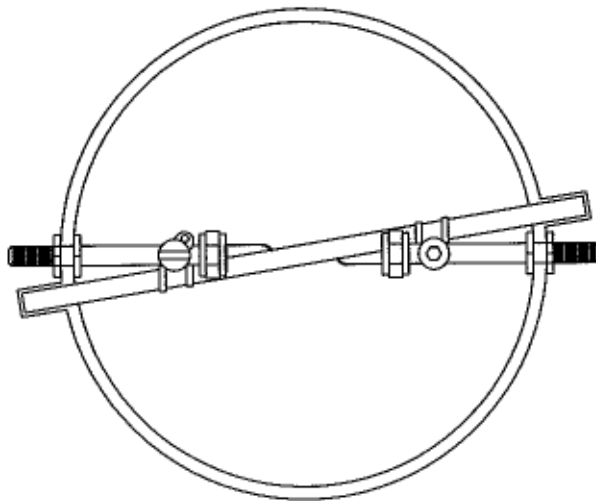
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

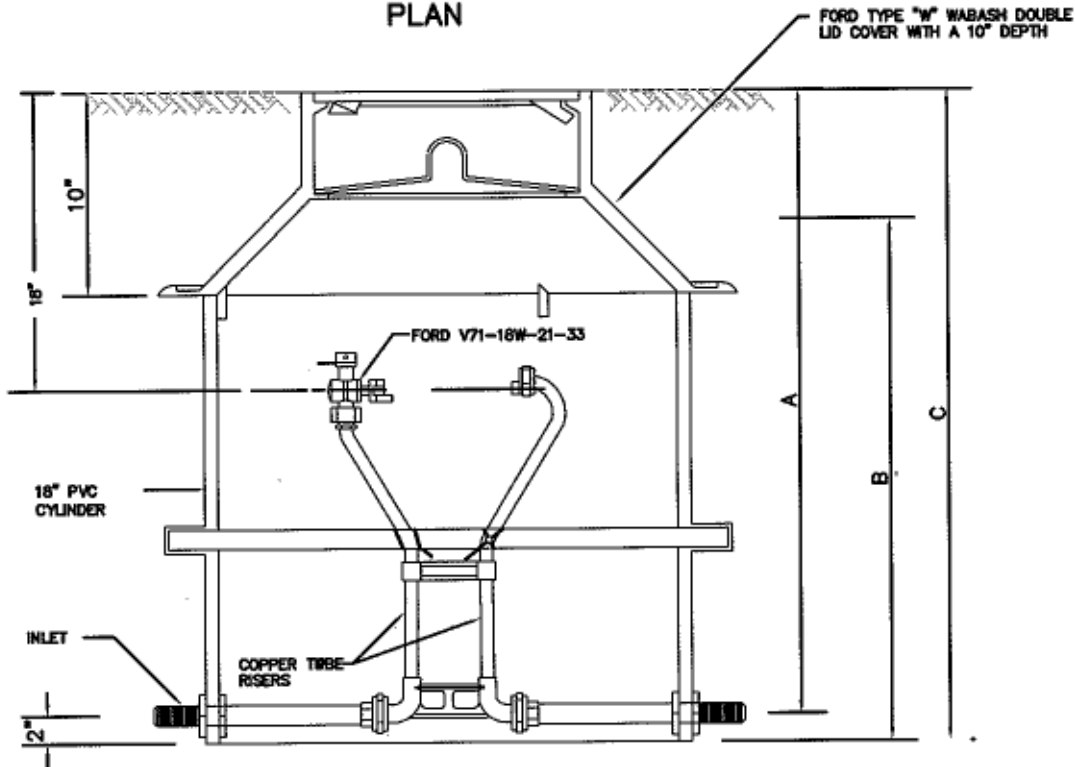
Dwg. No.:



### VERTICAL MEASUREMENTS

PIT DEPTH	SERVICE LINE DEPTH "A"	PVC CYLINDER LENGTH "B"	TOTAL PIT DEPTH "C"
3 FT. PIT	36"	28"	38"
4 FT. PIT	48"	40"	50"
5 FT. PIT	60"	52"	62"
6 FT. PIT	72"	64"	74"

### PLAN



### SECTION



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
 HADDON HEIGHTS, NEW JERSEY 08035

FORD PLASTIC METER PIT  
 (DOUBLE LID TYPE)

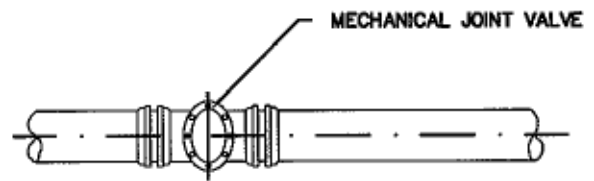
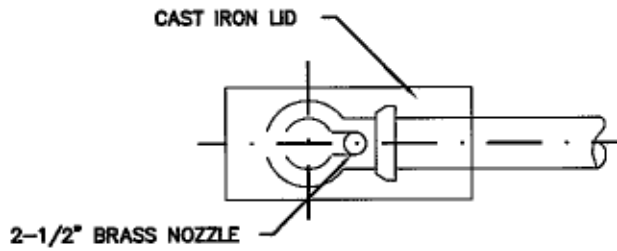
**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

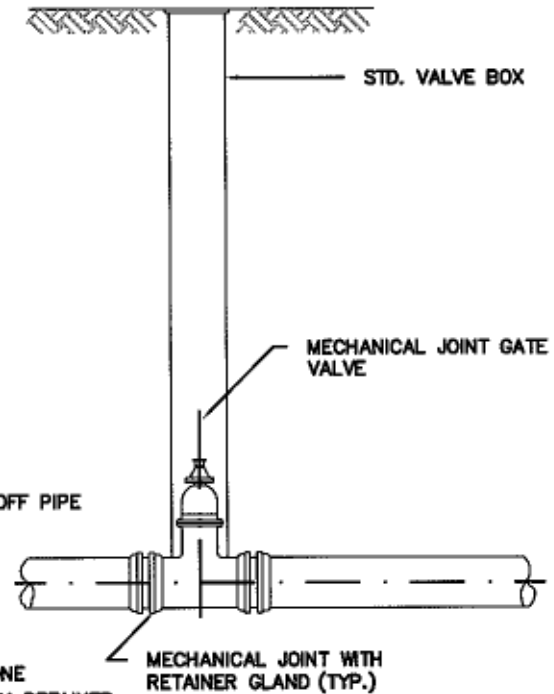
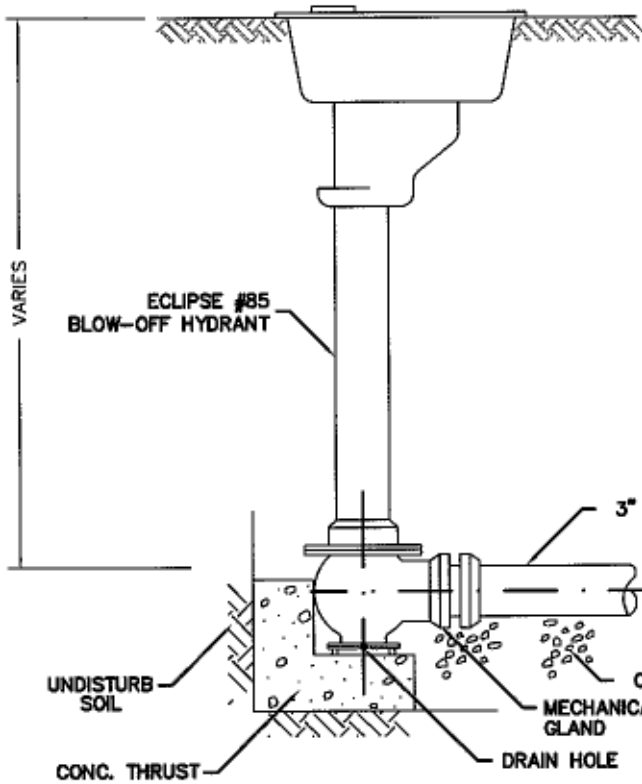
Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



PLAN



SECTION

NOTES:

BLOW-OFFS SHALL BE BOX HYDRANT WITH 4 CUBIC FEET OF CRUSHED STONE BENEATH HYDRANT TO ALLOW DRAINAGE.

WORKING PARTS SHALL BE BRASS WITH HYDRANT MAIN VALVE OPENING BEING 2-3/16".

INLET CONNECTION SHALL BE 3" MECHANICAL JOINT.

HYDRANT BARREL SHALL BE MADE OF 3" SCHEDULE 80 PVC PIPE.

HYDRANT SHALL HAVE A LOCKABLE CAST IRON BOX, AS MANUFACTURED BY KUPFERLE FOUNDRY, ST. LOUIS, MODEL #85, OR APPROVED EQUAL.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
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BLOW-OFF BRANCH WITH OUTLET VALVE AND HYDRANT

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

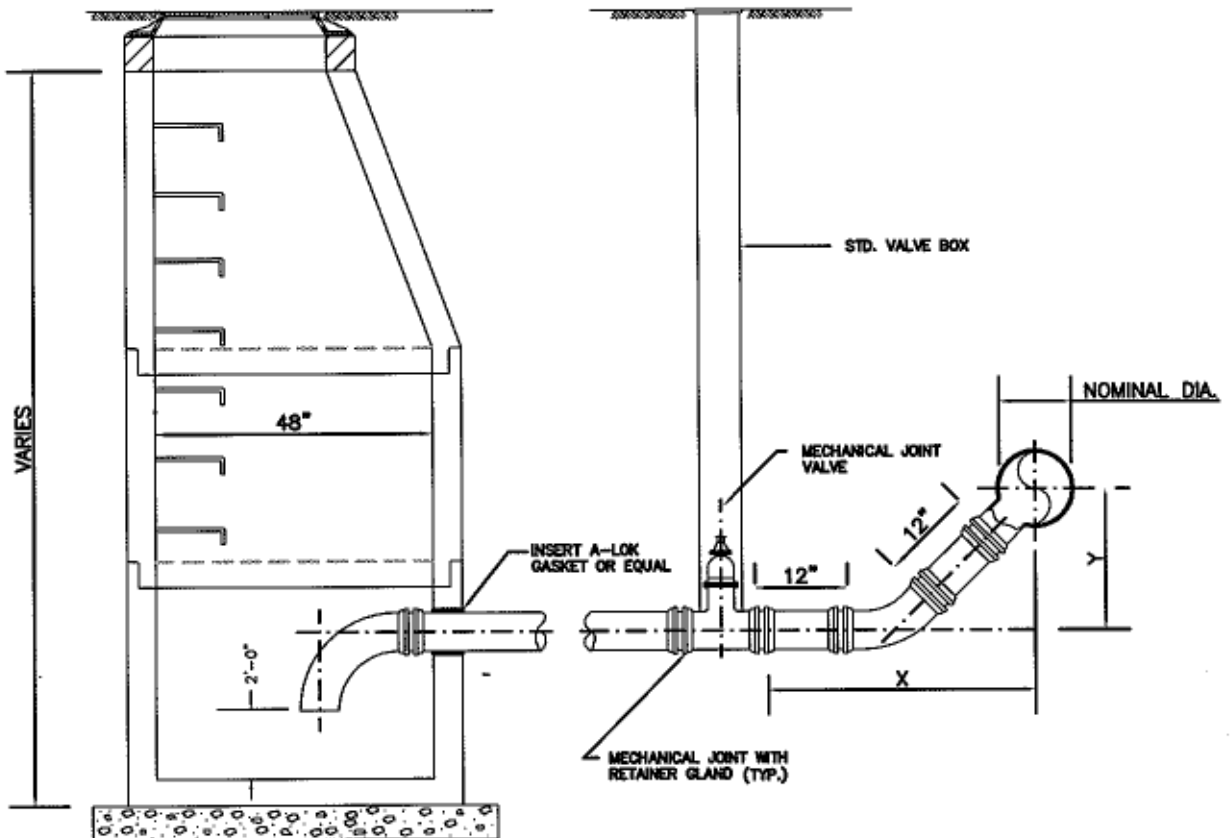
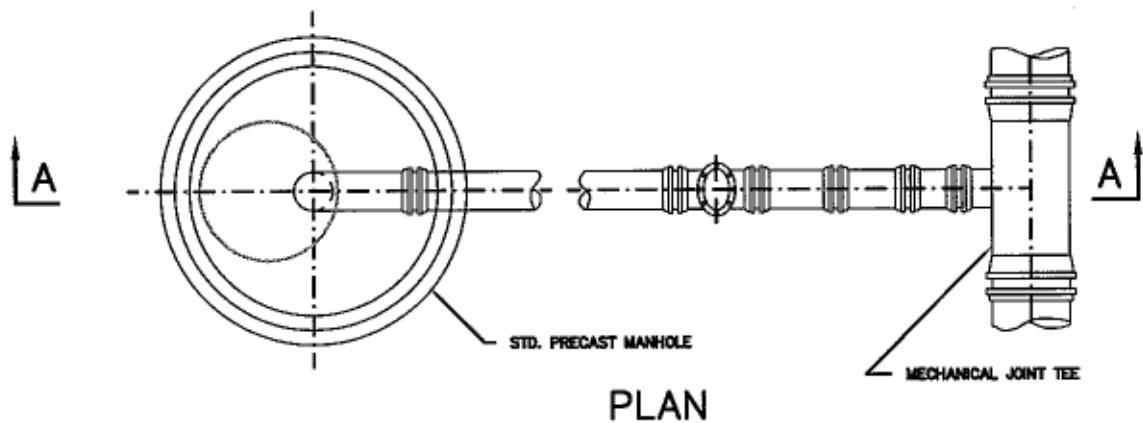
Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:





PIPE SIZE	BLOW-OFF AND VALVE	X (±)	Y (±)
12"	6"	37-1/2"	20-1/2"
16"	6"	39-3/4"	22-3/4"
20"	6"	41"	24"

**Pennoni**

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515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

BLOW-OFF BRANCH WITH OUTLET  
VALVE AND MANHOLE

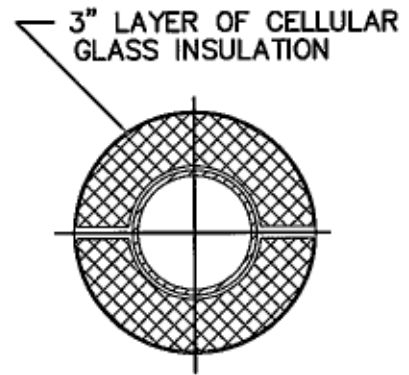
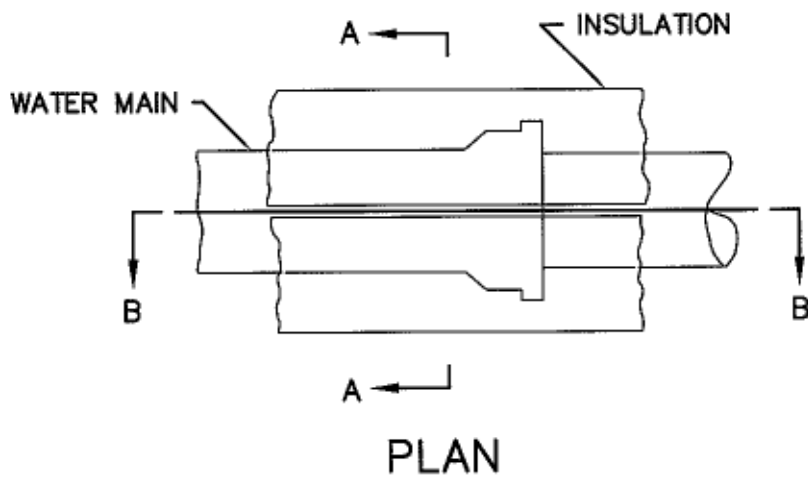
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

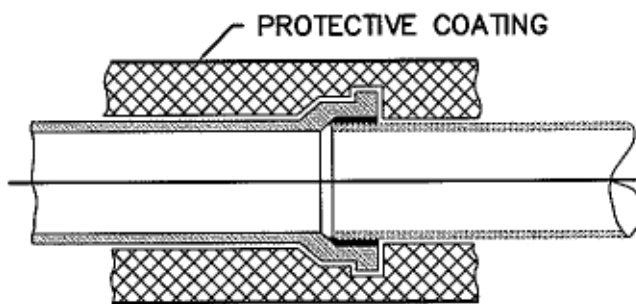
Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



SECTION A-A



SECTION B-B

NOTES:

1. INSULATION SHALL BE A CELLULAR GLASS CONFORMING TO ASTM C-552-73. INSTALLED ACCORDING TO MANUFACTURERS RECOMENDATIONS.
2. THE PROTECTIVE COATING SHALL BE A 125 MIL PREFABRICATED LAMINATE CONTAINING A 10x10 ASPHALT IMPREGNATED GLASS FABRIC AND A 1 MIL ALUMINUM FOIL. SANDWICHED BETWEEN 3 LAYERS OF BITUMINOUS MASTIC. THE EXPOSED SURFACE IS COATED WITH A PROTECTIVE PLASTIC FILM.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

EXPOSED WATER MAIN FROST  
PROTECTIVE COVERING

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

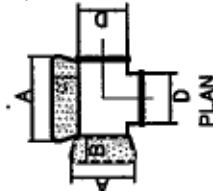
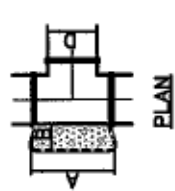
Date: JANUARY 16, 2009

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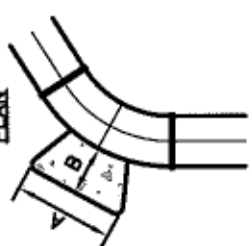
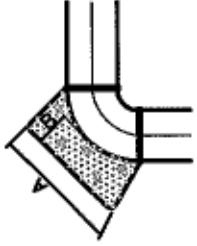
# MINIMUM SIZE OF CONCRETE THRUST BLOCKS

TEES & CROSSES		90° BENDS			90/45 DEGREE BENDS			45° BENDS			11 1/4 & 22 1/2 DEGREE BENDS			REDUCERS			DxD	
D	A	B	C	A	B	C	A	B	C	A	B	C	A	B	A	B		
6"	2'-0"	8"	1'-3"	2'-6"	8"	1'-3"	1'-6"	8"	1'-3"	1'-6"	8"	1'-3"	1'-6"	8"	6" x 4"	1'-6"	1'-0"	
8"	2'-6"	8"	1'-6"	3'-0"	8"	1'-6"	2'-0"	8"	1'-9"	1'-6"	8"	1'-9"	1'-6"	8"	8" x 4"	2'-0"	1'-0"	
10"	3'-0"	10"	2'-0"	3'-6"	10"	2'-0"	2'-8"	10"	2'-0"	1'-9"	10"	2'-0"	1'-9"	10"	10" x 6"	2'-4"	1'-3"	
12"	3'-6"	10"	2'-9"	3'-9"	10"	2'-9"	2'-9"	10"	2'-6"	2'-9"	10"	2'-6"	2'-9"	10"	10" x 8"	2'-6"	1'-6"	

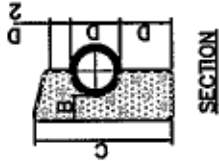
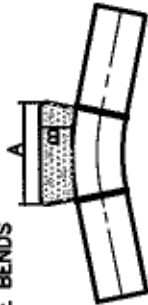
TEES & CROSSES



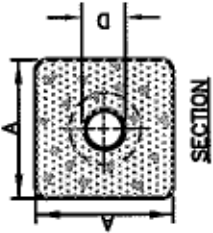
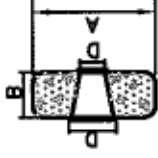
90/45 DEGREE BENDS



11 1/4 & 22 1/2 DEGREE BENDS



CAP



AT VERTICAL BENDS, ANCHORS FITTING TO RESIST OUTWARD THRUSTS



PLAN

ELBOW SECTION TURNED DOWN

NOTES:  
1. ALL CONCRETE TO BE 2500 P.S.I. AT 28 DAYS.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

CONCRETE THRUST BLOCK

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

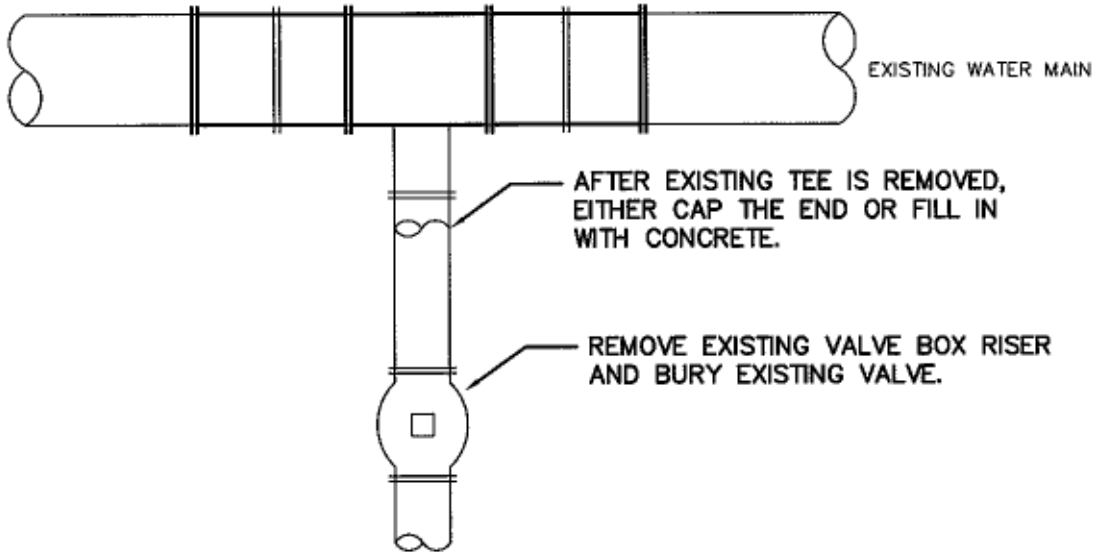
Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:

REMOVE EXISTING TEE.  
INSTALL TWO (2) MECHANICAL JOINT SLEEVES  
AND A ±3' PIECE OF C.L.D.I.P.  
CUT C.L.D.I.P. TO FIT AS TIGHT AS POSSIBLE  
BETWEEN EXISTING WATER MAIN ENDS.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

TEE REMOVAL DETAIL

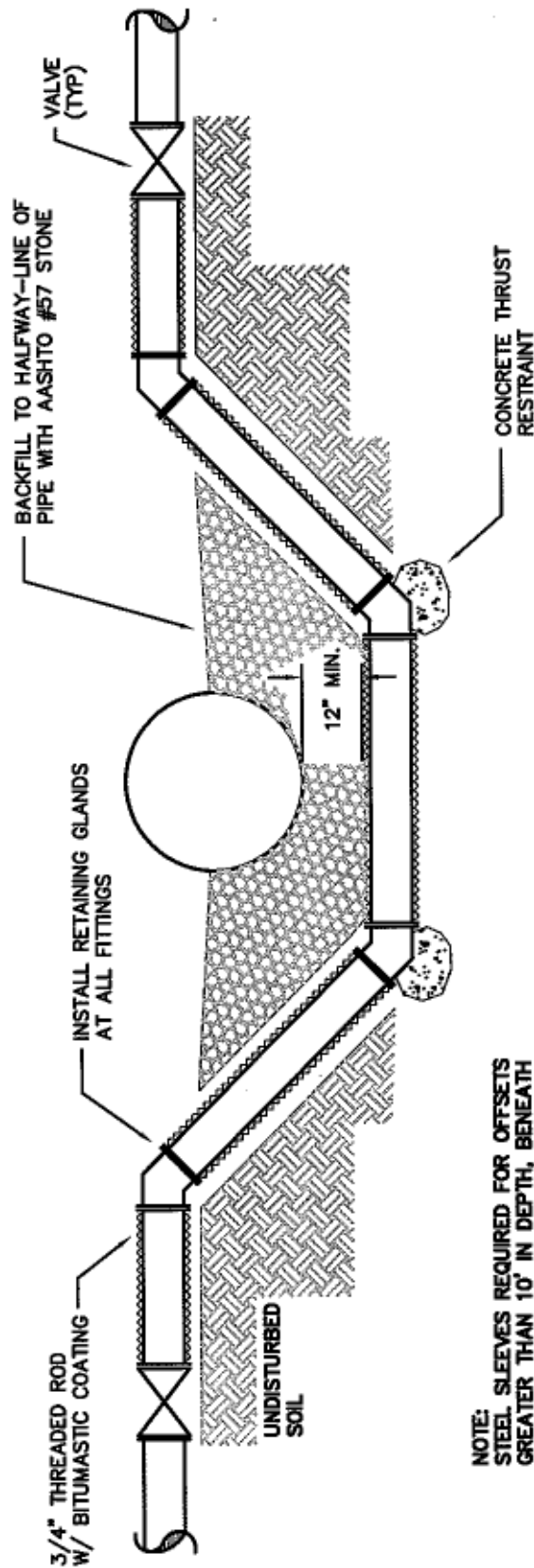
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



NOTE:  
 STEEL SLEEVES REQUIRED FOR OFFSETS  
 GREATER THAN 10' IN DEPTH, BENEATH  
 BOX CULVERTS, DUAL-PIPE CULVERTS  
 OR SANITARY SEWER MAINS AS DIRECTED  
 BY THE ENGINEER.



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
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WATER MAIN OFFSET DETAIL

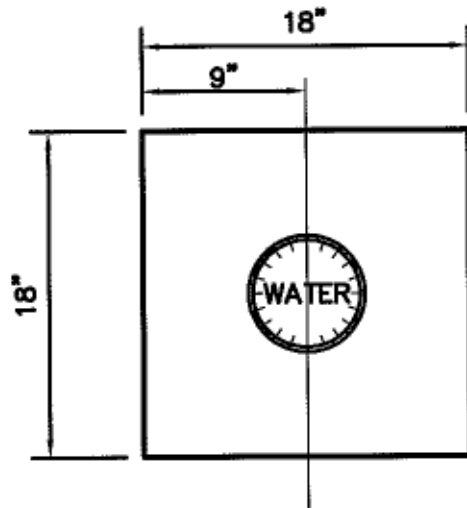
**PINE HILL BOROUGH  
 MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

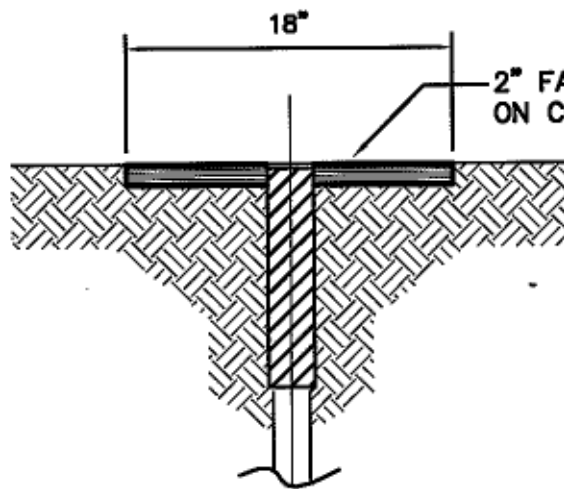
Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



2" FABC SURFACE COURSE  
TO BE PROVIDED AT ALL  
VALVE BOXES LOCATED IN  
GRASSED OR UNPAVED AREAS.



2" FABC SURFACE COURSE  
ON COMPACTED SUBGRADE



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

VALVE BOX  
PAVING DETAIL

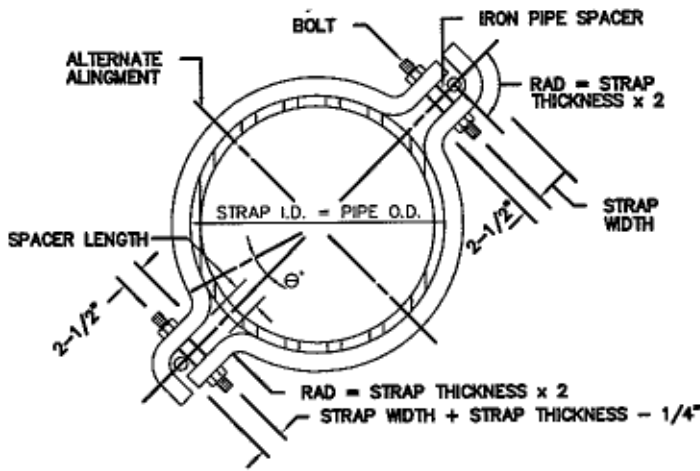
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

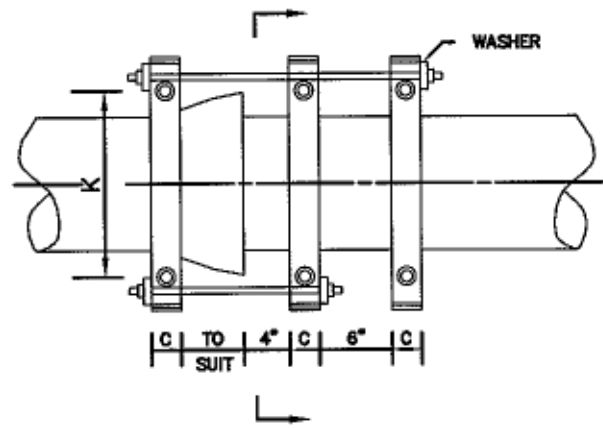
Scale: N.T.S.

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Dwg. No.:



SECTION



ELEVATION

PIPE SIZE	A STRAP I.D.	B STRAP THICKNESS	C STRAP WIDTH	D ROD DIA-METER	E BOLT SIZE	F SPA-CER SIZE	G SPA-CER LENGTH	H $\Theta$	K BOLT CENTER	W WEIGHT (AP-PROX)
3	-	1/2	2	5/8	5/8	3/4	1	-	-	-
4	4.80	1/2	2	5/8	5/8	3/4	1	26.179	11.10	72
6	6.90	1/2	2	3/4	5/8	3/4	1-1/4	21.418	13.29	98
8	9.05	1/2	2	3/4	5/8	3/4	1-1/4	17.105	15.56	100
12	13.20	3/4	3	1	7/8	1	1-1/2	16.128	20.56	218
16	17.40	3/4	3	1	7/8	1	1-1/2	12.744	24.90	228
20	21.60	3/4	3	1-1/4	7/8	1	1-3/4	11.133	29.14	331
24	25.80	3/4	4	1-1/2	7/8	1	2	10.000	33.36	520

WASHER THICKNESS=STRAP THICKNESS+1/4"

$$\Theta = \sin^{-1} \left( \frac{\text{SPACER LENGTH} + 4 \times \text{STRAP THICKNESS}}{\text{STRAP I.D.} + 4 \times \text{STRAP THICKNESS}} \right)$$

NOTES:

1. BOLTS TO BE A-193-GRADE B7.
2. NUTS TO BE A-194-GRADE 4 HEAVY HEX.
3. STRAPS TO BE A-36 STEEL.
4. ALL JOINTS WITHIN 12 FEET OF A BEND SHALL BE HARNESSSED.
5. APPLY COLD BITUMINOUS COATING AS SPECIFIED.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PUSH-ON JOINT HARNESSING DETAIL

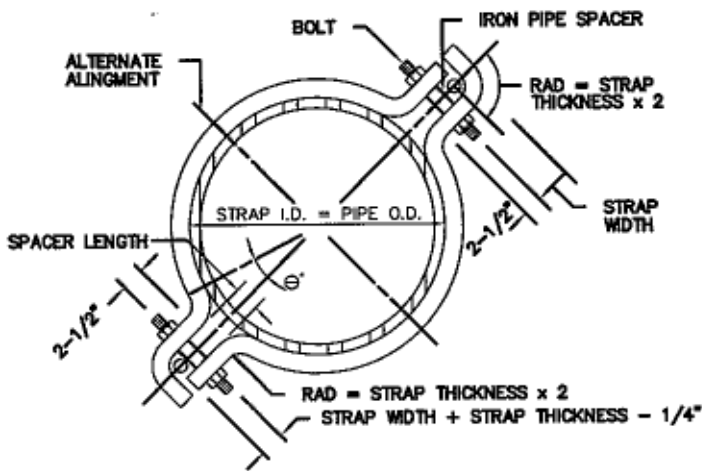
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

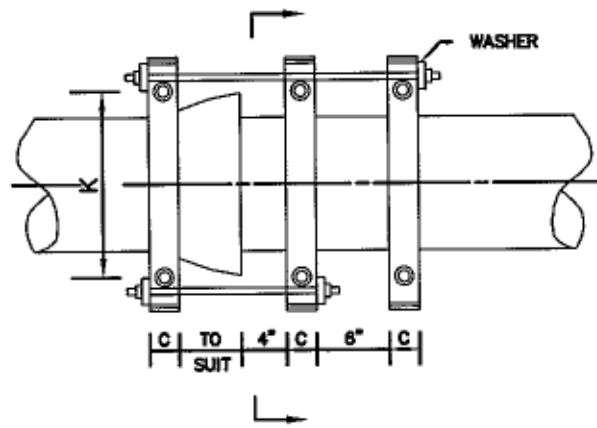
Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



SECTION



ELEVATION

PIPE SIZE	A STRAP I.D.	B STRAP THICKNESS	C STRAP WIDTH	D ROD DIA-METER	E BOLT SIZE	F SPA-CER SIZE	G SPA-CER LENGTH	H $\ominus$	K BOLT CENTER	W WEIGHT (AP-PROX)
3	-	1/2	2	5/8	5/8	3/4	1	-	-	-
4	4.80	1/2	2	5/8	5/8	3/4	1	26.179	11.10	72
6	6.90	1/2	2	3/4	5/8	3/4	1-1/4	21.418	13.29	98
8	9.05	1/2	2	3/4	5/8	3/4	1-1/4	17.105	15.56	100
12	13.20	3/4	3	1	7/8	1	1-1/2	16.128	20.56	218
16	17.40	3/4	3	1	7/8	1	1-1/2	12.744	24.90	228
20	21.60	3/4	3	1-1/4	7/8	1	1-3/4	11.133	29.14	331
24	25.80	3/4	4	1-1/2	7/8	1	2	10.000	33.36	520

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515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PUSH-ON JOINT HARNESSING DETAIL

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

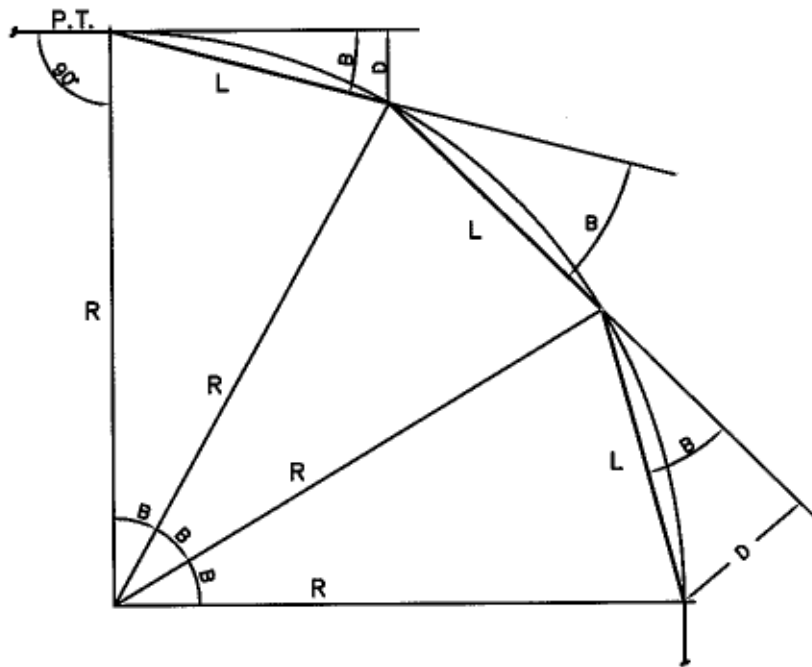
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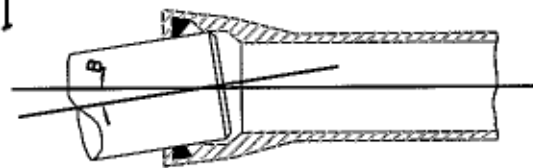
Date: JANUARY 16, 2009

Dwg. No.:





PLAN  
PIPE DEFLECTION



PUSH-ON TYPE JOINT

B - DEFLECTION IN DEGREES  
D - DEFLECTION IN INCHES  
L - LENGTHS  
R - RADIUS IN FEET  
P.T. - POINT OF TANGENT

PIPE SIZE	B	L=16 FEET		L=18 FEET		L=20 FEET	
		D	R	D	R	D	R
6"	3'	10"	306'	11"	344'	13"	382'
8"	3'	10"	306'	11"	344'	13"	382'
12"	3'	10"	306'	11"	344'	13"	382'
16"	2'	7"	458'	8"	516'	8"	573'
20"	2'	7"	458'	8"	516'	8"	573'
24"	2'	7"	458'	8"	516'	8"	573'
30"	2'	7"	458'	8"	516'	8"	573'



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PUSH-ON JOINT PIPE MAXIMUM  
DEFLECTION AND RADIUS

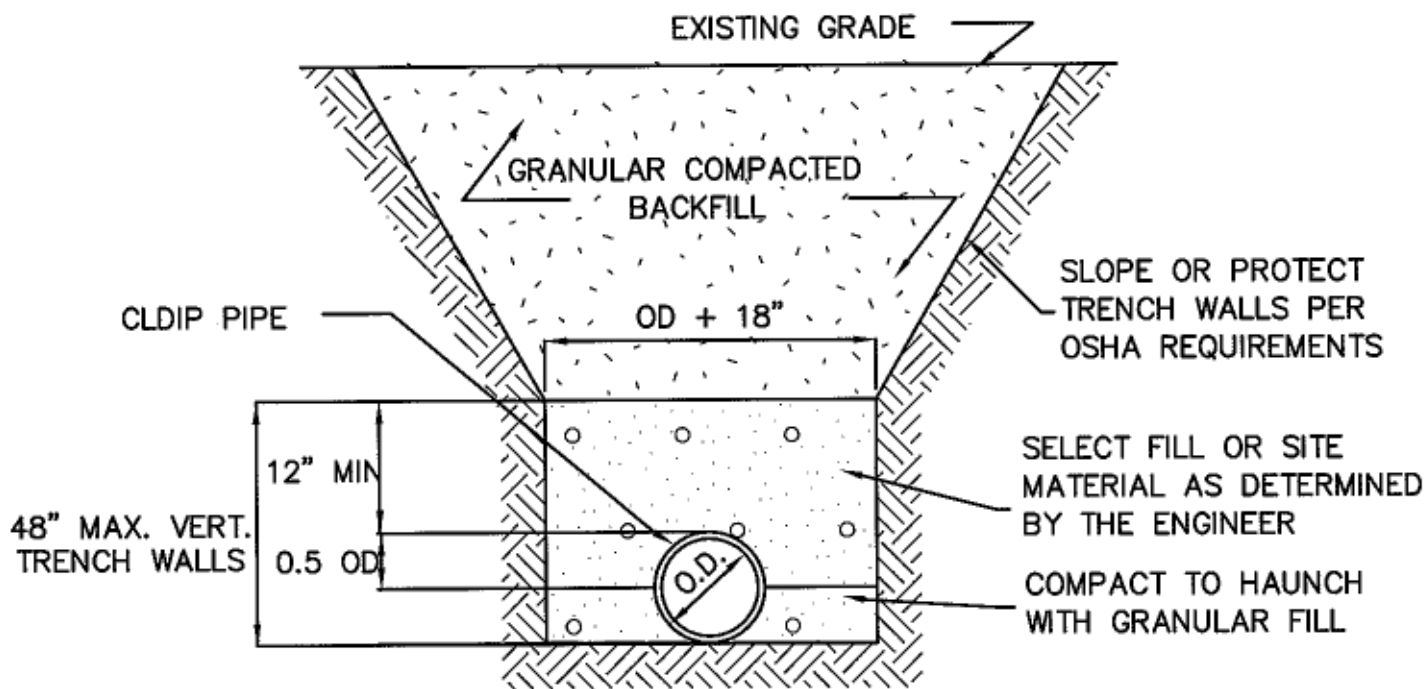
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:



NOTES:  
 TRENCHING OPERATIONS SHALL CONFORM TO ALL  
 OSHA REQUIREMENTS.



**PENNONI ASSOCIATES INC.**  
 515 GROVE STREET  
 HADDON HEIGHTS, NEW JERSEY 08035

WATER MAIN TRENCH DETAIL

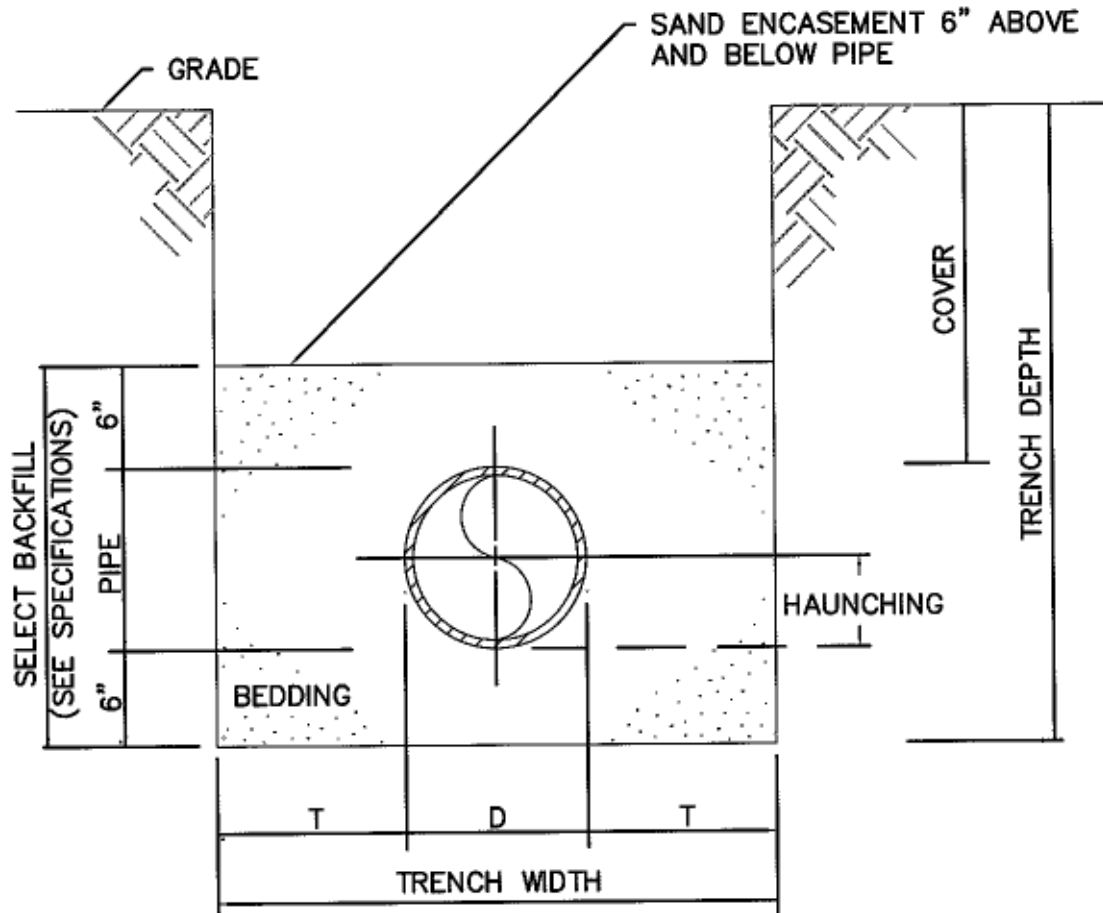
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 MUNICIPAL UTILITIES AUTHORITIES**

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Dwg. No.:



TYPICAL WATER MAIN TRENCH		
D=NOMINAL DIA.	T	TRENCH DEPTH
24" DIA. AND OVER	12"	COVER + DIA. +8"
8" DIA. TO 20" DIA.	8"	COVER + DIA. +8"
6" DIA. AND LESS	6"	COVER + DIA. +8"

TRENCH DEPTH = COVER PLUS NOMINAL PIPE DIA.  
PLUS 2" PIPE THICKNESS PLUS BEDDING 6" BELOW PIPE.

TRENCH WIDTH = NOMINAL PIPE DIA. PLUS 2 x T WITH  
NO PIPE THICKNESS ALLOWANCE.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PAY LIMITS FOR EXCAVATION OF  
WATER MAIN TRENCHES

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:

## EXCAVATION PAY LIMIT DIMENSIONS

EXCAVATION QUANTITIES PER LIN. FT.							SELECT BACKFILL	
COVER	PIPE SIZE	PIPE AREA (FT.)	TRENCH WIDTH (FT.)	TRENCH DEPTH (FT.)	CU. FT. PER LIN. FT.	CU. YDS PER LIN. FT.	DEPTH (FT.)	CU. FT. PER LIN. FT.
4'-0" ±	6"	0.35	1.50	5.16	7.75	.29	1.67	2.16
	8"	0.54	2.00	5.33	10.66	.39	1.83	3.12
	10"	0.79	2.17	5.50	11.94	.44	2.00	3.55
	12"	1.06	2.33	5.67	13.21	.49	2.17	4.00
	16"	1.77	2.67	6.00	16.02	.59	2.50	4.91
	20"	2.64	3.00	6.33	18.99	.70	2.83	5.85
	24"	3.68	4.00	6.67	26.68	.99	3.17	9.00

PIPE AREA BASED ON NOMINAL PIPE DIAMETER PLUS 2" PIPE THICKNESS

SAND DEPTH = NOMINAL PIPE DIAMETER PLUS 6" ABOVE AND BELOW PIPE.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PAY LIMITS FOR EXCAVATION OF  
WATER MAIN TRENCHES

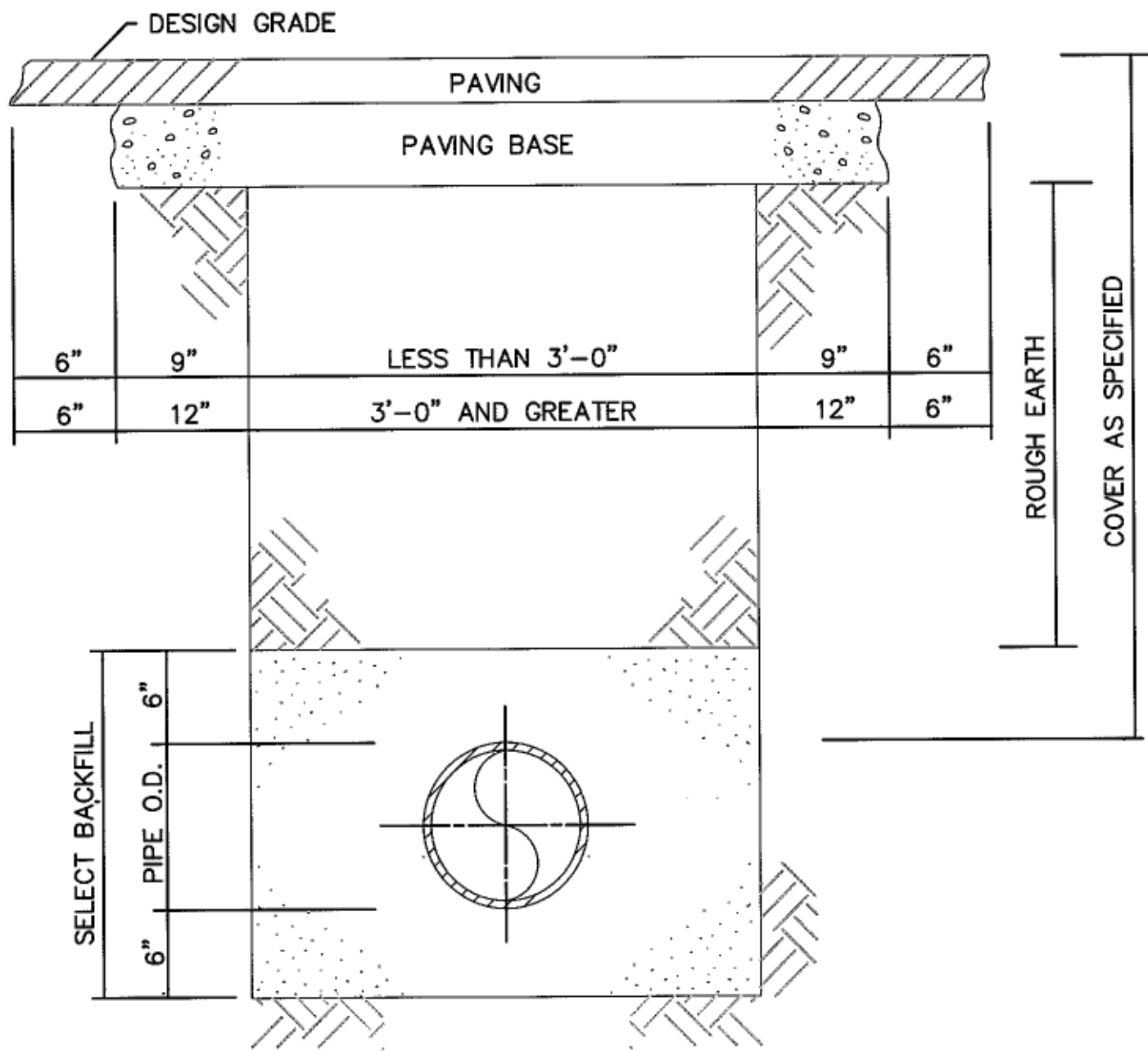
**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

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Date: JANUARY 16, 2009

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**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

PAY LIMITS FOR REPAVING WATER  
MAIN TRENCHES

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813	Scale: N.T.S.	Date: JANUARY 16, 2009	Dwg. No.:
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**GENERAL NOTES:**

1. 72 HOURS NOTICE MUST BE GIVEN TO THE PHMUA AND THE ENGINEER IN WRITING PRIOR TO INTERRUPTION ANY WATER SERVICE OR ROAD CLOSURE.
2. ALL DRIVEWAY ENTRANCES MUST BE MAINTAINED AND IN ACCESSIBLE CONDITION AT ALL TIMES.
3. RETAINING GLANDS TO BE USED AT ALL FITTINGS.
4. VALVES SHALL BE INSTALLED AS CLOSE TO THE NEAREST FITTING AS POSSIBLE AND ATTACHED TO THE FITTING BY THREADED RODS COATED WITH BITUMASTIC SEALANT.
5. PHMUA SHALL BE NOTIFIED PRIOR TO BLOWING OFF FIRE HYDRANTS.
6. PRESSURE TESTS SHALL NOT BE CONDUCTED UNTIL STICK DRAWN AS-BUILTS HAVE PROVIDED, DETAILING THE LOCATIONS OF ALL FITTINGS AND VALVES.
7. WATER SAMPLES FOR BACTERIA AND RESIDUAL CHLORINE MUST BE TAKEN IN THE PRESENCE OF THE INSPECTOR. PHMUA APPROVAL REQUIRED PRIOR TO HOUSE CONNECTIONS.
8. RESIDENTS SHALL BE NOTIFIED 30 MINUTES PRIOR TO REPLACEMENT OF HOUSE SERVICE.
9. WATER SERVICE LINES MUST BE BLOWN OFF THROUGH THE CURB STOP PRIOR TO CONNECTION TO HOUSE LINE. CONNECTED SERVICES SHALL BE VISUALLY INSPECTED UNDER CITY PRESSURE.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

**WATER  
GENERAL NOTES**

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

Job No. PHMU 0813

Scale: N.T.S.

Date: JANUARY 16, 2009

Dwg. No.:

## UTILITIES:

SANITARY SEWER  
& WATER

PINE HILL MUNICIPAL UTILITIES AUTHORITY  
907 TURNERVILLE ROAD  
PINE HILL, NJ 08021  
(856) 783-0739

GAS

SOUTH JERSEY GAS COMPANY  
1 SOUTH JERSEY PLAZA  
ROUTE 54  
FOLSOM, NJ 08037  
(609) 561-9000

ELECTRIC

ATLANTIC CITY ELECTRIC  
NEW FREEDOM ROAD  
RD#1 BOX 282  
BERLIN, NJ 08009  
(856) 767-494

TELEPHONE

VERIZON  
1713 MARSHA AVENUE  
WILLIAMSTOWN, NJ 08094  
(856) 728-9983

CABLE

COMCAST  
1250 HADDONFIELD - BERLIN RD.  
CHERRY HILL, N.J. 08034  
(856) 354-1660

NJ ONE-CALL SYSTEM: 1-800-272-1000

PRIOR TO OPENING AN EXCAVATION, EVERY EFFORT SHALL BE MADE TO DETERMINE WHETHER UNDERGROUND INSTALLATIONS; I.E., SEWER, TELEPHONE, WATER, FUEL, ELECTRIC LINES, ETC., WILL BE ENCOUNTERED, AND IF SO, WHERE SUCH UNDERGROUND INSTALLATIONS ARE LOCATED. WHEN THE EXCAVATION APPROACHES THE ESTIMATED LOCATION OF SUCH AN INSTALLATION, THE EXACT LOCATION SHALL BE DETERMINED AND WHEN IT IS UNCOVERED, PROPER SUPPORTS SHALL BE PROVIDED FOR ALL EXISTING INSTALLATIONS. UTILITY COMPANIES, AUTHORITIES AND OR OWNERS SHALL BE CONTACTED, ADVISED AND GIVEN ADEQUATE NOTICE OF PROPOSED WORK PRIOR TO THE START OF ACTUAL EXCAVATION.



**PENNONI ASSOCIATES INC.**  
515 GROVE STREET  
HADDON HEIGHTS, NEW JERSEY 08035

UTILITY NOTES

**PINE HILL BOROUGH  
MUNICIPAL UTILITIES AUTHORITIES**

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