

Mains
(developments)
Construction.

ALLEN TOWNSHIP

SANITARY SEWER SPECIFICATIONS

AND

STANDARD DETAILS

JANUARY 10, 2002

ADOPTED FEBRUARY 26, 2002

ALLEN TOWNSHIP STANDARD TECHNICAL SPECIFICATIONS FOR SANITARY SEWER
COLLECTION SYSTEM AND STANDARD DETAILS

100. STANDARDS AND SPECIFICATIONS

This sanitary sewer collection system shall be constructed in accordance with first class procedures and with new first class material in accordance with the Sanitary Sewer Collection System Industry Standards, including all the standards and specifications of these published standards and specifications referred to in the Construction Documents, and in accordance with the conditions of the Pennsylvania Department of Environmental Protection and Department of Transportation Permits issued for any project.

Certain recognized industry associations, technical societies, and governmental agencies which publish these standards and specifications are listed below for easy reference. The use of the association's name, society's name, or agency's name, or abbreviation for the name may be used interchangeably.

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| A.S.T.M. | American Society for Testing Materials |
| A.W.W.A. | American Water Works Association |
| A.S.A. | American Standards Association |
| A.C.I. | American Concrete Institute |
| A.I.S.C. | American Institute of Steel Construction |
| A.S.M.E. | American Society of Mechanical Engineers |
| P.C.A. | Portland Cement Association |
| PennDOT | Pennsylvania Department of Transportation |
| B.O.C.A. | Building Officials Code Administrators |
| D.E.P. | Department of Environmental Protection |
| E.P.A. | U.S. Environmental Protection Agency |

Any reference in these standards to "PennDOT Publication 408" or "Form 408", or other similar statement, are a reference to that Specification, latest edition.

All work shall comply with the requirements of Chapter 459 of Title 67 of the Pennsylvania Code entitled "Occupancy of Highways by Utilities", latest edition.

101. EXCAVATION

A. General

The CONTRACTOR shall furnish all labor, materials, equipment, and services required to perform all excavation, installation, repair, etc. of every description and of whatever substances encountered that may be necessary to complete the work. The use of

excavation machinery will be permitted, except as directed by the Township Engineer, in places where operation of same will cause damage to trees to be retained, buildings or existing structures above or below ground; in which case, hand methods shall be employed. The CONTRACTOR shall have no claim for compensation from the Township due to the fact that hand instead of machine excavation is necessary for whatever cause.

B. Removal and Storage Materials

The CONTRACTOR shall clear and grub the surface and remove all surface materials, of whatever nature, within the area where construction is to be accomplished, and shall properly separate and classify the materials removed, and shall store, guard, and preserve such quantities of said materials as may be required and are suitable for use in backfilling, regrading, resodding, or for other purposes. All the excavated material shall be stored in such parts of the construction area or such other suitable places, and in such manner, as shall be approved by the ENGINEER. The CONTRACTOR shall be responsible for any loss of or any damage to materials through careless removal or neglectful or wasteful storage, disposal, or use.

All perishable and objectionable material including, but not limited to, boards, fences, trees, brush, vines, shrubs, bushes, logs, stumps, roots, weeds, rubbish, and other organic matter shall be removed from the construction site by and at the expense of the CONTRACTOR. All stumps shall be cut off a minimum of three (3) feet below finished grade.

The CONTRACTOR shall remove all pavements, road surfaces, curbing, driveways, and sidewalks within the lines of excavation. Concrete pavements shall be opened by sawing and asphalt pavements by cutting to neat straight lines with channeling machines, hand operated pneumatic tools, or by such other methods as will furnish a clean cut in the pavement and base without undue shattering. All concrete curbing, driveways, or sidewalks within the lines of excavation shall be broken up and removed by the CONTRACTOR. All such work shall be done by the CONTRACTOR in accordance with the rules and regulations of the governmental agencies having jurisdiction. The use of weights dropped on pavement for breaking will not be allowed except by written permission of the ENGINEER.

In case more material is excavated from any trench than can be backfilled over the completed work or may be stored on the street or within the limits of the right-of-way, leaving space for the traffic and drainage as herein provided, the excess material shall be removed to some convenient place, provided by the CONTRACTOR. The CONTRACTOR shall return as much of the material so removed, as may be required to properly backfill the trench.

When it is necessary to haul soft or wet material over streets, the CONTRACTOR shall provide suitably tight vehicles.

C. Width and Depth of Trench

Pipe trenches shall be sufficiently straight between designated angle points to permit the pipe to be laid true to line in the approximate center of the trench. The trench widths below an elevation 3 feet above the top of the pipe when laid to the required grade shall be such as to provide a free working space on each side of the pipe as laid, but shall, in no event, exceed the outside diameter of the barrel of the pipe plus sixteen inches (16"). Where sheeting and shoring are used, the maximum allowable width shall be measured between the closest interior faces of the sheeting or shoring, as placed. If trench widths exceed the above requirements, pipe of greater crushing strength and/or other bedding may be required, as directed by the ENGINEER.

The depth of the excavation for the sewer or other structure herein specified shall be such that they can be built to proper grade, due allowance being made for crushed stone bedding, crushed stone cradles, concrete cradles, and concrete encasement.

Except at locations where excavation of unsuitable material or concrete encasement is required, excavation shall be to a depth of four (4) inches below the bottom of the pipe. A four-inch (4") crushed stone bedding shall be provided under all pipe to bring the pipe to grade, as specified. The crushed stone bedding shall be formed to fit the lower two (2) inches of the outside periphery of the pipe, with holes being dug for the bells, and the pipe having full bearing on the stone bedding throughout its length. Bedding for PVC force main shall be Type A sand or No. 10 aggregate screenings, PennDOT Publication 408, Section 703. When rock is encountered, it shall be removed to a depth of six (6) inches below the outside of the pipe barrel or bell and

the excavation shall be backfilled with crushed stone and the bed formed and shaped, as required above. When the material encountered at subgrade is unstable, it shall be removed from the trench at the direction of the ENGINEER. The excavation below subgrade of such unsuitable material shall be backfilled with crushed stone. In rock excavation, if trenches are shattered by blasting below or beyond the lines of excavation specified herein, the trench shall be refilled to specified lines of excavation with crushed stone.

D. Length of Open Trench

The ENGINEER shall have the right to limit the amount of trench opened in advance of pipe laying and the amount of pipe laid in advance of backfilling, but in no case shall more than two hundred (200) feet of trench be opened at any one place in advance of the completed sewer. Trench excavation shall be fully completed, at least twenty (20) feet in advance of the pipe placement, and shall be kept free from obstructions except that at the close of work at night or at the discontinuance of work, the pipe laying may be completed to within ten (10) feet of the end of the opened trench. The amount of pipe laid in advance of backfilling and tamping shall not exceed one hundred (100) feet.

If work is stopped on any trench for any reason and the excavation is left open, the CONTRACTOR shall refill such trench and shall not again open said trench until he is ready to complete the structure therein.

E. Accommodation of Traffic and Public Safety

The work on all streets and highways shall be governed by the Publication 203 of the Pennsylvania Department of Transportation, and the CONTRACTOR shall familiarize himself with this bulletin. (This Publication replaced Bulletin 90 and 43).

Streets shall not be unnecessarily obstructed and unless the Township, in writing, shall authorize the complete closing of a street, the CONTRACTOR shall take such measures at his own expense, as may be necessary, to keep the street or road open and safe to traffic. The CONTRACTOR shall construct and maintain such adequate and proper bridges over excavations as may be necessary or as directed for the safe accommodation of pedestrians or vehicles.

The CONTRACTOR shall furnish, erect, and maintain substantial flashing light barricades at crossings of trenches, or along the trench, to protect the public. Any trench left open and unattended shall be protected with suitable temporary fencing to minimize the risk of children or animals falling into the excavation. Driveways shall be backfilled, tamped, and covered with six (6) inches of crushed stone so that the driveway is usable at the end of each day's work.

The CONTRACTOR shall observe due precautions for accessibility of fire fighting equipment. Fire hydrants shall not be obstructed.

At all times, the CONTRACTOR shall maintain safe pedestrian traffic on sidewalks and over crosswalks.

IN narrow or congested streets or alleys, the CONTRACTOR shall complete his work as he goes along to minimize interference with access to garages and other places.

The CONTRACTOR shall, in all cases, so arrange his work as to cause the least inconvenience to property OWNERS consistent with the proper prosecution of this work.

F. Drainage

The sewer trench must be, in all cases, kept substantially free from storm, surface and subsoil water or sewage so that all masonry and joints may have ample time to set and harden and so that bedding and backfill can be undertaken in stable conditions. No joints shall be made under water. Gutters, sewers, drains, and ditches shall be kept open at all times for surface drainage. No damming or ponding of water in gutters or other waterways will be permitted, except where stream crossings are necessary and then only to an extent which the ENGINEER shall approve. The grading in the vicinity of sewer trenches shall be controlled so that the ground surface is properly pitched to prevent water running into the trenches or onto private property in an unnatural way or condition.

At any open water courses, ditches, culverts, or storm or drain pipes encountered during the progress of the work, the CONTRACTOR shall provide for the protection and securing of a continuous flow in such courses or culverts or pipes and shall take care not to damage them during his work. If his work does result in damage to these facilities, the CONTRACTOR shall repair the damaged portion of the facility.

G. Dewatering Trench

The CONTRACTOR shall keep all excavation free from water while sewer construction work is in progress, and to such extent as may be necessary, while excavation work alone is being carried out. The CONTRACTOR shall build all dams and other devices necessary for this purpose, including lowering the water table below trench bottom by well points and pumping, and provide and operate pumps of sufficient capacity for dewatering the excavations. He shall provide for the disposal of the water removed from excavations in such manner as shall not cause injury or damage to the public health, to public or private property, to the work of other CONTRACTORS, to any portion of the work completed or in progress, or produce any impediment to the use of the highways, roads, lanes, streets, sidewalks, and foot paths by the public.

H. Sheeting, Bracing, and Shoring

Wherever it is required by State or Federal occupational safety laws or regulations and wherever it is necessary to prevent injuries or to avoid damage to existing structures, pavement, or foundations or to prevent excessive trench loads on pipe, due to caving or sliding of banks of excavations, the CONTRACTOR shall determine these requirements and assure all responsibility for worker and public safety.

I. Blasting

When explosives are used, they shall be transported, stored, and used in accordance with all applicable Federal, State, and Local Laws and Regulations. Blasting operations shall only be performed by a Licensed Blaster.

Blasting operations, when required, shall be covered by a rider to the insurance policy or policies required under the General Conditions or by separate insurance policies. The amount of blasting insurance shall be one million dollars (\$1,000,000.00). If the CONTRACTOR anticipates that blasting may be required, a Certificate of Insurance shall be provided sufficiently in advance so that it may be approved prior to any actual blasting.

If blasting is anticipated within a State Highway right-of-way, a Blasting Permit is required from PennDOT. The CONTRACTOR is reminded to file an application for such a permit well in advance of blasting to allow time for the permit to be processed.

Special care shall be taken when blasting is to be performed in the vicinity of existing structure or utilities to preclude damage to them and applicable Regulations pertaining to such operations shall be strictly followed. Utility companies shall be notified of proposed blasting so they may provide information, including location, depth, material, age, and bedding of the facilities and make recommendations concerning blasting procedures and precautions.

The CONTRACTOR shall be responsible for injury to persons or property that may result from his use of explosives.

J. Sinkholes

It shall be the CONTRACTOR'S responsibility to fill all underground voids or sinkholes encountered during construction.

Generally, all loose or soft materials shall be removed from the sinkholes prior to backfilling. Excavation shall continue until all underground voids and caverns are uncovered and until rock or firm material is encountered in the excavation.

The CONTRACTOR must retain the services of a Registered Geologist to direct all repairs to sinkholes. The repair method must be approved by the ENGINEER and witnessed by the CONTRACTOR'S Geologist.

102. BACKFILLING

A. General

It is the intent of the following requirements for the backfilling of trenches to specify materials and methods which will: (1) result in thorough compaction of the backfilled material without displacement of the grade or alignment of the sewer line and its appurtenances; and (2) minimize settlement of the backfilled material. If displacement of the sewer or settlement of the backfilled material does occur, it will be considered as conclusive evidence of improper workmanship or the inclusion of unsuitable materials or both and it shall be the CONTRACTOR'S responsibility to remove and recompact the settled material and regrade and realign the sewer. During the course of the backfilling operation, the ENGINEER may, at the CONTRACTOR'S expense at any location or depth of trench, make tests to determine whether the CONTRACTOR'S compaction operations are sufficient to meet the requirements specified below.

B. Initial Backfilling

After the sewer and its appurtenances have been constructed, inspected, and approved, including the placement of the bedding material under the pipe haunches, as specified elsewhere, the trench shall be backfilled to a height of one (1) foot above the top of the pipe in horizontal layers not to exceed six (6) inches with this same bedding material. This material shall not be frozen nor placed when the material in the trench is frozen. The material shall be carefully placed with hand shovels and not pushed in by equipment to avoid damage to the pipe or lateral displacement of the pipe by uneven distribution of material. Each layer shall be compacted with a hand tamper when pipe is not covered or covered with less than six (6) inches of backfill and compacted with a mechanical tamper for the last layer at twelve (12) inches over the pipe. No puddling or jetting will be permitted.

C. Backfill in State Highway and Existing Township Street Rights-of-Way

After initial backfilling, the remainder of the trench shall be backfilled with No. 2A Aggregate and in accordance with PennDOT Publication 408, Section 703.2 and compacted by mechanical tampers throughout its full width in layers not to exceed four (4) inches. All work in State Highway rights-of-way will be subjected to inspection by representatives of the Commonwealth of Pennsylvania Department of Transportation, and the work must be performed in accordance with the requirements of that Department.

No puddling or jetting will be permitted.

D. Backfill in Areas Other Than State Highway and Existing Township Street Rights-of-Way

After initial backfilling, the remainder of the trench shall be backfilled in layers not to exceed six (6) inches, compacted to produce a density at the bottom of the compacted layer of not less than 95 percent of maximum dry density, as determined by the Standard Compaction Test, ASTM 0698. The backfill may consist of the earth excavated from the trench, if allowed by the Township's Ordinances, but shall be subject to the approval of the ENGINEER, shall not contain rocks larger than eight (8) inches in any dimension. Rocks shall be entirely surrounded by fine material and not constitute more than twenty-five (25) percent of the total volume of

backfill. Backfill material shall not be frozen nor placed when the material in the trench is frozen.

No puddling or jetting will be permitted.

All backfill shall be free of topsoil and organic material.

All backfill shall meet the requirements of embankment material, as specified by PennDOT Publication 408, Section 206.

103. SANITARY SEWER PIPE

A. General

The CONTRACTOR shall install all sanitary sewers and appurtenances of the size and type shown on the drawings and in accordance with the specifications and pertinent recommendations of the manufacturer.

B. Handling

Pipe and accessories shall be distributed at the project site and, at all times, carefully handled to avoid damage. All pipe shall be rolled or lifted, care being taken not to bump or drop pipe or fittings. The interior and machined ends of all pipe shall be kept free from dirt and foreign matter.

C. Trench Preparation

The trench shall be excavated in accordance with these specifications. Except in areas where concrete cradle or concrete encasement is specified, all gravity pipe shall be laid in a bed of crushed aggregate which shall have a minimum thickness of four (4) inches below the bottom of the pipe, and all pressure pipe shall be laid in a bed of sand or stone screenings which shall have a minimum thickness of four (4) inches below the bottom of the pipe.

D. Laying Pipe

Following the trench excavation and preparation of the crushed stone bedding, pipe laying shall proceed upgrade with pipe laid carefully, bells upgrade, spigot ends fully entered into adjacent bells, and true to lines and grades shown on the drawings. Each length or section of pipe shall be carefully inspected before installation and those containing cracks or other defects shall be removed

from the site or destroyed. Extreme care must be exercised to prevent breakage when the pipe is handled. Bells and spigots shall be carefully cleaned before pipes are lowered into trenches. The pipes shall be lowered as to avoid unnecessary handling in the trench. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses prepared where required to accommodate bells and joints. Each pipe shall be firmly held in position so that the invert forms a continuous grade with the invert of the pipe previously placed. The interior of all pipe and the inside of the bell and outside of the spigot shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean during laying operations by means of plugs or other approved devices.

Under no conditions shall pipe be laid in water or subgrade containing frost, and no pipe shall be laid when trench conditions are unsuitable for such work. In all cases, water shall be kept out of the trench until concrete cradles or supports, where used, and materials in the joints have hardened.

Walking or working on the completed pipeline, except as may be necessary in tamping or backfilling, will not be permitted until the trench has been backfilled to a height of at least two (2) feet over the top of the pipes.

Any pipe that has its grade or joint disturbed after laying shall be taken up and relaid. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe.

The CONTRACTOR shall furnish all material, equipment, and labor to provide a laser beam grade control on the pipe centerline.

Satisfactory means shall be used to hold the pipe in line while the pipes are being joined, and due precaution shall be taken to ensure that the spigot end of the pipe being laid is pushed home into the groove of the preceding pipe.

No pipe shall be laid within ten (10) feet of the machine excavating the trench nor within twenty-five (25) feet of any place where blasting is being done. In all cases, the mouth of the pipe shall be provided with a board or other stopper, carefully fitted to the pipe to prevent all earth or other substances from washing in. In rock excavation, the mouth of the pipe shall be carefully protected from all blasts.

Pressure pipe shall be installed in strict conformity to the manufacturer's recommended installation practice. In place, concrete thrust blocking shall be provided in accordance with the "Standard Details" at all locations listed below:

- d.1 Changes in Direction
- d.2 Bends
- d.3 Crosses
- d.4 Tees
- d.5 Laterals
- d.6 Changes in Size
- d.7 Stops
- d.8 Valves, and
- d.9 Check Valves

E. Joints

All joints shall be watertight and any leaks or defects discovered shall be immediately repaired. After joints are made, any superfluous material inside the pipe shall be removed by means of an approved follower or scraper. Prior to construction, the CONTRACTOR shall obtain the ENGINEER'S approval of the type of joint to be used.

F. Branches

Wye branches shall be installed at the locations required for laterals. In general, connection to mains shall be made with commercially manufactured branches and one-eighth (1/8) bends. Cutting of pipes will not be permitted. Wye branches shall be set at such vertical angle, as required to bring the service connection to the proper depth, or at the minimum angle shown on the drawings or Standard Details. For force main lateral branches, a 2" x 1 1/4" tee shall be installed.

G. Stubs

Where directed by the ENGINEER or when indicated on the drawings, a pipe stub approximately five (5) feet in length or to undisturbed ground shall be built into manholes for connections to future extensions. The outer end of such connections shall be closed with a watertight stopper.

H. Drop Connections

The CONTRACTOR shall build drop connections where shown on the drawings or where directed by the ENGINEER, in accordance with the Standard Details. Drop connections shall be constructed of the same material used to construct the main pipe.

I. Laterals

The CONTRACTOR shall build complete to a point generally four (4) feet beyond the curb or edge of pavement or to the property line or street right-of-way line, all service connection laterals. Unless otherwise approved by the ENGINEER, all laterals shall be of the same material and installed to the same specifications as the main sewer pipe. The ends of all laterals shall be closed with watertight stoppers. All laterals shall be marked at the end by a 2" x 4" length of lumber set vertically on the trench bottom at the end of the lateral extending a distance of three (3) inches above the finished ground elevation. The top of the marker shall be painted a bright green color with durable paint acceptable to the ENGINEER. They shall also be marked with a steel reinforcing rod. Lateral ends shall be located on as-built drawings from two property corners and its depth shall be noted.

Laterals shall be installed in accordance with the Standard Details at a grade of one-quarter ($\frac{1}{4}$) inch per foot minimum. The depth at the end of the lateral shall be sufficient to allow construction of the lateral complete to the house at a minimum slope of one-quarter ($\frac{1}{4}$) inch per foot.

Excavation for service connections shall be opened for the entire length of each connection before any pipe is laid therein. If rock is encountered within ten (10) feet of any building, it must be removed by drilling and wedging or some other approved method than blasting.

Where service connections are specified to be made to an existing sewer at such locations where there are no wye branches or laterals provided in the sewer line, connections shall be made as follows: A neat regular hole which will accommodate a six-inch wye saddle shall be cut in the existing pipe. The hole shall not extend below the horizontal centerline of the existing pipe. Oakum, Mastic, or similar shall then be yarned around the connection between the six-inch wye saddle and the existing sewer line to produce a watertight connection. Stainless steel clamps are required. The joint will then be encased in Class A concrete for a distance extending twelve (12) inches from the center of the joint laterally and providing a minimum thickness of six (6) inches of concrete under and around the outside of the pipe. A watertight joint will be required.

For force main laterals, pipe shall be 1½" PVC. A brass corporation stop shall be installed at the main with a suitable adaptor. A PVC gravity-operated flapper-type check valve shall be installed where directed by the ENGINEER generally one (1) foot outside the road pavement or shoulder. A brass shutoff valve shall be installed twelve (12) inches beyond the check valve and a cast iron valve box with an inside diameter of 2½" and cover shall be installed to grade over this valve.

The end of the lateral shall be fitted with a plug or cap that may be removed when the house lateral is connected.

This lateral will extend four (4) feet beyond the curb line or edge of pavement.

J. Lateral Standpipes or Risers

Where approved by the ENGINEER, house connections may enter the sewer through risers. Risers shall be of the same material to which they are being fitted, unless otherwise directed and shall enter the sewer through wye branches. The upper ends of standpipes shall be either wye branches or bends, as may be directed.

The riser pipes shall be recessed into the bank of the sewer trench and encased with Class A concrete for their full height, as shown on the Standard Details.

K. Pipe Materials

Only the following pipe materials may be used:

K.1 Polyvinyl Chloride (PVC) Pipe (Gravity)

PVC pipe and fittings for gravity sewer shall be the bell and spigot type and shall meet the requirements of ASTM D3034 SDR 35 (extra strength):

Joints for PVC pipe shall be made with compression type gaskets as designed by the manufacturer for watertight joints. Assembly of the joints shall be in accordance with the pipe manufacturer's specifications. Joint materials shall comply with the requirements of the applicable ASTM specifications.

K.2 Polyvinyl Chloride (PVC) Pipe (Force Main)

Polyvinyl Chloride (PVC) pressure pipe and fittings shall be manufactured in accordance with AWWA C900 and shall be pressure class 160 psi, S.D.R. 26.

All joints between PVC pipe sections and between pipe fittings shall be effected by a rubber ring gasket type coupling approved by the ENGINEER. The pipe may be made with an integral bell or a gasketed bell solvent welded to plain sections. In the latter case, the bell must be solvent welded to the pipe and hydro-tested in the plant of the manufacturer.

K.3 Ductile Iron Pipe (D.I.P.) - Gravity or Force Main

All pipe and fittings shall conform to the requirements of "Waterline Relocation and Repair", Section 107 of these specifications except joints inside a "casing" must be mechanical joints.

L. Field Tests on Gravity Sewers

L.1 General

All gravity sewer lines shall be tested to determine their degree of water-tightness and the correctness of their horizontal and vertical alignment. The CONTRACTOR shall furnish all necessary labor, material, and equipment and shall perform all specified tests for every length of sewer pipe, in the presence of the ENGINEER. The CONTRACTOR shall follow a testing program and schedule that is acceptable to the ENGINEER. All testing shall be performed after backfilling of both main line sewer and laterals so that it is representative of the "in service" condition.

If any section of sewer line fails to meet the specified test requirements, the CONTRACTOR shall, at his own expense, repair or replace all defective material and/or workmanship and shall conduct additional tests to demonstrate that the sewer line meets the specified test requirements.

L.2 Horizontal and Vertical Location and Alignment

The CONTRACTOR shall provide as-built locations of wye branches and lateral ends and elevations or depths of pipe inverts at manholes and lateral ends. As-built data shall be marked on a set of plans and shall be given to the ENGINEER. Manhole or pipe locations out of location by two (2) feet or more can be ordered to be reconstructed. Such order would be given by the ENGINEER if it is his opinion that the misalignment would otherwise adversely affect the completed project.

A test of correctness of horizontal and vertical alignment shall be performed on each and every length of sewer main between adjacent manholes, after backfill has been in at least thirty (30) days.

The CONTRACTOR shall attempt to pass a mandrel through the main pipe between manholes at a time that the main pipe is free of flowing liquids. Successful passing of the mandrel within the dry pipe between manholes shall be a prerequisite to the acceptance of the construction work.

L.3 Low Pressure Air Test

Unless directed otherwise by the ENGINEER, all sections of gravity sewer lines shall be tested for leakage by a low pressure air test. The test procedure shall be, in general, as recommended by the Uni-bell Plastic Pipe Association, Dallas, TX, Publication UNI-B-6-79. The basic test procedure and allowable air loss requirements are as follows:

- a. The inside of the pipe shall be thoroughly cleaned, removing all debris and mortar. The sewer shall be thoroughly flushed with water to clean and wet the pipe.
- b. All laterals, stubs, and other fittings shall be plugged and shall be adequately braced to withstand test pressures.
- c. The main sewer between two manholes shall be plugged at the upper and lower manholes by the use of inflatable air tight plugs, one of which shall be equipped with an air hose to the pipe interior.
- d. The test equipment shall consist of a compressor with air bleed valve, throttling valve, and sensitive air pressure test gauge with gage cock. This equipment shall be connected with the air hose connection to the sewer.
- e. If the sewer is laid in groundwater, the elevation of groundwater level shall be determined and compensations will be made in the test pressure at the direction of the ENGINEER.

- f. Air shall be slowly added to the sewer until the pressure reaches four (4) psi in excess of the groundwater head. After five (5) minutes stabilization time, air shall be added as required. Plugs shall be checked for leaks.
- g. The air supply shall be disconnected and, if necessary, air shall be released until the gauge reads exactly 3.5 psi above the groundwater head. The time for the pressure to drop from 3.5 to 2.5 psi above the groundwater head shall be noted.
- h. The minimum allowable time for the air pressure to drop 1.0 psi, for a typical section of eight-inch diameter pipe of lengths up to 300 feet shall be seven (7) minutes thirty-four (34) seconds.

For lengths of eight-inch diameter pipe greater than 300 feet, the minimum allowable time (in seconds) shall be computed as $1.52 \times L$ where L is the total horizontal length of pipe (in feet) between manholes.

This time period shall be used whether or not laterals are attached to this run of pipe. This time period shall also be used to test ten-inch diameter gravity sewer pipe. For other pipe sizes, the ENGINEER will direct the test period in accordance with the aforementioned Uni-bell Pipe Association recommendations.

I.4 Infiltration Test

Where the groundwater level is at least two (2) feet above the top of the pipe for the entire length of a section of sewer or where a noticeable flow is observed in a completed portion of sewer, the ENGINEER may require the CONTRACTOR to perform an infiltration test, even if a low pressure air test has already been conducted.

The basic test procedure and allowable infiltration rate is as follows:

- a. At the upstream manhole, all inlets shall be plugged.
- b. All laterals, stubs, and fittings into the sewer line being tested shall be plugged.

- c. A V-notch weir or other flow measuring device approved by the ENGINEER, shall be installed in the end of the pipe in the downstream manhole, in such a way that no water bypasses the device.
- d. After steady flow has been achieved (usually less than one [1] hour), six (6) flow readings shall be recorded over a thirty (30) minute interval. If the readings vary more than 20 percent (\pm) from the average of the readings, the test should continue until a more steady flow is observed. If the readings vary less than 20 percent (\pm) from the average of the readings, the test shall stop and the average shall be the "infiltration".
- e. The maximum allowable infiltration rate shall be 100 gallons per inch of inside pipe, diameter per mile per twenty-four (24) hours.

M. Hydrostatic Tests for Pressure Pipe (Force Main)

Sewer force mains shall be tested for leakage by means of a hydrostatic pressure test. After the pipe has been laid and partially backfilled between joints, each section of pipe between valves or temporary plugs shall be tested as follows:

- 1. The pipe shall be slowly filled with water and tested at a pressure fifty (50) percent above normal working pressures, as determined by the ENGINEER, but in no case less than one hundred twenty (120) psi, based on the elevation of the lowest point of the line or section under test. The pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the ENGINEER. A meter to measure makeup water required shall also be installed. The pump, pipe connections, taps into the pipe, and all necessary apparatus shall be furnished by the CONTRACTOR. Before applying the specified test pressure, all air shall be expelled from the pipe.
- 2. All exposed pipes, fittings, valves, and joints, shall be carefully examined during the open-trench test. Any cracked or defective pipes, fittings, or valves discovered as a consequence of this pressure test shall be removed and replaced by the CONTRACTOR with sound material and the test shall be repeated until satisfactory to the ENGINEER. Should the CONTRACTOR elect to backfill the entire trench or any portion thereof, prior to testing, it shall be the responsibility of the CONTRACTOR to locate and repair any leaks which occur during this test.

3. While the test pressure is being maintained, all exposed pipes, fittings, valves, and joints shall be inspected for leaks. Leakage shall not exceed ten (10) gallons per day per inch of diameter per mile of pipe. In the case of piping, which will remain permanently exposed, no leakage will be permitted. The test pressure shall be maintained for a period of not less than one (1) hour if joints are exposed and four (4) hours when joints are covered.

N. Shop Tests on Sewer Pipe

The materials listed below shall be tested at the shop or plant of and by the manufacturer. Each manufacturer of such materials shall be fully equipped to carry out the tests herein designated. Upon demand of the ENGINEER, the manufacturer shall perform such additional tests as the ENGINEER may deem necessary to establish the quality of the material offered for use. The ENGINEER shall be furnished with certified reports or records of the results of all tests, such records or reports to contain a sworn statement that the tests have been made as specified. The number of tests performed shall be specified in the appropriate ASTM or AWWA Test Method. The ENGINEER may require additional tests by an Independent Testing Laboratory. Payment for all tests shall be made by the CONTRACTOR.

| <u>PIPE MATERIAL</u> | <u>TEST METHOD</u> |
|----------------------------------|--------------------|
| Polyvinyl Chloride Sewer Pipe | ASTM D 3034 |
| Polyvinyl Chloride Pressure Pipe | AWWA C 900 |
| Ductile Iron Pipe, Class 52 | AWWA C 151 |

105. SANITARY SEWER MANHOLES

Precast concrete manholes shall be constructed at such locations and to such sizes, lines, and elevations, as shown on the drawings and as required by these specifications.

Drop manholes shall be constructed at such locations and with such drops, as are shown on the drawings.

Manholes shall be completely built and fitted with their frames and covers, as the work progresses.

A. Manhole Bases

Manhole bases may be either cast in place with Class A concrete or precast reinforced concrete.

When a cast in place manhole is used, all pipes entering or leaving the manhole shall be encased in the base, as shown on the Standard Details. The joint in the base shall be formed by means of a steel joint form to be provided by the manufacturer of concrete sections.

When a precast base is used, pipes shall be connected to the manhole using a rubber or neoprene flexible sleeve such as "A-lok", "Lock-joint", or approved equal.

When it is necessary to core into an existing base, a smooth hole shall be made in the existing base. A PSX gasket, or ENGINEER approved equal, with stainless steel bands, shall be installed to form a watertight seal.

B. Precast Sections

Manhole wall sections shall be constructed of precast reinforced concrete pipe having an inside diameter of forty-eight (48) inches. The pipe shall have tongue and groove joints made watertight using "RAM-NEK", "MAS-TIK", or approved equal, gaskets. Certain manholes may be required to be larger than forty-eight (48) inches. This requirement would be noted on the plans.

Lifting slots shall be sealed watertight with a premanufactured flexible "plug" made for the purpose of plugging these holes. If the plug does not fully seal the opening, non-shrink mortar may be used to provide additional sealing.

The top section shall be an eccentric tapered section, tapering from 48" I.D. to 24" I.D., unless a larger taper is required for larger manholes or unless a slab top is required because the manhole is too small in height to accept a tapered top section.

The entire exterior surface of all manholes shall be coated to a minimum thickness of sixteen (16) mils with bitumastic super service black manufactured by Koppers Company, Inc., Hydroside 648, or approved equal. Field application of bitumastic coating shall be applied to joints and areas of damaged coating and to the exterior of the riser rings needed to achieve proper manhole casting elevations.

C. Manhole Steps

Manhole steps shall conform in design to the requirements of AIA-140, as made by the Aluminum Company of America, or equal. Steps shall be cast into each manhole at the point of manufacture. Steps shall have a dropped front and ribbed tread and shall be placed twelve (12) inches apart and, as in accordance with the Standard Details. Manhole steps shall be factory installed with the manholes. Field installation of steps is not acceptable.

D. Surface for Frames

The top of the walls of precast manholes shall be properly contoured to the street or ground surface so as to form a flat surface upon which the manhole frame it to rest. If precast sections do not conform to the required grade, precast grade adjustment rings shall be used to bring the manhole frame to proper elevation. The final elevation of the manhole shall be at finished grade unless otherwise specified on the plans for manholes in fields where flooding is expected.

E. Frames and Covers

Cast iron manhole frames and covers shall be furnished and set in a full bed of mortar upon the top of each manhole. Frames and covers shall comply with the requirements of these specifications and drawings. Watertight frames and covers shall be installed at the locations indicated in the drawings and, as shown on the Standard Details.

F. Inverts

Invert channels shall be formed directly in the base, be built up of concrete and mortar, or consist of half tile. They shall be smooth and accurately shaped to a semicircular bottom conforming to the inside shape of the adjacent sewers. Changes in size and grade shall be made gradually and evenly. Changes in the direction of the sewer and entering branches shall have a smooth curve of as large a radius as the size of the manhole will permit. The slope of the floor adjacent to the channel shall generally not exceed one (1) inch per foot.

G. Materials

G.1 Frames and Covers

Castings for manhole frames and covers shall conform to the requirements of ASTM A48, Class 20. The castings shall be sound, true to form and thickness, cleaned by means of sandblast, and neatly finished to insure satisfactory seating. Castings shall receive one coat of black asphaltum paint at the factory. The cover shall have cast thereon the word "sanitary" in letters not less than two (2) inches in heights.

Castings shall be capable of safely supporting an H-20 loading, in accordance with specifications of the American Association of State Highway and Transportation Officials (AASHTO), with due allowance for impact included in the design.

G.2 Precast Manhole Sections

All precast manhole sections shall meet or surpass the requirements of ASTM C478.

G.3 Mortar

The mortar for masonry shall be either a prepared mortar conforming with the requirements of ASTM C91 Type II, or shall be made of one (1) part cement, one (1) part lime, and five (5) parts sand in a damp loose condition. The cement shall conform with the requirements of ASTM C150, Type I. The lime shall be hydrated lime conforming with the requirements of ASTM C207, Types S. The sand shall conform to the requirements of ASTM C144.

H. Pressure or Vacuum Test

Each manhole shall be tested. The manhole to be tested shall be completely filled with water for a period of twelve (12) hours prior to commencement of the test.

The manhole shall be filled with water to a point level with the top of the frame and this water level shall be maintained for a period of twelve (12) hours during which period an accurate record of the amount of water to be added by reason of leakage (exfiltration) will be kept. The amount of exfiltration so determined from the initial observation when converted into gallons per day, must be within the following limits.

The total rate of exfiltration shall not exceed a rate of 0.038 gallons per inch of diameter per vertical foot per day.

If any manhole fails to meet the exfiltration requirements specified herein, the CONTRACTOR shall determine, at his own expense, the source or sources of leakage. The CONTRACTOR shall repair or replace all defective material and/or workmanship and shall conduct such additional tests, as required to demonstrate that the manhole meets the test requirements.

As an alternative, the CONTRACTOR shall test all complete manholes by the vacuum testing method. A vacuum of 10" mercury shall be placed on the manhole and the time measured for the vacuum to drop to 9" mercury. The vacuum shall not drop more than 1" in less than sixty (60) seconds. If the manhole fails the vacuum test, the CONTRACTOR shall make the necessary repairs and then retest the manhole.

106. PUMPING STATIONS AND FORCE MAINS

All pumping stations proposed for dedication to the Township must meet the standards of the Department of Environmental Protection and these standards.

- A. Tanks - All pumping stations must be contained in concrete tanks or large diameter concrete manholes.
- B. Pumps - Pumps stations must be at least duplex and all pumps must be grinder pumps and meet the specifications of "Hydro-matic" unless otherwise deemed equal by the Township.
- C. Hardware - All hardware and metal within the tanks shall be of stainless steel.
- D. Valves - A separate dry tank shall be provided to house any valving.
- E. Generator - An emergency generator with appropriate weatherproofing must be provided for each pump station.
- F. Force Main Connection to Gravity - The Township may require that one or more gravity manholes be provided with fiberglass inside coating in any manholes downstream from a force main connection.

107. WATERLINE RELOCATION AND REPAIR

All waterline relocations and repairs shall be provided in accordance with the City of Bethlehem or the Northampton Borough Municipal Authority Specifications, depending on whose waterline is being relocated or repaired.

108. CONCRETE

All concrete on the project will be provided and installed in conformance with PennDOT Specification Publication 408, Section 1001 and Section 704.

The CONTRACTOR is required to observe, in particular, that section dealing with concrete placement in cold weather, Section 1001.3(i).

All concrete shall be PennDOT Class A (3300 psi) unless otherwise shown.

109. STEEL CASING FOR BORINGS

Steel pipe casing shall have a wall thickness of 0.563 inches when installed under railroad crossings and 0.375 inches when installed under streets and highways. In both cases, circular steel pipe shall not be less than twenty-four (24) inches in diameter. A coal tar epoxy protective coating shall be applied to the pipe interior and exterior.

110. FLOW METERING EQUIPMENT

The CONTRACTOR shall supply and install flow metering equipment at the location(s) shown on the plans. This equipment and installation shall consist of the following items:

- A. Flow Meter - Marsh McBirney Model 260-32K Flo-Tote, including velocity and level sensing probe, thirty (30) feet of sensing cable, battery operated (6V) flow meter in a waterproof housing, and instruction manual.
- B. Sensor Mounting Hardware - Appropriate Marsh McBirney mounting hardware and profiling adaptor as required for the pipe size in which it is to be installed.
- C. Portable Processor - Epson Model HX-20 Portable Microprocessor, designed for use with Model 260 Flow meters, including five-foot interface cable, two data cassettes, two printer ribbon cartridges, AC power adapter, and instruction manual.
- D. A factory approved representative shall provide a one day instructional demonstration of the metering and processing equipment at a time and location specified by the ENGINEER.
- E. All equipment shall be installed in accordance with the manufacturer's recommendations.

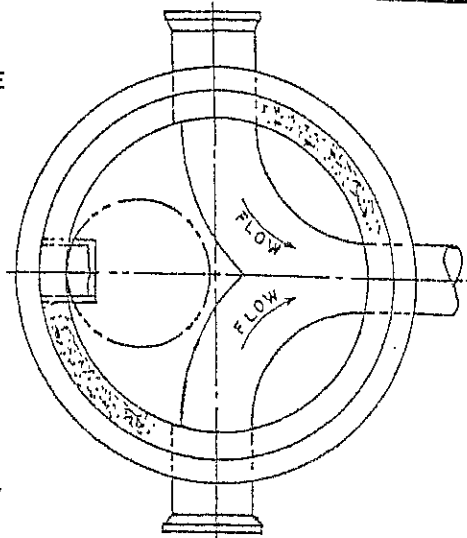
111. DEFINITIONS

- A. Engineer - shall mean the Municipal Engineer for Allen Township, as appointed by the Allen Township Board of Supervisors.
- B. Contractor - shall mean any contractor hired by the Allen Township Board of Supervisors or a contractor under employment by a developer performing sewer work.

December 1, 2001
A01-41-DetailsJlg.wpd

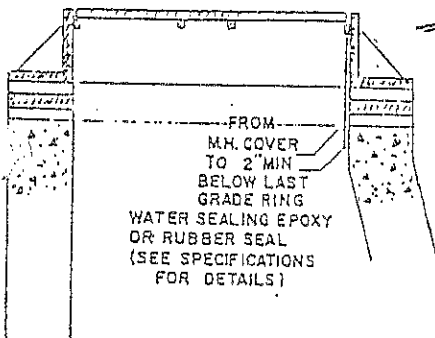
NOTES:

- 1) THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 3/4 OF THE DIA. OF THE SEWER PIPE.
- 2) THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A RATE OF 1" PER FT.

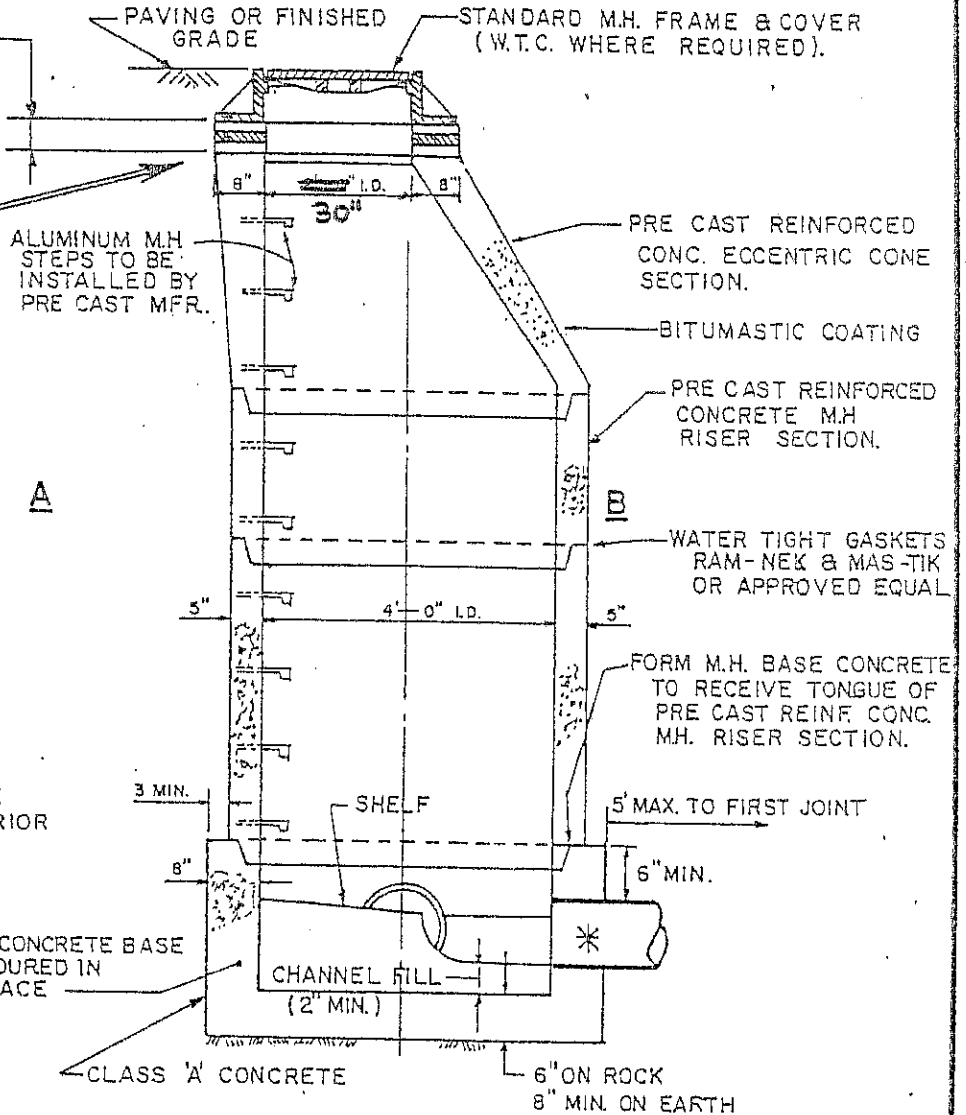


PLAN BELOW LINE A-B

DESIGN WITH ASSUMPTION OF 2 GRADE RINGS - SET WITH 0 TO 4 MAX. GRADE RINGS. ADJUST TO GRADE AND SLOPE AS NEEDED.



FROM M.H. COVER TO 2" MIN BELOW LAST GRADE RING
WATER SEALING EPOXY OR RUBBER SEAL (SEE SPECIFICATIONS FOR DETAILS)



* FOR P.V.C. CONNECTIONS, A FLEXIBLE GASKET SHALL BE INSTALLED PRIOR TO POURING THE BASE.

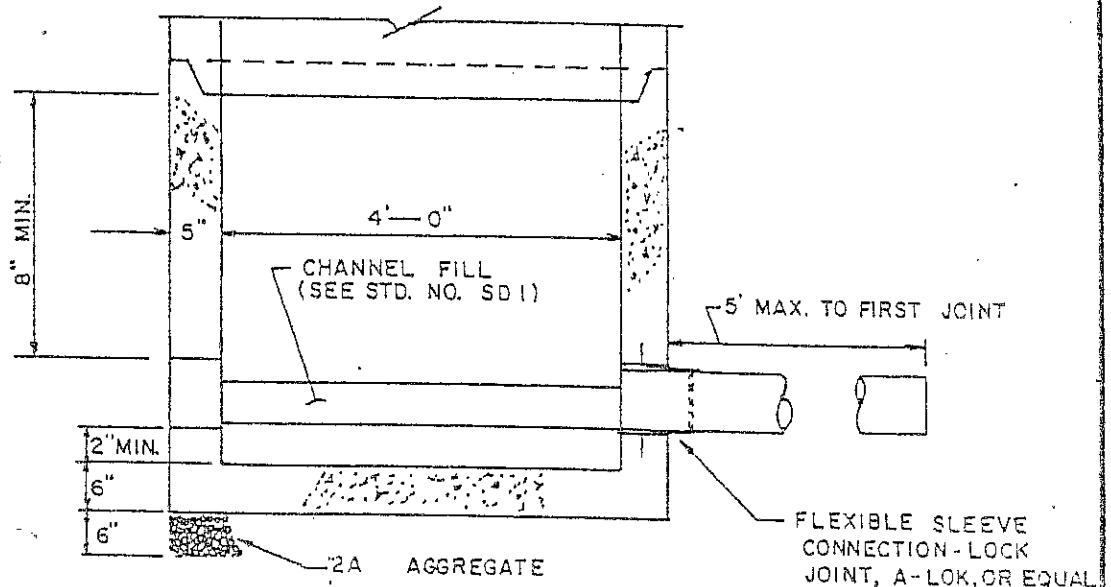
DATE: 1/1/92
SCALE: N.T.S.

STANDARD MANHOLE - BASE CAST IN PLACE

ST'D. NO.

HANOVER ENGINEERING ASSOCIATES, INC.
BETHLEHEM, PENNSYLVANIA

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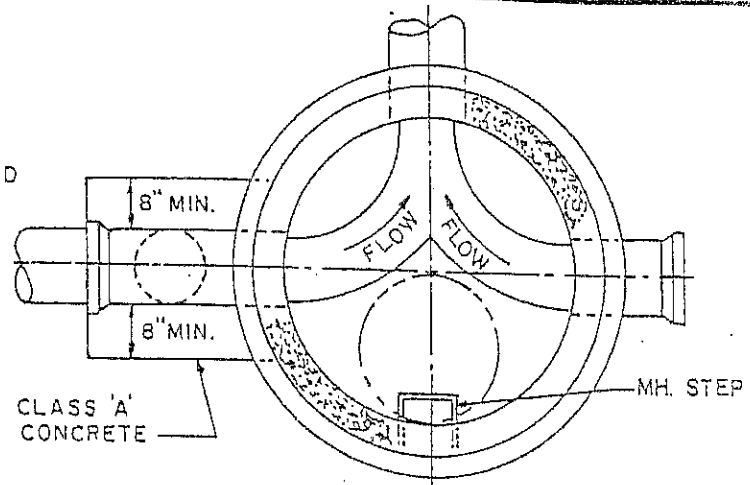
NOTES:

- 1) SEE STANDARD NO. SD-1 FOR MANHOLE DETAILS.
- 2) PRECAST CONSTRUCTION SHALL BE IN ACCORDANCE WITH ASTM C478.

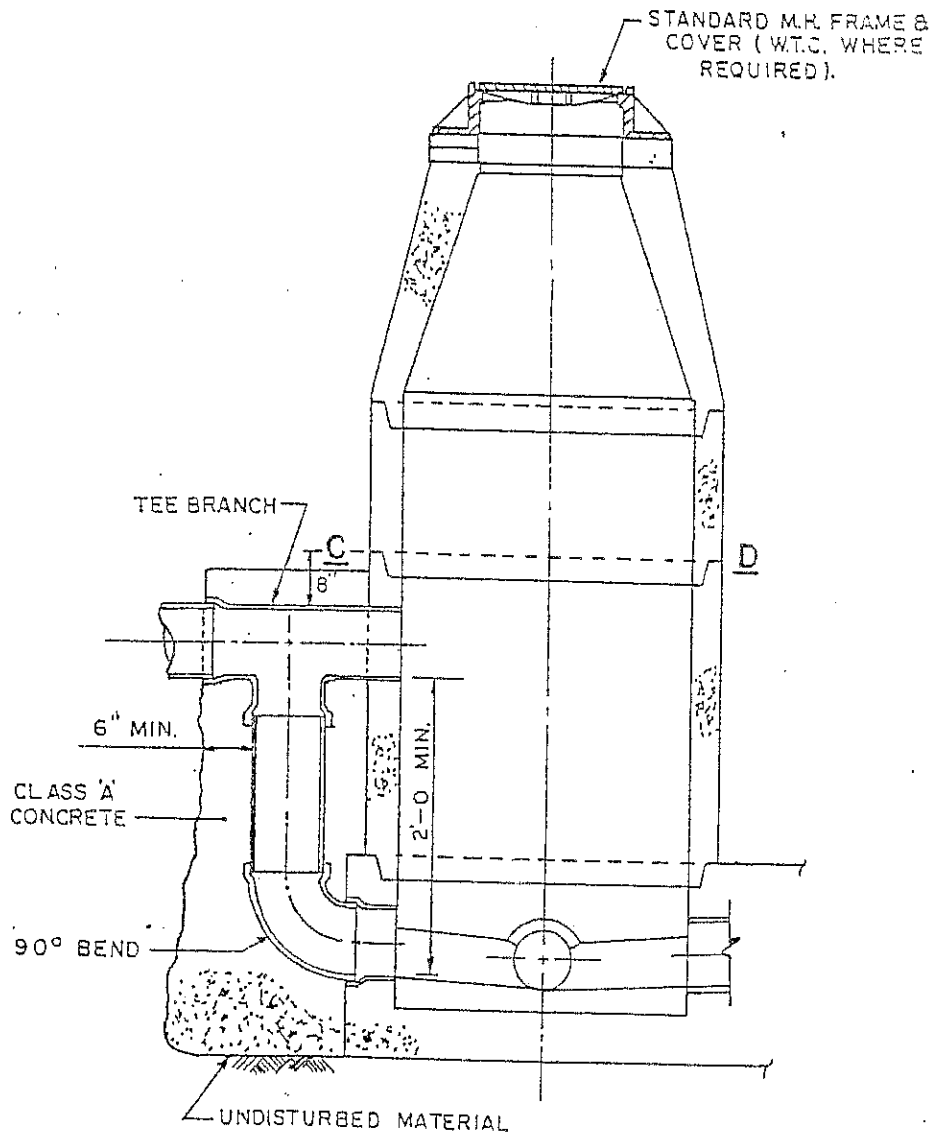
| | | |
|--------|--|-------------|
| DATE | STANDARD MANHOLE PRECAST BASE | ST'D NO. |
| 1/1/92 | | S D 2 |
| SCALE | HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | |
| N.T.S. | | |

NOTE:

1.) ALL DIMENSIONS AND DETAILS SAME AS STANDARD MANHOLE. EXCEPT AS NOTED



PLAN BELOW LINE C-D



DATE
1/1/92
SCALE
N.T.S.

"DROP MANHOLE"

ST'D.
NO.

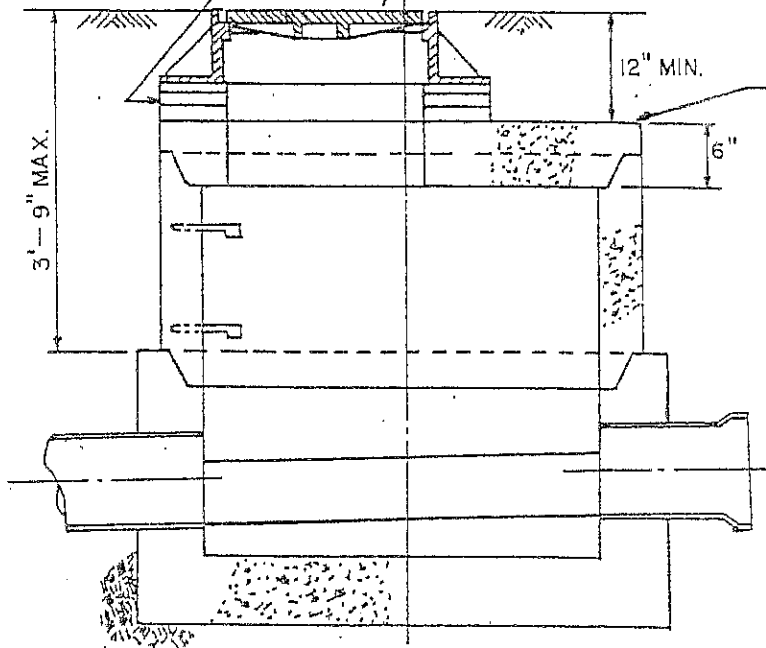
HANOVER ENGINEERING ASSOCIATES, INC.

BETHLEHEM, PENNSYLVANIA

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UNLESS OTHERWISE DIRECTED BY THE ENGINEER, PROVIDE GRADE ADJUSTMENT RINGS TO OBTAIN 12" MIN. OVER SLAB.

STANDARD M.H. FRAME & COVER (W.T.C. WHERE REQUIRED)



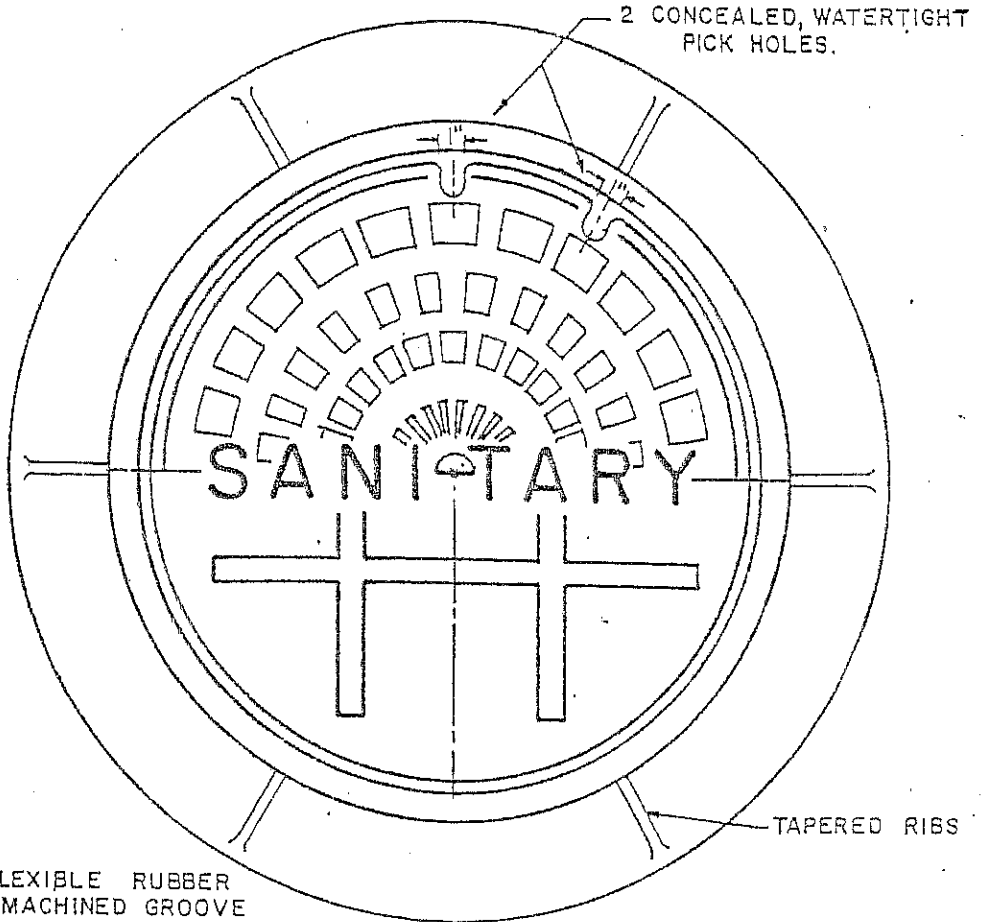
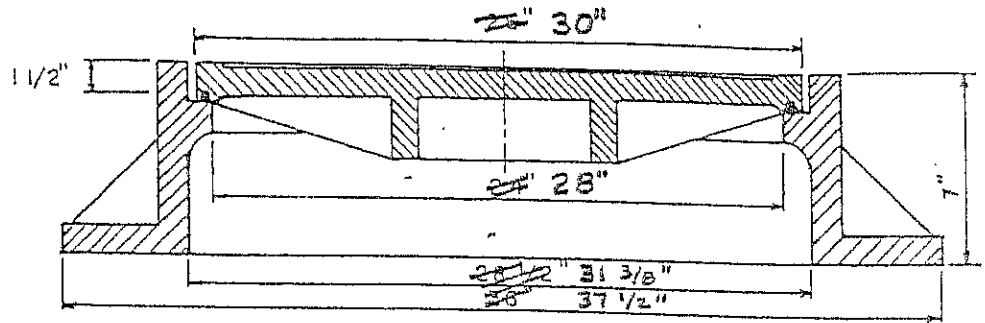
PRE CAST REINFORCED CONCRETE SLAB (ASTM DESIGN C-478).

NOTES:

- 1.) SAME AS STANDARD MANHOLE EXCEPT AS OTHERWISE NOTED.
- 2.) SHALLOW M.H.'s TO BE PROVIDED WHERE REQUIRED BY DEPTH CONDITIONS; ALL OTHER M.H.'s TO BE STANDARD TYPE.

| | | |
|---|-----------------|-------------|
| DATE 1/1/92 | SHALLOW MANHOLE | ST'D NO. |
| SCALE N.T.S. | | |
| HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | | S D 4 |

FRAME SECTION



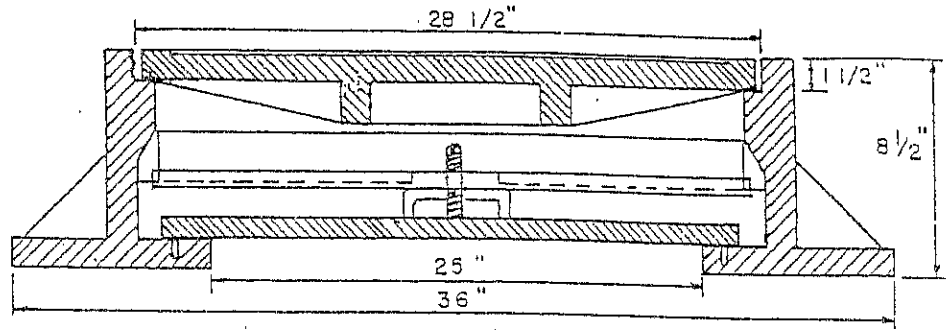
NOTES:

- 1) FRAMES & COVERS SHALL BE MADE OF CAST IRON AND CONFORM TO ASTM SPEC. A-48.
- 2) FRAMES & COVERS TO BE NEENAH FOUNDRY MODEL R-1642 OR APPROVED EQUAL.
- 3) ALL MANHOLE FRAMES SHALL BE FOR HEAVY DUTY TRAFFIC.
- 4) COVERS SHALL INCLUDE A FLEXIBLE RUBBER GASKET CEMENTED INTO A MACHINED GROOVE IN THE COVER.
- 5) CENTER SPACED 2" LETTERING EQUAL TO CHECKERING.

COVER PLAN
HALF BOTTOM—HALF TOP

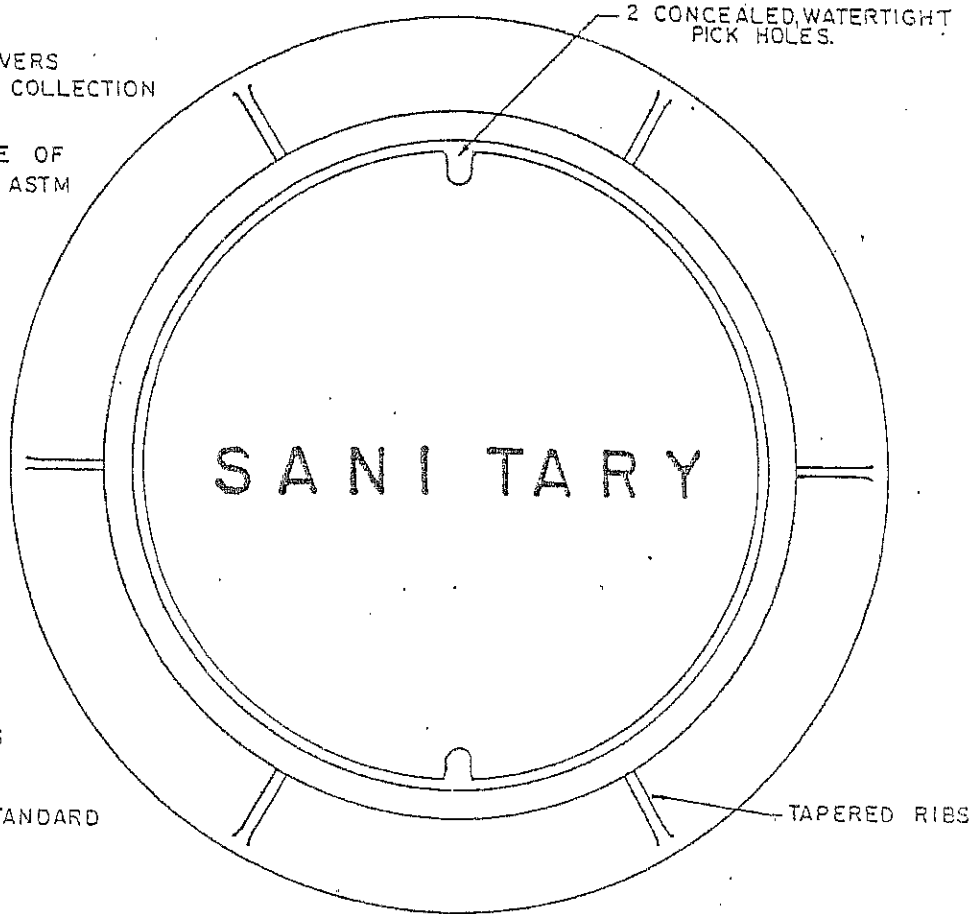
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|---|-----------------------------------|--------------|
| DATE 1/1/92 | STANDARD MANHOLE COVER & FRAME | ST'D. NO. |
| SCALE N.T.S. | | S D 5 |
| HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | | |

FRAME SECTION



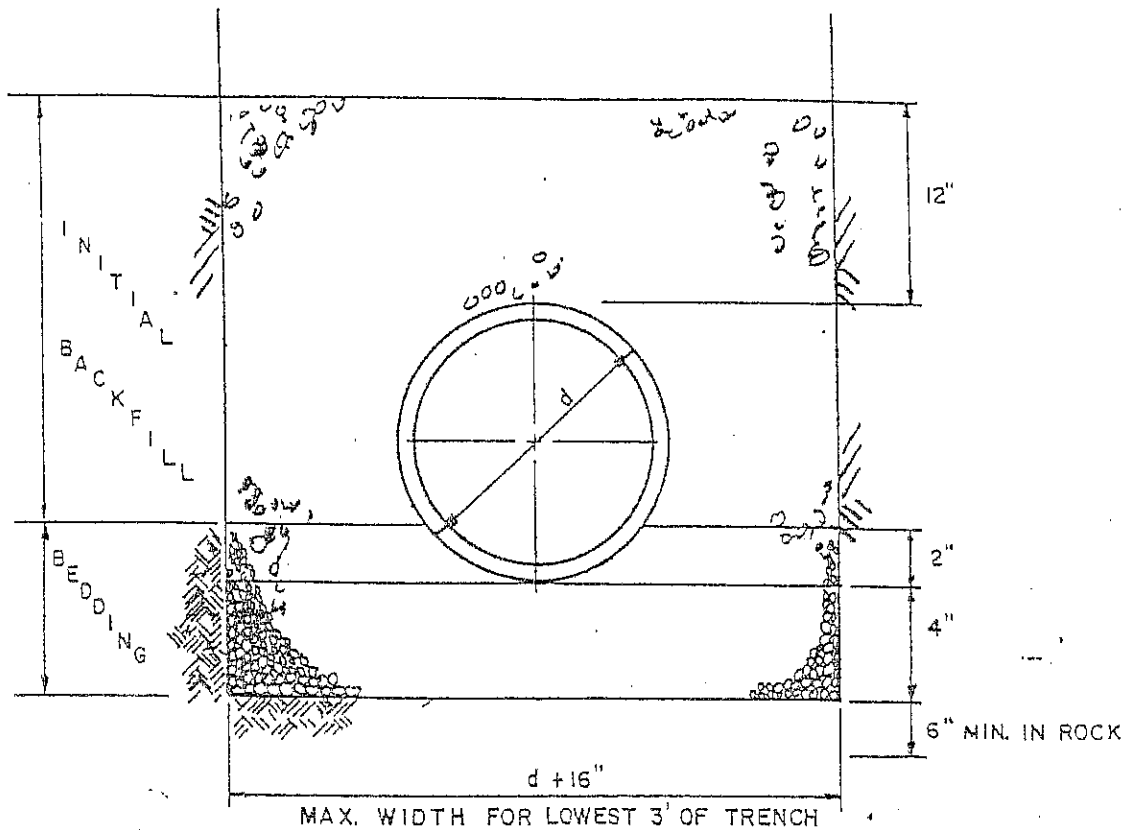
NOTES:

- 1) WATERTIGHT M.H. FRAMES & COVERS REQUIRED WHERE SHOWN ON COLLECTION SYSTEM DRAWINGS.
- 2) FRAMES & COVERS TO BE MADE OF CAST IRON AND CONFORM TO ASTM SPEC. A-48.
- 3) FRAMES & COVERS TO BE NEENAH FOUNDRY MODEL R-1755-F1 OR APPROVED EQUAL.
- 4) ALL M.H. FRAMES AND COVERS SHALL BE FOR HEAVY DUTY TRAFFIC.
- 5) COVERS SHALL INCLUDE A FLEXIBLE RUBBER GASKET CEMENTED INTO A MACHINED GROOVE IN THE COVER.
- 6) CENTER SPACED 2" LETTERING EQUAL TO CHECKERING.
- 7) FOR M.H. COVER DESIGN SEE STANDARD COVER & FRAME DETAIL.



PLAN VIEW

| | | |
|---|-------------------------------------|-------------|
| DATE 1/1/92 | WATERTIGHT MANHOLE COVER & FRAME | ST'D NO. |
| SCALE N.T.S. | | S D 6 |
| HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | | |

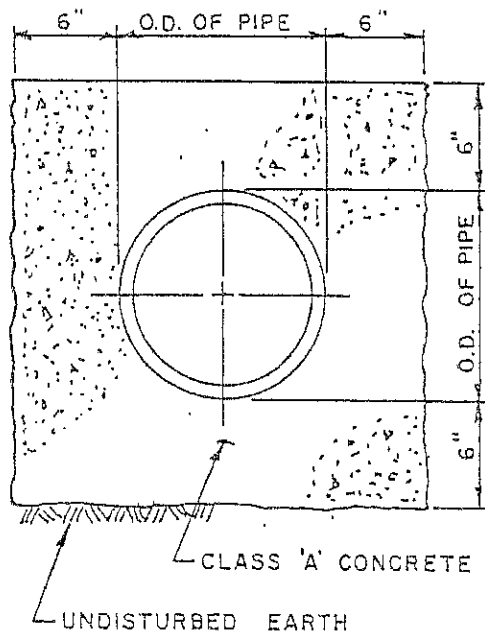


NOTES:

QUARRY SCREENINGS OR ZRC

- 1.) BEDDING AND INITIAL BACKFILL MATERIAL TO BE TYPE A SAND OR # 10 AGGREGATE (SCREENINGS FOR GRAVITY SEWERS AND PRESSURE SEWERS OR WATER MAINS.)
- 2.) SHAPE BEDDING FOR BELL OR OTHER FITTINGS.

| | | |
|-----------------|--|-------------|
| DATE 1/1/92 | STANDARD PIPE BEDDING | ST'D NO. |
| SCALE N.T.S. | HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | S D 7 |



NOTE: DIMENSIONS SHOWN ARE THE MINIMUM REQUIRED.

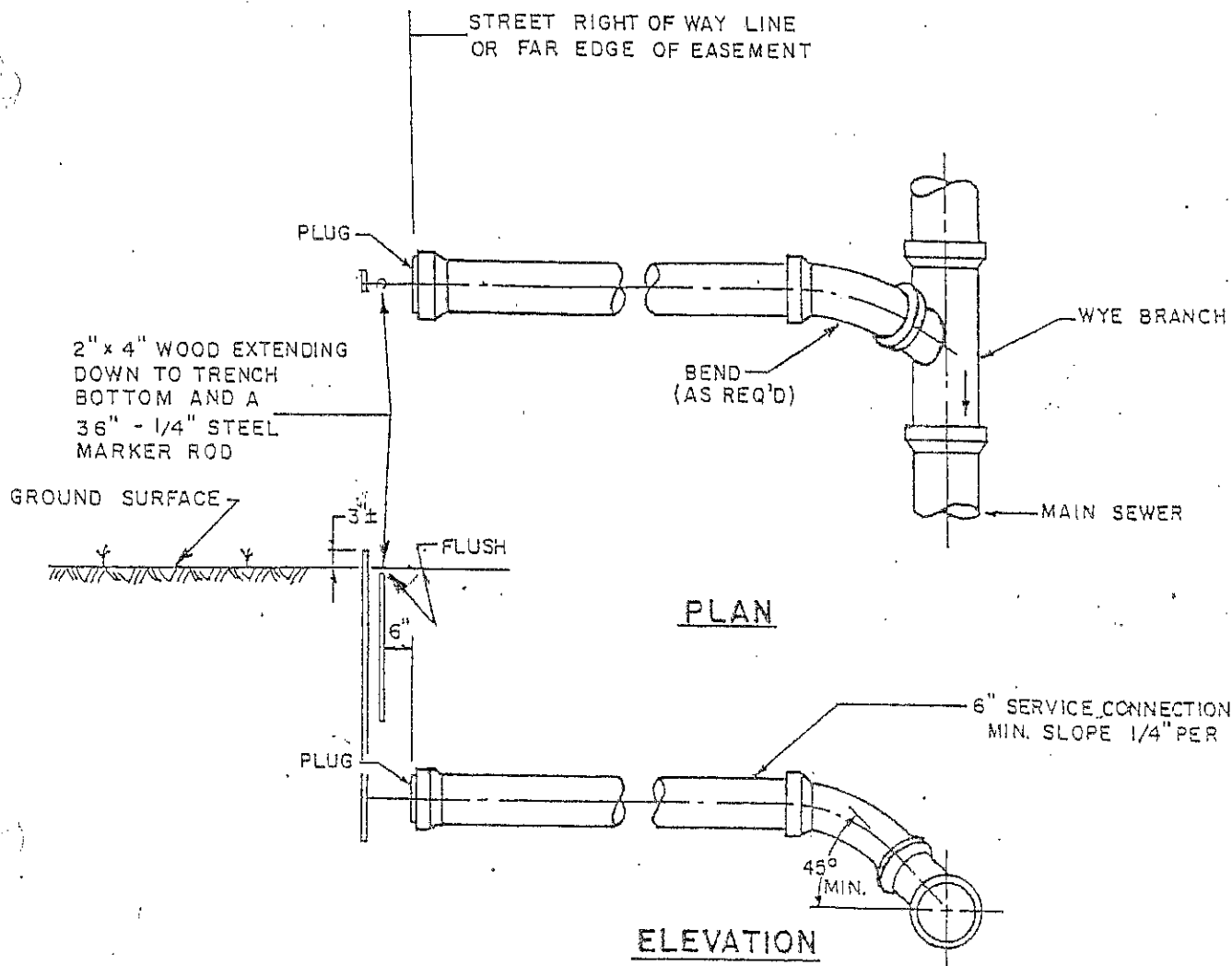
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1/1/92
SCALE
N.T.S.

STANDARD CONCRETE ENCASEMENT

ST'D
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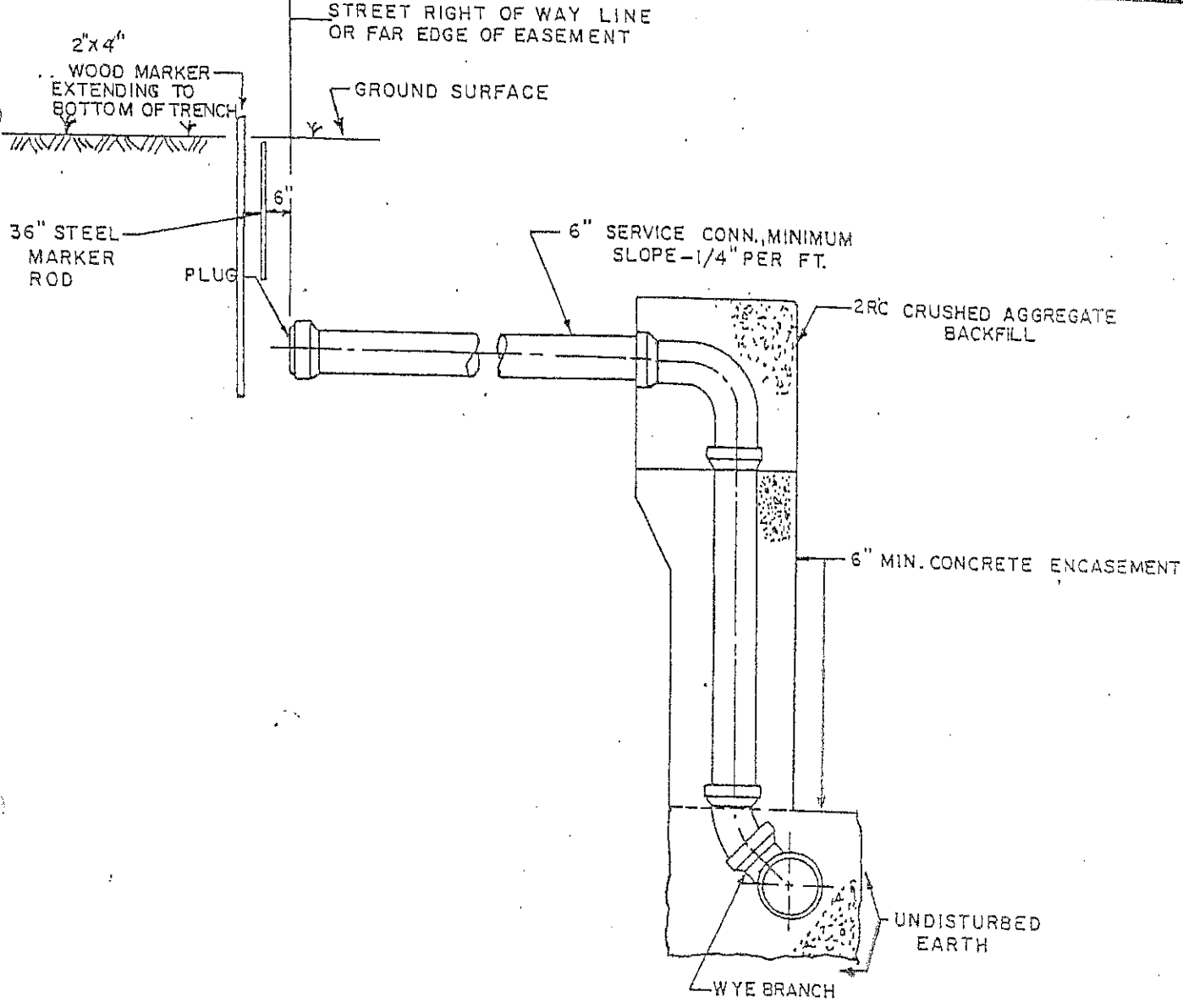
HANOVER ENGINEERING ASSOCIATES, INC.
BETHLEHEM, PENNSYLVANIA

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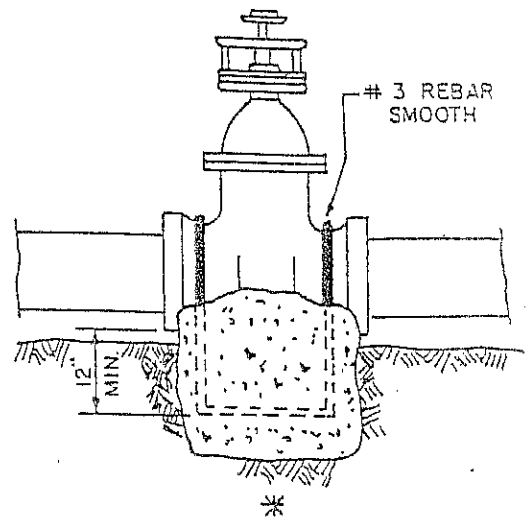
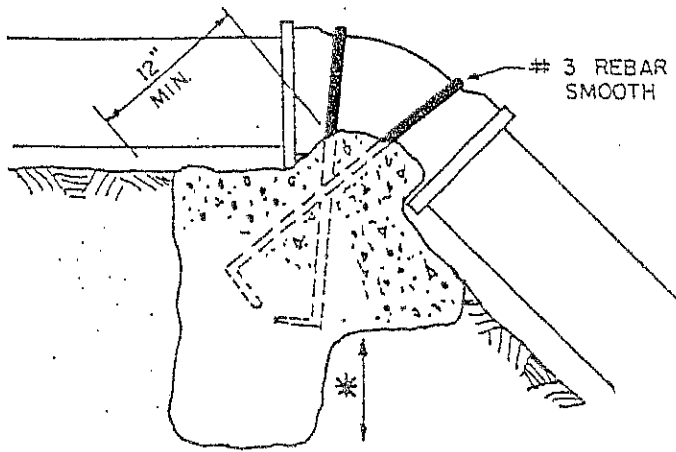
- NOTES:**
- 1) THE LOCATION OF THE END OF THE LATERAL IS TO BE MARKED WITH A 36" LONG VERTICAL 1/4" ϕ STEEL REINFORCING ROD SET OR DRIVEN FLUSH WITH GROUND SURFACE 6" BEYOND PLUG, AND A 2"X4" WOOD MARKER SET 3" \pm ABOVE GROUND AND WITH THE TOP PAINTED RED.
 - 2) SET LAST SECTION OF LATERAL WITH 3/8" PER FOOT SLOPE TO ACCOUNT FOR SOME SETTLEMENT AT THE EXPOSED END, DURING BACKFILL.

| | | |
|--|------------------------------------|-------------|
| DATE 1/1/92 | STANDARD LATERAL CONNECTION | ST'D NO. |
| SCALE N.T.S. | | S D 9 |
| HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | | |



NOTE: FOR OTHER LATERAL DETAILS AND NOTES - SEE "STANDARD LATERAL CONNECTION" SD9.

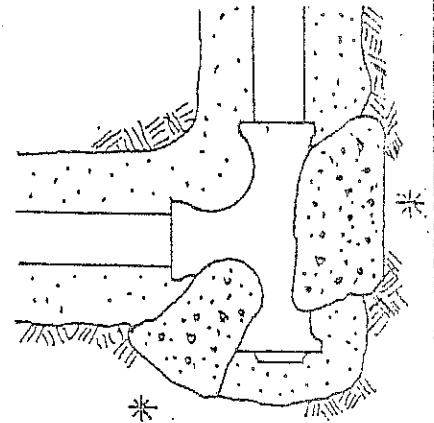
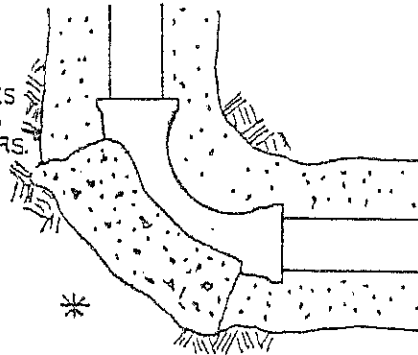
| | | |
|---|-----------------------------------|--------------|
| DATE 1/1/92 | STANDARD LATERAL RISER CONNECTION | ST'D NO. |
| SCALE N.T.S. | | |
| HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | | S D 10 |



TYPICAL DETAILS

NOTES:

- 1.) PROVIDE THRUST BLOCKING AT ALL CHANGES IN DIRECTION, ALL TEES, ELBOWS, WYES CAPS, VALVES, HYDRANTS AND REDUCERS.
- 2.) BEARING REQUIRED ON UNDISTURBED EARTH.
- 3.) FOR OTHER CONDITIONS FOLLOW SIMILAR PATTERNS.



| PIPE SIZE | BRG. AREA REQD. @ * | MIN. BRG. WIDTH |
|-----------|---------------------|-----------------|
| 2" | 2 S.F. | 12" |
| 4" | 5 S.F. | 18" |
| 6" | 10 S.F. | 18" |
| 8" | 17 S.F. | 24" |
| 10" | 26 S.F. | 24" |

NOTE: THIS DETAIL ALSO APPLIES TO WATER MAIN CONSTRUCTION- REQUIRED FOR THE PROJECT.(IF ANY)

DATE
1/1/92

FORCE MAIN THRUST BLOCKING

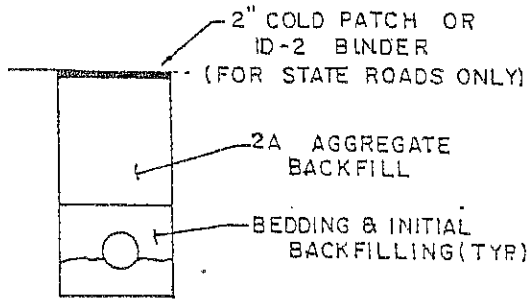
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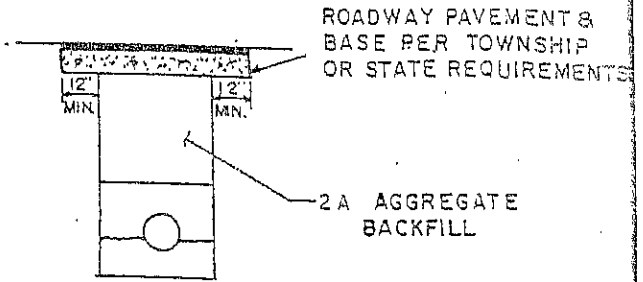
HANOVER ENGINEERING ASSOCIATES, INC.
BETHLEHEM, PENNSYLVANIA

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PAVING IN STATE AND TOWNSHIP ROADS

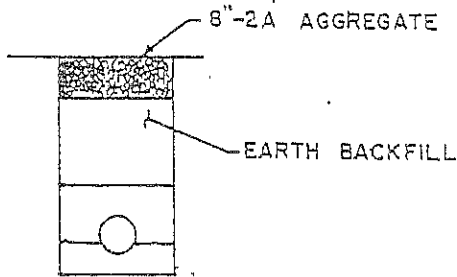


TEMPORARY

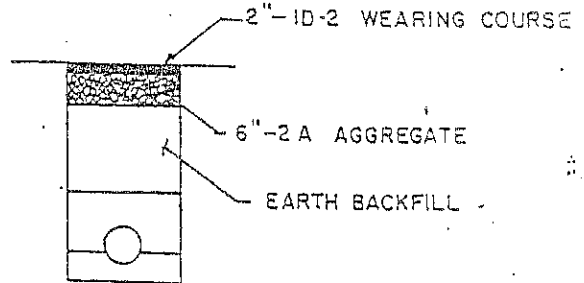


PERMANENT

PAVING IN PRIVATE DRIVEWAYS, PARKING LOTS, & ALLEYS

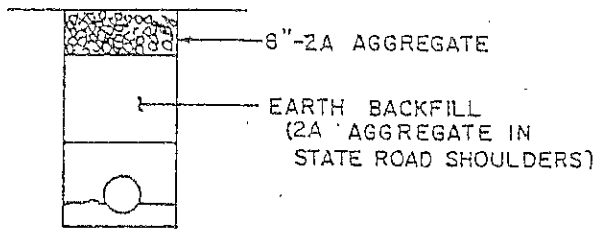


TEMPORARY

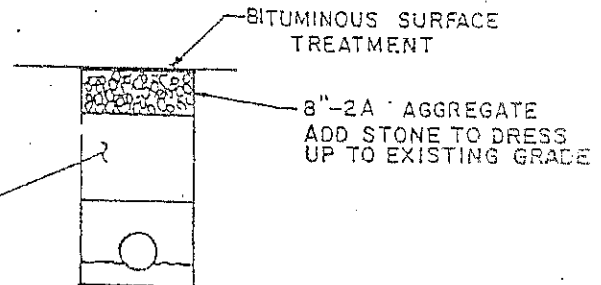


PERMANENT

SURFACING IN UNPAVED SHOULDERS, ROADS, PRIVATE DRIVES & ALLEYS



TEMPORARY

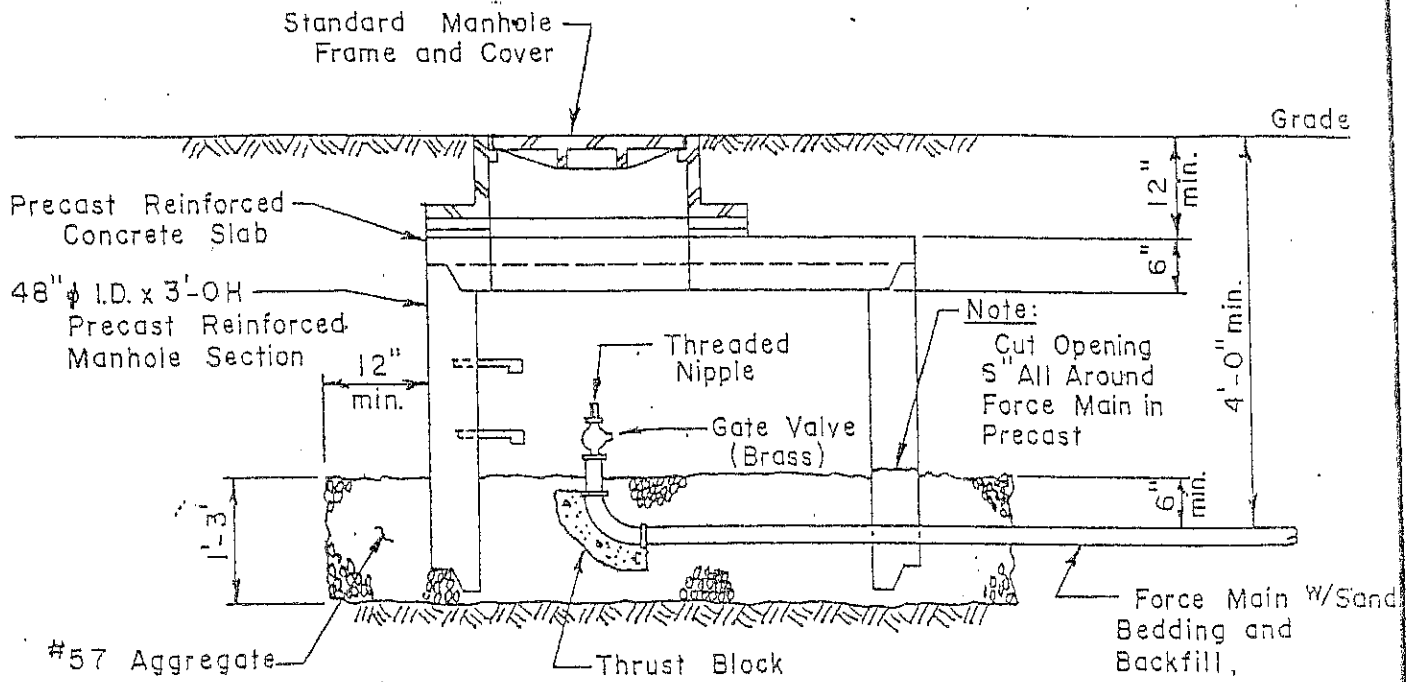


PERMANENT

NOTES:

- 1) THESE SPECIFICATIONS SHOULD BE USED UNLESS OTHERWISE SHOWN ON APPROVED DRAWINGS AND/OR PERMIT DOCUMENTS.
- 2) SEE SPECIFICATIONS FOR SPECIFIC DETAILS & CONSTRUCTION MATERIALS.
- 3) ALL RESTORATION WORK IN STATE RIGHT-OF-WAYS SHALL CONFORM TO THE REQUIREMENTS OF PENNDOT CHAPTER 459, TITLE 67 OF THE PENNSYLVANIA CODE.

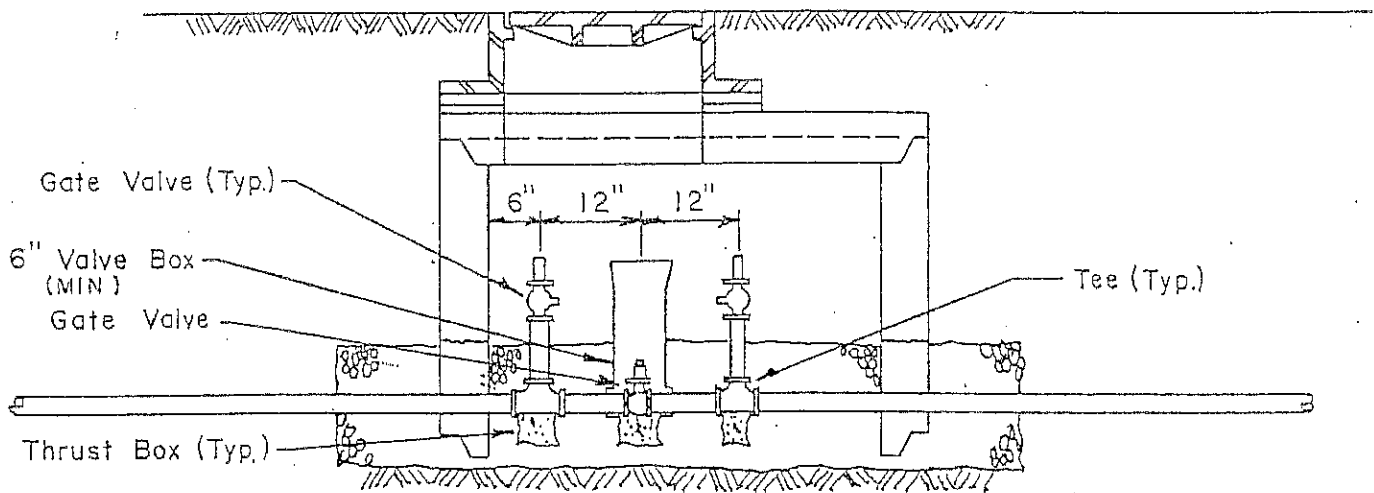
| | | |
|-----------------|--|--------------|
| DATE 1/1/92 | PAVING RESTORATION | ST'D NO. |
| SCALE N.T.S. | HANOVER ENGINEERING ASSOCIATES, INC. BETHLEHEM, PENNSYLVANIA | S D 12 |



Notes:

- Construction To Conform To Shallow Manhole Details Except As Noted.
- Keep Valves Under Manhole Cover For Easy Access.

TERMINAL CLEANOUT



Note:

Manhole Details Same as Terminal Cleanout

IN-LINE CLEANOUT

DATE:
1/1/92

SCALE:
N.T.S.

FORCE MAIN CLEANOUT - SMALL DIAMETER

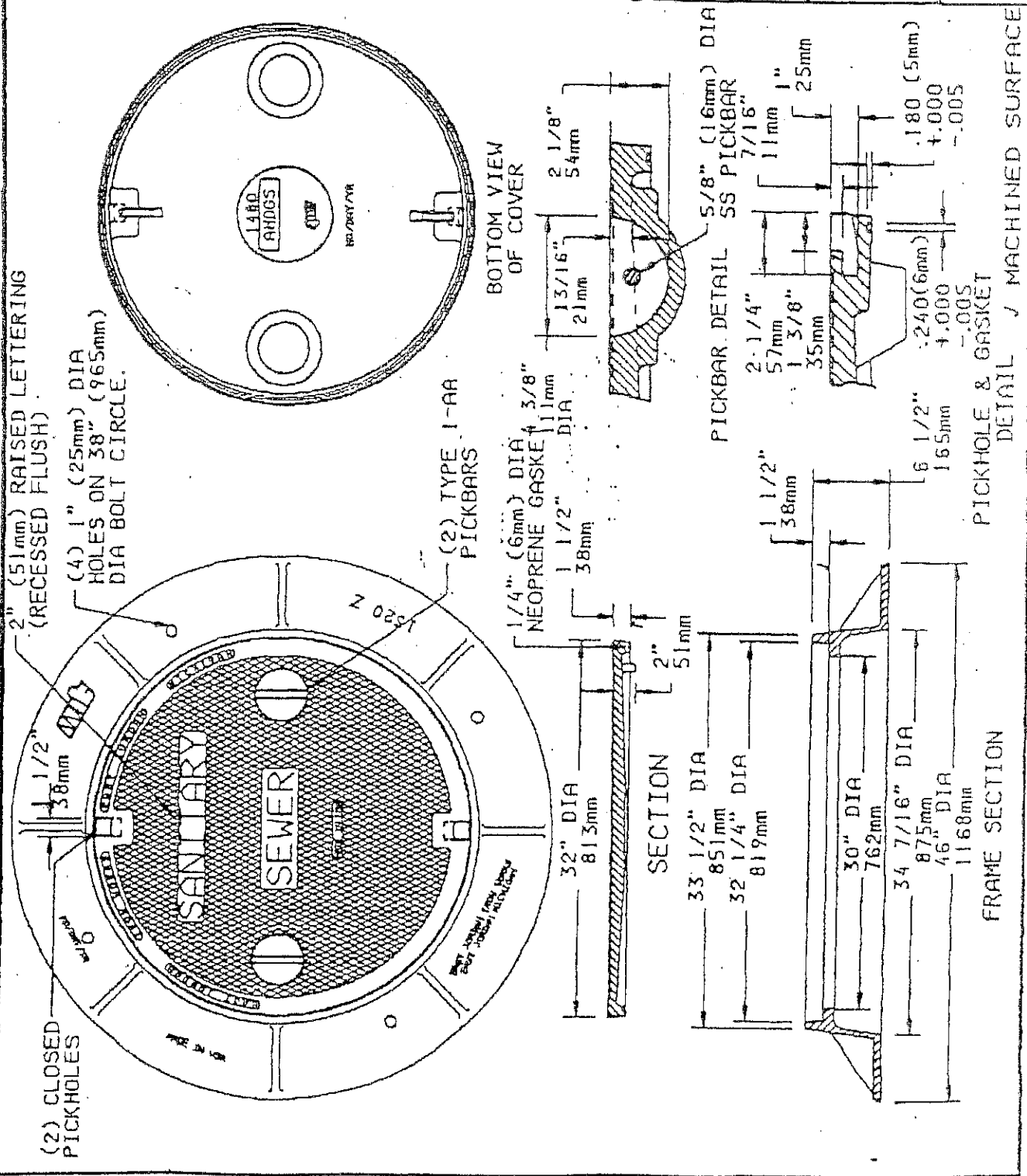
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HANOVER ENGINEERING ASSOCIATES, INC.

BETHLEHEM, PENNSYLVANIA

| | | |
|---|--|--|
| EAST JORDAN IRON WORKS, INC. P.O. BOX 439 EAST JORDAN, MI. 49727 1-800-87A-4100 FAX 616-536-7058 | | DRAIN DEV DATE 02/23/98 APPROVED HEB DATE 2/23/98 |
| MANHOLE FRAME & COVER | | |
| PRODUCT NO. 132056 | | |
| CATALOG NO. 1320Z 1480AGS | | |
| REF. PRODUCT DRAWING 132013 148122 | | |
| EST. WT. COVER: 200 LBS 91K9 FRAME: 255 LBS 116K9 UNIT: 455 LBS 206K9 | | |
| OPEN AREA N/A | | |
| MAT'L SPEC. COVER - GRAY IRON ASTM A48 CL35 FRAME - GRAY IRON ASTM A48 CL35 | | |
| LOAD RATING HEAVY DUTY | | |



PICKHOLE & GASKET DETAIL / MACHINED SURFACE

FRAME SECTION