Large Project Supplement: Rules and Regulations of Sewer Use

Definition of a "large project"

1. Gravity pipe size diameter greater than 8-inches and force main diameter greater than 1-1/4"
2. Installation depth is generally greater than 6-feet
3. Project includes manholes
4. Project may include a pumping station

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1. Permits and Notifications

1.1 Drain Layer's Permit

Any Contractor intending to install a sewer system or sewer service connection that meets any definition included in this Technical package shall secure a Drain Layer's Permit as defined in Article II, Section 4 of the Town of Dighton's "Rules and Regulations of Sewer Use" Fees, warranties, and submittals required by the Town of Dighton are also defined in these rules and regulations.

1.2 Insurance Requirements

Any Drain Layer or contractor shall possess the required minimum public liability and property damage insurance, and underground coverage insurance in the amounts of $100,000.00 and $300,000.00 each, respectively.

1.3 Notifications

The Drain Layer shall notify the Town of Dighton Highway Department Superintendent, DIGSAFE (1-888-344-7233), the Town of Dighton Fire Department, the Town of Dighton Water District Superintendent, and any other appropriate or impacted parties prior to initiating any excavation.

The applicant for the building sewer permit shall notify the Superintendent, in writing, when the building sewer is ready for inspection and connection to the public sewer. The Superintendent shall be notified not less than forty-eight (48) hours in advance of the time any connection is to be made to any public sewer. These notifications shall be made consistent with the conditions in Article II, Section 17 of the Town of Dighton's "Rules and Regulation of Sewer Use".

When it is necessary to make sewer connections in State highways, the applicant shall obtain the necessary permits from the Massachusetts Department of Public Works, prior to the issuance of a sewer connection permit. All work shall then be done in accordance with the requirements set forth in the permit issued by the Massachusetts Department of Public Works.

When ledge is encountered in the excavation, a permit must be obtained from the Town of Dighton Fire Chief for the use of explosives. All blasting shall be done in accordance with the requirements as imposed by the Fire Chief. All blasting must be performed by a person licensed by the Massachusetts Department of Public Safety for this purpose.

1.4 Supplemental Requirements

Based on the type and scale of the project being proposed and submitted for review, the Town of Dighton Board of Sewer Commissioners may develop additional technical requirements that shall be satisfied.

All work within 10 feet of the building foundation must conform to the Massachusetts Uniform Plumbing Code and will require a separate plumbing permit.

In general, the size, slope, alignment, materials of construction of a building sewer, and the methods to be used in excavating, placing of the pipe, jointing testing, backfilling the trench, and connecting to the public sewer shall all conform to the requirements of the building and plumbing code or other applicable rules and regulations of the Town. In the absence of Code provisions or in amplification thereof the materials and procedures set forth in appropriate specifications of the American Society for Testing and Materials (ASTM), the WEF Manual of Practice No. 9 (Design and Construction of Sanitary and Storm Sewers), New England Interstate Water Pollution Control Commission (NEIWPCC) TR-16 (Guide for the Design of Wastewater Treatment Works), Title 5 of the Massachusetts State Environmental Code, the Uniform State Plumbing Code, and any and all applicable design or guidance documents.

2. Plan Approval

The Town of Dighton has a project review process in place that establishes a basic framework for the administration of sewerage development project proposals by private developers and property owners in the Town of Dighton, provides for the conceptual and technical reviews of such proposals, and establishes a system for fee assessments at key points of project planning and development.

The key steps in this process are:

1) Pre-Application (including review of Preliminary Plans);
2) Project Design;
3) Application for Proposed Sewer Plan Approval; and
4) Application for Sewerage Facility Construction.

Each of the four steps in the review process is defined in the "Requirements" Chapter of the Town of Dighton's by-law, along with the required elements to be included in Preliminary Plans and in Applications for Approval.

3. Acceptable Equipment and Materials

3.1 Pipe

For gravity sewers, pipe material may be polyvinyl chloride (PVC) or ductile iron. Minimum requirements for each are included below. Alternate materials will be considered on a case-by-case basis by the Town of Dighton.

PVC pipe shall conform to ASTM D3034 and have an SDR of 35. Joints for PVC pipe shall be push-on joints using permanently bonded elastomeric ring joints. Such joints shall be installed in accordance with the pipe manufacturer's written instructions.

Ductile Iron pipe shall be Thickness Class 52, centrifugally cast and conform to ANSI A21.51 and ANSI A21.50. All pipe shall be made of ductile iron equal to grade 60-42-10. The pipe shall be in nominal laying lengths of 18-20 feet. Joints shall be mechanical or "push-on" type with rubber gaskets and shall conform to ANSI A21.11. Fittings shall be ductile iron with mechanical joints conforming to all requirements on ANSI 21.10. The pipe shall be coated on the outside and inside in accordance with the requirements of ANSI A21.51. As an alternative, with no additional cost to the Owner, the pipe may be cement lined to twice the thickness specified in ANSI A25.51 and ANSI 21.4 and shall be asphalt seal coated twice.

All building sewers, ties, and fittings shall be constructed utilizing PVC SDR-35 material and be installed in a watertight manner.

Buried Polyvinyl Chloride Pressure Sewer Pipe, couplings and fittings shall conform to ASTM 2241, with an SDR of 21. Joints for PVC pipe shall be push-on joints using permanently bonded elastomeric ring joints conforming to ASTM F477. Such joints shall be installed in accordance with the pipe manufacturer's written instructions. Pipe utilized for service connections shall be manufactured of PVC. Service pipe shall conform to ASTM 2241, with an SDR of 21. Joints for PVC pipe shall be push-on joints using permanently bonded elastomeric ring gaskets. As an option, SDR11 HDPE I.P.S. butt-fused pipe or SDR 7 HDPE I.P.S. pipe with compression fittings and insert stiffeners may be substituted for the SDR 21 PVC gasketed pipe for pressure main and services. All couplings, fittings, adapters, valves, reducers, wyes and tees shall be compatible with the type of pipe used. HDPE pipe shall be pressure rated for 200 psi and shall conform to ASTM D1248, ASTM D3350, ASTM D2239, and NSF-14. Compression fitting shall be brass.

3.2 Fittings

Wye branches or tees shall be of the same material and of the class and type so as to be compatible with the pipe with which they are used.

Mechanical couplings with stainless steel clamps shall be used for couplings to the public sewer from the building.

3.3 Grinder Pumps

For individual pumping situations, the Board of Sewer Commissioners encourages the use of self contained grinder pumps, 2000 series, as manufactured by E|One. Solids are ground into fine particles that pass easily through the pump, check valve and small-diameter pipe lines, including plastic, rubber, fiber, wood, etc. Each pump shall be of a semi-positive displacement type such that the output capacity is essentially independent of the discharge pressure. The pump shall be designed to deliver 11 GPM at a total dynamic head of 92 feet (40 psig) and 9 GPM at 138 feet (60 psig) of total dynamic head. At zero head the pump output shall not be more than 15 GPM. The pump shall be capable of intermittent operation (three minute minimum) at any head. The pump speed shall be 1,725 RPM. Power requirements shall be 1 horsepower maximum, 230 V, Single Phase, 60 Hertz.

4. Pipe Sizing

Gravity sewer pipe shall be a minimum of eight (8) inches in diameter. Pipe shall be selected to minimize settling of solids within the pipe. The Town of Dighton will not approve using larger-diameter pipe than required in order to justify pipe installation with less slope.

Service connection pipe shall be a minimum of six (6) inches in diameter for single family dwelling and such larger size for multiple family dwelling or other type of building as the Superintendent or his agent may determine. Pipes and fittings less than six (6) inches in diameter shall be allowed only under special conditions approved by the Superintendent and Board of Sewer commissioners.

5. Slope and Installation

5.1 Pipe

All gravity sewers should be designed to produce a wastewater velocity of at least 2.0 feet per second based on Manning's equation, using an 'n' value appropriate for the pipe material proposed.

All pipe shall be installed with uniform slope between manholes. Pipe alignment shall be checked both visually (manhole to manhole) and with a laser beam.

Pipe installed on grades exceeding 15% shall be anchored to prevent displacement. When pipe is installed in within areas impacted by high groundwater tables, impervious dams shall be built every 300 feet within the trench.

When different pipe diameters are joined, the invert of the larger diameter pipe shall be lowered by placing the 0.8 depth point of both sewers at the same elevation. This will encourage continuous flow without turbulence within the pipe.

Service connections in excess of one hundred (100) feet in length shall be subject to review and such other requirements as may be found necessary to assure a "functional connection" by the Superintendent/Board of Sewer Commissioners.

All pipes and fittings shall be laid in an envelope of 3/8-inch crushed stone or sand with not less than six (6) inches surrounding the pipe. No wooden blocks, bricks, stones or other unsuitable material shall be allowed directly under or above the pipe.

5.2 Service Connections

Service connections shall be installed with a minimum slope shall be 1.67 feet per 100 feet unless otherwise directed by the Town of Dighton. The extreme end of the service connection shall be capped unless it is to be connected to an existing service. Connections made to the building drain shall be upstream of any septic tank or cesspool, and done only under the supervision, inspection, and approval of the Town of Dighton Plumbing Inspector.

A service connection shall not have more than two (2) angle points, or a total angular deviation of one hundred and eighty (180) degrees. Cleanouts shall be installed within six (6) feet prior to the second deflection point and at every 100 feet of developed length, unless determined by the Board of Sewer Commissioners that a manhole is required.

An inspection tee and riser and/or cleanout, constructed of PVC, with lockable metal cover shall be required for each public sewer connection (refer to the attached figure for

details) and shall be installed near the building's sewer at the property line for access and inspection by the Town of Dighton. When new building construction is set back from the property line, the owner shall install an inspection tee and riser and/or cleanout on the service connection at the property line for access and inspection by the Town of Dighton.

In new construction, and where practicable in existing buildings, when the public sewer is sufficiently deep, the building sewer shall be laid directly without deflection, from the building plumbing vent stack to the connection provided at the public sewer.

Whenever possible, the building sewer shall be brought to the building at an elevation below the basement floor. In all buildings in which any building drain is too low to permit gravity flow to the public sewer, sanitary sewage carried by such building drain shall be lifted by means approved by the Superintendent and discharged to the building sewer.

6. Chimneys

Chimneys (vertical pipe encased in concrete) shall be installed when the vertical distance between the sewer main and the service connection is at least three (3) feet, or when the sewer main is twelve (12) or more feet below grade. When required, the concrete utilized for the encasement of chimneys shall have a minimum compressive strength of 3,000 psi. Ends of the wye branch shall be capped with standard caps.

Connection of services to public sewers shall be made only with a "wye" branch or "chimney"; direct stub-ins through the wall of the sewer pipe shall not be permitted. Whenever possible, the service connection shall be made at the top of the sewer pipe with a smooth bend in the service pipe not exceeding forty-five (45) degrees (to prevent clogging).

7. Adjacent Utilities

7.1 Horizontal Separation

Gravity sewers shall be placed at least ten (10) feet, horizontally, from any existing or proposed water main, unless otherwise approved by the Town of Dighton. Other utilities shall be treated in a similar fashion, when possible. Whenever sewer lines are required to be within five (5) feet of water lines, the sewer lines must be constructed of durable corrosion resistant materials with water-tight joints, preferably below the water lines, and encased in concrete.

The minimum distance of a service connection from a water line shall be 10 feet and from a water supply well shall be 50 feet.

7.2 Vertical Separation

Sewers shall be placed below water mains whenever possible. When this is not possible, gravity sewers shall be placed with at least twelve (12) inches between the top of sewer and the bottom of the water main, unless otherwise approved by the Town of Dighton, with a sand "cushion" between the pipes. Exceptions to this shall include additional protection provided by flowable fill or other encasement. If sewer pipe will be placed over a water main, one full-length section of sewer pipe shall be centered do that joints will be as far from the water main as possible.

8. Backflow Prevention Device

At the Town's discretion, all existing or new building drains from plumbing fixtures subject to backflow from the Town's sewerage system or a private sewer shall be required to have a backflow prevention device installed at the owner's expense. Any plumbing fixture located at an elevation below the top of a manhole located in the Town's sewerage system shall be considered to be subject to backflow conditions. Backflow prevention devices shall be installed in compliance with the Uniform State Plumbing Code, and Section 248 of the Code of Massachusetts Regulations (248 CMR).

9. Installation Depth

All sewers, fittings, and service connections shall have a minimum of five (5) feet of cover to top of pipe. When this is not possible, pipe and fittings shall be insulated and jacketed. Pump stations shall be installed at a depth that is appropriate for the type proposed for the installation.

9.1 Insulation and Jacketing

Pipes requiring insulation shall be insulated by the void-free rigid polyurethane foam, factory applied, with an outer polyethylene jacket, UV inhibited. The minimum thickness of the insulation shall be 50 mm (2 inches); the minimum thickness of the jacket shall be 1.27 mm (50 mils).

Polymer coated, form fitting insulation kits shall be used to insulate elbows, tees and other fittings, according to the manufacturer's recommendations.

9.2 Buoyancy

If the pipes or pump stations are to be installed in areas prone to high groundwater conditions, buoyancy of the pipe and pump stations must be taken into consideration.

10. Septic Tank Decommissioning

Upon connection of the building sewer to the public sewer, existing septic tanks and cesspools shall be pumped and completely filled with suitable material under the supervision and inspection of the Town of Dighton Health Department or shall be removed. Under no circumstances shall septic or cesspool wastes be discharged to a public sewer. Verification of septic tank and cesspool abandonment shall be submitted in writing by the licensed drain layer or contractor to the Board of Sewer Commissioners.

All septic systems must be abandoned in accordance with 310 CMR 15.354 (Abandonment of Systems). This means that before a septic tank or cesspool that contains sewage is disconnected, the entire contents of the tank or cesspool must be pumped by a licensed septage hauler. All components that hold water (i.e., septic tank, pump chambers) must be broken in place or removed so that liquid can not collect in the future. All empty voids in the system (including the tank hole) must be filled with clean sand.

Leaching beds and leaching trenches are unlikely to collapse and may be left in place.

Sewage-contaminated soil around septic components is not required to be removed in order for the septic system to be abandoned unless a new sewer pipe or service connection is to be installed in or near that soil.

11. Service Tie Records

For PVC pipes, a magnetic marking tape shall be installed on the top of the pipe to facilitate locating it in the future.

The drain layer or contractor is required to submit an “as-built” plan within 30 days of job completion or within 10 days of completion of final inspection and testing of the sewer in a development, the owner thereof shall file with the Board "as built" plans which are acceptable to the Board's engineer on reproducible paper which shall be 24 inches by 36 inches in size. These as-built plans shall be certified by the installing contractor's engineer, licensed to practice in the Commonwealth of Massachusetts. The Drain Layer or contractor shall submit the “as built drawings electronically and shall also provide a scaled electronic layer in a format acceptable to the Board for use in updating the Town of Dighton’s sewer system map. In addition, the submittal shall include all testing results.

Manhole tie records shall be tied into a minimum of three points including, if possible, the permanent corners of a nearby building and/or permanent utility poles. These tie records shall be made part of the Project Record Documents.

For service connections, a steel marker shall be installed at the end and tied into a minimum of three points including, if possible, the permanent corners of the building which is to be served. The depth of cover from the ground surface to the top of the pipe at the cap shall be recorded. The depth and tie information shall be made part of the Project Record Documents. The depth of cover from the road surface to the top of the branch and the distance from the downstream manhole shall also be recorded. No wyes and tees shall be backfilled before the location measurements are taken.

12. Bypass Pumping

12.1 Discharge to Ground

Discharge of wastewater to the ground shall not be permitted under any circumstances. When extending or replacing existing sewer pipe, the Drain Layer shall provide storage of wastewater within existing infrastructure or utilize bypass pumping to convey flows to another point within the collection system.

12.2 Control of Water

The Drain Layer shall evaluate the impact of the anticipated subsurface soil and groundwater conditions on proposed method(s) of excavation, dewatering and other operations. If subsurface conditions so dictate, provide wells, wellpoints, pumps, or any other facilities to control groundwater and surface water in order to permit Work to be performed under dry and stable conditions. Provide any facilities required to remove subsurface water from a construction area in advance of excavation. Dewatering shall continue until all Work below groundwater level has been completed or otherwise stabilized against uplift or other disturbance. Pumping shall be continuous where required to protect the Work and to maintain satisfactory progress. All dewatering wells shall be backfilled upon completion of the Work in a manner approved by the Town of Dighton Superintendent (or his designated representative).

The Drain Layer shall control all surface water within each Work area. Excavations shall be protected from flooding by surface water by use of berms, ditches or other appropriate means.

The Drain Layer shall pay special attention to areas where difficult soil and groundwater conditions are anticipated and evaluate the subsurface conditions in these areas from the geotechnical data provided in the Contract Document or by other means. Dewater in a manner that does not cause loss of ground or disturbance to the bearing soil or soil supporting adjacent structures.

All pipeline(s) and structures not stable against uplift during construction or prior to completion of installation shall be thoroughly braced or otherwise protected.

13. Alternative Pipe Installation Methods

13.1 Directional Drill

The Town of Dighton will consider use of directional drilling in projects that would severely interrupt traffic, occur in State Roadways with current pavement moratoriums, or otherwise require such excavation to be cost-prohibitive.

Pipe used in directional drill shall be high-density smooth wall polyethylene pipe and meet the applicable requirements of ASTM F714 based on outside diameter or AWWA C906, ASTM D1248 and ASTM D3350. Only pipe made of virgin materials shall be installed. The new pipe shall be homogeneous throughout and shall be free of visible, cracks, holes, foreign material, blisters, or other deleterious faults. All pipe and fittings shall be at least DR-11, and meet the requirements of AWWA C906, PPI PE 3408, and ASTM D3350 cell classification 345444C, and shall be so marked. The same manufacturer shall supply both pipe and fittings. All pipe shall receive an abrasion resistant coating, as required based on boring length and soil characteristics.

The Contractor shall haul, heat fuse joints, and hydrostatically test the pipeline in one section. The limit for the minimum bending radius of the installed pipe line shall be no less than 25 times the outside diameter of the HDPE pipe. Joints shall be butt-fusion joints made in accordance with ASTM D2657.

HDPE pipe installed in this manner shall satisfy the same requirements for alignment and deflection as specified for gravity sewer and force mains.

14. Alternative Collection Systems

14.1 Force Mains

Force main pipe materials may be polyvinyl chloride (PVC) or ductile iron.

PVC force main pipe, couplings and fittings shall conform to ASTM 2241, with an SDR of 21 unless otherwise specified. Joints for PVC pipe shall be push-on joints using permanently bonded elastomeric ring joints conforming to ASTM F477. Such joints shall be installed in accordance with the pipe manufacturer's written instructions. Any joint which is not properly made, shows signs of leakage or is in the opinion of the Town of Dighton Superintendent (or his designated representative) is defective in any way shall be redone. PVC force mains shall be permanently identified with 3-inch wide silver metal detectable tape. The tape shall meet APWA requirements and use brown colored stripes with black print indicating “CAUTION BURIED FORCE MAIN BELOW”.

Ductile iron force main pipe shall be of a thickness class of 52 unless otherwise required and approved by the Town of Dighton. All ductile iron pipe shall be centrifugally cast and conform to ANSI A21.51 and ANSI A21.50. All pipe shall be made of ductile iron equal to grade 60-42-10. The pipe shall be in nominal laying lengths of 18 to 20 feet. Joints shall be mechanical or "push-on" type with rubber gaskets and shall conform to ANSI A21.11. Fittings shall be cast-iron with mechanical joints conforming to all requirements of ANSI A21.10. The pipe shall be coated on the outside and inside in accordance with the requirements of ANSI A21.51. As an alternative, with no additional cost to the Town of Dighton, the pipe may be cement lined to twice the thickness specified in ANSI A26.51 and ANSI 21.4 and shall be asphalt seal coated twice.

Concrete utilized for thrust blocks shall have a minimum compressive strength of 3,000 psi and conform to the specifications in SECTION 03310, CAST-IN-PLACE CONCRETE. Concrete thrust blocks shall be placed at all force main bends 11-1/4 degrees and greater, or otherwise required by the Town of Dighton.

14.2 Pumping Stations

Pumping stations will be evaluated on a case-by-case basis by the Town of Dighton.

14.3 Low-Pressure Sewer Systems

Low-pressure sewer systems will be considered on a case-by-case basis by the Town of Dighton. These systems shall not be submitted based only on an economic basis; the developer must clearly demonstrate that traditional gravity systems or force mains are not feasible.

For low pressure sewer systems proposed for new developments or for any proposal to the Board involving low pressure sewers, grinder pumps are required. For reasons of system and equipment compatibility, the Board strongly encourages the use of Series 2000 grinder pumps as manufactured by E|One (See Section 3, Acceptable Equipment and Materials). Alternative manufacturers may be proposed; however, experience, equipment longevity and reliability are of paramount importance. The Board reserves the

right to reject alternatives to the E|One system on the basis of inexperience, unreliability or incompatibility.

15. Trench Construction

Excavations in streets or rights-of-ways, protection, traffic control, backfilling and pavement replacement shall meet the standards and requirements of the Town of Dighton Police Chief and Highway Department for local streets and the State of Massachusetts Department of Public Works for State roads.

Trenches shall be excavated from the end of the existing public sewer to its point of connection to the building drain and the pipe line before backfilling any trench beyond the washed gravel envelope surrounding the pipe. All excavations for building sewer installation shall be adequately guarded with barricades and lights to protect the public from hazard. Methods for preventing trench excavation hazards, such as bracing, shoring, and trench boxes, shall be installed to protect the public from hazard.

Trenches shall be backfilled from the washed gravel envelope to within fourteen (14) inches of the road surface with selected materials from the excavation. Gravel borrow shall then be placed flush with the existing surface and the entire trench, within the right-of-way and shall then be compacted by puddling with jet pipes at least five (5) feet in length or by mechanical compaction equipment. Settled portions shall be filled with additional gravel borrow as required to accommodate the temporary bituminous patch, if required.

Power shovels, bull-dozers, loaders, trucks, and other equipment shall not be operated on or across sidewalks, beams, curbings, etc. until they have been properly protected from damage by planking or other approved means. All damage resulting from the licensed drain layer's or contractor's operation shall be repaired by him at no cost to the Town. All repairs to municipal structures shall be accomplished by the licensed drain layer or contractor under the supervision of the Town of Dighton Highway Department. The cost of this supervision shall be borne by the drain layer or contractor on an hourly basis. Time and one-half will be charged for overtime. Any material furnished by the Town of Dighton shall be replaced in kind.

15.1 Trench Size

Trench excavation shall consist of the removal of all materials encountered. Excavations shall be made to accommodate the elevation, depth of cover, or detail shown as required. Trench widths shall be kept to the minimum practicable but shall be at least 3 feet wide or 2 feet plus the diameter of the pipe, whichever is greater. The bottom of all trenches shall be firm and free of water and shall be accurately graded and shaped to allow placement of required bedding beneath the bottom of all barrels, bells or couplings of all pipes installed.

Design criteria requires that pipe be laid in trench conditions, therefore trenches for utilities in fill areas shall be excavated after all fill materials have been placed, spread and compacted to an elevation at least 12 inches above the top of the proposed utility. This requirement is necessary to fulfill design criteria and should not be construed as a dictation of means and methods of construction.

15.2 Bedding Materials

Pipe and/or structures shall be placed on specified bedding materials, to provide uniform support and a stable foundation for the pipeline(s) or structure(s) and backfill material. No bedding shall be placed on unstable subgrade soils. An unstable subgrade is defined as a condition of running sand, running silt, quick bottom, or otherwise soft, soupy or spongy bottom. If an unstable condition exists, or develops during the excavation, excavate, dewater and stabilize the subgrade to the extent necessary to provide a firm stable foundation prior to placing bedding, pipe and/or structures. Where the bottom of trench is stable and the existing material at trench grade meets the requirements for gravel fill, excavation to six (6) inches below the pipeline for placement of bedding material will not be required. Gravel fill or crushed stone bedding material shall be placed and compacted to the mid-diameter of the pipe as specified.

When the subgrade material does not meet the specification for Gravel Fill, the excavation shall be made to a depth of 6 inches below the bottom of pipe for placement of bedding material. Where the bottom of the trench excavation is below the groundwater level and pumping of water is done from within the excavation, utilize a bedding system which provides a stable working surface which limits the disturbance of the subgrade and prevents migration or washing of fine soils from the subgrade due to the flow of water into the trench. If the subgrade is stable and meets the requirements of gravel fill (specified below), excavation for six (6) inches of bedding material is not required. If crushed stone is used as bedding material, a 12-inch wide impermeable clay cutoff barrier ("Control Dam") shall be constructed across the trench from the bottom of the excavation to the mid-diameter of the pipe every 300 feet to prevent groundwater from flowing unimpeded along the pipe trench, through the crushed stone. No more than six (6) inches of crushed stone bedding shall be placed beneath the bottom of any pipe and/or structure.

Gravel fill shall consist of hard, durable gravel and sand, free from trash, organic matter and clay, surface coatings, and other deleterious materials. Select fill shall consist of hard durable sand or sand and gravel, free from trash, organic matter, clay, surface coatings and other deleterious materials. Crushed stone shall consist of clean, crushed, non-porous rock, or crushed gravel, uniformly blended.

Gravel fill shall have a maximum stone size of two thirds of the loose lift thickness or 8 inches whichever is smaller. Gravel fill used for pipe bedding shall have a maximum stone size of 2 inches. That portion passing 4 inch sieve shall meet the following gradation requirements, as determined by ASTM C136 and ASTM C117:

U.S. Sieve Size	Percent Passing
4 inch	100
1/2 inch	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Select fill placed between the mid-height of a pipe and 12 inches above a pipe shall have a maximum stone size of 4 inches. Select fill used for other purposes shall have a maximum stone size of two thirds of the loose lift thickness and that portion passing the 4 inch sieve shall meet the following gradation requirements, as determined by ASTM C136 and ASTM C117:

U.S. Sieve Size	Percent Passing
4 inch	100
No. 10	30-100
No. 40	0-70
No. 200	0-15

Crushed stone shall meet the following gradation requirement as determined by ASTM C136 and ASTM C117:

U.S. Sieve Size	Percent Passing
1 inch	100
3/4 inch	90-100
1/2 inch	20-55
3/8 inch	0-15
No. 4	0-5
No. 10	0-2

15.3 Shoring/Sheeting

Design, furnish, install and maintain temporary earth support systems, as required, to prevent injury to persons, collapse of the sides of the excavation, and damage, disturbance and settlement of adjacent property. Sheeting and bracing shall be of adequate type; size and strength for the conditions encountered and shall be driven to true alignment in a workmanlike manner.

Timber sheeting shall be straight and sound and shall be tongue and grooved where groundwater is encountered. Minimum thickness of timber sheeting shall be a nominal three inches.

Steel sheeting shall have a minimum thickness of 3/8 inch. Steel sheeting shall be designed for the conditions encountered and shall be driven tight.

Sheeting may be either left in place or removed. Sheeting left in place shall be cut off at least one foot above the crown of the pipe. In no case shall the top of sheeting be left in place within 5 feet of finish grade.

16. Dewatering

All water entering excavations shall be removed until the completion of all the work. No sanitary sewer shall be used for the disposal of dewatering liquids.

Excavations shall be kept free from water, snow and ice during construction. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over bedding and backfill material.

17. Rock or Ledge Excavation

When ledge is encountered in the excavation, a permit must be obtained from the Town of Dighton Fire Chief for the use of explosives. All blasting shall be done in accordance with the requirements as imposed by the Fire Chief. All blasting must be performed by a person licensed by the Massachusetts Department of Public Safety for this purpose.

Rock and/or boulder excavation shall include the excavation, removal and disposal of solid rock and all boulders one cubic yard or more in volume that require blasting or drilling and splitting. When ledge is encountered in the excavation, a permit must be obtained from the Town of Dighton Fire Chief for the use of explosives. All blasting shall be done in accordance with the requirements as imposed by the Fire Chief. All blasting must be performed by a person licensed by the Massachusetts Department of Public Safety for this purpose.

Boulders of less than one cubic yard in volume or other materials found in the excavations, however stiff, heavy and compact, including rippable rock, which, in the opinion of the Town of Dighton Superintendent, can be removed without blasting or drilling and wedging, shall not be considered as rock excavation.

Blasts shall be covered to prevent scattering of material and all adjacent property shall be suitably protected. Explosives shall be transported, handled and stored in a safe manner and in compliance with all federal, state and local regulations. Charges shall not be so large as to shake, loosen or endanger adjacent structures or their contents or to do harm to their occupants. Responsibility for damage to persons or property shall rest solely with the Contractor. Only personnel qualified in the use of explosives shall be employed for blasting. Obtain all necessary permits at no additional cost to the Town of Dighton.

Design blast pattern(s) and use blast control methods to prevent detrimental effects to the rock outside of the excavation limits. All loose, unsound or semidetached rock fragments, which may be detrimental to the proposed structure or installation, shall be removed from the excavation. Excavation beyond the necessary limits, made to remove damaged rock shall be backfilled with compacted gravel fill at no additional cost to the Town of Dighton.

After blasting, the rock surface at subgrade shall be thoroughly cleaned of all vegetation, soil, excessively broken rock, excessively weathered or decomposed rock, loose fragments, ice, snow, and other objectionable substances. Picking, barring, wedging, streams of water, hammers, and other effective means shall be used as required to accomplish this cleaning. All free water left on the surface of the rock shall be removed. The Town of Dighton Superintendent shall be notified and provided the opportunity to observe the cleaned rock surface before any masonry, concrete, bedding, or fill is placed on or against the rock.

18. Manholes and Appurtenances

18.1 Manhole Structures

Precast reinforced concrete sections for drain manholes, sewer manholes, valve manholes, chemical or process manholes, (hereinafter referred to as "manholes") and catch basins, shall conform to the applicable requirements of ASTM C478. Sections and bases shall have a minimum wall thickness of the dimensions shown in the following table.

Diameter	Wall Thickness	Floor Thickness
4 feet	5 inches	6 inches
5 feet	6 inches	7 inches
6 feet	7 inches	8 inches

Unless otherwise specified, all sections shall be of precast concrete. Flat top sections to be substituted for conical sections of manholes and catch basins in areas of low cover shall be indicated in submittals, and shall conform to the requirements for precast concrete sections for hand holes.

Unless otherwise specified, manholes shall be four foot in diameter for pipe up to 24 inches in diameter unless the angle between two 24-inch pipes is less than 120 degrees. In such cases and when the size of the pipe is less than 36 inches, a five foot inside diameter manhole shall be used. Where the pipe is 36 inches in diameter or greater, the diameter of the structure shall be specified by the Town of Dighton.

Horizontal joints between sections of manholes, unless otherwise specified herein, shall be sealed with a self-sealing butyl rubber based flexible joint sealant in rope form. Sealant material shall be Kent-Seal No. 2 as manufactured by Hamilton-Kent Mfg. Co., Kent, Ohio; C-S146 as manufactured by Concrete Products Supply Co. Div., Press Seal Gasket Corp., Fort Wayne, Indiana; Ram-Nek as manufactured by K.T. Snyder Co., Inc., Houston, Texas, or equal. Sealant shall be installed in accordance with the manufacturers written instructions.

All manholes with a depth of 20 feet or greater from rim to invert shall have installed at the midpoint of the manhole a mid-level platform.

All manholes shall be installed with an external manhole encapsulation system that seals: (1) the interface between the precast concrete manhole and the frame and cover and (2) all manhole joints which are located below groundwater. The manhole encapsulation is a heat shrinkable wraparound sleeve system and shall have an overall thickness of 0.100 inches with a minimum width of 6 inches. The manhole encapsulation shall be “Wrapid Seal Manhole Encapsulation System” as manufactured by Canusa, A Division of Shaw Pipe Resources.

In areas where high groundwater conditions are anticipated, special provisions shall be included to prevent excessive infiltration into the sewer system and manholes.

18.2 Steps

Manhole steps shall be of steel reinforced copolymer polypropylene conforming to ASTM C478, cast-in-place or installed utilizing inserts approved by the Town of Dighton. All steps shall be 12 inches on center with abrasive step surface and safety edge, drop front design, 1-inch diameter and 16 inches wide. Metal items embedded in concrete shall be painted with a zinc chromate primer.

18.3 Frame and Cover

Manhole frames and covers shall be cast iron conforming to the requirements of ASTM A48, Class 30, and shall be of noiseless, non-rocking design with pick holes. The word " Sewer" shall be cast on each cover in two inch letters as applicable. Standard manhole covers and frames shall have a minimum total weight of 420 pounds with a clear opening of 24 inches, unless otherwise specified. Standard manhole frames and covers shall be East Jordan Ironworks or comparable models as manufactured by Neenah Foundry Co., or Campbell Foundry Co.

Locking (bolted and gasketed) type manhole frames and covers shall have a minimum total weight of 680 pounds with a clear opening of 25 1/2 inches, unless otherwise specified. Bolted and gasketed type frames and covers shall be East Jordan Ironworks 2111A or 2111Z or comparable models as manufactured by Neenah Foundry Co., or Campbell Foundry Co. All cross-country manholes shall have bolted and gasketed manhole frames and covers, unless otherwise specified.

Watertight manhole frames and covers shall have a minimum total weight of 625 pounds with a clear opening of 24 inches, unless otherwise specified. Watertight manhole covers shall have a gasketed interior cover of watertight design, and shall also contain a locking bar. Watertight manhole frames and covers shall be East Jordan Ironworks model 2111APT and 2111ZPT. All electrical handhole and chemical or process pullboxes and manholes shall have watertight manhole frames and covers, unless otherwise specified.

18.4 Waterproofing

Manhole structures shall be coated with an asphalt-based waterproofing coating at the factory, prior to being delivered to the project site.

18.5 Drop connections

Drop connections shall be installed for manholes, which have invert elevation differences greater than three (3) feet. No exterior drop connections are allowed. Drop connections for manholes shall be constructed utilizing polyvinyl chloride pipe, elastomeric sealed

joints, and Type 316 stainless steel mounting hardware and materials. The size of the drop piping shall be 8 inches when the size of the sewer main is less than 24 inches. When the sewer main is equal to or larger than 24 inches, the drop piping shall be 12 inches in diameter.

19. Manhole Testing

The Town's Superintendent may require either hydrostatic/exfiltration testing or vacuum testing of manholes.

19.1 Hydrostatic/Exfiltration Testing

Exfiltration leakage for manholes shall not exceed 1 gallon per vertical foot of manhole section for a 24 hour period.

19.2 Vacuum Testing

When using the vacuum test method, the test shall be made after the manhole has been assembled, in-place, all lifting holes and horizontal joints have been filled (with an approved, non-shrinking mortar) but prior to placing tables and inverts and before filling and pointing the horizontal joints. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test. All pipes and other openings into the manhole shall be suitably plugged and plugs braced to prevent blowout. The test may be conducted before backfilling around the manhole. The initial test pressure shall be 10 inches mercury (i.e., 20 inches absolute). For manholes 1 to 10 feet deep, the pressure is permitted to drop by 1 inch mercury (to 9 inches mercury) in two minutes. For manholes 10 to 15 feet deep, the pressure is permitted to drop by 1 inch mercury (to 9 inches mercury) in 2.5 minutes. For manholes deeper than 15 feet, the pressure is permitted to drop by 1 inch mercury (to 9 inches mercury) in 3.0 minutes. If the pressure drop exceeds the allowable drop in the appropriate time period, the manhole shall be repaired and retested. If a manhole fails to meet the requirements even after repair, the manhole shall be exfiltration tested.

20. Erosion and Sedimentation Control

Each Drain Layer or contractor seeking to construct, repair or modify a building sewer or private sewer, or connection to the Town's sewerage system may be required to prepare an Erosion and Sedimentation Control Plan. The intent of this Plan is to prevent the introduction of sediments into the Town's sewerage system and to the environment. The design of any facilities or construction practices shall be subject to the approval of the Board, and the design, installation and maintenance of all erosion and sedimentation control devices shall be at the owner's expense.

The Drain Layer shall take such actions as may be required so as to insure that construction activities do not interfere with the hydraulic or aesthetic quality of any natural or manmade watercourses or drains. Design, furnish and install acceptable siltation control devices such as hay bale sediment control devices or permanent or portable control basins for the settling or filtering of fine sands, silts and clay caused by any dewatering operations. These siltation and erosion control devices shall be in addition to any other requirements specified in the Contract Documents.

Any natural areas or manmade structures which have been affected by siltation or erosion due to construction activities shall be restored to their preconstruction condition at no additional cost to the Town of Dighton.

21. Project Restoration

Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the Town of Dighton. All public property, curbs, pavement and roadways, sidewalks, and landscaped and grassy areas must be repaired and restored to their original condition by the drain layer or contractor upon sewer service connection. Any excavation on public property left open day or night shall be properly protected by a snow fence, horses, blinkers, and warning signs as needed

Pavement shall be replaced to match existing pavement thickness. Pavement shall be cut with pavement saws, and all edges tack coated. Overall pavement thickness shall be comprised of a binder base and top (wearing) course as applicable to the specific project.

Permanent paving shall be placed only when the underlying surface is dry, when the atmospheric temperature in the shade is above 40 degrees F, and when the weather is not foggy or rainy, provided, however, that the Engineer may permit, in case of sudden rain, the placing of mixture then in transit from the plant, if laid at proper temperature and if the roadbed is free from pools of water. Such permission shall in no way relax the requirements for quality of the pavement and smoothness of surface.

No material shall be laid upon a frozen base course or when wind conditions are such that rapid cooling will prevent satisfactory compaction. No load shall be sent out so late in the day that spreading and compaction cannot be completed during daylight.

The licensed drain layer or contractor shall maintain the temporary bituminous patch in all public ways and paved private ways for a period of not less than three (3) months, when he shall remove the temporary patch which shall include 12 inches of virgin pavement along each side of temporary pavement and place a permanent patch of Type I bituminous concrete in two layers to a total depth of two and one-half (2-1/2) inches. The edges of the patch shall be sealed with approved bitumen. All patch work shall be rolled and spread in accordance with the best practices.

The licensed drain layer or contractor shall restore the permanent road surface within fourteen (14) days following notification to do so. Failing to comply with notification requirements will result in completion of the work by the Town of Dighton Highway Department, and the licensed drain layer or contractor shall be liable for all debts incurred.

The Town of Dighton reserves the right to require placement of temporary trench pavement. Failure in the temporary patch shall be restored within eight (8) hours of notification to do so.

Existing curbing removed for a project shall be replaced with the same product.

22. Safety

All Drain Layers and contractors working in the Town of Dighton are expected to satisfy all federal, State, and local safety requirements. This includes OSHA Confined Space Entry procedures and trenching and excavation practices, and traffic management methods that keep the work zone safe. The Town of Dighton reserves the right to shut down (temporarily or permanently) any work practices that it determines pose a hazard to persons in or near the work area.

23. Failure to Conform

Should the Board of Sewer Commissioners find that any Drain Layer or contractor has failed to conform to the requirements of the Town's rules and regulations and to the conditions of any permit issued there under, or that such drain layer or contractor has not been faithful in the performance of work or furnishing of materials under his license, the Board of Sewer Commissioners may suspend, cancel, or revoke such license and/or permit, or may extend the suspension of such license and/or permit for such period, or limit the activities of such drain layer or contractor in such manner as may appear to be to the public interest. Suspension, cancellation, or termination of a permit shall not entitle the permittee to any compensation or reimbursement from the Town or its agents for any alleged loss or expense incurred thereby, and licenses and permits shall be issued only on this condition.

24. Testing and Inspection Prior to Connection

24.1 Pipe Testing

All pipe shall be tested in the presence of the Town of Dighton Superintendent or his designated agent.

The Town inspector may require either infiltration testing or pressure testing of new sewer lines. Where lines are installed in areas having a high groundwater level, an infiltration test shall be conducted for at least four hours under the supervision of the Town of Dighton Superintendent or his designated agent. The infiltration leakage shall not exceed 100 gallons per inch of pipe diameter per mile of pipe for sewers 24-inches in diameter and smaller. The leakage test using low-pressure air shall be made on each manhole-to-manhole section of pipe. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressure without requiring external bracing or blocking. All air shall pass through a single control panel.

Water leakage tests (i.e., exfiltration tests) may also be performed on installed sewer lines. The exfiltration leakage shall not exceed 100 gallons per inch of pipe diameter per mile per day for any section of the pipe system for sewers 24-inches in diameter and smaller. Exfiltration tests shall be performed with a minimum positive head of two (2) feet. Various sections of the sewer shall be isolated by watertight plugs and the quantity of water exiting the pipe during a predetermined time shall be measured.

Low-pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psig greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe at the time of the test. The internal air pressure in the sealed line shall not exceed 8 psig. At least two (2) minutes shall be allowed for the air pressure to stabilize in the section being tested. After the stabilization period, the low-pressure air supply hose shall be quickly disconnected from the control panel. The tire required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig (greater than the maximum pressure exerted by the groundwater that may be above the invert of the pipe) shall not be ***less than*** that shown in the following table:

Pipe Diameter (inches)	Time (minutes)
6	4.0
8	5.0
10	6.5
12	7.5
14	9.0
15	9.5
18	11.5
Greater than 18	7.7 x Pipe Diameter (ft)

These tests shall include losses or gains through manholes as well as through pipe walls and joints, as well as through house connection fittings and joints. In case the leakage

exceeds the specified amounts, the contractor shall locate the leaks and shall repair the pipe at his own cost. After repairs have been made, the line shall be re-tested and the processes of repairing and re-testing shall be repeated until the results are within the specified limits. No sewer shall be connected until the piping has been satisfactorily tested.

When the sewer section to be tested contains more than one size of pipe, the minimum allowable time shall be based on the largest diameter pipe in the section.

After completion of each installation in a development and before connection is made, the newly constructed lines shall be cleaned, flushed and tested for deflection. The amount of deflection in all sewer lines shall be tested in the presence of the Town of Dighton Superintendent or his designated agent. This testing shall be done by the use of a deflectometer, calibrated television or photography, or a properly sized "go, no go" mandrel or sewer ball. All sewer lines with a deflection angle of greater than 5 percent shall be repaired by re-bedding or replacement of the pipe.

24.2 Force Main Testing

Any force main shall be tested in the presence of the Town of Dighton Superintendent (or his representative), by water to a pressure equal to 2 times the total dynamic head of the pump to which he force main is attached, unless the test pressure is greater than the working pressure of the pipe. In that case the pipe shall be tested to the working pressure of the pipe. The Superintendent shall provide the test pressure. This pressure shall be held for a period of at least 15 minutes, allowing a maximum pressure drop of 5 psi. Any defective work shown by this test shall be replaced at no additional cost to the Town.

24.3 Inspection

Sewers and service connections within developments shall be installed at the expense of the builder and/or owner, and shall be subject to inspection and acceptance by the Town of Dighton.

Tests shall be conducted under the supervision of the Superintendent or his designated representative. Final inspection and observation of all testing shall be done by an engineer appointed by the Board, and the owner will be required to reimburse the Board for the expense of said final inspection and testing.

Service connections shall not be backfilled beyond the hardened gravel envelope until the work has been inspected and approved by the Superintendent or his designated agent. The licensed drain layer or contractor shall arrange his work in a manner to minimize the required services and time of the Superintendent.

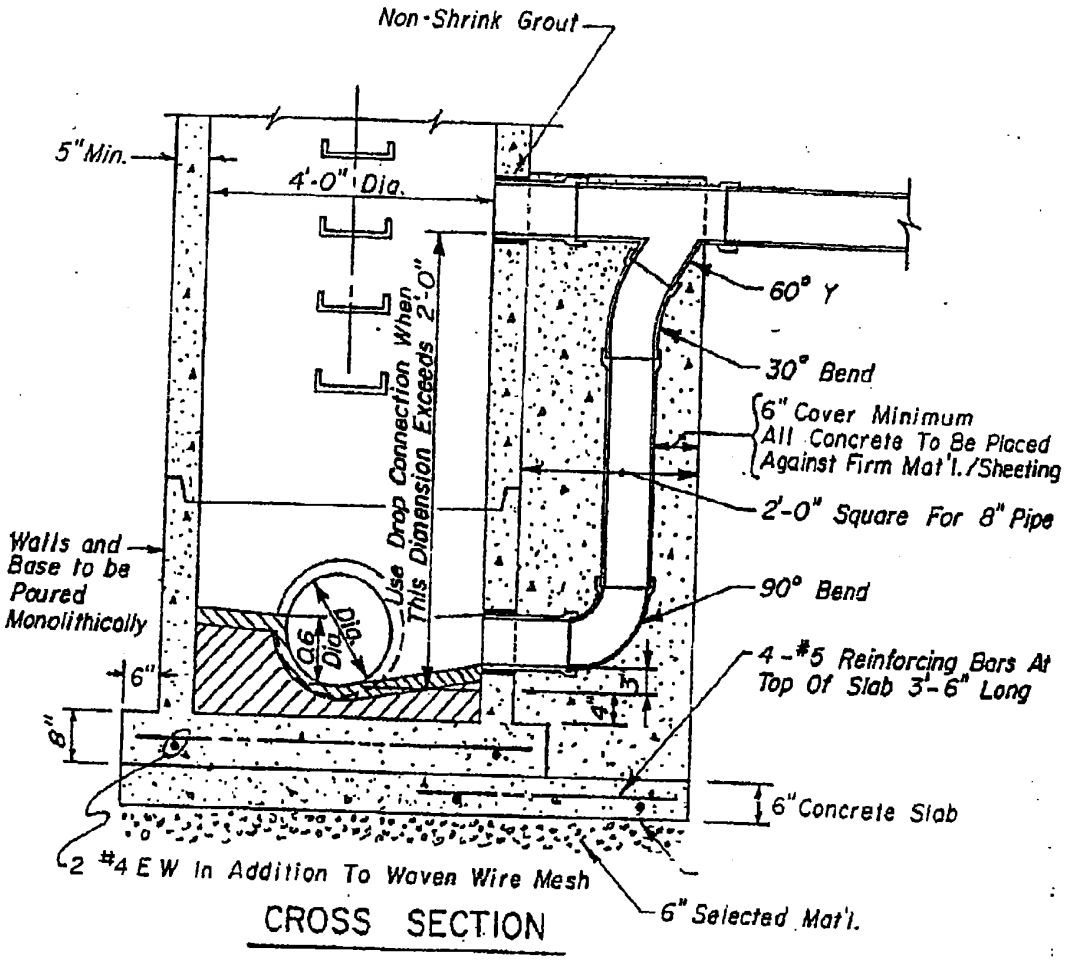
Pipes and fittings within trenches shall not be backfilled until the work is inspected and approved by the Superintendent.

The Town of Dighton also reserves the right to require inspection of the new sewers by closed-circuit television inspection. When required by the Town, copies of this inspection shall be provided on digital video disks (DVDs), compact disks (CDs) or VHS tapes.

25. Figures and Details

The following figures and details shall be used for all new construction within the Town of Dighton's collection system.

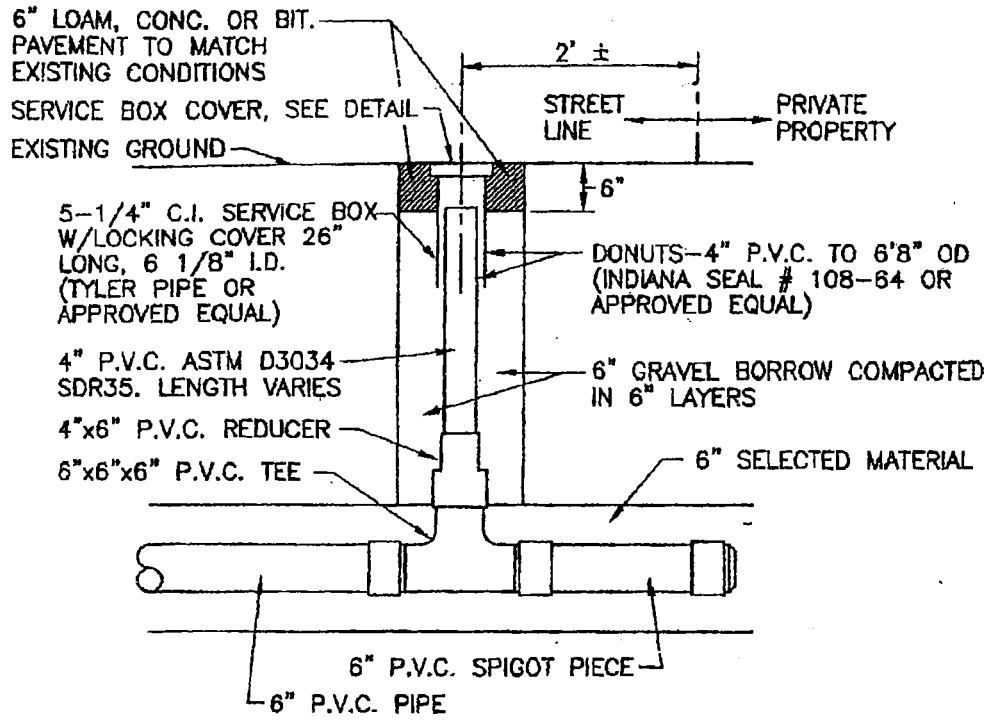
1. Typical Exterior Drop Manhole
2. Typical Inspection Tee and Riser
3. Typical Pre-Cast Manhole
4. Typical Interior Drop Manhole
5. Typical Trench Cross-Section
6. Typical Service Connection Chimney and Wye



CROSS SECTION

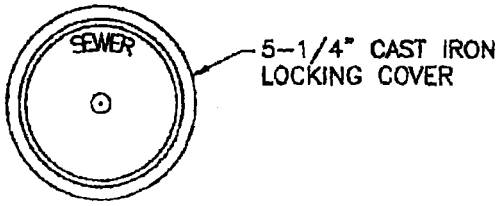
SANITARY SEWER DROP MANHOLE

TOWN OF DIGHTON
SEWER DEPARTMENT



SECTION

NOT TO SCALE



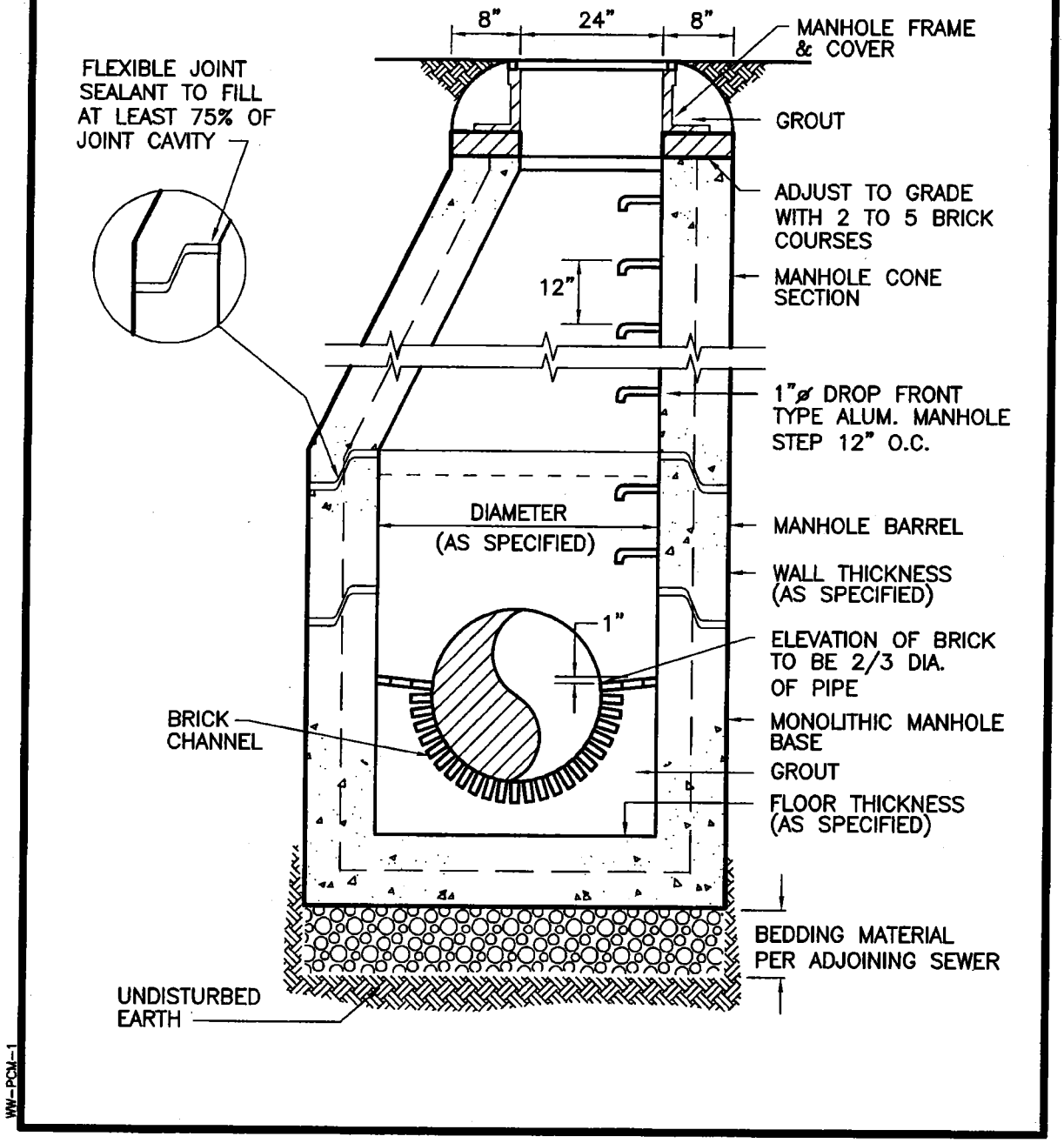
SERVICE BOX COVER DETAIL

NOT TO SCALE

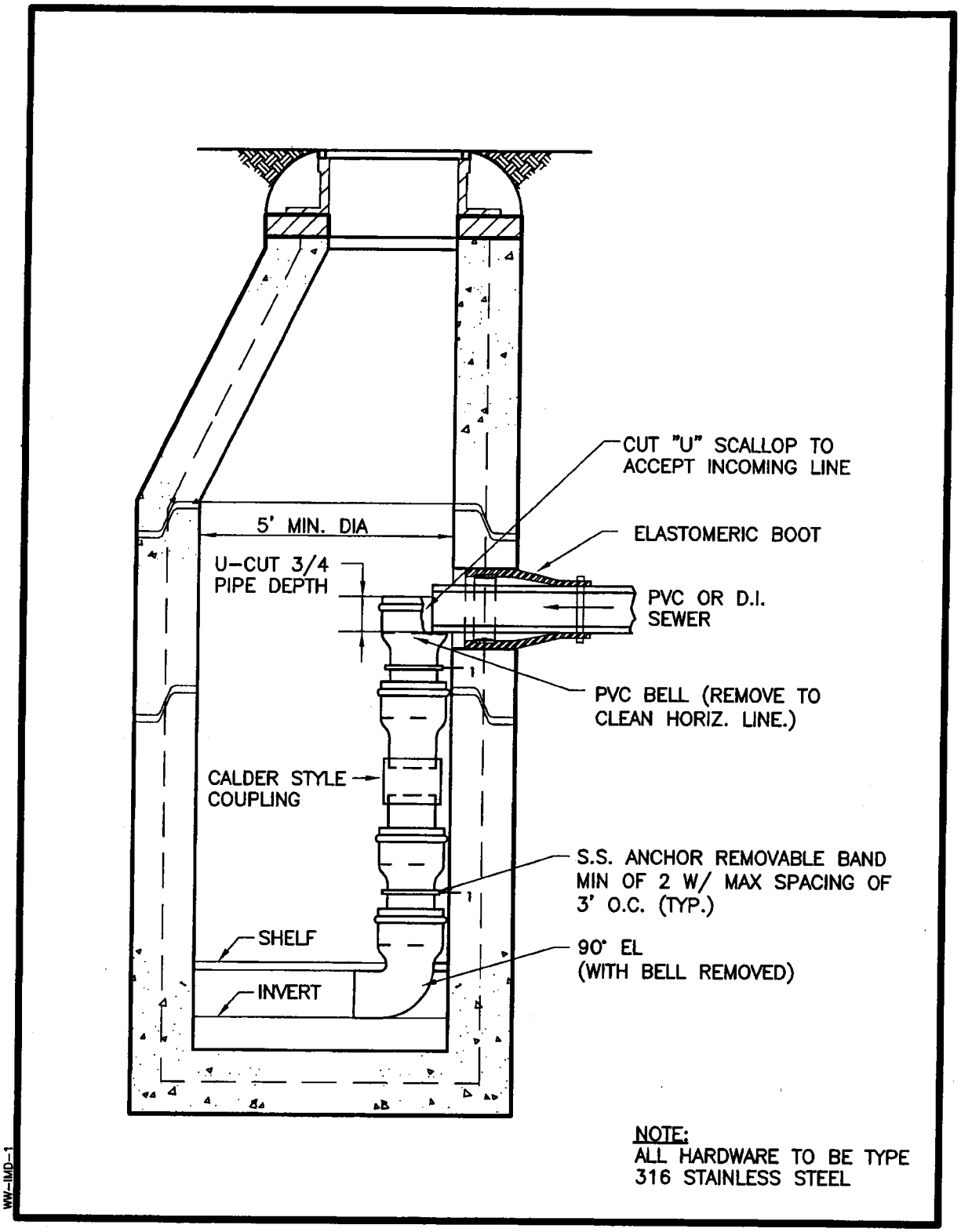
INSPECTION TEE AND RISER

TOWN OF DIGHTON
SEWER DEPARTMENT

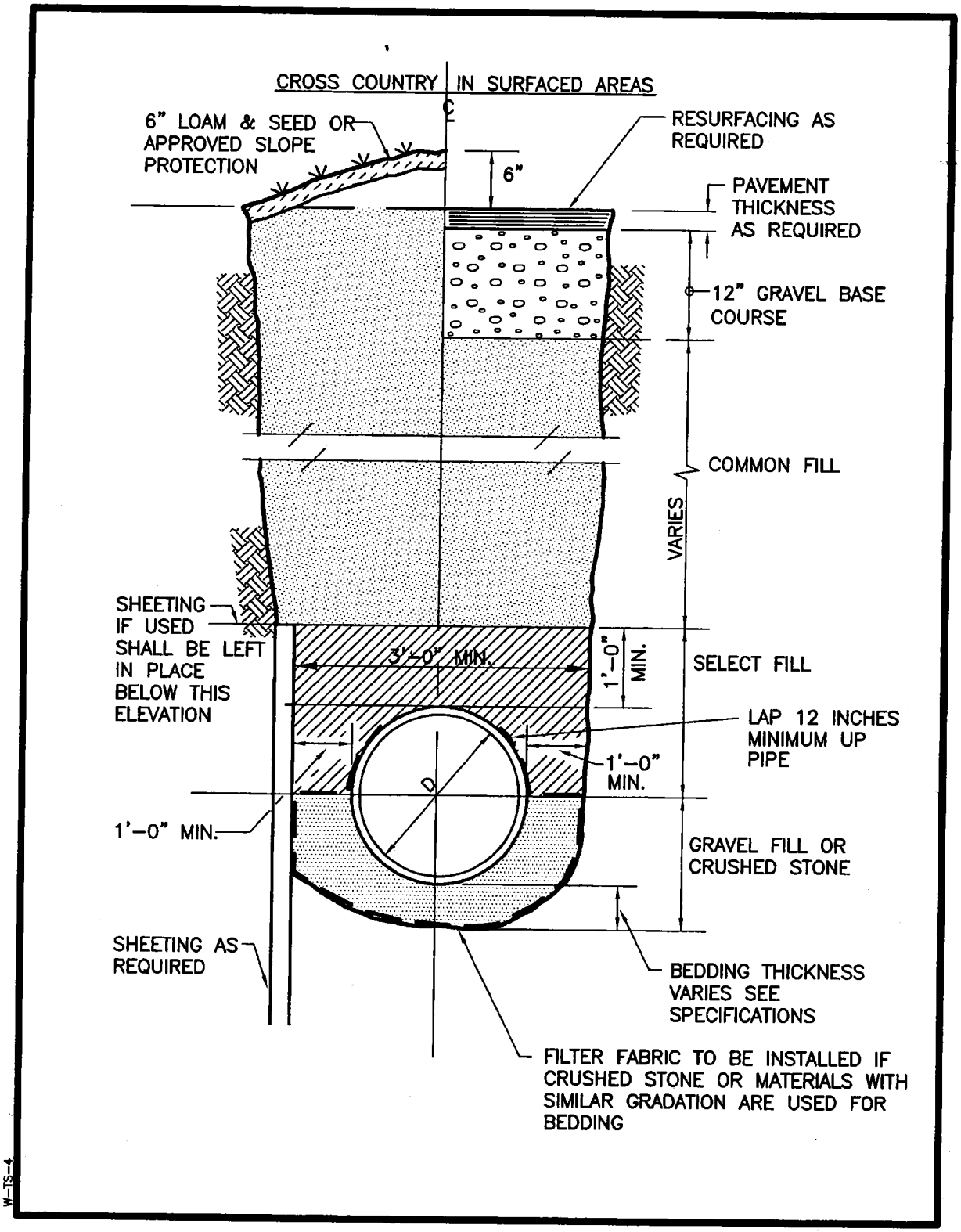
DIAMETER	WALL THICKNESS	FLOOR THICKNESS
4 FT.	5 IN.	6 IN.
5 FT.	6 IN.	7 IN.
6 FT.	7 IN.	8 IN.



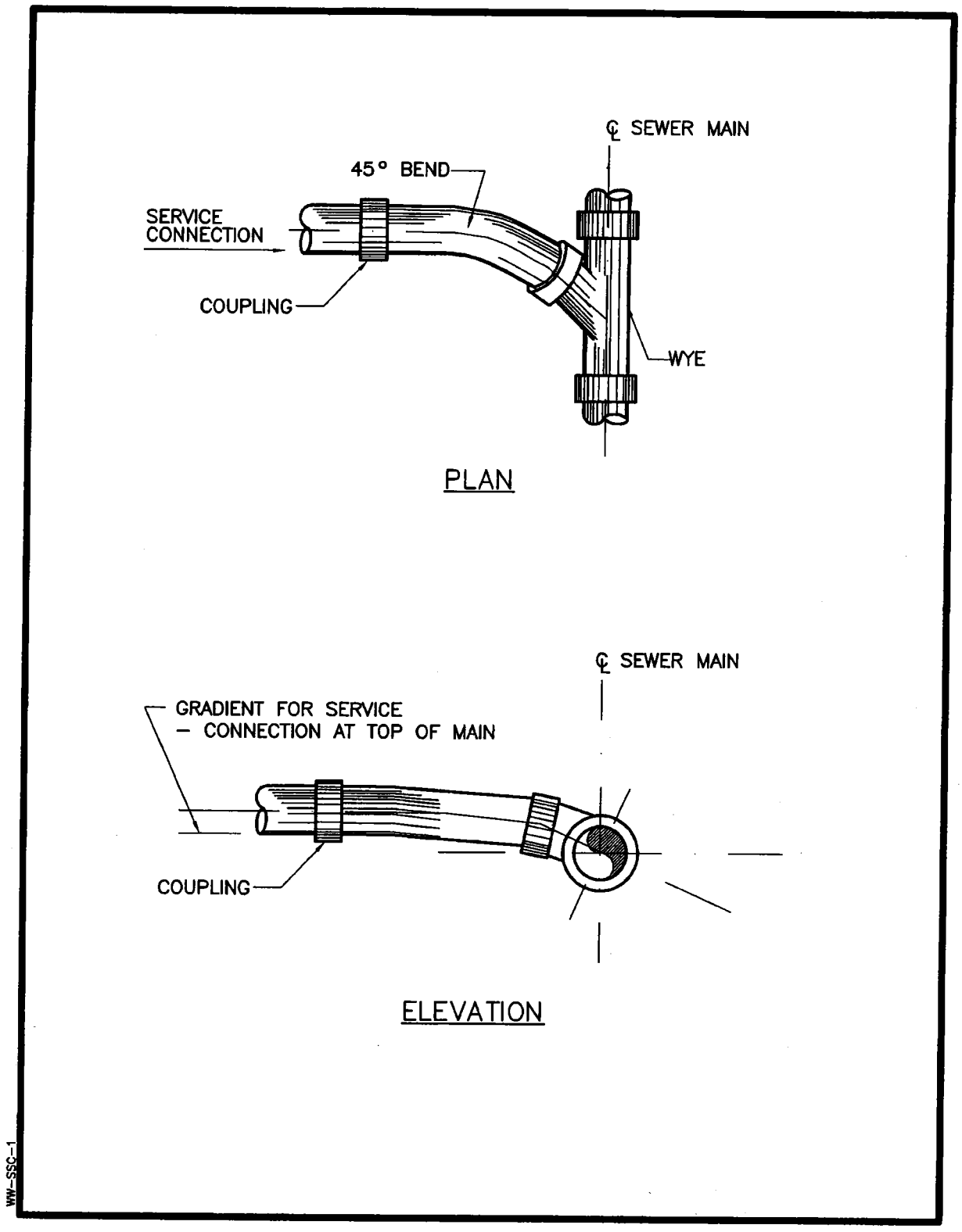
PRECAST CONCRETE MANHOLE
NOT TO SCALE



TYPICAL INTERIOR MANHOLE DROP
NOT TO SCALE



TYPICAL TRENCH SECTION
NTS



SEWER SERVICE CONNECTION DETAIL
NOT TO SCALE