Town of South Kingstown

Public Services Department

WASTEWATER SPECIFICATIONS

3/1/12

PREFACE

This procedure is based upon an amendment from the Town of South Kingstown, Rhode Island Specifications for the Construction of Systems of Sewers Contract 3A East Side Lateral Sewers for Wastewater Treatment Facilities, 1977.

This procedure shall be utilized for installation of all sanitary sewer mains and laterals, which are either public and/or privately owned and maintained. This document shall be utilized, as inspection criteria for the Town of South Kingstown Utilities Department.

This procedure has been established for the use of Poly Vinyl Chloride (PVC) SDR 35 Pipe for gravity mains and service lines and Ductile Iron pipe for the use of pressurized force mains. Any Contractor desirous of utilizing piping material other than specified in this procedure must demonstrate in writing the purpose and need of alternate materials which is subject to, and shall receive written authorization from the Public Services Director.

The Contractor shall conduct all construction activities regarding the installation of pipe, pipe fittings, accessories, appurtenances, and backfilling between 9:00 a.m. and 4:00 p.m., Monday through Friday. No construction work shall be allowed on Saturdays, Sundays or Holidays without prior written authorization from the Public Services Director.

INDEX TO TECHNICAL SPECIFICATIONS

SECTION 1. CLEARING AND GRUBBING

1.1 **SCOPE:** This work covered under this Section includes the furnishing of all labor, equipment and materials, and performing all operation in connection with the clearing and grubbing and the preparation of the site within the limits of the construction shown on the drawings. The work also includes the disposal of the site of materials resulting from clearing and grubbing and site preparation operations, and all appurtenant work,, complete in accordance with the specifications and the drawings and as directed.

1.2 **CLEARING:** Clearing shall include the felling and cutting up of all trees, and the satisfactory removal and disposal of trees, downed timber, brush and debris and obstructions of any nature. Individual trees directed to be left standing shall be protected in a satisfactory manner to prevent damage incident to construction operations.

1.3 **GRUBBING:** Grubbing shall include the satisfactory removal and disposal of all stumps, roots larger than one (1) inch in diameter, matted roots, debris and other obstructions to a depth not less than 18 inches below finish ground grades, except that in areas to be occupied by structures they shall be removed in their entirety. All depressions resulting from grubbing shall be refilled with selected materials from earth excavation, graded and compacted so as to conform to adjacent ground surfaces.

1.4 **DISPOSAL OF CLEARED AND GRUBBED MATERIAL:** All timber, stumps, roots, brush, and other debris, obstructions and objectionable material resulting from clearing and grubbing and site preparation operations shall be removed and disposed of by the contractor off the site. Disposal by burning or burying on the site is not permitted.

SECTION 2. STRIPPING, STOCKPILING AND REPLACING TOPSOIL

2.1 **SCOPE:** The work covered under this Section includes the furnishing-of all labor, equipment and materials and performing all operations in connection with the stripping, stockpiling and replacing of topsoil including marsh soils within the limits of the areas as indicated or directed, completed and accepted, in accordance with the drawings and specifications, and as directed. The work shall also include all hauling, handling and rehandling of topsoil, maintaining and protecting of stockpiled topsoil; preparation of subgrades; spreading; compacting, grading and replacing deficiencies in quantities of topsoil; protection of completed topsoiled areas; and all other work incidental and necessary for the satisfactory completion of this Section.

2.2 **STRIPPING (REMOVAL) OF TOPSOIL:** Topsoil shall be carefully removed to the depth and within the limits indicated or directed removed to the depths for removal and replacing of topsoil. Topsoil shall be transported and deposited in storage piles in approved locations convenient to the areas from which it is removed. The topsoil shall be stockpiled separate from other excavated materials and free of roots, stones, and other undesirable material. The Contractor shall take all necessary precautions to prevent other excavated materials or objectionable materials from becoming intermixed with topsoil during any operations. Stripping operations shall be completed prior to excavation, compacting, or grading operations.

2.3 **STOCKPILES:** Stockpiles shall be neatly trimmed and graded to provide drainage from surfaces and to prevent depressions where water may become impounded. After being trimmed and graded, stockpiles shall be protected and shall not be disturbed except for subsequent reuse of topsoil. Any deficiencies in the quantities of topsoil obtained from the stripping operations and caused by the Contractor's operations shall be replaced by the Contractor with approved topsoil.

2.4 **PREPARATION OF SUBGRADE:** 2.4.1 The subgrade of all areas to be topsoiled shall be clear of all vegetation, stones and roots larger than one (1) inch in diameter, brush, stakes or any other material which might hinder proper grading or tillage operations or which might interfere with or be harmful to plant growth. The subgrade of all such areas shall be brought to the elevations required by filling, excavation or grading, free of depressions or irregularities, so that topsoil may be placed to the depth as directed.

2.4.2 After subgrades of areas to be topsoiled have been brought to the-proper condition, the subgrade shall be loosened immediately prior to placing topsoil by disking, scarifying or other approved method to a depth of approximately three (3) inches, to permit bonding of the topsoil to the subgrade.

2.5 **PLACING TOPSOIL:** 2.5.1 Before the stockpiled topsoil is reused it shall cleaned of all debris, roots and stones larger than one (1) inch in diameter and other objectionable material. Topsoil shall not be placed when the topsoil or subgrade is frozen, excessively wet, extremely dry or in a condition which would be detrimental to the topsoiling operations.

2.5.2 Topsoiling shall be performed only when it can be followed within a reasonable time by seeding. Topsoil shall be loaded, hauled and uniformly spread and compacted to the depth as directed by the Public Services Director. The topsoil shall be distributed in sufficient depth to compensate for any shrinkage or settlement so that the surfaces of the topsoiled areas shall finish evenly with the adjacent undisturbed surfaces.

2.5.3 The whole surface shall be rolled with a hand roller weighing not more t an 100 pounds per foot of width. During rolling, all depressions shall be filled with additional topsoil, and the surfaces shall be regraded and rerolled until they present a smooth and uniform finish at the required grade. Areas consisting of marsh soils shall not require rolling.

SECTION 3. DEWATERING, CONTROL AND DIVERSION OF WATER

Paragraph Number	Paragraph Title
3.1	Scope
3.2	Dewatering Excavations
3.3	Cofferdams
3.4	Diversion of Water

3.1 **SCOPE:** The work covered under this Section includes the furnishing of all labor, equipment and materials, and performing all operations in connection with the dewatering, control and diversion of water, and all other operations necessary to maintain in the dry condition all excavations and work areas of this contract. The contractor shall be responsible for providing, maintaining, operating and removing all dewatering, and other facilities, including all pumping and appurtenant equipment required to maintain in a dry condition the areas in which construction of this contract is to be conducted. The Contractor shall be responsible for performing all required dewatering in a manner to prevent injury to persons or public health and damage to existing facilities or the work in progress.

3.2 **DEWATERING EXCAVATIONS:** 3.2.1 The excavations for work required under this contract are to Some extent below existing ground water levels. The Contractor shall provide, operate, and maintain all pumps, drains, well points, or any facility necessary for the control, collection and disposal of all surface and subsurface water encountered in the performance of the contract work. All excavations shall be kept dry at all times, and all construction work shall be performed in the dry, unless otherwise authorized or directed by the Public Services Director.

3.2.2 Any damages to existing facilities or new work resulting from the failure of the Contractor to maintain the work areas in a dry condition shall be repaired by the Contractor, as directed by the Public Services Director. Pumping shall be continuous where specified or directed or as necessary to protect the work and to maintain satisfactory progress.

3.2.3 The Contractor's pumping and dewatering operations shall be carried out in such a manner that no loss of ground will occur. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected against movement or damage.

3.2.4 Water being disposed of by the pumping and dewatering operations shall be disposed of in such a manner to avoid injury to persons or public or private property, or to the work completed or in progress. Dewatering shall be accomplished by approved methods which have a background record of successful dewatering of similar excavations and subsurface conditions expected to be encountered in the work.

3.2.5 The Contractor's pumping or dewatering operations shall be carried out in a manner to minimize erosion of wetland areas or deposition of sediment in streams or wetlands. If in the opinion of the Public Services Director excessive sedimentation is occurring, the Contractor shall alter his operations as required by the Public Services Director.

3.3 **COFFERDAMS:** 3.3.1 Where cofferdams are necessary so that the work may be performed in the dry, the Contractor shall design, furnish, install and maintain and remove all such cofferdam facilities. Cofferdams shall be designed to withstand all imposed loads and to prevent injury to persons or damage to existing structures and property and to the work.

3.3.2 Cofferdams shall be installed to sufficient depths to allow a reasonable depth of below grade excavation below the work to be constructed. They shall be as watertight as necessary for the construction of the work in the dry. They shall be of such dimensions as to give sufficient clearance for construction and inspection of the work, and to permit installation of all necessary dewatering facilities.

3.3.3 The Contractor shall be solely responsible for the design, construct on, adequacy and safety of all cofferdam facilities and for any injury or damage caused by the installation or failure of the cofferdam facilities. Cofferdams, including all sheeting and bracing required, shall be removed by the Contractor after completion of the permanent construction unless otherwise directed by the Public Services Director.

3.4 **DIVERSION OF WATER:** 3.4.1 The Contractor shall be responsible for providing and maintaining all ditching, grading, sheeting and bracing, pumping and appurtenant work for the temporary diverting of water courses and protection from flooding as necessary to permit the construction of work in the dry.

3.4.2 Upon completion of the contract work, the Contractor shall remove all temporary construction and shall do all necessary earthwork and grading to restore the areas disturbed to their original condition or to such other conditions as indicated or directed by the Public Services Director.

3.4.3 Water shall not be permitted to flow into or through excavations in which work is under way or has been partially completed. The Contractor shall not restrict or close off the natural flow of water in such a way that ponding or flooding will occur, and shall at all times prevent flooding of public and private property. All damages resulting from flooding or restriction of flows shall be the sole responsibility of the Contractor.

SECTION 4. EARTH EXCAVATION AND BACKFILL

4.1 **SCOPE:** 4.1.1 The work under this Section includes the furnishing of all labor**,** equipment and materials, and performing all operations in connection with excavating, backfilling, compacting, grading and all other incidental work necessary for the construction of pipelines, structures, pavement and appurtenant work in accordance with the drawings and specifications and as directed. The work also includes installing, shoring and bracing as the excavation proceeds; providing approved earth borrow and bankrun gravel from off-site sources when directed for backfills or excavations and refills of below-grade excavations; excavation and disposal at approved locations of pavements, surplus and unsuitable materials; protection of existing pipelines; utilities and structures and of new work; compaction of trench bottom, backfills and subgrades; excavation and backfilling of test pits; and all other appurtenant work as required or as directed.

4.1.2 Stripping, stockpiling and replacing topsoil, including marsh soils, is included under Section entitled, "STRIPPING, STOCKPILING AND REPLACING TOPSOIL."

4.1.3 Where required or directed, the use of gravel bedding beneath pipe and under structure base slabs is included under Section entitled, "GRAVEL BEDDING."

4.1.4 The required excavations are to some extent below existing groundwater levels. All excavations shall be kept dry at all times, and all construction work shall be performed in the dry, unless otherwise authorized or directed by the Public Services Director. The providing and maintaining of facilities for dewatering, control and diversion of water, and protection from flooding is included under Section entitled, "DEWATERING, CONTROL AND DIVERSION OF WATER."

4.2 **PROTECTION OF TREES AND SHRUBBERY:** Existing trees and shrubbery to remain shall be protected from injury. Except as otherwise permitted, cutting and trimming of existing trees will not be permitted. All existing trees to remain and which may be damaged by construction operations shall be boxed and protected as directed.

4.3 **DISPOSAL OF EXCAVATED MATERIAL**: All excavated earth materials approved by the Public Services Director as suitable for reuse shall be used for backfilling excavations and for rough grading as necessary for the completion of the contract work. All surplus or unsuitable materials, rock from rock excavation, and boulders and pavement material shall be removed and satisfactorily disposed of off the site by the Contractor.

4.4 **UNSUITABLE MATERIALS**: 4.4.1 Unsuitable materials are herein defined as organic material, peat, organic or inorganic silts, clay, or combinations thereof, all having unsuitable bearing properties; and all materials of whatever description which are too loose or saturated for use as backfill to provide satisfactory bearing. If unsuitable material is encountered at a depth indicated on the drawings for bottom limit of excavation, the Contractor shall immediately notify the Public Services Director and shall not proceed further until instructions are given.

4.4.2 The Contractor shall satisfactorily excavate and remove all unsuitable material to lines, grades and limits indicated on the drawings or as directed in writing by the Public Services Director, and shall satisfactorily dispose of such material off the site. All resulting below-grade excavations shall be refilled with compacted gravel bedding refill.

4.4.3 Material which becomes unsuitable as a result of the Contractor's lack of dewatering or improper dewatering shall be removed by the Contractor and replaced with gravel bedding all as directed and approved by the Public Services Director.

4.5 **EXCAVATION:** 4.5.1 Earth excavation shall include the excavation, removal and satisfactory disposal of all materials of whatever nature encountered from within the limits indicated or specified, or as directed in writing, other than rock or ledge as defined under Section entitled, "ROCK EXCAVATION." It shall include but not be limited to earth materials such as peats, organic or inorganic silts, clay, sand and gravel; pavements; cobbles and boulders less than one (1) cubic yard in volume; soft or disintegrated rock which, in the opinion of the Public Services Director, can be removed without blasting or drilling; brick and concrete masonry; and all obstructions not specifically included in another Section.

4.5.2 All excavation, sheeting, shoring and dewatering operations shall be accomplished to prevent the undermining or disturbing of existing pipelines, utilities and structures or of any completed construction.

4.5.3 Excavation shall be made to the lines and grades shown on drawing WW-1-D-1, or as modified by the Public Services Director. Excavations shall be accurately graded to allow satisfactory construction of the contract work. Immediately after excavation to the indicated or directed trench bottom, the Contractor shall compact the exposed bottom surface with two (2) passes of an approved plate-type vibratory compactor.

4.5.4 Bell holes and depressions for joints shall be dug after trench bottom has been graded and compacted, and after gravel bedding, if required, has been placed and compacted. The bottom quadrant of each pipe barrel shall have complete and uniform bearing for the full length of each pipe. The trench bottom shall again be thoroughly compacted just prior to final shaping for bedding and installation of pipe.

4.5.5 Excavation operations adjacent to and below existing structures and utilities shall be done manually and in a manner to prevent disturbance of or damage to the existing structures and utilities.

4.5.6 Existing pavements and base courses shall be carefully cut and removed to obtain sound, vertical edges at the lines indicated. Existing pavements and base courses beyond the indicated lines which are to remain and which have been disturbed or damaged shall be restored or replaced by the Contractor to match existing pavement and base courses. Existing pavements and base courses to remain shall be protected by the Contractor.

4.5.7 The Contractor shall be responsible for keeping all excavated and construction material a safe distance back from the edge of excavations to avoid overloading the sides of excavations and to prevent slides or cave-ins.

4.5.8 If a pipe is to be placed in fill, or the top of the pipe is within two (2) feet of existing ground surface, the fill shall first be placed as specified herein to a height of not less than two (2) feet over the top of the pipe and for a width of five (5) feet beyond each side of the pipeline. Following placement of such fill, excavation and backfill shall proceed as specified herein.

4.5.9 At locations where sheeting is indicated or is directed to be used, the use of a trenching box, will not be allowed. The use of a trenching box will be subject to the determination and approval of the Public Services Director.

4.5.10 Where the Contractor elects to use shoring installed as the excavation progresses to maintain or otherwise protect the sides of the excavation from cave-ins in loss of ground, the shoring shall be adequately braced to prevent cave-ins or loss of ground, and portions of the shoring or bracing shall be left in place as directed by the Public Services Director to maintain stability as backfilling progresses.

4.5.11 No excessive trench widths will be allowed to avoid the use of sheeting.

4.5.12 Where existing subsurface utilities or other facilities adjacent to or crossing through the excavation require temporary support or protection, such temporary support or protection shall be satisfactorily provided by the Contractor. All necessary measures shall be taken by the Contractor to prevent lateral movement or settlement of existing facilities or of work in progress.

4.5.13 Grading shall be done as necessary to prevent surface water from flowing into excavations, and any water accumulating therein shall be removed by pumping or other approved method. The pipelines shall not, at any time, be used for trench drainage.

4.6 **BACKFILLING:** 4.6.1 Unless directed otherwise by the Public Services Director, excavations shall not be backfilled until all required pipeline tests have been satisfactorily performed, and until the work as installed conforms to all requirements specified in these Sections. Each layer of backfill material shall be moistened and compacted in such a manner as to permit the proper and desired compaction of the filled excavation, so that paving of excavated areas can proceed immediately after backfilling is completed.

4.6.2 All excavations shall be backfilled as soon as practicable with approved excavated material. If suitable material as approved by the Public Services Director is not available from the excavations in the quantities required for proper backfilling of excavations, the Contractor shall provide the necessary approved earth borrow for backfills from off-site sources.

4.6.3 All backfill placed in trenches below a level twelve(12) inches above the top of pipe shall consist of select backfill, placed in layers not exceeding four (4) inches in loose depths. Select backfill shall be compactible materials as approved by the Public Services Director, not frozen and free from clods of earth, stones larger than one and a half (1 1/2) inches in diameter or unsuitable materials, per Drawing WW-1-D-1. The select backfi11 shall be deposited uniformly on both sides of the pipe and shall be thoroughly compacted by tamping under and on each side of the pipe to provide uniform support around the pipe, free from voids. (revised 3/16/95)

4.6.4 The balance of backfill in trenches shall be compactible materials as approved by the Public Services Director, not frozen and without any stones larger than eight (8) inches in their greatest dimension. It shall be spread in layers not exceeding twelve (12) inches in loose depth, and each layer shall be compacted by at least four (4) passes of an approved plate-type vibratory compactor, per Drawing WW-1-D-1. All trench backfilling shall be carefully placed to avoid disturbance of new work and of existing utilities or structures. The moisture content of backfill shall be such that proper compaction will be obtained. Puddling or jetting of backfill with water will not be permitted.

4.6.5 During filling and backfilling operation, pipelines will be checked by the Public Services Director to determine whether any displacement of the pipe has occurred. If the inspection of the pipelines shows poor alignment, displaced pipe or any other defects, the defects designated by the Public Services Director shall be remedied in a satisfactory manner by the Contractor.

4.6.6 Backfilling against masonry or concrete shall only be done when approved. backfilling against concrete within seven (7) days after placement will not be allowed. During backfilling and compacting operations, care should be exercised so that equipment used will not overload the structures. Backfill adjacent to structures shall be placed in layers not more than nine (9) inches in loose depth, and each layer thoroughly compacted with at least four (4) passes of an approved plate-type vibratory compactor.

4.6.7 After backfilling trenches, the Contractor shall maintain the filled surfaces in good condition, with a smooth surface level with adjacent undisturbed surfaced. Any subsequent settling shall be immediately repaired by the Contractor in a manner satisfactory to the Public Services Director and such maintenance shall be provided by the Contractor for the remainder of the project.

4.6.8 The finished surfaces of filled excavations shall be compacted, and reasonably smooth and free from surface irregularities. Subgrade upon which either topsoil is to be placed or pavements are to be constructed shall be maintained in a satisfactory condition until the finish courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.

4.6.9 Prior to paving upon the subgrade, all soft or unsuitable material shall be removed and replaced with suitable material from excavation or earth borrow, as approved by the Public Services Director. All low sections, holes or depressions shall be brought to the required grade with material approved by the Public Services Director. The entire subgrade shall be shaped to line, grade and cross-section and thoroughly compacted.

4.6.10 Replacing topsoil is specified and included under Section entitled, "STRIPPING, STOCKPILING AND REPLACING TOPSOIL."

4.7 **PROTECTION OF EXISTING UTILITIES AND STRUCTURES:** 4.7.1 Excavation and backfill operations shall be done in such a manner to prevent caveins of excavations or the undermining, damage or disturbing of existing utilities and structures or of new work. Backfill shall be placed and compacted so as to prevent future settlement or damage to existing utilities and structures and new work.

4.7.2 Any excavations improperly backfilled or where settlement occurs shall be reopened to the depth required, then refilled with new materials and compacted, and the surface restored to the required grade and condition.

4.7.3 Any damage due to excavation., backfilling or settlement of the back injury to persons or damage to property occurring as a result of such damage, shall be the responsibility of the Contractor.

4.8 **MATERIALS**: Earth borrow shall be a well-graded granular material-, at least 80 percent of which must be sand and gravel. It shall be free from peat, organic matter and debris, and shall not contain any stones or clay lumps in excess of eight (8) inches in their greatest dimensions. Any materials of whatever description which are too uniformly-graded or saturated to be readily compactible shall not be utilized for earth borrow.

4.9 **TEST PITS:** Test pits shall be dug at the locations selected and to the dimensions directed by the Public Services Director, to establish locations of existing pipelines or any other buried item for which the exact location is to be determined. The excavation, protection and backfilling of test pits shall be in accordance with the provisions of this Section. The maximum depth of test pits shall be eight (8) feet, measured from the average ground surface existing at the test pit location immediately prior to digging each pit.

4.10 **PROTECTION OF WATER RESOURCES**: The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams. (revised 3/16/95)

4.11 **MAINTENANCE OF DRAINAGE FACILITIES**: All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs through circumstances beyond his control any of the aforesaid drainage facilities, he shall repair the same within the same day. (revised 3/16/95)

4.12 **DUST CONTROL**: During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Public Services Director decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water. (revised 3/16/95)

4.13 **ENVIRONMENTAL PROTECTION:** 4.13.1 Baled Hay or Straw: To trap sediment an to prevent sediment from clogging drainage systems, baled hay or straw shall be used where shown on the drawings. Care shall be taken to keep the bales from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically. Hay bales shall not be placed within a waterway during construction of the pipeline crossing. (revised 3/16/95)

4.13.2 Silt Fence: As directed by the Public Services Director, the Contractor shall erect and maintain a temporary silt fence. In areas designated as wetlands, the Contractor shall line the limits of the construction easement with silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction. (revised 3/16/95)

4.13.2.1. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a 2 ½ foot wide, continuous length support netting, and stapled to preweathered oak posts. The oak posts shall be two (2) inches by two (2) inches by a four (4) feet six (6) inches and shall be tapered. The support netting shall be industrial strength polypropylene. (revised 3/16/95)

SECTION 5. ROCK EXCAVATION

Paragraph Number	Paragraph Title
5.1	Scope
5.2	Rock Excavation
5.3	Blasting

5.1 **SCOPE:** The work covered under this Section includes the furnishing of all labor, equipment and materials, and performing all operations in connection with rock excavation and subsequent earth refill within the property as indicated on the drawings, and all incidental work in accordance with the drawings and specifications, and as directed. The work shall also include providing and compacting gravel for refilling depressions resulting from removal of boulders; the satisfactory removal and disposal of the excavated rock materials; and the protection of existing pipelines, structures and appurtenant facilities.

5.2 **ROCK EXCAVATION:** 5.2.1 Rock excavation shall include the excavation, removal and disposal of all boulders and detached rock fragments one (1) cubic yard or more in volume; and all ledge rock, the removal of which, in the opinion of the Public Services Director, can be accomplished only by drilling and splitting mechanically or by hand or by blasting. Boulders of less than one (1) cubic yard in volume, and all soft or disintegrated rock which can be removed without the manipulation noted above, shall be classified as "earth excavation."

5.2.2 Where boulders and ledge are exposed on the sides of or in the bottom of excavations, they shall be wholly or partially removed, as specified or directed. Boulders shall be removed to not less than the lateral trench width indicated, not less than twelve (12) inches outside structure walls, and to not less than twelve (12) inches below the underside of pipes or structure foundation slabs, per Drawing WW-1-D-1. Depressions resulting from the removal of boulders and ledge shall be refilled with approved compacted back-run gravel.

5.2.3 Unauthorized excavations in rock, or excavations made beyond or below the indicated or directed limits, shall be refilled with compacted gravel as directed by the Public Services Director.

5.2.4 Whenever rock is encountered, it shall be stripped of the overlying material in sections as directed by the Public Services Director. Drilling through the existing overburden and blasting prior to stripping will be allowed only at locations approved by the Public Services Director.

5.2.5 Rock excavation for future connections: 5.2.5.1 Whenever provisions for future connections are placed in the sewer lines or structure in an area of rock excavation, the rock shall be removed for a distance of at least two (2) feet or more if directed, horizontally from the end of the pipe or tap and in the direction of the future connection.

5.2.5.2 If directed by the Public Services Director, the Contractor shall also drill a hole in rock not less than three (3) feet but not more than five (5) feet beyond the outer limit of his excavation and to a point lower than the level of the branch, and shall explode a charge therein adequate to shatter the rock sufficiently to permit its subsequent removal by others when any future connection is made.

5.3 **BLASTING:** 5.3.1 No blasting will be permitted at any locations within a railroad right-of-way, within twenty (20) feet of existing utilities nor within fifty (50) feet of existing structures.

5.3.2 Where blasting is permitted by the Public Services Director, the Contractor shall take every precaution to protect persons,, property and the work. The Contractor, in addition to complying with all other requirements specified elsewhere in these specifications, shall also conform to any further regulations which the Public Services Director may deem necessary in this respect. The Contractor shall be held liable for all injury to persons and damage to property and the work caused by blast or explosion.

5.3.3 Rock encountered within areas where blasting is not permitted, shal1 be removed by drilling and splitting mechanically or by hand, or by any other approved method not requiring the use of explosives.

SECTION 6. GRAVEL BEDDING

Paragraph Number	Paragraph Title
6.1	Scope
6.2	Material
6.3	Placing

6.1 **SCOPE:** The work covered under this Section includes the furnishing of all labor, equipment and materials, and performing all operations in connection with providing and compacting gravel for pipe bedding and under structure base slabs in accordance with the drawings and specifications, at the locations indicated and as directed. The work shall also include compacting and shaping of bedding just prior to laying pipe, to provide proper bedding of pipe.

6.2 **MATERIAL:** Gravel for pipe bedding and under slab shall be provided from off-site sources in the quantities required for completion of the work and shall be as approved by the Public Services Director. Gravel bedding shall consist of clean, hard and durable particles or fragments, and shall be free from clay, organic matter and other objectionable material. Gravel bedding shall consist of 3/4 inch crushed stone or gravel conforming to the following gradation limits. Gravel other than 3/4 inch crushed stone per the following chart, may be utilized at the option of the Public Services Director.

U.S. Standard Sieve Size	% Passing By Weight	Remaining Wt. of 3/4"
3/4 inch	100	0
1/2 inch	50-85	50-15
3/8 inch	45-80	55-20
No. 4	40-75	60-25
No. 40	0-45	100-55
No. 200	0-10	100-90

6.3 **PLACING:** 6.3.1 General: The bottoms of excavations shall be thoroughly compacted and in approved condition prior to placing gravel bedding. Gravel bedding shall be placed in layers not exceeding six (6) inches in loose depth, and each layer shall be compacted by at least two (2) passes of an approved plate-type vibratory compactor. The moisture contest of the gravel shall be adjusted, by moistening or drying, so that proper compaction will be obtained.

6.3.2 Gravel bedding shall be graded, compacted and shaped so that the full length of pipe barrel has complete and uniform bearing for the bottom quadrant of each pipe. Bell holes and depressions for joints shall be dug after the gravel bedding has been graded andcompacted, and shall be the proper clearance for jointing of pipes. Gravel bedding shall be placed to a minimum height flush with the top of the pipe, for the entire trench width, per Drawing WW-1-D-1.

6.3.3 The Contractor shall exercise care in all operations to prevent disturbing joints, displacement of or damage to the pipes already installed. As the work progresses, the pipelines will be checked by the Public Services Director to determine whether any disturbance, displacement or damage has occurred. If inspection shows poor alignment, displaced or damaged pipe, disturbed joints, or any other defects, all defects designated by the Public Services Director shall be remedied in a satisfactory manner by the Contractor.

SECTION 7. TIMBER SHEETING AND BRACING

7.1 **SCOPE:** The work covered under this Section includes the furnishing of all labor, equipment and materials, and performing all operations in connection with the installation, maintenance and removal of all temporary and permanent timber sheeting and bracing necessary to permit the proper installation and construction of the work; to prevent injury to persons or damage to pavements, utilities or structures; to prevent injurious caving or erosion, or loss of ground; to maintain at all times pedestrian and vehicular traffic on public or private streets; or where shown on drawings, necessary for unforeseen reasons, or where directed by the Public Services Director, all in accordance with the specifications and the drawings and as directed.

7.2 **MATERIAL:** 7.2.1 Timber sheeting and bracing may be of any species of wood which will satisfactorily withstand all driving and construction stresses and the loads to which the members will be subjected. Sheeting shall not be less than three (3) inches nominal thickness. All timber sheeting and bracing shall be free from wormholes, windshakes, loose knots, decayed or unsound portions or other defects which might impair its strength or tightness.

7.2.2 The Contractor shall provide all necessary hardware and fastenings necessary in connection with satisfactory installation of all sheeting and bracing.

7.3 **INSTALLATION:** 7.3.1 Sheeting and bracing shall be of sufficient strength to safely sustain all loads from the sides of the excavations together with all water pressure and surcharge. The Contractor shall be entirely responsible for adequacy of sheeting and bracing used, and shall take all precautions necessary to prevent movement of material along the sides of excavations. Sheeting shall be permanently left in place where indicated or directed.

It is expressly understood and agreed that whenever sheeting and bracing is used, it shall not relieve the Contractor of the sole responsibility for any damages or injury due to installation or failure of the sheeting or bracing or the settling of the backfill, the pipeline or the adjacent ground.

7.3.2 Where timber sheeting is used, it shall be driven ahead of all excavation operations. Sheeting shall be driven to sufficient depths below the deepest excavation level to maintain sufficient restraint of the adjacent soil and to prevent movement of the sheeting. If voids occur behind the sheeting, they shall be filled immediately with selected material from earth excavation to the satisfaction of the Public Services Director.

7.3.3 Unless otherwise directed by the Public Services Director, timber sheeting shall be cut-off and the remainder permanently left in place as follows, after the excavations have been satisfactorily backfilled and compacted to within six (6) inches of the cut-off grade:

(1) In paced areas, at grade 18 inches below existing ground surface.
(2) At all other locations, at a level two (2) feet above the top of pipe.

7.3.4 Withdrawal of sheeting shall be carefully performed to prevent movement of material along the sides of the backfilled excavations; to prevent damage to utilities, structures or the work; and to avoid injury to persons. Unless otherwise permitted, sheeting shall be withdrawn in lifts of not more than four (4) feet, and all voids shall be filled immediately with selected materials and thoroughly compacted.

SECTION 8. STEEL SHEETING AND BRACING

Paragraph Number	Paragraph Title
8.1	Scope
8.2	Material
8.3	Installation & Removal

8.1 **SCOPE:** The work covered under this Section includes the furnishing of all labor, equipment, and materials, and performing all operations in connection with the furnishing, installation, maintenance and removal of all temporary and permanent steel sheeting and bracing necessary to permit the proper and satisfactory installation and construction of the work; to prevent injurious caving or erosion, or loss of ground to maintain at all times pedestrian, vehicular and railroad traffic on public and private streets, property and rights-of-way; or where shown on drawings, necessary for unforeseen reasons, or where directed by the Public Services Director, and all in accordance with the specifications and the drawings and as directed.

8.2 **MATERIAL:** 8.2.1 The shapes, sizes and lengths of steel sheeting to be-utilized are optional with the Contractor, providing they are satisfactory to withstand all driving and construction stresses and are driven in continuous interlock. Bracing and other supports whether of steel or of timber, shall be of the strength and dimensions necessary to satisfactorily withstand the loads to which they will be subjected. All bracing and other supports shall be free from any defects which might impair this strength.

8.2.2 The Contractor shall provide all necessary hardware and fastenings necessary in connection with satisfactory installation of all sheeting and bracing.

8.3 **INSTALLATION AND REMOVAL**: 8.3.1 Steel sheeting and bracing shall be of sufficient strength to safely sustain all loads from the sides of the excavations together with all water pressure and reasonable surcharge. The Contractor shall at all times be entirely responsible for adequacy of sheeting and bracing used to permit the satisfactory and safe installation and construction of the work, to provide adequate protection against damage to all existing utilities, structures and complete portions of the work, and to prevent injury to persons.

8.3.2 The Contractor shall take all precautions necessary to prevent lateral or inward movement of material along the sides or the bottoms of excavations. It is expressly understood and agreed that whenever steel sheeting and bracing are used, it shall not relieve the Contractor of the sole responsibility for any damages or injury due to the installation or failure of the sheeting or bracing or the settling of the backfill, the pipeline or of the adjacent ground, structures, utilities or other work.

8.3.3 Where steel sheeting is used, it shall be driven ahead of all excavation operations. Sheeting shall be driven to sufficient depths below the deepest excavation level to maintain sufficient restraint of the adjacent soil and to prevent movement of the sheeting, excessive inflow of water, and intrusion of soils into or instability of the bottom of the excavations. If void occurs behind the sheeting, they shall be filled immediately with selected materials from earth excavation to the satisfaction of the Public Services Director.

8.3.4 The Contractor shall provide inspection prior to and during his operations of all existing utilities, structures and other facilities which might be damaged by his sheeting operations. The Contractor shall utilize the most modern techniques and devices available for monitoring and controlling his construction operations to prevent damage to the existing adjacent utilities, structures, and completed portions of the work.

8.3.5 Steel sheeting used on railroad property or within railroad rights-of-way shall be cut-off at a level of eighteen (18) inches below existing ground surface and the remainder permanently left in place. Unless otherwise directed by the Public Services Director, all other steel sheeting shall be extracted from the work area. Steel sheeting shall be withdrawn in small progressive vertical increments not exceeding two (2) feet, carefully performed to prevent any lateral or vertical movement of material on the sides of the sheeting and to prevent damage to existing utilities, structures or the construction and to avoid injury to persons. All voids left or caused by withdrawal of steel sheeting shall be immediately filled with selected earth materials from excavations and thoroughly compacted to the satisfaction of The Public Services Director.

SECTION 9 POLY VINYL CHLORIDE (PVC) SEWER PIPE

NOTE: The following references to Poly Vinyl Chloride will be referred to as "PVC."

9.1 **SCOPE:** The work covered under these items includes the furnishing of -all plant, labor, equipment, appliances and materials, and in performing all operation in connection with providing the construction of PVC sewer pipe, at the locations and to the lines and grades indicated and/or as directed, including all pipe, pipe fittings and accessories, connections to other piping and structures, testing of pipelines and material tests, jointing and jointing materials, services of manufacturer's representative, and all other related and appurtenant work, complete in place and accepted, in accordance with the drawings and specifications, and as directed.

9.2 **MATERIAL:** 9.2.1 PVC SEWER PIPE: All piping used in gravity sewer main and lateral construction shall meet ASTM specification D-3034- SDR 35 with minimum stiffness of 46 pounds per square inch. Any deviation from this material must be approved by the Public Services Director.

9.2.2 Standard length: The standard nominal laying length of the sewer pipes all be forteen (14) feet zero (0) inches. (Revised 3/1/12).

9.2.3 Pipe Fittings shall be injection molded polymer designed for specific use with PVC gravity sewer pipe. All pipe fittings shall be the pipe manufacturer I s standard type and subject to the approval of the Public Services Director. Each pipe fitting shall be provided with the necessary coupling as specified herein for the pipe. Jointing of pipe fittings shall be as specified for the pipe. Rubber boot reducers (Ferncos) may only be used on service lines and only as a transition reducer at the foundation wall to a home from PVC SDR 35 to PVC SDR 40. Rubber boot (Ferncos) shall not be permitted on sewer mains or laterals. Rubber "doughnuts" are not permitted. (revised 3/16/95)

9.2.4 Manufacturer's Recommendations: Prior to site delivery the Contractor shall submit for approval five (5) copies of the manufacturer's shop drawings and printed recommendations for the storage, handling and installation of the PVC pipe and fittings. (revised 3/16/95)

9.2.5 Marking: Each standard and short length of pipe shall be clearly marked on the outside surface with the trade name, pipe size, and date of manufacture. Each coupling and pipe fitting shall be clearly marked with the manufacturer's name and with the size and ASTM Designation.

9.3 EXTERNAL CLEANOUTS AND CHECK VALVES

9.3.1 External Cleanouts at Property Line: An external cleanout located at the lot property line shall be required for all laterals that are installed per Drawing WW-1-D-2. External cleanouts shall be fabricated of PVC to the details shown on the drawings. Top of PVC cleanout cap shall be placed at the distance below the surface of the ground as indicated, unless otherwise directed. External cleanouts shall be accurately placed and secured as the backfilling progresses.

9.3.2 Check Valve: In accordance with RIGL, all new residential construction that will connect to the sanitary sewer system, and any residential construction where the existing sewer connection will be substantially altered, shall have a check valve installed, that is automatically activated, on the main building sewer line for purposes of protecting residents from the possible backflow of, and exposure to, untreated sewage. Installation of said check valves shall be consistent with the rules and regulations promulgated in the state building code. (revised 3/1/12).

9.4 **INSTALLATION:** 9.4.1 General: All pipe, fittings and accessories shall be carefully inspected by the Contractor for defects before installation and all defective, unsound or damaged materials shall be rejected. The Public Services Director shall make such additional inspection as he deems necessary and the Contractor shall furnish all necessary assistance for such inspection. Proper implements, tools and facilities, satisfactory to the Public Services Director shall be provided by the Contractor for the proper and satisfactory execution of the work. Pipe, pipe fittings, accessories and appurtenances shall be new and unused, and shall be of the types and materials specified, as indicated and as directed.

The interior of pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations. The trench bottom and gravel bedding shall be shaped and compacted to give substantially uniform unyielding circumferential support to the lower half of the full length of each pipe. Pipe laying shall proceed upgrade; each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. As the work progresses, the interior of the sewer shall be cleaned of all dirt and superfluous materials of every description and where cleaning after laying is difficult because of small pipe size, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed. Trenches shall be kept free from water so

as to prevent flotation of the pipes. Pipelines shall be constructed in a dry trench. At times when work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipe or fittings. Any pipe that has the grade or joint disturbed after laying shall be taken up and relaid. All materials found to be defective during the progress of the work will be rejected by the Public Services Director and the Contractor shall promptly remove such defective material from the site of the work. All defective material shall be replaced by the Contractor with new sound material. The Contractor shall be responsible for the safe storage of all material. No spalls, shims or lumps shall be used to raise the pipe to grade. All pipe shall be maintained accurately to the required line and grade. No pipe joints shall be covered in any way until the joints have been inspected. Sewers shall
not be used as conductors for trench drainage during construction. Pipes shall be protected at all times during construction against flotation and shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance.

9.4.2 Jointing of PVC pipe and pipe fittings shall be made as specified herein. No pipes or fittings shall be jointed until coupling and ends of pipe and fittings have been inspected to determine that the joint surfaces are free from any defects in materials or workmanship; any defective joint materials or piping will be rejected and shall be replaced by the Contractor with new and sound material.

Pipe, pipe fittings and accessories shall be handled, stored, installed, jointed and protected by the contractor in strict accordance with the printed recommendations of the manufacturer of the piping materials, and as approved. The Contractor shall furnish to the Public Services Director, for his use, copies of the printed recommendations of the pipe manufacturer for the handling, storing, protecting and installation of pipe and fittings with the pipe couplings. All stub openings of sewer pipe shall be capped, using the pipe manufacturer's standard end caps. Assemble O-Ring joints by applying a coat of approved joint grease to the inside of the socket and to the outside of the spigot end of pipe.

9.4.3 Joints shall be protected from damage and shall be kept free from any defects or material which would impair the proper jointing and watertightness of joints. Pipe and fittings on which, in the opinion of the Public Services Director, the joint materials or joint surfaces have been damaged, shall be rejected and shall be removed from the site and the Contractor shall replace the rejected material with new and sound materials.

9.5 **CLEANING:** 9.5.1 At the option of the Public Services Director, the Contractor-shall be required to use a pressurized water "JetSpray" to clean the completed piping work after the piping has passed the testing requirements specified in "Leakage Tests."

9.5.2 The Contractor shall furnish all equipment subject to approval by the Public Services Director, and personnel to conduct the cleaning operation. The cleaning operation shall be conducted under the supervision of the Public Services Director.

9.5.3 The Contractor shall commence the cleaning sequence with the highest elevation manhole within the project, working to the lowest manhole. At each manhole, the jet spray

hose shall be inserted into the upstream piping section and engaged to a distance where it emerges from the next manhole upstream, at this point the hose shall be retracted. This procedure shall be performed as many times as required to remove any debris from the piping lines that was deposited during construction.

9.6 **PIPE STOPPERS:** Pipe stoppers shall be installed, sealed and blocked in such a manner as to prevent any leakage and so as to withstand an internal hydrostatic pressure of not less than 5 psi; timber blocking shall be of adequate size and arrangement to prevent the stopper from being blown off the line and timber bracing shall extend back to the undisturbed end of trench.

9.7 **LEAKAGE TESTING:** 9.7.1 The sewers and appurtenant structures connected thereto shall be made as nearly watertight as practicable. Leakage tests will be required for all sewers and manholes. Leakage into or from the sewer piping system shall be determined by a pneumatic low-pressure air test. The Contractor shall perform all work, provide all necessary weirs or such other measuring devices as required, do all pumping and furnish all equipment necessary for the proper performance of leakage tests. (revised 3/16/95)

9.7.2 Exfiltration Tests: Where low-pressure air test and vacuum manhole testing is not possible and when the Public Services Director finds that exfiltration tests are required, the section of the sewer to be tested shall be subjected to an internal hydrostatic pressure. The lower end of the section of sewer to be tested shall be closed and the entire section of the sewer, including manholes, shall be filled with clean water so as to obtain a minimum head of two (2) feet above the top of the pipes; the length of the section of sewer pipeline being tested shall be such that with the head of water two (2) feet above the top of pipe at the upper end of the section of pipeline being tested, the head of water above the top of pipe at the lower end of the section of pipeline being tested will not exceed eight (8) feet. The rate of leakage from each section of the sewers being tested shall be determined by the Public Services Director by measuring the amount of water required to maintain the minimum head of two (2) feet above the top of the pipes for the full length of each section of the sewers being tested.

9.7.3 Low Pressure Air Acceptance Test: 9.7.3.1 All sewer and service laterals shall require a low pressure air test to be performed by the Contractor using this method and shall conform to the requirements listed below. (revised 3/16/95)

9.7.3.2 The Contractor shall furnish all equipment and personnel to conduct an acceptance test using low pressure air. The test shall be conducted under the supervision of the Public Services Director.

9.7.3.3 All branch fittings and ends of lateral stubs shall be securely plugged to withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced when required.

9.7.3.4 Air shall be slowly supplied to the plugged pipelines until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe. At least two (2) minutes shall be allowed for temperature stabilization before proceeding further.

9.7.3.5 The rate of air loss shall then be determined by measuring the time interval for the internal pressure to decrease one (1) pound per square inch. (revised 3/16/95)

9.7.3.6 The pipeline shall be considered acceptable if the time interval for the 1.0 psi pressure drop is not less than the holding time listed below. (revised 3/16/95)

PIPE DIAMETER

	6"	8"	10"	12"	15"
Time (min.)	3.0	4.0	5.0	6.0	7.0

(revised 3/16/95)

9.7.3.7 Should the exfiltration or low air pressure test on any section of the sewers, including manholes, show a rate of leakage into or from the sewers exceeding the maximum allowable rate of specified herein, the Contractor shall locate. repair or replace defective joints and work in a manner satisfactory to the Public Services Director, and retest, until the rate of each section of the sewers being tested does not exceed the rate specified herein for exfiltration or low pressure air leakage. (revised 3/16/95)

9.8 **PHYSICAL DEFLECTION TESTS:** 9.8.1 A Physical Deflection Test shall be performed on--a77 sewer mains installed by the Contractor using this method and shall conform to the requirements listed below. (revised 3/16/95)

9.8.2 The Contractor shall furnish all equipment and personnel to conduct an acceptance test using a stationary physical deflection test gauge. The test shall be conducted under the supervision of the Public Services Director.

9.8.3 The gauge outside diameter shall be five (5) percent less than the base inside diameter of the pipe being tested.

9.8.4 The gauge shall be pulled through piping between all gravity manholes. Should the gauge not be able to pass through any section of the sewer main, the Contractor shall locate, repair or replace defective piping and work in a manner satisfactory to the Public Services Director and retest until the gauge passes freely through the piping.

9.8.5 Minimum waiting period before testing the sewer system shall be thirty (30) days after the installation of the system. This shall include exfiltration, low air pressure and deflection testing. (revised 3/16/95)

9.9 **TEST REPORTS AND CERTIFICATES OF COMPLIANCE:** In addition to other requirements specified herein, the Contractor shall furnish to the Public Services Director notarized test reports and methods of test by an approved independent testing laboratory to

show compliance of all materials furnished under this section of the specifications with all specification requirements; and pipe manufacturer's notarized certificates of conformance stating that all materials to be furnished under these items conform with all specification requirements; and each shipment of pipe manufacturer's notarized certificate of conformance, certifying that the pipe and pipe fittings meet all requirements of the specifications. All testing of all material furnished under this section of the specifications shall be provided by the Contractor.

9.10 **SERVICES OF MANUFACTURER'S REPRESENTATIVES:** The Contractor shall furnish to the Public Services Director, the services of pipe manufacturer's representatives for such lengths of time as may be necessary to properly instruct the Contractor's personnel in the proper handling, installation and jointing of the piping in accordance with the printed recommendations of the manufacturer of the pipe.

9.11 **GUARANTEE:** The Contractor shall furnish to the Public Services Director a written guarantee signed by the Contractor and the manufacturer of the PVC pipe and pipe fittings which shall warrant and guarantee that the PVC pipe and pipe fittings installed in the work of this contract meet all requirements of the specifications and that the PVC pipe and pipe fittings shall not fail or be injured or be damaged or service shall not be impaired as a result of:

1. Conveying sewage, sewer gases, drainage, industrial wastes or groundwater of any nature whatsoever excepting only hydrofluoric acid. The manufacturer of the PVC pipe and pipe fittings shall agree and bind itself for:

   (a) A period of 100 years from the date of installation of the PVC pipe and pipe fittings to replace promptly with new PVC pipe and pipe fittings in the same quantity and sizes all PVC pipe and pipe fittings as may have been injured or destroyed in service due to defects in material or manufacture or as a result of the conditions enumerated in "(1)" above;

   (b) A period of ten (10) years from the date of installation of the PVC pipe and pipe fittings to assume full responsibility for all costs of labor, materials and equipment for furnishing and installing promptly with new PVC pipe and pipe fittings in the same quantity and sizes for the replacement of all sewer pipe lines of PVC pipe and pipe fittings as may have been injured, damaged or destroyed in service due to defects in material or manufacture or as a result of the conditions enumerated in "(1)" above.

9.12 **CORE DRILLING**: Tapping into existing sewer lines shall be performed by a core drilling device. Irregular type cuts will not be acceptable. Sewer saddle body shall be: high tensile ductile iron, ASTM 536-80 rating with a corrosion resistant paint coatings The saddle shall have a gasket (Virgin SBR type or approved equal) meeting ASTM D-2000 3 BA715. The saddle shall have a stainless steel adjustable strap, bolts, nuts and washers Teflon coated. Minimum band width shall be 3 1/2". (revised 3/16/95)

SECTION 10 DUCTILE IRON PIPE AND FITTINGS (revised 3/16/95)

Paragraph Number	Paragraph Title
10.1	Scope
10.2	Quality Assurance
10.3	Products
10.4	Execution
10.5	Installation
10.6	Testing

10.1 **SCOPE:** The work covered under these items includes the furnishing of all plant, labor, equipment, appliances-a--n7 materials, and in performing all operation in connection with providing the construction of Ductile Iron sewer pipe, at the locations and to the lines and grades indicated and/or as directed, including all pipe, pipe fittings and accessories, connections to other piping and structures, testing of pipelines and material tests, jointing and jointing materials, services of manufacturer's representative, and all other related and appurtenant work, complete in place and accepted, in accordance with the drawings and specifications, and as directed.

10.2 **QUALITY ASSURANCE:** All pipe and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates of such tests.

10.2.1 In addition, the Owner reserves the right to have any or all pipe, fittings and special casting inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

10.3 **PRODUCTS:** 10.3.1 PIPE**:** The Contractor shall use push-on joint type ductile iron pipe unless otherwise indicated on the plans. All ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151. Unless otherwise indicated or specified, ductile iron pipe shall be thickness Class 52.

10.3.2 JOINTS**:** Where so indicated, pipe and fittings shall be furnished with approved joint restraining appurtenances to keep the piping from pulling apart under pressure.

10.3.3 FITTINGS: Fittings shall conform to the requirements of AWWA C110 or C153 as appropriate and shall be of a pressure classification at least equal to that of the pipe with which they are used.

10.3.3.1 The Contractor shall use ductile iron fittings, except fittings over 20-inches which shall be cast-iron Class 250 fittings may be substituted, at the Contractor's option, for ductile iron fittings. Unless otherwise indicated, fittings shall have all bell mechanical joint ends.

10.3.4 GASKETS, GLANDS, NUTS AND BOLTS: Gaskets, glands, nuts, bolts and accessories shall conform to AWWA C111 or C153 as appropriate.

10.3.4.1 Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.

10.3.4.2 Glands shall be ductile or cast iron.

10.3.5 LINING AND COATING**:** 10.3.5.1 The inside of pipe and fittings shall be given a cement lining and asphaltic seal coat in accordance with AWWA C104. The thickness of the lining Shall be double that specified in AWWA C104.

10.3.5.2 The outside of pipe and fittings shall be coated with the standard asphaltic coating specified under the appropriate AWWA Standard Specification for pipe and fittings.

10.3.5.3 Machined surfaces shall be cleaned and coated with a suitable rust preventative coating at the shop immediately after being machined.

10.3.6 FLEXIBLE COUPLINGS: 10.3.6.1 All sleeve-type couplings and accessories shall be of a pressure rating at least equal that of the pipeline in which they are to be installed.

10.3.6.2 Couplings shall be provided with gaskets of a composite suitable for exposure to the liquids in the pipe.

10.3.6.3 Sleeve-type couplings shall be made by Dresser Mfg. Div., Bradford, PA; Rockwell International, Pittsburgh, PA; Clow Corporation, Rochester, NY; or be an approved equal.

10.3.6.4 Couplings for buried pipe shall be of cast iron and shall be Dresser style J8 or lb3; Rockwell Type 441; Clow Type F-1208; or approved equal products. The couplings shall be mechanical joint type and be provided with steel bolts and nuts.

10.3.7 JOINT RESTRAINTS: 10.3.7.1 Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, anchoring and joint restraint methods shall be utilized. Methods shall include concrete backing and anchor blocks, tie rods, and restrained joint systems. Alternate methods shall be used only when shown on the drawings or with the approval of the Public Services Director. Methods that rely on the use of friction clamps and/or retainer glands with set screws alone are not acceptable. All restraining appurtenances and

tierods shall be coated with an approved bituminous paint after assembly. The completed joint shall be inspected and the paint repaired/ touched up as necessary.

10.3.7.2 Restrained joint systems shall be Lokring or Lokfast Joint by American Cast Iron Pipe Company, Birmingham, AL; TR-Flex Joint by United States Pipe and Foundry Company, Birmingham, AL; Super-Lock Joint by Clow Corporation, Besenville, IL; or approved equal.

10.4 **EXECUTION:** 10.4.1 INSPECTION BEFORE INSTALLATION**:** Pipes and fittings shall be subjected to a careful inspection just before being laid or installed.

10.4.2 HANDLING AND CUTTING**:** 10.4.2.1 Any pipe or fitting which has a damaged lining, scratched or marred machine surface and/or abrasion to the pipe coating or lining shall be rejected and removed from the job site.

10.4.2.2 Any fitting showing a crack and any fitting or pipe received a severe blow that- may have caused incipient even though no such fracture can be seen, shall be rejected and removed at once from the work.

10.4.2.3 In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the piece used will be perfectly sound. The cut shall be made in the sound barrel at a point at least 12- inches from the visible limits of the crack-

10.4.2.4 All cutting shall be done with a machine suitable for cutting ductile-iron pipe. Hydraulic squeeze cutters are not acceptable for cutting ductile iron pipe. Travel type cutters or rotary type abrasive saws may be used. All cut ends shall be examined for possible cracks caused by cutting.

10.4.2.5 Lined and coated pipe and fittings shall be installed as, and assembled with approved packing or gaskets of the type recommended by the pipe manufacturer for the particular lining used.

10.5 **INSTALLATION:** 10.5.1 DEPTH: The pipe shall be installed with a minimum of 5'-0" of cover, unless specifically indicated otherwise on the plans or directed by the Public Services Director.

10.5.2 Where pipe is installed at less than the required cover, the Contractor shall furnish and install insulation in accordance with Section 02631, INSULATION FOR UNDER-GROUND PIPELINES, or as directed by the Public Services Director.

10.5.3 PIPE AND FITTINGS: 10.5.3.1 No defective pipe or fittings shall -be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.

10.5.3.2 Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.

10.5.3.3 Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or as required. Care shall be taken to ensure good alignment both horizontally and vertically.

10.5.3.4 In buried pipelines, each pipe shall have firm bearing along its entire length.

10.5.4 TEMPORARY PLUGS**:** At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

10.5.5 PUSH ON JOINTS**:** 10.5.5.1 Joining of push-on joint pipe shall conform to AWWA C600, Section 9C, and all amendments thereto.

10.5.5.2 If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.

10.5.5.3 Deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the following table. These values indicate the maximum permissible deflection for 18-foot lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

Pipe Deflection Allowances
Maximum permissible deflection, inches

Diameter of Pipe, Inches	Push-on Joint
3-12	19
14-24	11

10.5.6 MECHANICAL JOINTS: 10.5.6.1 Assembling of fittings with mechanical joint end shall conform to AWWA C600, Section 9B and all amendments thereto.

10.5.6.2 If effective sealing of the joint is not attained at the maximum torque indicated in the above standard, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint.

10.5.6.3 The deflection of alignment at a mechanical joint shall not exceed the appropriate permissible deflection as specified in the following table. These values indicate the maximum permissible deflection for 18-foot lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

Pipe Deflection Allowances

Maximum permissible deflection, inches

Diameter of Pipe, Inches	Mechanical-Joint
6	27
8-12	2.0
16	13.5
20	11

10.5.7 SLEEVE-TYPE COUPLINGS: 10.5.7.1 Pipe ends shall be cleaned thoroughly prior to installation. After the bolts have been inserted and ail nuts have been made up fingertight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferable by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed 90 foot-lb.

10.6 **TESTING:** 10.6.1 Prior to the pressure and leakage tests, the piping shall be thoroughly flushed clean of ail dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

10.6.2 PRESSURE AND LEAKAGE TESTS: 10.6.2.1 Except as otherwise directed all pipelines shall be given combine pressure and leakage tests in section of approved length. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gates, and other necessary equipment; and all labor required. The Public Services Director shall reserve the right of requesting a certification of the Contractor's gauges employed during testing activities.

10.6.2.2 The section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants and blowoffs are not available at high points for releasing air, the Contractor shall make the necessary excavations and do the necessary backfilling and make the necessary taps at such points and shall remove any corporations used for testing and shall plug said holes after completion of the test.

10.6.2.3 The section under test shall be maintained full of water for a period of 24 hours prior to the combined Pressure and leakage test being applied.

10.6.2.4 The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe (normally 150 psi). If the Contractor cannot achieve the specified pressure and maintain it for a period of one (1) hour, the section shall be considered as having failed to pass the pressure test.

10.6.2.5 Following or during the pressure test, the Contractor shall make leakage test by metering the flow of water into the pipe while maintaining in the section being tested a pressure equal to the pressure rating of the pipe. If the average leakage during a two-hour period exceeds a rate of 11.6 gallons per inch of diameter per 24 hours per mile of pipeline, the section shall be considered as having failed the leakage test. For example, if 1,000 feet of 12-inch pipe is to be tested, the allowable leakage is 2.2 gallons over a 2-hour period, calculated as follows:

$$L = \frac{(11.6 \text{ gal}) \times (12") \times (2 \text{ hr.}) \times (1000')}{(1") \times (24 \text{ hr.}) \times (5280')} = 2.2 \text{ gal.}$$

10.6.2.6 If the section fails to pass the pressure and leakage test, the Contractor shall take necessary actions to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.

10.6.2.7 Minimum waiting period before testing the sewer system shall be thirty (30) days after the installation of the system.

SECTION 11 BENTONITE DAMS (revised 3/16/95)

Paragraph Number	Paragraph Title
11.1	Scope
11.2	Materials
11.3	Installation

11.1 **SCOPE:** The work covered under these items includes the furnishing of all labor, equipment, and materials, and in performing all operations in connection with the installation of Bentonite Dams.

11.2 **MATERIALS:** Concrete for the concrete cradle below the bentonite dam -shall have a 28-day compressive strength of 3000 psi.

11.2.1 The bentonite clay shall be granular and high swelling. High swelling is defined as the ability of two (2) grams of the base bentonite, when mechanically reduced to 100 mesh, to swell in water to a volume of 16 cc or greater, when added to 100 cc distilled water.

11.2.2 The sand shall be a fine aggregate consisting of natural sand, manufactured sand, or combination thereof. The sand shall be free of injurious amounts of organic impurities and shall conform to ASTM C33, Concrete Aggregate.

11.3 **INSTALLATION:** Prior to placement, the bentonite clay shall be uniformly mixed with sand at a minimum ration of nine (9) pounds of bentonite clay to each cubic foot of sand. The mixture shall be placed such that the entire length of the dam on either side of the trench contacts undisturbed earth. The mixture shall be placed in 8-inch lifts, each lift being compacted to the density required for backfill.

11.3.1 The depth of the dam below the proposed grade shall be two (2) feet unless otherwise noted on the plans or as directed by the Public Services Director. The length of the dam shall be the width of the trench excavated by the Contractor and the width of the dam shall be a minimum of two (2) feet.

SECTION 12 PRECAST SEWER CHIMNEYS (revised 3/16/95)

Paragraph Number	Paragraph Title
12.1	Scope
12.2	The Sewer Chimney Assembly
12.3	Materials Incorporated
12.4	Installation

12.1 **SCOPE:** The work covered under these items includes the furnishing of all plant, labor, equipment, appliances and materials, and in performing all operations in connection with providing the construction of precast sewer chimney structures at the locations and to the grades and to the details indicated and/or as directed, including precast reinforced concrete chimney bases, risers, transition sections, tops and grade rings, all jointing and jointing materials, and appurtenant work for construction of the chimney structures, complete in place and accepted, in accordance with the drawings and specifications, and as directed.

12.2 **The sewer chimney assembly** and design shall consist of three (3) basic-units as follows:

12.2.1. Base Section**:**

a. Shall be of bridge and base pad design with both pads and bridge cast as a monolithic unit and with pads having a total minimum bearing area of six (6)square feet.
b. Bridge section shall encapsulate a captive gasket unit and be joined to the mainline vertical positioned Tee with a 611 PVC Nipple, minimum length 12", tapered at both ends.
c. Bridge outside width perpendicular to mainline pipe shall be 3611 for mainline pipe 15" and smaller and 48" for mainline pipe 18" to and including 27".

12.2.2. Intermediate Sections:

a. Desired ultimate elevation of sewer chimney to the lateral shall be obtained through the use of 12", 24", 36", or 48" vertical intermediate sections, used individually or in combination.
b. Sections shall be hollow cored with minimum outside measurement of 18" square.
c. Intermediate sections shall sea! to the base, cap or other intermediate sections with captive "o" rings.

12.2.3. Cap Block (Top Section):

a. Cap block shall be precast round and capable of rotation of 1800 and/or 150 from right angle to accept lateral connections of various degrees of angle.
b. Precast cap shall encapsulate a 6" x 6" PVC Tee to accept lateral on one side and have 6" PVC plug clean-out on top. Lateral connection (bell) in cap block shall be capable of accepting PVC SDR-35 or C-900, SDR-18 with tight sealing gasket.
c. PVC lateral pipe entering chimney cap shall be SDR-35 except as noted. If the distance between the main sewer centerline and the beginning of undisturbed trench wall at the lateral invert elevation exceeds four (4) feet, PVC C-900, SDR-18 pipe shall be used to a distance not less than three (3) feet beyond the beginning of undisturbed trench wall. Transition back to SDR-35 shall be accomplished with a tight sealing rubber of PVC coupling.
d. If the lateral pipe is smaller than six (6) inches (gravity or pressure), the Contractor shall provide appropriate transition, acceptable to the Public Services Director, to a six (6) inch pipe before entering the chimney cap.

12.3 **Materials incorporated** into the precast chimney shall be as follows:

1. Concrete strength 5,000 psi @ 28 days.
2. Cement per ASTM C150-81.
3. Air entraining per ASTM C233-82.
4. Reinforcing per ASTM A615.
5. Captive "O" rings and captive seal unit gaskets shall be vulcanized natural rubber or vulcanized synthetic rubber.
6. PVC fittings per ASTM D3034.

12.4 **INSTALLATION:** At locations designated by the Public Services Director to receive precast sewer chimneys, crushed stone shall be placed and compacted in maximum 6-inch lifts from the bottom of the trench to the top of the pipe. The area of the crushed stone foundations shall be at least as great as the base of the precast chimney with a depth no less than 12 inches and the stone shall be compacted to at least 95% maximum density, per ASTM D1557 Method C.

12.4.1 **Cap, intermediate, and base sections** shall be attached to each other on opposite sides with 2-1/2" x 2-1/2"x ½" bolt-on brackets with bolts and nuts. Chimney shall eliminate infiltration and exfiltration and shall accept normal low pressure air testing, 3.5 to 5 psi. Bridge and pad assembly shall allow for normal amount of settling to occur without transmitting weight of assembly to the mainline pipe.

SECTION 13. TRACER TAPE (revised 3/16/95)

13.1 **SCOPE:** The work covered under these items includes the furnishing of all labor, equipment and materials, and in performing all operations in connection with the installation of the tracer tape.

13.2 **TRACER TAPE SPECIFICATIONS:** shall be at least 3-inches wide. Tape colors shall be Green.

13.2.1 Tracer tape for non-ferrous pipe shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thickness.

13.2.2 Tracer tape for ferrous pipe shall be multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.

13.2.3 The tape shall bear the wording: "BURIED SEWER LINE BELOW", continuously repeated every 30-inches to identify the pipe.

13.3 **INSTALLATION:** Tracer tape shall be installed 24-inches directly above the-pipe or conduit it is to identify.

SECTION 14. PRECAST CONCRETE MANHOLES (revised 3/16/95)

14.1 **SCOPE:** 14.1.1 The work covered under these items includes the furnishing of all plant, labor, equipment, appliances and materials, and in performing all operations in connection with providing the construction of sewer manhole structures at the locations and to the grades and to the details indicated and/or as directed, including precast reinforced concrete manhole bases, risers, transition sections, tops and grade rings, brick masonry for manhole inverts, all jointing and jointing materials, and appurtenant work for construction of the manhole structures, complete in place and accepted, in accordance with the drawings and specifications, and as directed.

14.1.2 Cast-iron manhole frames and covers are specified and included under Section entitled, "MANHOLES, FRAMES AND COVERS."

14.2 **PRECAST CONCRETE MANHOLE BASES, RISERS, TRANSITION, TOPS AND PRECAST GRADERINGS:** General: Precast reinforced concrete manhole bases, risers, tops and grade rings shall be of the types indicated or as directed; manhole bases, risers, transition sections and tops shall conform to the requirements of ASTM Designation: C 478-72 except as modified herein and/or on Drawing WW-1-D-3. Each manhole base, riser and top shall be constructed with a bell-and-spigot or tongue-and-groove joint. The manhole bases, risers, transition sections, tops and grade rings shall be manufactured by the centrifugal, roller suspension or vertical cast process; workmanship and methods shall be in accordance with the best practices of modern shops for this type of work. The height of manhole bases shall be as required to accommodate the size and diameter of sewer pipe used.

The manhole risers shall be available in l-, 2-, 3-, and 4 foot lengths; manhole tops of the eccentric cone type shall be 3or 4-foot lengths with 30-inch inside diameter opening at top; manhole tops of the flat slab type may be utilized upon approval by the Public Services Director, for use where shallow installations do not permit use of a cone type top, shall be not less than six (6) inches thick and shall have an opening having an inside diameter of 30 inches. The transition sections shall be similar to the tops and used as reducers to join the larger bases with the 4foot diameter risers. The transition sections shall be of the length required and have a 4-foot opening at the top. Aluminum or steel reinforced plastic manhole steps shall be provided in each manhole base, transition section, riser and cone type top and shall be integrally cast in each of these items. Aluminum steps shall be as detailed and shall be of solid forged aluminum alloy 6061, of the safety type. Manhole steps shall be arranged in the manhole bases, transition sections, risers and cones so as to provide manhole steps approximately 12 inches on centers for full length of installation. Wall thickness of manhole risers shall be not less than five (5) inches at the base and shall taper to a thickness of not less than eight (8) inches at the top; manhole transition section shall have a 6-inch or 7-inch wall thickness as shown on Drawing WW-1-D-3. (revised 3/16/95)

14.2.1 DROP CONNECTIONS: When the invert of a pipe entering a manhole is 12 inches or more above the invert of the lowest pipe leaving the manhole, it shall be connected to the manhole with an outside drop section. The manhole shall be constructed in the normal manner except that a straight-through clean-out pipe shall be connected through the manhole wall.

The drop pipe shall be the same diameter, material, and class as the sewer pipe entering the manhole, unless otherwise noted in the drawings. After installation of the outside drop section and pipe connections into the manhole, the entire vertical, outside assembly shall be encased in concrete, as shown on the drawings, using concrete with strength of at least 3000 psi.
(revised 3/16/95)

14.2.2 Opening in manhole bases and riser: opening for pipes entering manhole bases and risers shall be provided at the locations and to arrangements and dimensions shown on the approved shop drawings. All pipe openings in manhole bases and risers shall be provided with cast-in-place neoprene rubber boot type coupling. The joint seal shall be of the type to ensure watertight jointing between manhole and pipes under all conditions of installation; the type of joint seals to be used shall be subject to approval and shall be shown on the approved shop drawings. The types and details of manhole bases shall be as indicated. (revised 3/16/95)

14.2.3 Jointing of manhole bases, transition sections, risers and tops: Ends of each length of manhole bases, riser pipe, and bottom end of manhole tops of the cone type shall be provided with bell-and-spigot or tongue-and-groove ends of concrete formed on machined rings to ensure accurate joint surfaces. The joints shall be the type using as “0-ring” type gasket for sealing the joints. All joints shall be provided as to be watertight under all conditions of service.

The ends of bases, transition sections, risers, and cones to be jointed using "O-ring" type joints shall be designed to enclose the gasket on four (4) surfaces when the joint is in its final position.

14.2.3.1 Gaskets for sealing joints using the "O-ring" type gaskets shall be of a special composition having a texture to assure a watertight and permanent seal. Each gasket shall be a continuous ring of round solid cross-section gasket type having smooth surfaces free from blisters, porosity and other imperfections. The joint sealing gasket shall be of a composition and texture which shall be resistant to sewage, industrial wastes including oils and groundwater, and which will endure permanently under the conditions likely to be imposed by the use. The tensile strength shall be at least 1,200 psi. The elongation shall be such that 2-inch gauge marks shall stretch to not less than nine (9) inches. The compression set (constant deflection) shall not exceed 25 percent of the original gauge length. The tensile strength after accelerated aging shall be not less than 80 percent of the original strength.

14.2.4 Concrete: The concrete for precast manhole bases, transition sections, risers and tops shall have an average strength of 5,000 psi at 28 days. Strength shall be determined by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the manhole bases, transition sections, risers and tops or by any other approved methods. Not less than two (2) concrete strength tests shall be made for each 100 linear feet of manhole bases, transition sections, risers and tops and the test results submitted to the Public Services Director. Testing may be conducted at the manufacturer's plant or at an approved testing laboratory and shall be the responsibility of the Contractor.

14.2.4.1 Cement shall be moderate heat-of-hardening Portland cement conforming to ASTM Designation: C 150 as amended to date, Type II.

14.2.5 Inspection: Acceptance of precast reinforced concrete manhole bases, transition sections, risers and tops shall be made on the basis of plant tests, material tests and inspection of the completed product, in accordance with ASTM Designation: C 478 with the following modifications:

(1) Manhole bases, transition sections, risers and tops shall not be shipped for at least five (5) days after manufacture when cured by subjecting them to thoroughly saturated steam at a temperature of 100-150 degrees F. for a period of not less than eight (8) hours, or when necessary, for such additional time as may be required to enable the manhole bases, transition sections, risers and tops to meet specification requirements.

(2) All manhole bases, transition sections, risers and tops shall be inspected upon delivery; manhole bases, transition sections, risers and tops which do not conform to specification requirements will be rejected and shall be removed immediately from the site by the Contractor.

(3) All manhole bases, transition sections, risers and tops which have been damaged after delivery and manhole bases, transition sections, risers and tops installed in the work which are found to be damaged shall be rejected and shall be removed and replaced by the Contractor with new, sound and approved material. At the time of inspection, the surfaces of bases, transition sections, risers and tops shall be dense and close textured. Cores shall serve as a basis for rejection of manhole bases, transition sections, risers and tops if poor bond or reinforcement is exposed. The Contractor shall furnish all labor and facilities necessary to assist the inspector inspecting the material.

(4) The quality of all materials, processes of manufacture, and the finished manhole bases, transition sections, risers and tops shall be subject to inspection and approved by the Public Services Director. Such inspection may be made at the place of manufacture and/or on the site, and the manhole bases, transition sections, risers and tops shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though sample manhole bases, transition sections, risers and tops may have been accepted as satisfactory.

14.2.6 Handling and installation: 14.2.6.1 Handling: Each manhole base, transition section, riser and top shall be handled into its position in the trench only in such manner and by such means as recommended by the manufacturer of the manhole bases, transition sections, risers and tops, and as approved.

The Contractor shall provide all necessary slings, straps and other devices for the safe and satisfactory handling and support of the manhole bases, transition sections, risers and tops during lifting, installation and final positioning of the bases, transition sections, risers and tops. Lifting holes may be permitted provided the full depth of lifting holes are plugged with watertight mortar subsequent to installation by the Contractor.

14.2.6.2 Installation: Manhole bases, transition sections, risers and tops shall be installed using approved type "O-ring" type gasket for sealing joints of manhole bases, transition sections, risers and tops shall be installed level and plumb. Water shall not be permitted to rise over newly made joints, nor until after inspection as to their acceptability. All jointing shall be done in a manner to ensure watertight joints. Where directed, the cast-iron manhole frames shall be set one (1) course of brick mortared on the manhole top in a full bed of mortar to the finished grade indicated or directed and the outside of frame shall be completely encased in cement-mortar as specified and included herein under Section entitled, **"MANHOLE FRAMES AND COVERS."** Openings shall be provided in the precast manhole bases and risers to receive entering pipes, and these openings shall be made at the place of manufacture. The openings for all entering pipes shall be provided with the approved type cast-in-place neoprene rubber boot type coupling. The joint seal shall be of the type to ensure watertight

jointing between manhole and pipes under all conditions of installation; the type of joint seals to be used shall be subject to approval and shall be shown on the approved shop drawings. The installation of pipes entering the manholes shall be installed in strict conformance with the manhole manufacturer's printed recommendations and so as to obtain watertight joints between manholes and pipe and in a satisfactory manner. Five (5) copies of the manufacturer's printed recommendations shall be furnished to the Public Services Director. Care shall be taken to assure that the openings are made to permit setting of the entering pipe at its correct elevation as indicated or directed. Mortar used in sealing spaces between entering pipes and openings in manhole walls shall be of the non-shrink type. Damaged bases and risers of jointing devices shall be rejected and shall be replaced by the Contractor. Manhole bases, transition sections, risers and tops shall be installed so that the manhole steps shall be in alignment. A bituminous coating shall be applied on the outside of the entire manhole structure including the bottom of the base section. (revised 3/16/95)

14.3 **BRICK MASONRY FOR MANHOLES:** 14.3.1 General: Brick masonry for manholes shall be provided for constructing manhole invert tables per Drawing WW-1-D-3.

14.3.2 Materials: 14.3.2.1 Cement shall conform to the standard specifications for portland cement of ASTM Designation: C 150, Type 1, unless otherwise directed, and subsequent revisions thereof. Whenever directed by the Public Services Director, a quick-setting cement shall be used for any desired purpose.

14.3.2.2 Brick for the manholes shall conform in all respected to ASTM Designation: C 32, Grade SM, as amended to date, size 2-;i@ inches by 3-3/4 inches by 8 inches. Bricks that are broken, warped, cracked or of improper size of quality or unduly chipped or otherwise defective shall not be used in the work and shall be removed from the site.

14.3.2.3 Mortar and plaster shall be composed of one (1) part portland cement and two (2) parts sand with only sufficient water added to make a stiff plastic mortar of a consistency and texture satisfactory to the Public Services Director. Mortar shall be used so that it will be in place before the initial setting of cement has taken place; retempering of mortar in which the cement has started to set shall not be permitted.

14.3.2.4 Sand for mortar shall be graded uniformly from fine to coarse and when dry shall pass a screen having eight (8) meshes to the inch. Sand shall consist of an aggregate having clean, hard, durable, strong, uncoated grains and free from injurious amount of dust, lumps, soft or flake particles, shale, alkali, organic matter, loam or other deleterious substances. The sand shall be washed clean at the bank before loading on delivery trucks. Natural sand which shows a color darker than the standard color when tested in accordance with the Standard Method of Test for Organic Impurities of ASTM Designation: C 40 as amended to date shall be cause for rejection.

14.3.3 Masonry: Brick masonry shall include brick masonry walls for extending manhole walls to grade, when directed; formed brick masonry for constructing manhole inverts and invert tables, cement-mortar plaster on exterior surfaces of masonry walls, mortar, building-in of manhole steps and pipes, and appurtenant work. Brick masonry shall be provided to the details and dimensions indicated or as directed. All exterior surfaces of brick masonry manhole walls shall be plastered with a 1:2 portland cement and sand mortar plaster to provide a minimum thickness of 1/2 inch; mortar plaster shall be applied with sufficient pressure to ensure a dense plaster completely filling all voids and thoroughly bonded to the brickwork.

Inverts shall have a cross-section shaped to conform with connecting sewers; changes in size shall be made gradually and evenly. The entire thickness of the brick invert shall consist of mortared brick courses; under no circumstances shall a crushed stone or a concrete base be allowed. Brick masonry construction shall be done in a manner to ensure watertight construction and all leaks in brick masonry shall be sealed; brick masonry shall be repaired or replaced so as to obtain watertight construction. all workmanship shall conform to the best standard practice and all brick masonry shall be laid by skilled workmen. Brick masonry walls shall be constructed to the thickness indicated. All beds on which masonry is to be laid shall be damp but free **of** any surface water when placed in the work.

Bed joints shall be formed of a thick layer of mortar which shall be smoothed or furrowed slightly. Head joints shall be formed by applying to the brick to be laid a full coat of mortar on the entire end, or on the entire sides as the case requires, and then shoving the mortar-covered end or side of the brick tightly against the bricks laid previously; the practice of buttering at the corners of the brick and then throwing the mortar or scrapings into the empty joints shall not be permitted. Dry or butt joints shall not be permitted. Joints shall be uniform in thickness and shall be approximately 1/4 inch thick. Joints on the inside face of walls shall be tooled slightly concave with an approved jointer when the mortar is thumbprint hard, the mortar shall be compressed with complete contact along the edges and so as to seal the surface of the joints. Brickwork shall be constructed accurately to dimensions, and brickwork at top of manholes shall be to the dimensions of the flange of the cast-iron frames. No water shall be allowed to flow against brickwork or to rise on the masonry for 60 hours after it has been laid and any brick masonry damaged in this manner shall be replaced as directed by the Public Services Director. Adequate precautions shall be taken in freezing weather to protect the masonry from damage from frost. All pipes, or castings to be embedded in the brickwork shall be accurately set and built-in as the work progresses; pipe stubs shall be closed with suitable plugs in an approved manner. Outside face of all brickwork of all manhole walls shall be plastered to the thickness and using the mortar specified herein; plaster shall be troweled to a smooth, hard finish and no backfill shall be placed until the mortar has thoroughly hardened.

14.4 **MANHOLE VACUUM TESTING:** All sewer manholes shall be tested utilizing the Vacuum testing method. The following method shall be used for testing completed manhole structures:

14.4.1 The Contractor shall furnish all equipment and personnel to conduct an acceptance test using an approved type manhole vacuum tester which utilizes an inflatable compression band, vacuum pump, and appurtenances specifically designed for vacuum testing manholes. The test shall be conducted under the supervision of the Public Services Director.

14.4.2 The test shall be conducted before the manhole frame is installed and prior to backfilling manhole structure unless otherwise directed by the Public Services Director. (Revised 3/1/12)

14.4.3 The Contractor shall use inflatable bladder type plugs in all pipe outlets within the manhole. The plugs and piping shall be braced adequately to the satisfaction of the Public Services Director to prevent implosion of plugs, piping, and rubber pipe boots.

14.4.4 Air shall be slowly withdrawn from the manhole chamber until the internal vacuum reaches 10.0" Hg.

14.4.5 Test time duration for a 48" internal diameter manhole shall be one (1) minute 30 sections minimum. The manhole test shall be considered acceptable if the vacuum does not decay more than 111 Hg. within the one (1) minute 30 second period.

14.4.6 Should the vacuum test on any portion of the manhole show a rate of vacuum leakage in excess of the maximum allowable rate specified herein, the Contractor shall locate, repair or replace defective material and work, in a manner satisfactory to the Public Services Director, and retest, until the maximum allowable rate of vacuum leakage does not exceed the rate specified herein.

14.5 **CORE DRILLING:** Tapping into existing sanitary sewer manholes shall be done by a core drilling device. Irregular type cuts will not be acceptable. (revised 3/16/95)

SECTION 15. MANHOLE FRAMES AND COVERS

15.1 **SCOPE:** The work covered under this item includes the furnishing of all plant, labor, equipment, appliances and materials, and in performing all operations in connection with furnishing and setting in place the cast-iron manhole frames and covers for all manhole structures, complete in place, in accordance with the drawings and specifications, and as directed.

15.2 **CAST-IRON MANHOLE FRAMES AND COVERS:** 15.2.1 General: Cast-iron manhole frames and covers shal7-conform to the types and styles as specified and a shown on the Drawing WW-1-D-4. Shop drawings shall be submitted to the Public Services Director for approval before fabrication. Gray iron castings shall conform to the requirements of ASSHO Designation: M 105-49, Class 30, amended to date. Iron castings shall be true to pattern in form and dimensions, free from pouring, faults, sponginess, cracks, blowholes and other defects in positions affecting the strength and value for the service intended. The finished castings shall be painted with a bituminous material so as to present a smooth, finished coating tough and tenacious when cold and not tacky or with any tendency to scale off under seasonable temperature changes.

15.2.2 Cast-iron manhole frames and covers shall be provided for all sewer manhole structures and shall have the word "SEWER" cast thereon.

15.2.2.1 Standard manhole frames and covers, shall be LeBaron Foundry Company No. LC-328, or approved equal. (revised 3/16/95)

15.2.2.l(a) Watertight type manhole frames with 32-inch diameter covers (bolted and gasketed) shall be 4 bolt, 550 pounds minimum. Frames shall be 6 inches in height with web reinforcement between vertical and horizontal flanges and shall be LeBaron Foundry Co. No. LC 328;or approved equal. (revised 3/16/95)

15.2.2.l(b) Frostproof manhole frames, with covers and inner lids shall be R-1758 series by Neenah Foundry Co., Neenah, WI; LBF series by E. L. LeBaron Foundry co., Brockton, MA; B-3045 (or similar) by Mechanics Iron Foundry, Boston, MA; or approved equal Two (2) inch thick polystyrene insulation shall be firmly adhered to all frostproof inner lids. (revised 3/16/95)

15.2.2.2 All standard manhole covers within paved areas shall have two (2)1-inch diameter holes for venting, per Drawing WW-lD-4. (revised 3/16/95)

15.2.2.3 All manholes not within paved areas, (i.e., manholes within sewer easements) shall have a four (4) bolt looking gasketed cover with no vent holes. The rim elevation of the manhole shall be a minimum of 12 inches above grade, but not exceeding 18 inches above grade, unless otherwise directed by the Public Services Director.

15.3 **INSTALLATION:** Cast-iron manhole frames and covers shall be installed on the manholes and shall be well-bedded in cement mortar bearing on a minimum of one (1) brick course and accurately set to the grades indicated or as directed, unless otherwise directed by the Public Services Director. The manhole frames shall be encased with cement-mortar around entire perimeter of the frames, per Drawing WW-1-D-5 and WW-1-D-6.

SECTION 16. MISCELLANEOUS CONCRETE WORK

16.1 **SCOPE:** 16.1.1 The work covered under this item includes the furnishing of all plant, labor, equipment, appliances and materials, and in performing all operations in connection with providing the construction of all plain cement-concrete work for pipe cradles, encasements, thrust blocks, and appurtenant work, as shown on the drawings and as directed, complete in place and accepted, in accordance with the drawings and specifications. Prior to placing the concrete, the Contractor shall be responsible for checking and maintaining the proper locations of all parts to be embedded in concrete work.

16.1.2 Concrete work in connection with the construction of precast concrete manholes is specified and included under Section entitled, **"PRECAST CONCRETE MANHOLES."**

16.2 **CLASS OF CONCRETE:** All cast-in-place concrete shall have a compressive strength at-the end of 28 days of not less than 3,000 pounds per square inch. Concrete work for cast-in-place manhole bases shall contain a retarding densifier admixture, other than the retarding densifier specified herein, shall not be permitted.

16.3 **MATERIALS:** 16.3.1 Cement shall conform to the standard specifications for Portland cement of ASTM Designation: C 15074, Type 1, unless otherwise directed. Whenever directed by the Public Services Director, a quick-setting cement shall be used where directed for any purpose.

16.3.2 Fine aggregate shall consist of washed sand having clean, hard, durable, uncoated grains free from deleterious substances and shall range in size from coarse to fine within the following percentages by weight.

Passing No.	4	sieve ------	95-100%
Passing No.	16	sieve ------	45- 70%
Passing No.	50	sieve ------	15- 30%
Passing No.	100	sieve ------	3- 8%

Volume removed by sedimentation not more than 3%. Fine aggregate shall conform in all other respects to ASTM Designation: C 33-74.

16.3.3 Coarse aggregate shall consist of crushed traprock or hard ledge stone having clean, hard, durable, uncoated particles free from deleterious matter. The grading shall be within the following percentages by weight.

Passing	1 1/2"	-sieve ------	100%
Passing	1"	-sieve ------	45- 70%
Passing	1/2"	-sieve ------	15- 30%
Passing No.	4	-sieve ------	3- 8%

Coarse aggregate shall comply in all other respects to standards of ASTM Designation: C 33-74.

16.3.4 Mixing water for concrete shall be clean and shall preferably be obtained from the municipal supply-

16.3.5 Admixture: Cement-concrete for manhole bases shall contain a retarding densifier admixture as an integral part of the design mix. Unless specified otherwise, the amount of densifier used shall not exceed the proportion of 1/2 pound per bag of cement at concrete placing temperatures below 65 degrees F. and 3/4 pound at temperatures above 65 degrees F. The densifier shall have the following characteristics and when used in the proportions required at specified temperatures, shall secure the following improvements of concrete containing densifier compared to reference concrete without the densifier.

(1) For equal water cement ratio - increase the slump from 3 to at least 4-1/2 inches and increase the compressive strength at 28 days at least 10 percent.

(2) For reduced water cement ratio - maintain a slump and increase compressive strength at 28 days at. least 15 percent.

(3) For reduced water cement ratio - delay the setting time of concrete at least 20 percent under normal temperature conditions.

(4) For equal or reduced water cement ratio - increase the unit weight of concrete.

The Contractor shall submit a statement from the manufacturer of the densifier certifying that his product meets specification requirements.

16.4 **STORAGE OF MATERIALS:** 16.4.1 Cement shall be stored immediately upon receipt at the site of the work. Cement in sacks shall be stored in a suitable weatherproof structure which shall be as airtight as practicable; floors shall be elevated above the ground a distance sufficient to prevent the absorption of moisture. Sacks shall be stacked close together to reduce circulation of air, but shall not be stacked against outside walls; the manner of storage shall permit easy access for inspection and identification of each shipment. Bulk cement shall be transferred to elevated airtight and weatherproof bins. At the time of use, all cement shall be free-flowing and free from lumps. Cement that has hardened or partially set shall be removed from the site and not used in the work.

16.4.2 Aggregate shall be stored on area covered with tightly laid wood planks, sheet metal or other hard and clean surface, and in a manner that will preclude the inclusion of foreign material. Aggregate of different sizes shall be stored in separate piles. Stockpiles of coarse aggregate shall be built in horizontal layers not exceeding four (4) feet in depth to avoid segregation. Should the coarse aggregate become segregated, it shall be remixed to conform to the grading requirements given here.

16.5 **INSPECTION:** Cement-concrete shall be proportioned, mixed and placed only in the presence of the Public Services Director, and the Contractor shall give ample notice to the Public Services Director before mixing is commenced.

16.6 **TESTS:** 16.6.1 Portland cement shall be tested by the Public Services Director.

16.6.2 Aggregates shall be tested by the Public Services Director.

16.6.3 Tests of cement-concrete test specimens will be made by the Public Services Director. When required by the Public Services Director, 6-inch by 12-inch test cylinders shall be made in accordance with the requirements of ASTM Designation: C 192-69; test cylinders shall be tested in accordance with the requirements of ASTM Designation: C 39-72 as revised to date. The cost of making laboratory tests for concrete work shall be at the expense of the Public Services Director, but the Contractor shall furnish the Public Services Director the necessary labor, assistance and facilities for making, protecting, caring for and transporting the test specimens.

16.7 **PROPORTIONING OF CONCRETE MIXES:** The proportioning of concrete materials shall be based on the requirements for a plastic and workable mix. Not less than six (6) sacks (94 pounds per sack) of Portland cement per cubic yard, and not more than 6gallons of water per sack of cement shall be used in the mix. The surface water contained in the aggregates shall be included in the total water used. Slump shall not exceed three (3) inches. Concrete for all concrete work shall attain a 28-day compressive strength of not less than 3,500 pounds per square inch, as determined by the "Standard Method of Making Compression Tests of Concrete," ASTM Designation: C 39-82; the design of the concrete mix to be used in the work shall be subject to the approval of the Public Services Director.

16.8 **CONCRETE MIXING:** 16.8.1 Concrete shall be mixed until there is a uniform distribution . of the materials and shall be discharged completely before the mixer is recharged. Concrete shall be delivered in watertight containers which shall not permit segregation of the material. When delivered the concrete shall be uniform throughout the mass. Concrete mixing shall conform to all requirements of ASTM Designation: C 94-74, except as modified herein.

16.8.2 Type of plant: The batching plant and mixing equipment shall have a capacity as required to perform the work within the specified time. Either a manual or semi-automatic plant may be used, subject to the approval of the Public Services Director. A manual plant is defined as one in which batch weights are set manually and materials are batched manually. A semi-automatic plant is defined as one in which batching weights are set manually, mixes are charged manually, and materials are batched automatically.

16.8.3 Job-mixed concrete shall be mixed in a batchmixer for not less than one (1) minute after all the material is in the mixer drum and until there is a uniform distribution of the material and the mass is uniform in color and is homogeneous. the mixer shall rotate at a peripheral speed of about 200 feet per minute and shall not be loaded above its rated capacity.

16.8.4 Truck-mixed concrete may only be used when and as approved by the Public Services Director.

16.8.5 Sampling and Inspection: The Public Services Director shall have free access at all times to the batching and mixing plant for sampling of all material and inspection of work performed for this project.

16.9 **CONSTRUCTION JOINTS:** The placing of concrete shall be such that the concrete for each structure shall be placed in one (1) continuous operation, except that where construction joints are indicated the concrete shall be placed in one (1) continuous operation between construction joints. Construction joints in addition to those indicated or changes in location of construction joints indicated shall not be permitted except upon written permission of the Public Services Director.

16.10 **PLACING CONCRETE:** 16.10.1 Preparation for placing: Water shall be removed from excavations before concrete is deposited. Any flow of water shall be diverted through proper side drains and shall be removed without washing over the freshly deposited concrete. Hardened concrete, debris and foreign materials shall be removed from interior of forms and from inner surfaces of mixing and conveying equipment. The subgrade for concrete work placed on gravel bedding foundation shall be maintained in an approved, smooth and thoroughly compacted condition in conformity with the required section and grade until the concrete is in place. The subgrade shall be thoroughly moistened, but not muddy, at the time the concrete is deposited. No concrete shall be placed until forms and all work to be built into concrete have been satisfactorily installed and inspected.

16.10.2 Placing temperature during cold weather: Concrete shall not be placed when the ambient temperature is below 35 degrees F. nor when the concrete without special protection is likely to be subjected to freezing temperature before the expiration of the specified curing period. If necessary to place concrete under conditions of low temperature, placement shall be approved by the Public Services Director. The temperature of the concrete when placed shall be not less than 50 degrees F. nor more than 70 degrees F.

Heating of the mixing water and/or aggregates shall be required as necessary to maintain the minimum temperature of 50 degrees F., and all methods and equipment for heating shall be satisfactory to the Public Services Director. Materials shall be satisfactory to the Public Services Director. Materials shall be free from ice, snow and frozen lumps before entering the mixer. Suitable covering and other means shall be provided for maintaining the concrete at the temperatures and the lengths of time as specified herein under paragraph entitled, "CURING." Salt, chemicals or other foreign materials shall not be mixed with the concrete to prevent freezing. Any concrete damaged by freezing shall be removed and replaced by the Contractor.

16.10.3 Placing: The gravel foundations on which concrete is placed shall be clean, damp and free from frost, ice and standing or running water and shall be thoroughly compacted in a satisfactory manner. Concrete shall be handled from mixer to transport vehicle to place of final deposit in a continuous manner, as rapidly as practicable, and without segregation or loss of ingredients until the unit of construction is completed. Concrete that has attained its initial set or has contained its mixing water for more than 30 minutes shall not be placed in the work. Placing shall not be permitted when, in the opinion of the Public Services Director, the sun, heat, wind, temperature of limitations of facilities furnished by the Contractor prevent proper finishing and curing of the concrete. Forms shall not be splashed with concrete in advance of pouring. When placing concrete for encasements, precautionary measures shall be taken to prevent the displacement of piping or disturbing of joints of the piping; displaced piping or disturbed joints shall be made good by the Contractor in a manner satisfactory to the Public Services Director. Concrete shall be placed in the forms in uniform layers as nearly as practicable in final position. Immediately after placing, concrete shall be compacted thoroughly in a satisfactory manner. Tapping or other external vibration of forms shall not be permitted.

Concrete shall not be placed on concrete sufficiently hard to cause formation of seams and planes of weakness within the section. Concrete shall not be allowed to drop freely more than five (5) feet. Concrete to receive other construction shall be screeded to the proper level.

16.10.4 Concrete on gravel foundation: Gravel foundation on which concrete is placed shall be clean, damp and free from frost, ice and standing or running water. Prior to placing concrete the gravel foundation shall be satisfactorily compacted as specified under Section entitled, **"GRAVEL BEDDING."**

16.11 **PATCHING:** 16.11.1 Any concrete which is not formed to the details as -shown on the drawings or for any reason is out of alignment or level or shows a defective surface shall be considered as not conforming with the intent of these specifications and shall be removed from the job by the Contractor unless the Public Services Director grants permission to patch the defective area.

16.11.2 Permission to patch defective work shall not be considered a waiver of the right of the Public Services Director to require complete removal of the defective work, if, in the opinion of the Public Services Director, the patching does not satisfactorily restore the quality and appearance of the surface.

16.12 **FINISH:** 16.12.1 Immediately after removal of the forms, all fine and loose material shall be removed; honeycomb, aggregate pockets, voids and holes over 1/2 inch in diameter shall be cut out to solid concrete, thoroughly wetted, brushcoated with neat cement-grout and filled with cement-mortar composed of one (1) part ;cement to two (2) parts of fine aggregate. Patching of any surface irregularities, especially those resulting from honey-combing, shall be done only after inspection by the Public Services Director for his determination as to whether or not the work is satisfactory enough to remain in the structure. Mortar shall be placed in layers as required, with each layer being thoroughly compacted in place. The final layer shall be finished flush and in the same place as adjacent surfaces. Patchwork shall be damp-cured for 72 hours.

16.12.2 Uniformed exposed surfaces to receive masonry or mortar setting beds shall be finished by tamping the concrete with special tools to force aggregate away from the surface, then screeding and floating to bring surfaces to the required finished levels and form, wood-floated to true even surfaces and then given a broom finish for the proper bonding of masonry or mortar. Other unformed surfaces shall be finished as directed. Formed surfaces to receive masonry shall be free from loose material, laitance or any other condition which would impair the bonding of the masonry to the concrete.

16.13 **CURING:** Curing shall be accomplished by preventing loss of moisture, rapid temperature change and mechanical injury or injury from rain or flowing water, and kept moist for a period of at least seven (7) days after placing. During this period concrete shall be maintained at 70 degrees F. for at least four (4) days or above 50 degrees F. for at least seven (7) days. All concrete shall be damp-cured in a suitable and approved manner and curing shall be started as soon after placing and finishing as practicable.

SECTION 17. FERTILIZING, GRASSING AND APPURTENANT WORK

17.1 **SCOPE:** The work covered under this item includes the furnishing of all plant, labor, equipment, appliances and materials, and in performing all operations in connection with the preparation of the ground for seeding, liming, fertilizing, and rolling of the topsoiled areas within the limits of the areas indicated for grassing and/or where directed, and the raking, rolling, watering and maintenance of all seeded areas, complete and accepted, in accordance with the specifications and the drawings.

17.2 **MATERIALS:** 17.2.1 Commercial fertilizer shall be a complete fertilizer with 30 to 40 percent of the nitrogen derived from natural organic sources and containing in available form by weight eight (8) percent nitrogen, six (6) percent phosphoric acid and four (4) percent potash. The commercial fertilizer shall be delivered to the site in the original unopened containers which shall bear the guaranteed statement of analysis of the manufacturer.

17.2.2 Lime shall be ground, dolomitic, agricultural limestone and shall contain a minimum of 85 percent total carbonates. It shall be ground to a fineness so that 80 percent will pass through a 100-mesh sieve and 95 percent through a 60-mesh sieve. A certificate from a reputable producer of ground, dolomitic agricultural limestone attesting that his product meets the above specifications shall be submitted by the Contractor.

17.2.3 Lawn seed shall be fresh, clean, new crop seed. Seed may be mixed by an approved method on the site or may be mixed by the dealer. If the seed is mixed on the site each variety shall be delivered in the original containers which shall bear the guaranteed analysis of the dealer. If the seed is mixed by the dealer, the Contractor shall furnish to the Public Services Director the guaranteed statement of the dealer of the composition of the mixture and percentages of purity and germination of each variety. Grass seed for the grassed areas shall be composed of the following seeds mixed in the proportions by weight and testing the minimum percentages of purity and germination as indicated.

Type of Seed	Proportion by Wgt. %	% of Purity	% Germ-ination
Penn Lawn Chewings Fescue	40	95	88
Kentucky Bluegrass	25	95	90
Merion Bluegrass	25	95	90
Perennial Ryegrass	10	98	90

17.3 **PREPARATION OF SEED BED:** Before starting work, approved types of equipment shall be-on hand and it shall be demonstrated that the application of lime, fertilizer and seed shall be made at the specified rates.

17.3.1 The seed bed shall be brought to the required finished grades, free from ridges and depressions, through successive stages of light rolling, fine grading and raking operations. The surfaces shall be cleared of all objectionable weeds and shall be free from stone, roots or objects larger than one (1) inch in diameter and other material which would be a hindrance to planting operations or to plant growth. A finely pulverized seed bed shall be obtained.

17.3.2 Application of lime and fertilizer: Lime shall be spread uniformly over the areas to be seeded at a rate of 2,000 pounds per acre. Fertilizer shall be spread uniformly over the areas to be seeded at a rate of 900 pounds of 8-6-4 commercial fertilizer per acre. Each material shall he incorporated independently into the top three (3) inches of soil by discing, harrowing or other acceptable methods. Sticks, stone and debris shall be removed from the areas and satisfactorily disposed of. After incorporation of the lime and fertilizer with the topsoil, the areas shall be rolled or dragged to form a firm seed bed.

17.4 **PLANTING SEED:** After the areas to be seeded have been prepared as specified herein, the specified seed mixture shall be uniformly sown thereon at a rate of four (4) pounds per 1,000 square feet. Hand seeders, power-drawn drills or other approved equipment shall be used. After sowing, the seed shall be lightly covered and the seeded areas compacted by rolling. Seed shall be sown only between the periods from April 5th to May 25th, and August 25th to September 25th.

17.5 **PROTECTION:** All seeded areas shall be protected against traffic or other use by erecting barricades, warning signs or by other approved methods. The Contractor shall repair any damage resulting from his operations at no additional expense to the Public Services Director.

17.6 **MAINTENANCE AND ACCEPTANCE:** All areas and parts of areas which fail to show a satisfactory stand of grass for any reason whatsoever, shall be reseeded, repeatedly if necessary, until all areas are covered with an adequate growth of grass. All seeded areas shall be maintained including watering, mowing and weeding, and all reseeding shall be provided by the Contractor at no additional expense to the Public Services Director, until the work has been accepted.

SECTION 18. TRAFFIC POLICE

Paragraph Number	Paragraph Title
18	Scope

18.1 **SCOPE:** 18.1.1 The work covered under this item includes the furnishing of the services of police officers for supplementary traffic control in the vicinity of the work sites, at the times and locations as directed by the Public Services Director ,and in accordance with the following requirements:

(1) All services of police officers for whom compensation is to be paid under Section 18 shall have been employed by the Contractor only at such locations and times and for such lengths of time as directed by the Public Services Director.

(2) Police officers shall be paid on an hourly basis at a rate not less than the prevailing wage rates paid to police officers of the Town of South Kingstown, Rhode Island.

(3) Police officers shall be stationed at the locations directed by the Public Services Director.

18.1.2 The Contractor shall provide all lights, barriers, watchmen, flagmen and such other facilities at the sites of the work for the prevention of accidents, protection of persons, property and the work, direction of traffic and such other purposes at the sites of the contract work in accordance with the requirements specified elsewhere in these specifications, at no additional expense to the Public Services Director.

18.1.3 When, in the opinion of the Public Services Director, conditions in the vicinity of the work site are such as to require traffic control measures to supplement those required to be provided by the Contractor as described in the preceding paragraph, the Public Services Director may direct the Contractor to furnish the services of police officers for traffic control in the vicinity of the work site at the specific locations, times and lengths of time as directed by the Public Services Director.

Payment for the services of police officers for supplementary traffic control under Section 18 will only be made for the services of police officers which have been provided by the Contractor at the locations and times and for the lengths of time as directed by the Public Services Director.

SECTION 19. SEWER SERVICE LATERALS (revised 3/16/95)

19.1 **SCOPE:** The work covered under this item includes the furnishing of all labor, equipment and appurtenant materials used in performing any and all installations for sanitary sewer laterals from a sewer main to and including dwelling foundation.

19.2 **PIPE MATERIALS**: All piping used in the installation of a gravity sewer lateral-shall be in accordance Section 9 of this document. Any deviation from this material shall receive prior approval by the Public Services Director.

19.3 **PIPE FITTINGS**: 19.3.1 All pipe fittings used in the installation of a gravity sewer lateral shall be in accordance with Section 9 of this document. Any deviation from this material shall receive prior approval by the Public Services Director.

19.3.2 "**FERNCO FITTINGS**" Flexible rubber "Fernco" type fittings are prohibited during normal installation of a sanitary sewer service lateral. One (1) Fernco fitting is - permissible at the connection to dwelling waste pipe located at building foundation.

19.4 **INSTALLATION:** 19.4.1 General: All pipe, fittings and accessories shall be carefully inspected by the Contractor for defects before installation and all defective, unsound or damaged materials shall be rejected. The Public Services Director shall make such additional inspection as he deems necessary and the Contractor shall furnish all necessary assistance for such inspection. Proper implements, tools and facilities, satisfactory to the Public Services Director shall be provided by the Contractor for the proper and satisfactory execution of the work. Pipe, pipe fittings, accessories and appurtenances shall be new and unused, and shall be of the types and materials specified, as indicated and as directed.

The interior of pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations. The trench bottom and gravel bedding shall be shaped and compacted to give substantially uniform unyielding circumferential support to the lower half of the full length of each pipe. Pipe laying shall proceed upgrade; each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. As the work progresses, the interior of the sewer shall be cleaned of all dirt and superfluous materials of every description and where cleaning after laying is difficult because of small pipe size, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed. Trenches shall be kept free from water so as to prevent flotation of the pipes. Pipelines shall be constructed in a dry trench. At times when work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter one pipe or fittings. Any pipe that has the grade or Joint disturbed after laying shall be taken up and relaid. All materials found to be defective during the progress of the work will be rejected by the Public Services Director and the Contractor shall promptly remove such defective material from the site of the work. All defective material shall be replaced by the Contractor with new sound material. The Contractor shall be responsible for the safe storage of all material. No spalls, shims or lumps shall be used to raise the pipe to grade. All pipe shall be maintained accurately to the required line and grade. No pipe joints shall be covered in any way until the joints have been inspected. Sewers shall not be used as conductors for trench drainage during construction. Pipes shall be protected at all times during construction against flotation and shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance.

19.4.2 Jointing of PVC pipe and pipe fittings shall be made as specified herein. No pipes or fittings shall be jointed until coupling and ends of pipe and fittings have been inspected to determine that the joint surfaces are free from any defects in materials or workmanship; any defective joint materials or piping will be rejected and shall be replaced by the Contractor with new and sound material.

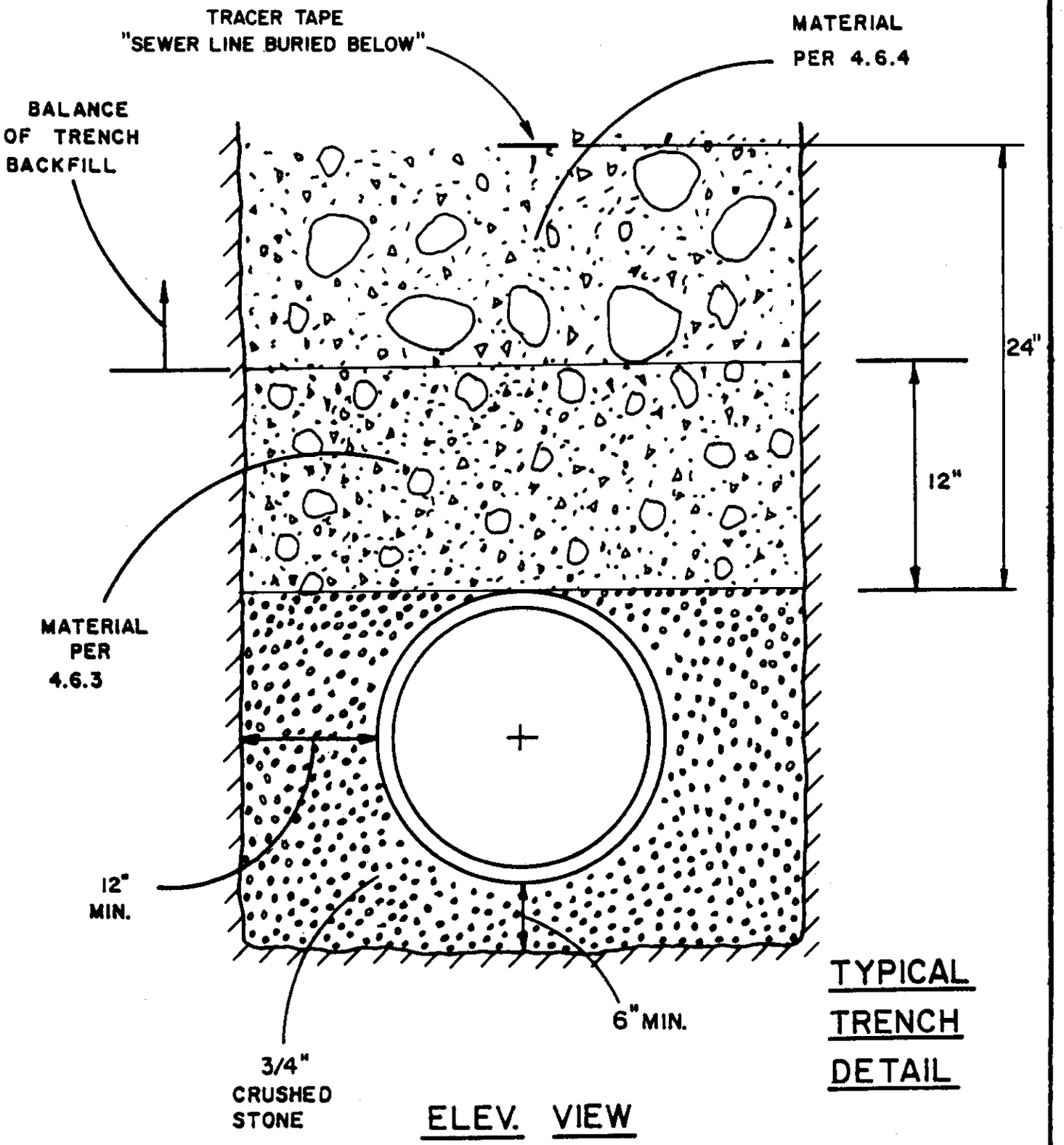
Pipe, pipe fittings and accessories shall be handled, stored, installed, jointed and protected by the Contractor in strict accordance with the printed recommendations of the manufacturer of the piping materials, and as approved. The Contractor shall furnish to the Public Services Director, for his use, copies of the printed recommendations of the pipe manufacturer for the handling, storing, protecting and installation of pipe and fittings with the pipe couplings. All stub openings of sewer pipe shall be capped, using the pipe manufacturer's standard end caps. Assemble O-Ring joints by applying a coat of approved joint grease to the inside of the socket and to the outside of the spigot end of pipe.

19.4.3 Joints shall be protected from damage and shall be kept free from any defects or material which would impair the proper jointing and watertightness of joints. Pipe and fittings on which, in the opinion of the Public Services Director, the joint materials or joint surfaces have been damaged, shall be rejected and shall be removed from the site and the Contractor shall replace the rejected material with new and sound materials.

19.5 **MINIMUM SLOPE:** The minimum slope for a sanitary sewer service lateral shall be 1.67 feet per 100 feet. Any deviation from this minimum slope shall require prior approval by the Public Services Director.

19.6 **MINIMUM PIPE DIAMETER:** The minimum pipe diameter for a sanitary sewer service lateral shall be six (6) inches for single family dwellings and such larger size for multiple family dwellings or other types of buildings as the Public Services Director may determine.

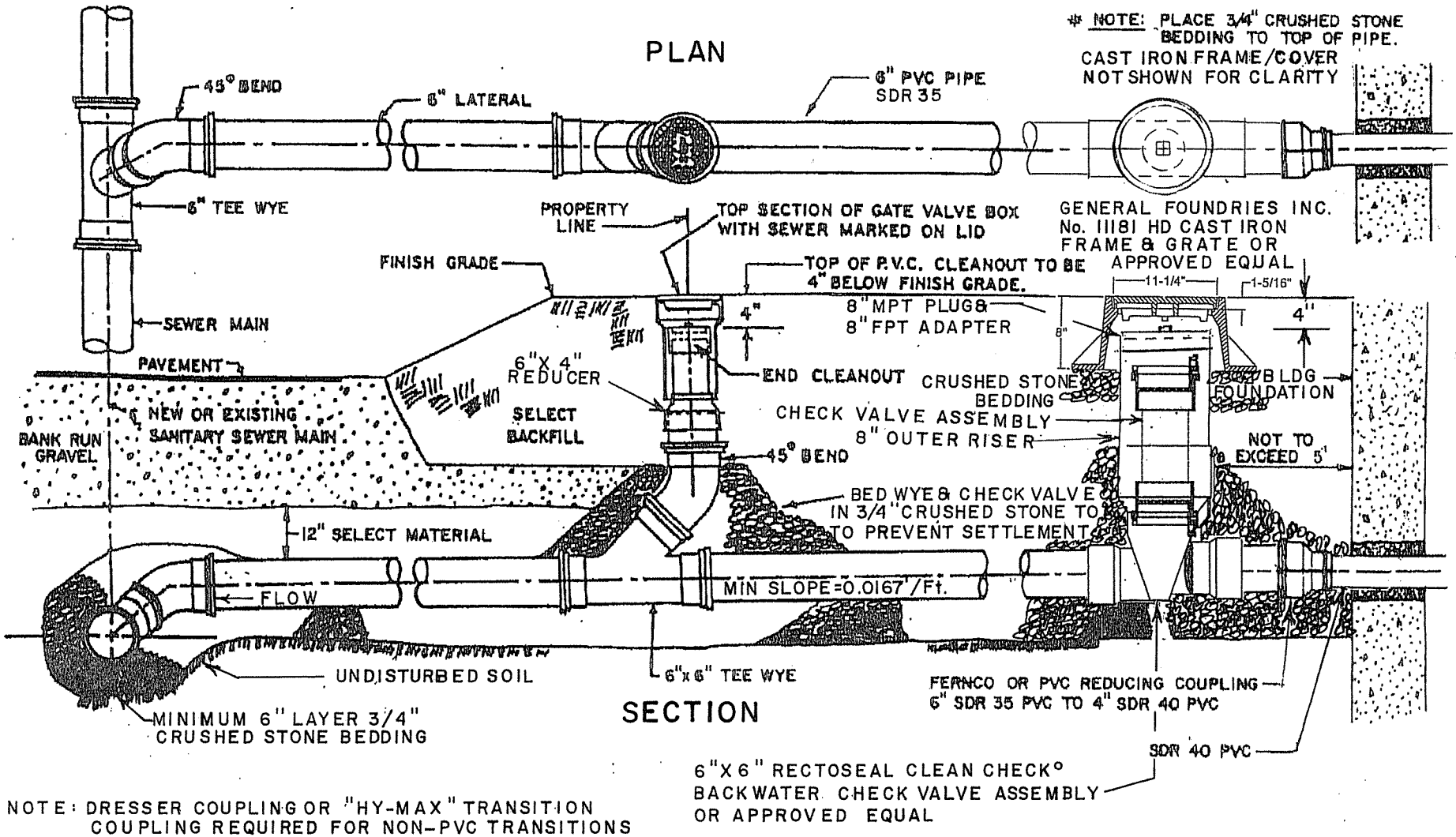
19.7 **HORIZONTAL AND VERTICAL DISTANCE FROM OTHER UTILITIES:** The minimum horizontal distance of a sanitary sewer lateral from a water service line and/or water main shall be ten (10) feet. Sewer lines crossing other utilities pipes shall have a minimum separation of twelve (12) inches from the outside diameter of said pipes. Sanitary sewer service pipes shall be lower in elevation than potable water service lines and/or water mains.



ELEV. VIEW

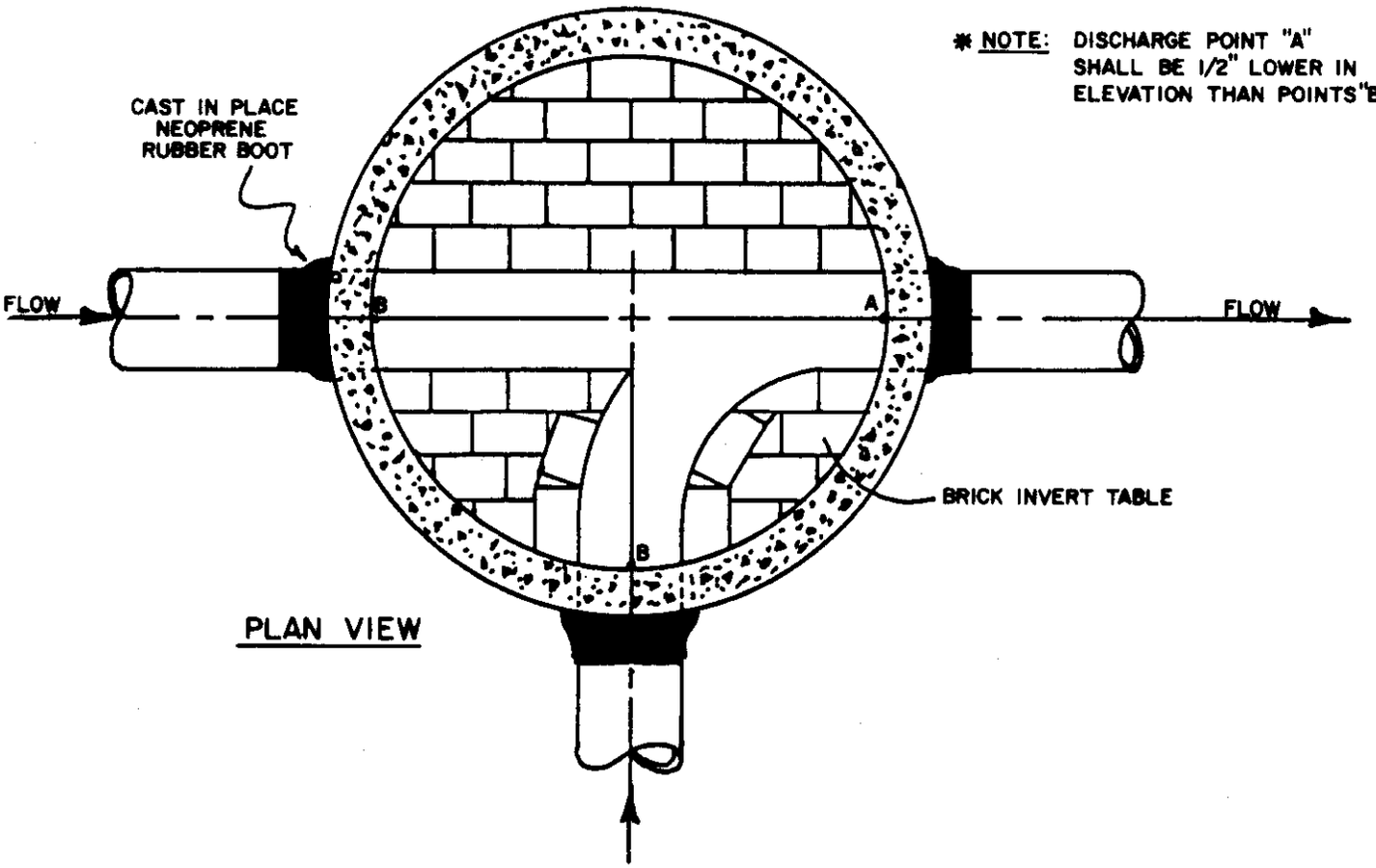
TYPICAL TRENCH DETAIL

DRAWING NO. WW-1 D-1	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT. SPECIFICATIONS FOR SEWER CONSTRUCTION			
	SCALE: NO SCALE	DATE		APPR.
REV. ϕ	NOTES:			



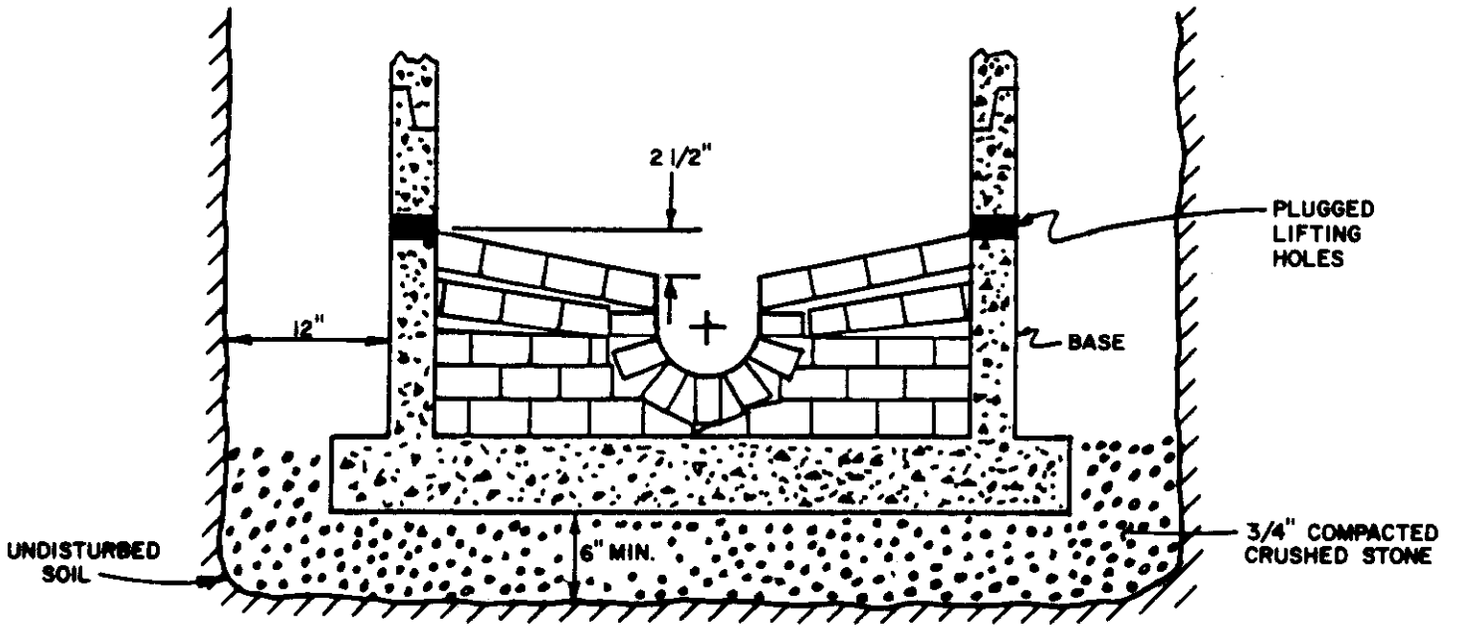
NOTE: DRESSER COUPLING OR "HY-MAX" TRANSITION COUPLING REQUIRED FOR NON-PVC TRANSITIONS

DRAWING No.	TOWN OF SOUTH KINGSTOWN, RHODE ISLAND WASTEWATER DIVISION STANDARD HOUSE CONNECTION DETAIL				WW-1
	SCALE N/T/S	DATE 04/13	DRN: PJE	APPR	D-2
REV. 1	DEPT. PUBLIC SERVICES		NOTES:	8-7-13	



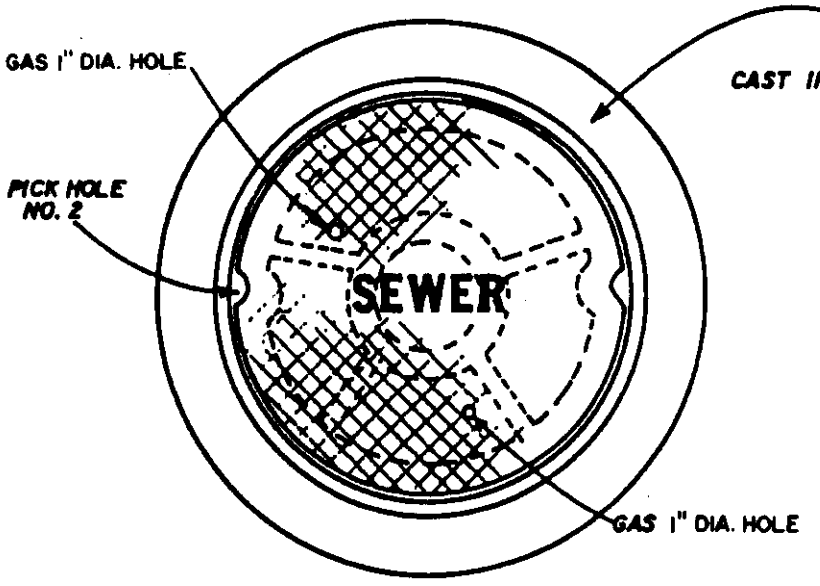
PLAN VIEW

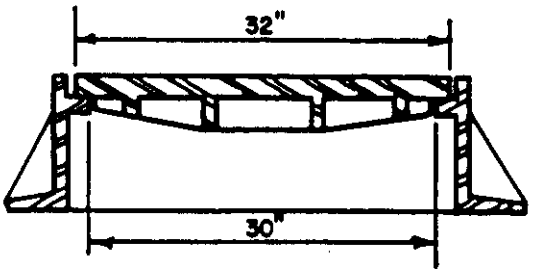
BRICK INVERT DETAIL



SECTION

DRAWING NO. WW-1 D-3	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT. SPECIFICATIONS FOR SEWER CONSTRUCTION			
	SCALE AS NOTED	DATE		APPR.
REV. ϕ	NOTES:			





NOTE: CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF FRAME & COVER SHOWING CASTINGS FOR APPROVAL.

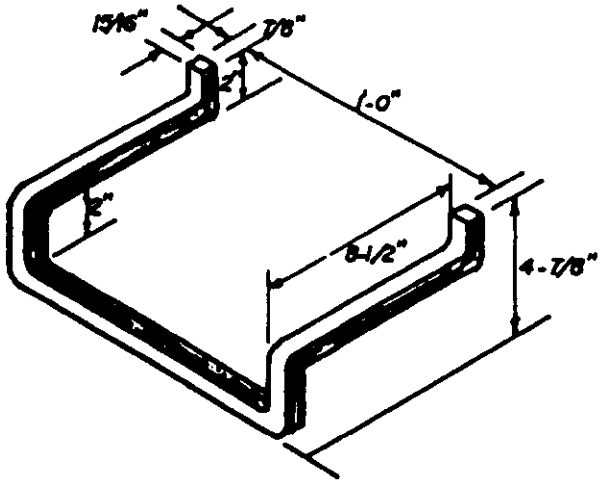
PLAN — PAVED AREA — SECTION

MANHOLE COVER & FRAME DETAIL

(not to scale)

NOTES:

1. ALL MANHOLES SHALL HAVE CAST IRON MANHOLE FRAME AND COVER AS INDICATED. COVER SHALL HAVE THE WORD "SEWER" CAST ON THE TOP. GRAY IRON CASTING A.A.S.H.O. M105-49, CLASS 30, AMENDED TO DATE. FRAME & COVER SHALL BE LEBARON LC328 OR APPROVED EQUAL.
2. ALL PRECAST CONCRETE MANHOLES AND CONES SHALL BE EQUIPPED WITH ALUMINUM OR STEEL REINFORCED PLASTIC MANHOLE STEPS AS SHOWN



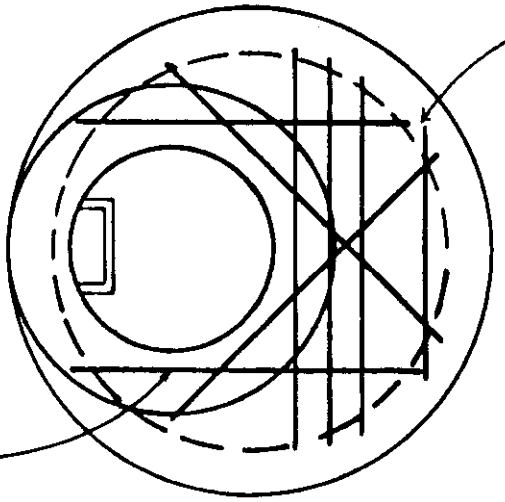
MANHOLE STEP DETAIL

(not to scale)

SOLID FORGED ALUMINUM ALLOY 6061
SAFETY TYPE DROP FRONT DESIGN
OR STEEL REINFORCED PLASTIC

MANHOLE DETAILS

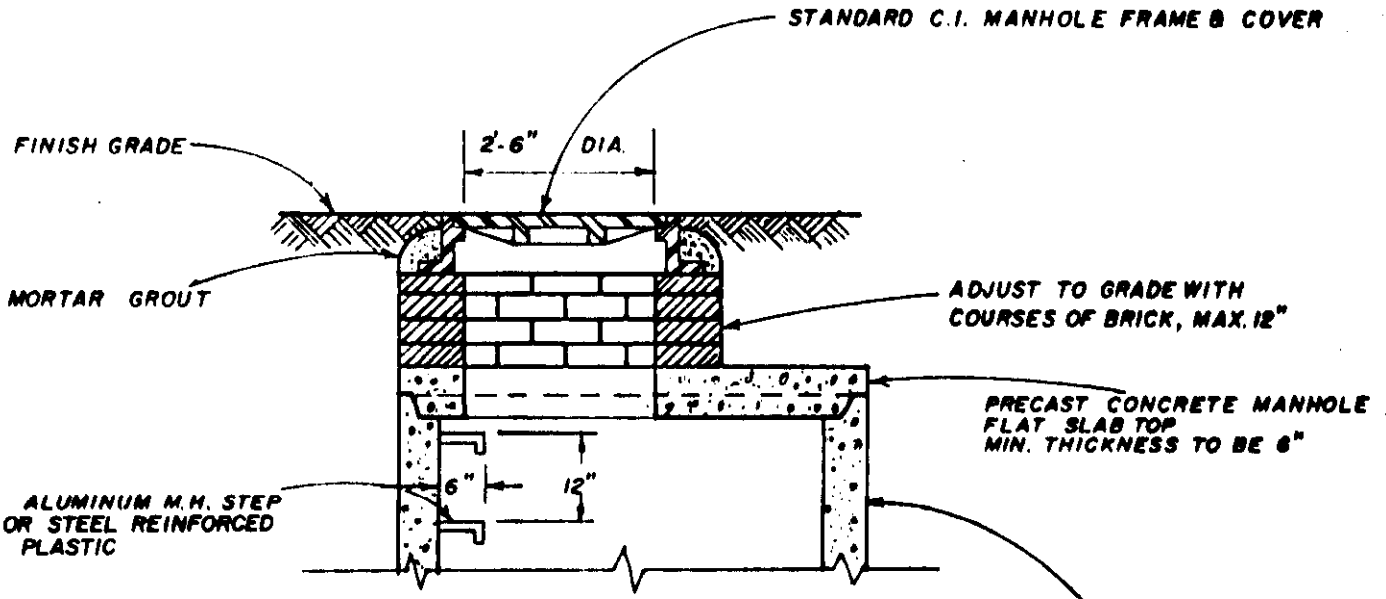
DRAWING NO.	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT.			
WW-1 D-4	SPECIFICATIONS FOR SEWER CONSTRUCTION			
	SCALE AS NOTED	DATE		APPR.
REV. ϕ	NOTES:			



NOTE:

FOR USE WHERE SHALLOW INSTALLATION DOES NOT PERMIT USE OF A CONE-TYPE OR WHERE DIRECTED

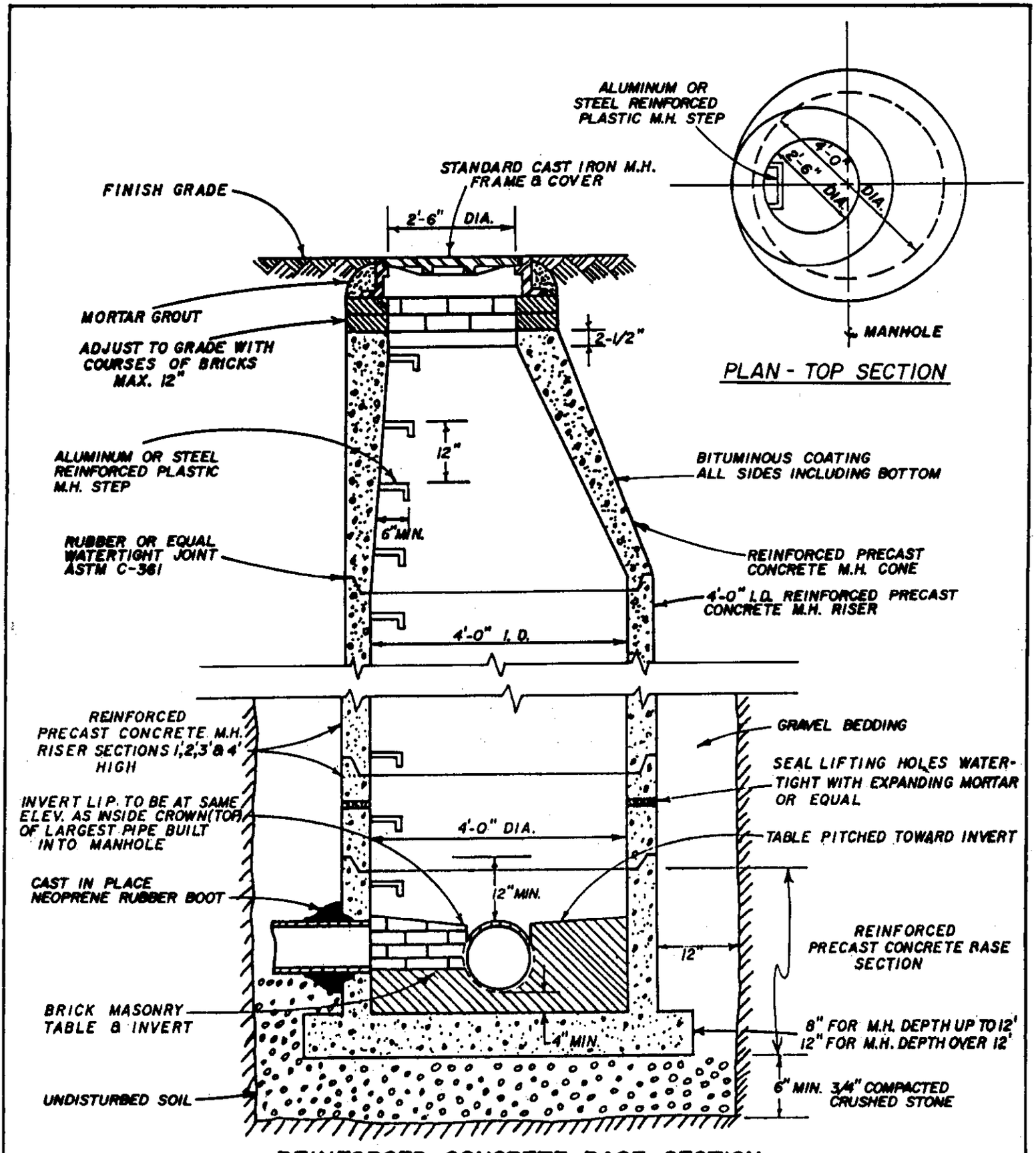
PLAN FLAT TOP SECTION



SECTION

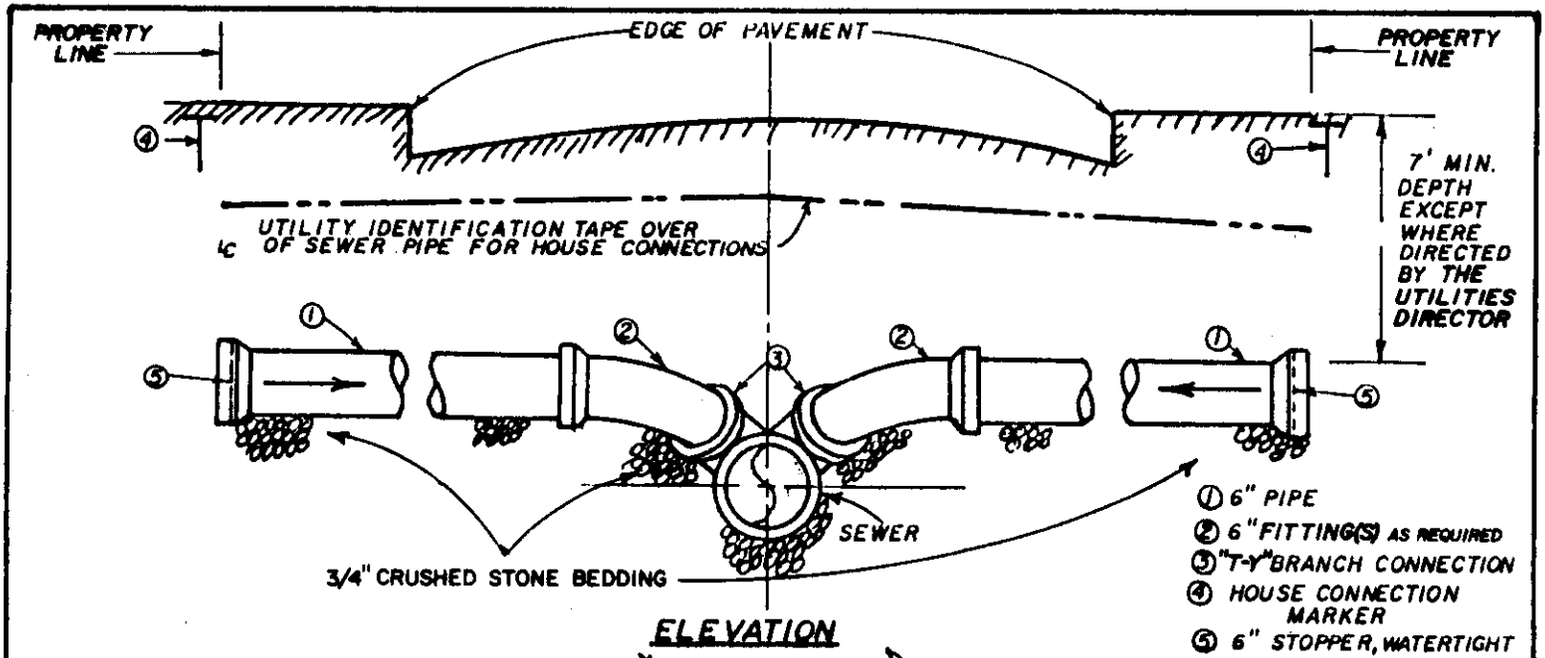
MANHOLE DETAILS

DRAWING NO.	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT. SPECIFICATIONS FOR SEWER CONTRACTS			
WW-1 D-5	SCALE 1/2" = 1'-0"	DATE FEB 1978	DRN PJE	APPR.
	NOTES:			

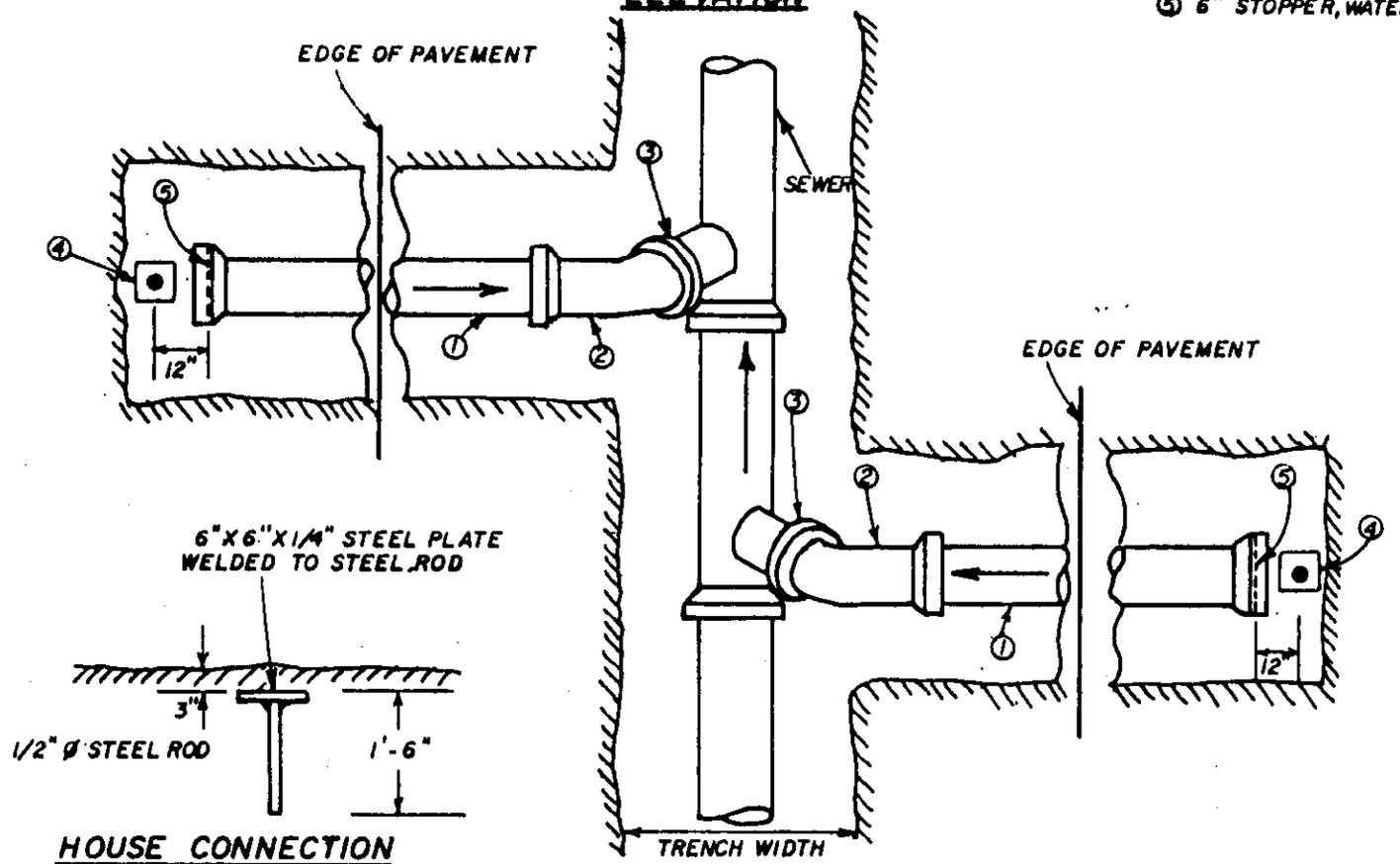


REINFORCED CONCRETE BASE SECTION

DRAWING NO.	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT.			
WW-1	SPECIFICATIONS FOR SEWER CONTRACTS			
D-6	SCALE 1/2" = 1'-0"	DATE FEB. 1978	DRN PJE	APPR
	NOTES:			



ELEVATION

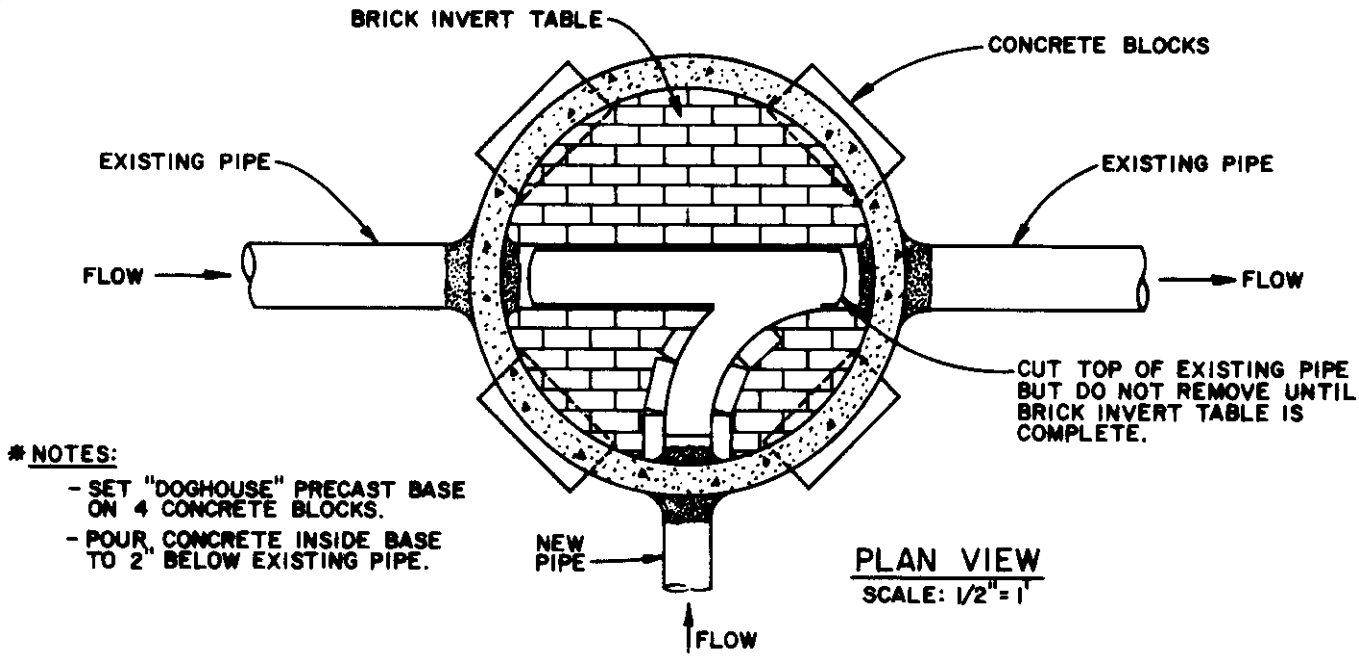


PLAN

HOUSE CONNECTION MARKER DETAIL

HOUSE CONNECTION DETAILS

DRAWING NO.	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT. SPECIFICATIONS FOR SEWER CONTRACTS			
WW-1 D-7	SCALE NOT TO SCALE	DATE FEB. 1978	DRN PJE	APPR.
	NOTES			

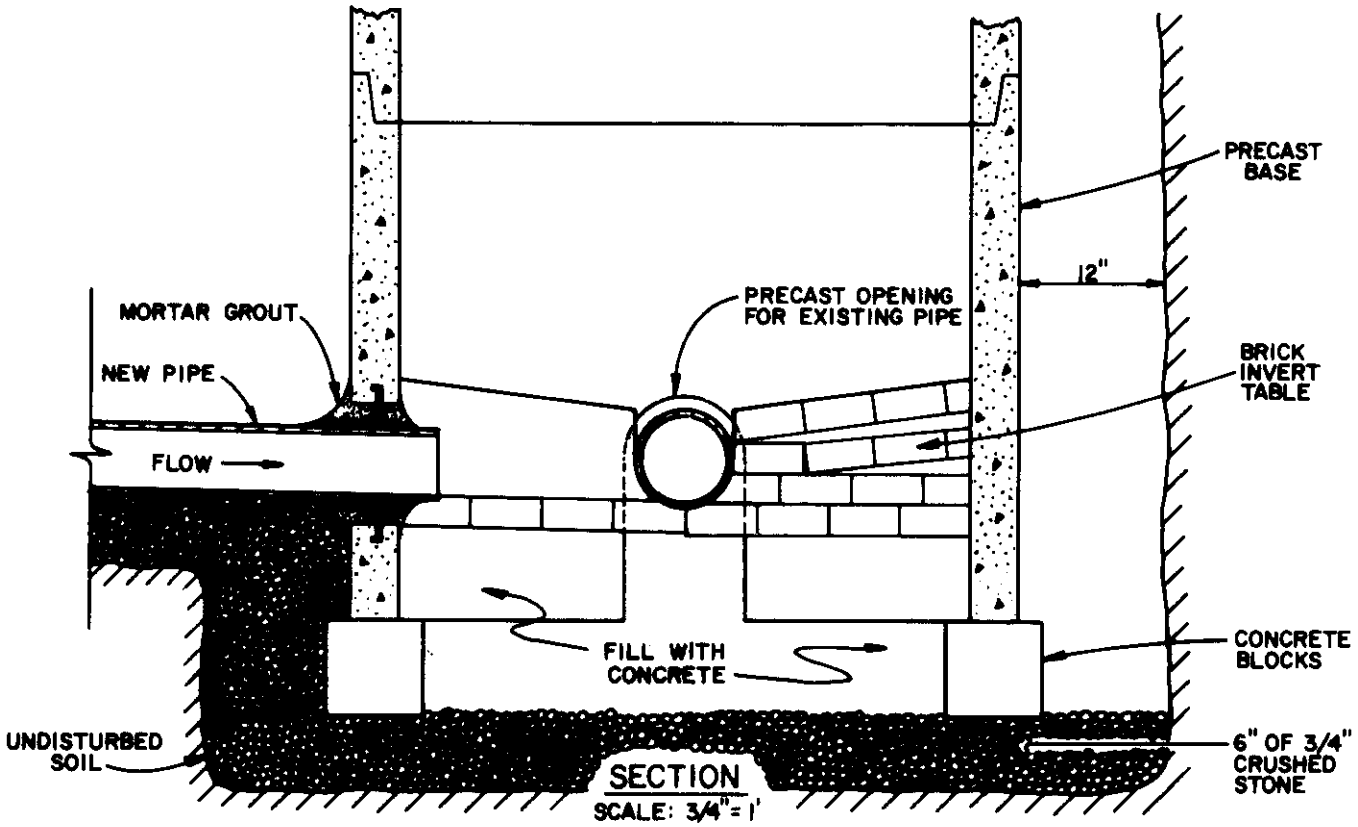


PLAN VIEW
SCALE: 1/2" = 1'

NOTES:

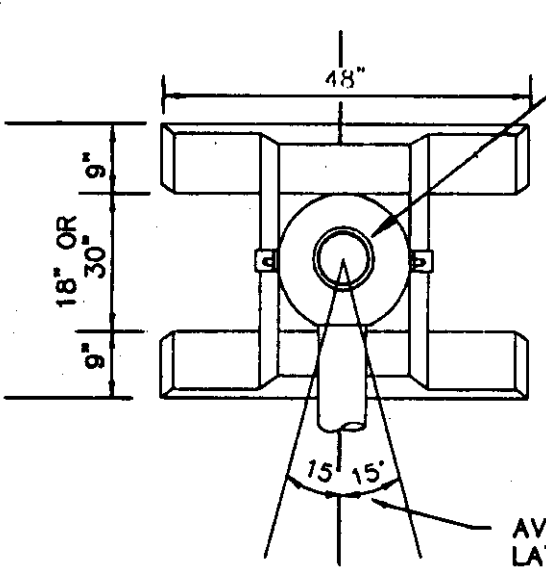
- SET "DOGHOUSE" PRECAST BASE ON 4 CONCRETE BLOCKS.
- POUR CONCRETE INSIDE BASE TO 2" BELOW EXISTING PIPE.

"DOGHOUSE" MANHOLE DETAIL



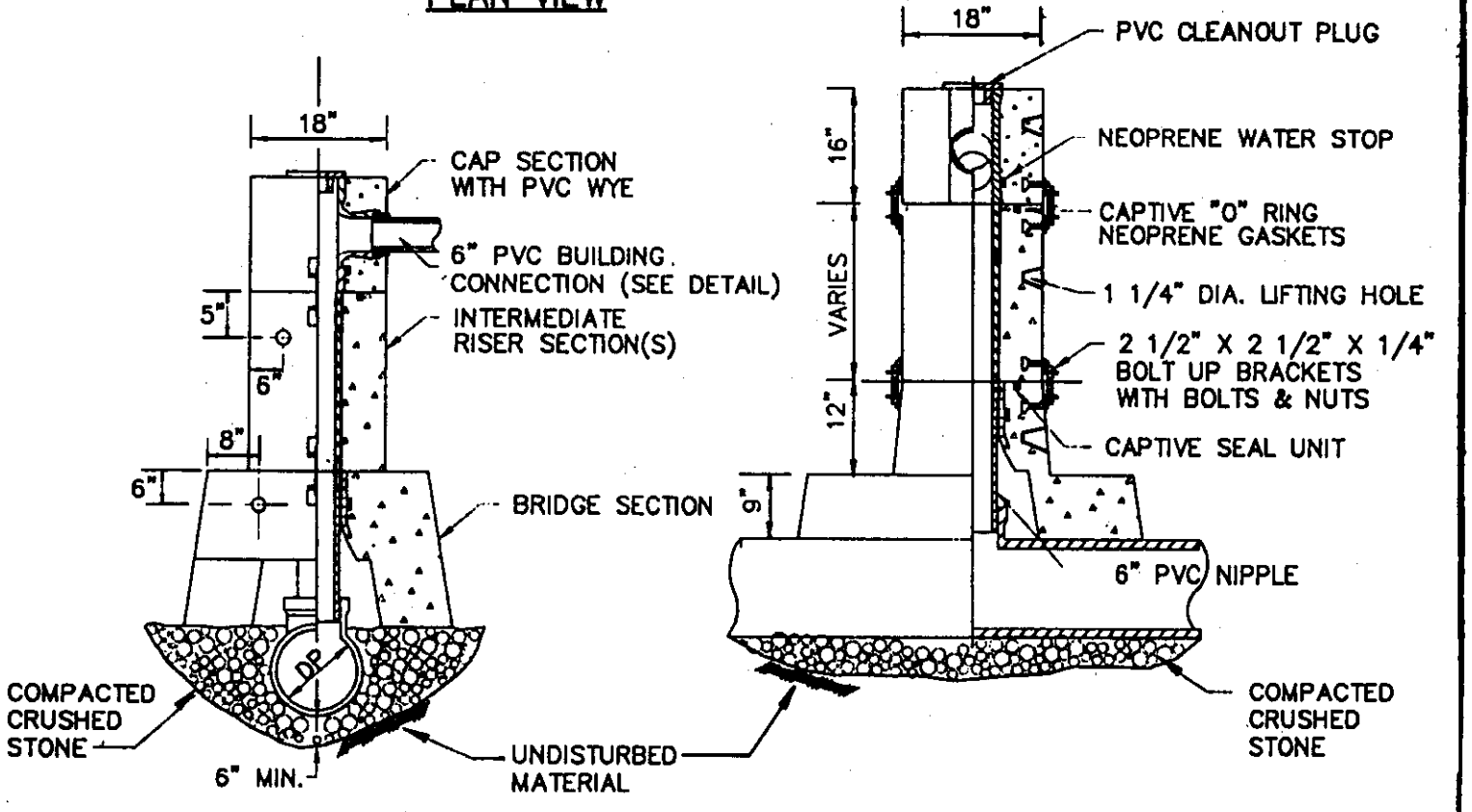
SECTION
SCALE: 3/4" = 1'

DRAWING NO.	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT.			
WW-1	SPECIFICATIONS FOR SEWER CONTRACTS			
D-8	SCALE: AS NOTED	DATE: 3/27/95	DRAWN: M.E.L.	APPR.: J.C.D.
	NOTES:			



NOTE:
1. FILL VOID UNDER THE BRIDGE WITH SUITABLE MATERIALS.
2. INSTALLATION OF ANY SEWER CHIMNEYS MUST RECEIVE PRIOR APPROVAL FROM THE UTILITIES DIRECTOR.

PLAN VIEW



TYPICAL PRECAST SEWER CHIMNEY

N.T.S.

DRAWING NO.	TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT.			
WW-1	SPECIFICATIONS FOR SEWER CONSTRUCTION			
D-9	SCALE AS NOTED	DATE		APPR.
REV. Φ	NOTES:			

TOWN OF SOUTH KINGSTOWN WASTEWATER DEPT.
SPECIFICATIONS FOR SEWER CONSTRUCTION

DRAWING NO. WW-1 D-10

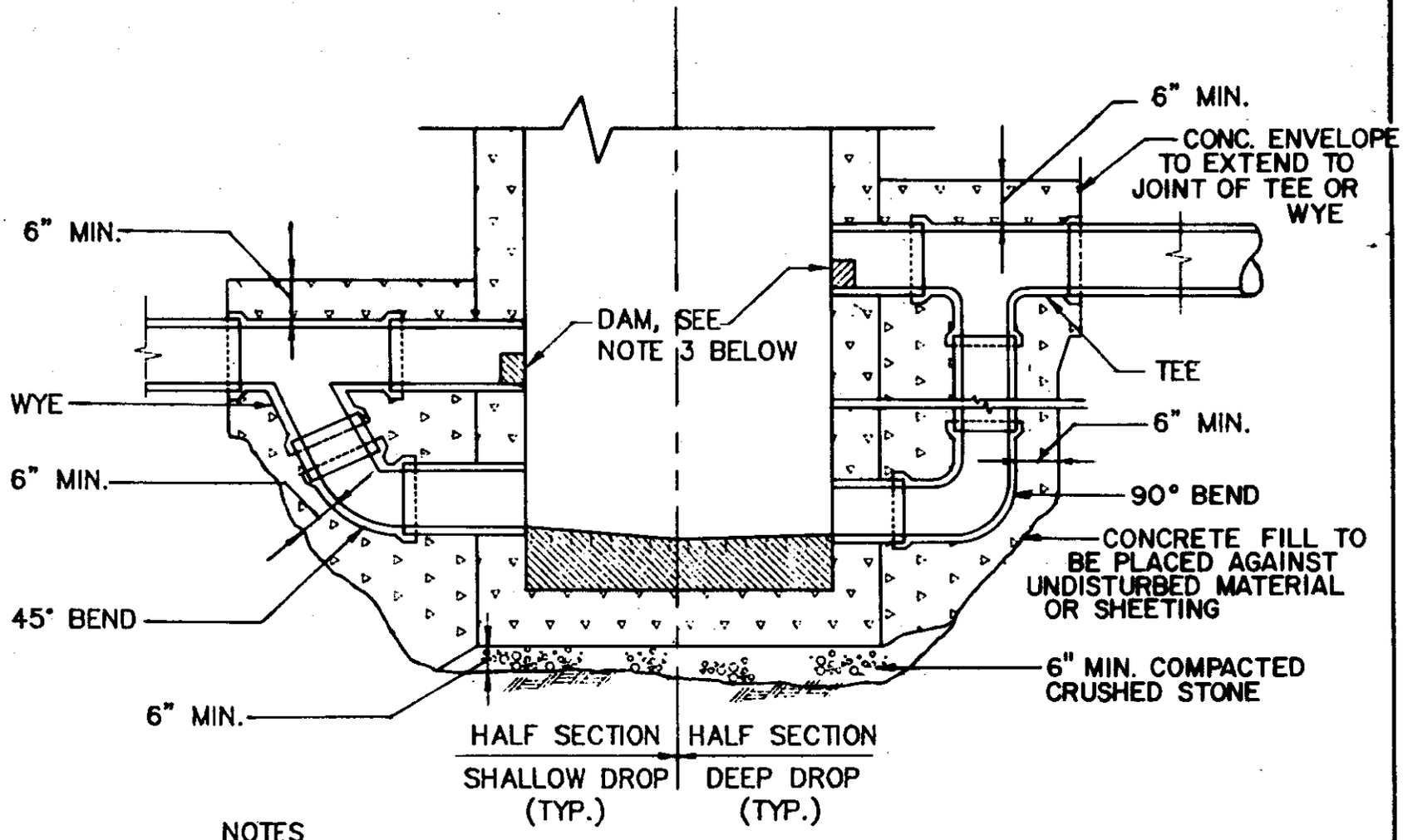
REV. Ø

SCALE AS NOTED

DATE

APPR.

NOTES:



NOTES

1. DROP PIPE TO BE SAME DIAMETER AS SEWER DISCHARGE INTO MANHOLE UNLESS OTHERWISE SHOWN ON DRAWINGS.
2. DIMENSIONS & CONSTRUCTION OF DROP MANHOLE TO BE SIMILAR TO TYPICAL MANHOLE EXCEPT AS SHOWN.
3. FOR PVC PIPE, EPOXY HALF PLUG TO PIPE, FOR DI, VC AND RC PIPE, MORTAR AND BRICK IN PIPE.

DROP CONNECTION DETAIL

N.T.S.

DIVISION 4.

BUILDING SEWERS

AND CONNECTIONS

(2) The contractor shall have obtained the following before permission will be granted to dispose of wastes at the treatment plant:

a. A license to remove, transport, and discharge ISDS contents at the South Kingstown treatment plant; and

b. A disposal vehicle permit for each vehicle to be utilized for waste hauling.

(3) The vehicle shall, at all times, have a valid disposal vehicle permit aboard and, with each delivery to the treatment plant, a properly completed pump-out record shall be transmitted to authorized plant personnel before waste may be deposited.

(4) Before issuance of a disposal vehicle permit:

a. The vehicle shall be equipped with pumps, valves, hoses and accessories so that the waste can be deposited at the designated point without spillage.

b. The vehicle tank shall be airtight and free from leakage.

c. All apparatus shall be kept clean and well-painted, and shall have the name of the waste hauling company upon it in plain letters.

d. The director, or assigned personnel, shall issue a disposal vehicle permit upon determination of compliance with the above and payment of the appropriate fee.

(5) Delivery to the treatment plant shall be only at times and locations designated by the director.

(6) No industrial wastes of any kind shall be permitted to be discharged at the treatment plant. Sampling of wastes may be required by treatment plant personnel before discharging.

(7) The waste hauler shall pay a fee per one thousand (1,000) gallons of waste discharged, as established by resolution of the town council upon recommendation by the director. Waste haulers will be billed on the first of each month and payments shall be made to the town prior to the first of the next month or the waste haulers discharge license may be suspended at the discretion of the director for nonpayment.

(8) No waste hauler vehicle shall be allowed to stand in any public thoroughfare except while in actual operating use.

(Ord. of 5-27-75, art. III; Ord. of 7-23-84)

Sec. 19-54. Reserved.

Editor's note—An ordinance adopted June 28, 1993, amended the Code by deleting provisions contained in § 19-54. Said provisions pertained to the refund of sewage disposal costs and derived from an ordinance adopted May 27, 1975, art. III; an ordinance adopted Dec. 14, 1981.

Secs. 19-55—19-65. Reserved.

DIVISION 4. BUILDING SEWERS AND CONNECTIONS*

Sec. 19-66. Permit—Required.

(a) No unauthorized person shall uncover, make any connections with or opening into, use, alter or disturb any public sewer or appurtenance thereof without first obtaining a written permit from the director.

(b) Any person applying for a new connection of large volume or unusual character of pollutants or any person proposing a substantial change in volume or character of pollutants that are being discharged into the system shall notify the director at least forty-five (45) days prior to the proposed change or connection.

(Ord. of 5-27-75, art. IV)

Sec. 19-67. Same—Application.

(a) There shall be two (2) classes of building sewer permits, one (1) for residential and commercial service, and another for service to establishments producing industrial wastes. In either case, the owner or his agent shall make application on

*Cross reference—Buildings and building regulations, Ch. 5.

a special form furnished by the town. The permit and inspection fee shall be paid to the town at the time the application is filed and prior to any construction. For new structures, this permit, accompanied by the plan required by subsection (b) of this section, shall be required before issuance of a building permit.

(b) Accompanying each application for a permit shall be a location plan showing the lot lines and dimensions, location of water pipes, gas lines, buried cable, location of permanent buildings and location of building sewers and storm drains.
(Ord. of 5-27-75, art. IV)

Sec. 19-68. Costs, expenses of installation.

All costs and expenses incidental to the installation and connection of the building sewer shall be borne by the owner. The owner shall indemnify the town from any loss or damage that may directly or indirectly be occasioned by the installation of the building sewer. The building sewer from the street sewer to the property line shall be installed by the town. The cost shall be the actual cost incurred by the town in the installation of each sewer connection. The cost for this connection shall be paid in full at time of billing or may be paid in three (3) annual installments at eight (8) percent interest annually on the unpaid balance. Where building connections of a larger size than six (6) inches are required by the director, the additional material and labor costs for the connection will be charged to the owner.
(Ord. of 5-27-75, art. IV; Ord. of 3-12-84)

Sec. 19-69. Separate sewer for each building; exception.

(a) A separate and independent building sewer shall be provided for every building, except where one (1) building stands at the rear of another or an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, courtyard or driveway, the building sewer from the front building may be extended to the rear building and the whole considered as one (1) building sewer or if no house connection in the street is previously installed and an existing connection is available and approved by the director. If such buildings are on lots not under the same ownership, costs of the building sewer due the town shall be equitably distributed between the owners as determined by the director.

(b) The lot owner of a rear lot shall obtain and file in the town records a sewer easement from the front lot owner for the use of the sewer in this event.

(c) Every building sewer connection installed after March 15, 1984, must include a cleanout located at the property line. Cleanouts must have a removable cover and be accessible zero to twelve (12) inches below ground surface.
(Ord. of 5-27-75, art. IV; Ord. of 1-22-79; Ord. of 3-12-84)

Sec. 19-70. Use of old building sewers.

Old building sewers may be used in connection with new buildings only when they are found on examination and test by the director or his agent to meet all requirements of this article.
(Ord. of 5-27-75, art. IV)

Sec. 19-71. Standards for installation.

The size, slope, alignment, materials of construction of a building sewer and the methods to be used in excavation, placing of pipe, jointing, testing, and backfilling the trench shall all conform to the requirements of the building and plumbing code or other applicable rules and regulations of the town. In absence of Code provisions or in amplification thereof the materials and procedures set forth in appropriate specifications of the American Society of Testing Materials and Water Pollution Control Federation Manual of Practice No. 9 shall apply. Minimum size shall be six (6) inches for single-family dwellings and such larger size for multiple-family dwellings or other types of building as the director or his agent may determine except four-inch pipe may be allowed on the owner's property if the distance from the owner's street property line to the point of connection at the house does not exceed eighty (80) feet and the line was installed prior to November 1979. Minimum slope shall be 1.67 feet per one hundred (100) feet and/or as required by the director. Connection to sewers shall be made only with a "Y" branch or "chimney." The mini-

mum distance of a building sewer from a water line shall be ten (10) feet and from a public water supply well shall be fifty (50) feet. Where sewer lines cross water lines, they must be constructed of durable corrosion resistant materials with watertight joints preferably below water lines. Sewer lines crossing other pipes should have a minimum separation of twelve (12) inches with a sand "cushion" between the pipes. Pipe material shall meet the approval of the director and meet the following requirements:

(1) Asbestos cement sewer pipe ASTM 644. Joints, rubber rings, compression type;

(2) Plastic pipe—ABS meeting ASTM D2751 SDR 35 PVC meeting ASTM 3034 '73 SDR 3T. Minimum wall thickness, 0.18 inches, Joints—Rubber compression rings or welded joints and couplings;

(3) Vitrified clay pipe ASTM C. 700 standard or extra joints—Rubber compression rings;

(4) Fittings.

a. Normal ring-tight stab-joint and/or couplings with rubber compression rings. Special adapters to join different sizes and different materials of pipe shall be stainless steel band, rubber couplings, or couplings fabricated of the pipe material with rubber rings to form a tight joint to the two (2) pipe materials and sizes of pipe to be joined.

b. For industrial wastes, clay pipe may be required at the option of the director or his agent.

c. Pipe must have support and bedding of sand or gravel for the full length of the barrel with clean fill, sand or gravel placed and hand tamped to one (1) foot above the top of the barrel of the pipe. The minimum cover above the top of the pipe at any point shall be three (3) feet. If required by the plumbing inspector, it must show no leakage at ten (10) feet head of water.

(Ord. of 5-27-75, art. IV; Ord. of 1-22-79)

Sec. 19-72. Procedure for removing sewage when drain is inadequate.

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 an approved means by the owner and discharged to the building sewer. Where fixtures are installed in basements close to the main sewer grade, backwater valves shall be installed on the owner's sewer lateral at the owner's expense.
(Ord. of 5-27-75, art. IV)

Sec. 19-73. Stormwater, groundwater connections.

No person shall make connection of roof downspouts, exterior foundation drains, basement sump pumps, areaway drains, or other sources of surface runoff or groundwater to a building sewer or building drain which in turn is connected directly or indirectly to a public sanitary sewer. Such connections as may exist at the time of adoption of this article shall be disconnected from such sanitary sewers within six (6) months of the date of such adoption, failing which, the penalties described in this article shall apply.
(Ord. of 5-27-75, art. IV)

Sec. 19-74. Connection requirements generally.

(a) The connections of the building sewer into the public sewer shall conform to the requirements of the building and plumbing code or other applicable rules and regulations of the town or the procedures set forth in appropriate specifications of the Water Pollution Control Federation Manual of Practice No. 9. All such connections shall be made gastight and watertight. Any deviation from the prescribed procedures and materials must be approved by the director before installation.

(b) The applicant for the building sewer permit required under this division shall notify the director when the building sewer is ready for inspection and connection to the public sewer. The connection shall be made under the supervision of the director or his representative.
(Ord. of 5-27-75, art. IV)

Sec. 19-75. Barricades; replacement of excavations.

All excavation for building sewer installations shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the director.
(Ord. of 5-27-75, art. IV)
Cross reference—Excavations, § 16-21 et seq.

Sec. 19-76. Drainlayers.

(a) Building sewers and connections shall be made only by drainlayers licensed to perform such work in the town. Application forms for drainlayers shall be completed and approved by the director. The application fee shall be deposited at the time of application. Notice must be left at the office of the water/wastewater department at least forty-eight (48) hours before work is begun on a drain, and no material shall be used or work covered until inspected and approved by the plumbing inspector, the director or his agent. Such information as the town has with regard to the position of junctions or branches will be furnished to drainlayers, but at their risk as to the accuracy of the same.

(b) Any contractor engaged by a property owner with the permission of the director for installation or repair of house connections in the public streets or highways shall be bound by the conditions for sewer installations stated in sections 19-112 and 19-113.

(c) Drainlayers shall complete and file application for drains in the name of the owner, obtain the owner's signature thereon, pay application and inspection fee, and complete the location plan required by section 19-67(b).

(d) Drainlayers must meet one (1) of the following standards, complete the application form, and pay the drainlayer's fee:

(1) Have a current license as installer of individual sewage disposal systems issued by the state department of health under state law.

(2) Have a license as a master plumber under state licensing requirements.

(3) Complete the requirements for qualifying as a drainlayer in the town.

(e) Drainlayers' licenses shall be renewable yearly.
(Ord. of 5-27-75, art. IV)
Cross reference—Licenses and miscellaneous business regulations, Ch. 9.

Sec. 19-77. Middlebridge Sewer Area connections.

(a) All lots within the Middlebridge Sewer Area shall be required to connect to the sewer system consistent with the provisions of section 19-33 and 19-48, except as provided in (b) and (c) below and section 19-145(i), (j), and (k).

(b) No lot or parcel of land which on June 6, 1989, was not a buildable lot in accordance with the then present Zoning Act of the town, shall be allowed to connect to any sewer line or main installed in the Middlebridge Sewer Area, without the express approval of the town council; provided, however, that any lot on which there is located either a dwelling house or building being used for commercial purpose, notwithstanding that said real estate may constitute a nonconforming lot of record, shall be connected to said sewer line or main.

(c) Notwithstanding the obligation to connect all lots to the sewer system, if all of the owners of a buildable lot, on which there is no structure, enter into an agreement with the town that said lot will be forever restricted from the erection of a dwelling or commercial building thereon, then upon the recording of said agreement in the land records, the said assessment established and made under Article II, Division 8, section 19-145 against said lot will become null and void.
(Ord. of 10-26-92)
Cross reference—Middlebridge Sewer Area assessments, fees and user charges, § 19-145.

Secs. 19-78—19-85. Reserved.