



City of East Dubuque, Illinois

Wastewater Collection System Requirements



WORKING ON TOMORROW.

Origin Design Project Number 22175

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WASTEWATER COLLECTION SYSTEM REQUIREMENTS

FOR

CITY OF EAST DUBUQUE, ILLINOIS

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I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Illinois.

For Origin Design Co.
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CITY OF EAST DUBUQUE, ILLINOIS
WASTEWATER COLLECTION SYSTEM REQUIREMENTS

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CITY OF EAST DUBUQUE, ILLINOIS
WASTEWATER COLLECTION SYSTEM REQUIREMENTS

PART I
SANITARY SEWER DESIGN PROVISIONS

1. GENERAL

- A. Reference to materials or systems herein by name, make, or catalog number is intended to establish a standard of quality, and not to limit competition; the words "or approved equal" are implied following each brand name.
- B. Sanitary sewers shall be located within street right-of-way whenever possible. If a sewer is located on private property, it shall be within a 20 foot wide permanent sanitary sewer easement or wider as required for sewers deeper than 10 feet.
- C. Sanitary sewer design shall be in accordance with these provisions and specifications, and the requirements of the Illinois Environmental Protection Agency (IEPA).
- D. The person(s) or entity proposing the installation of sanitary sewers shall be responsible for obtaining the required construction permit from the IEPA and any other permits from state or federal agencies and paying all costs associated with obtaining permits and/or approvals.
- E. Design Engineer shall submit sanitary sewer drawings and IEPA permit application for City review to seek City approval.

2. SCOPE

- A. These provisions are intended to govern the design of sanitary sewers for installation within the City of East Dubuque, Illinois, and shall set forth the minimum requirements.

3. DEFINITIONS

- A. City – The City of East Dubuque, Illinois.
- B. Engineer or City Engineer – The designated Engineer for the City or the authorized representative of the Engineer.
- C. Design Engineer – The Engineer or Engineering Firm responsible for the design of the sewer project.
- D. Inspector – A representative of the City or its Engineer, at the site of the work.
- E. Sewers – The definitions for and classifications of sewers shall be as indicated Illinois Administrative Code Title 35.

4. DESIGN PERIOD

- A. Sanitary sewer system design shall consider the estimated ultimate tributary population. Consideration shall be given to the maximum anticipated capacity required for institutions, commercial establishments, industrial parks, etc. The design of sewers shall take into consideration a planning period of 50 years and the City Land Use Plan.

5. BASIS OF DESIGN

- A. Sewer Design Capacity – Peak hour domestic wastewater flow; additional maximum wastewater flow from non-domestic municipal, commercial, institutional and industrial sources; infiltration and inflow waters; and sewage pumping station capacity shall be considered in determining required capacities of sanitary sewers.
- B. Peak Hour Domestic Flow - The minimum peak hour domestic flow shall be determined using 100 gallons per capita per day (gpcd) multiplied by the peaking factor found in IL AC Title 35 Section 370.310 Design Basis. The 100 gpcd value when used in conjunction with the peaking factor is intended to cover normal extraneous flows for newer sewers and new service connections built with modern construction techniques serving households with typical per capita wastewater flows rates. Additional extraneous flow allowances may be warranted where high groundwater levels, significant inflow sources or higher than average per capita wastewater flow rates are anticipated to occur over the design life. If the sewer is to serve existing development infiltration and inflow contributions from upstream sewers and services connections, it shall be evaluated, and the design flow adjusted accordingly.
- C. Minimum Design Equivalents – Unless otherwise justified to and approved by the City and IEPA, the following design equivalents shall be used as minimums when calculating required sewer capacity, unless actual or comparable flow data is available.
 - 1) Single family development: 3.0 to 3.5 units per acre; 3.5 people per unit; or 10 people per acre.
 - 2) Multi-family development (medium density): 4.5 units per acre; 3 people per unit; or 15 people per acre.
 - 3) Multi-family development (high density): 6 to 12 units per acre; 2.5 people per unit; or 30 people per acre.
 - 4) Commercial development: 5,000 gallons per day per acre (peak flow).
 - 5) Industrial development: 10,000 gallons per day per acre (peak flow).
- D. Carrying Capacity of Pipe – Gravity sewer pipe size 8 to 15 inches in diameter shall carry the design flow at a depth of no more than 67% of the pipe diameter. Larger pipes shall carry the design flow at a depth of no more than 75% of the pipe diameter.

6. DETAILS OF DESIGN

- A. Diameter – No gravity sewer, other than a building service lateral, shall be less than 8 inches in diameter, unless the City approves 6 inch and the IEPA grants a variance. Larger sewers shall be installed when required by the City.
- B. Depth – Gravity sewers should be deep enough to receive sewage from basements, withstand surface loads, and have a minimum of 4 feet of cover over top of the pipe to prevent freezing. If shallower depths are approved by the City or the Engineer, sufficient insulation shall be provided to prevent freezing.

Minimum manhole depth shall be 6.5 feet from rim to flow line unless otherwise approved by the Engineer. Sewer depth shall not exceed 20 feet for SDR 35 PVC, 30 feet for SDR 26 PVC, and 40 feet for DR18 AWWA C900/905. Special designs are required for depths exceeding 40 feet.

- C. Buoyancy – Where high ground water conditions are anticipated, buoyancy of sewers shall be considered and, if necessary, adequate provisions should be made for protection.
- D. Flow Velocity – All gravity sewers shall be designed and constructed to give an average velocity when flowing full of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013. Full flow velocities less than 2.0 feet per second or slopes less than the minimum slope of the smallest pipe which can accommodate the design flow may be considered for installations requiring deep or continuous rock excavation. The following minimum slopes of gravity sewers shall be provided:

| Sewer Size | Minimum Slope (ft/100 ft.) | Flow (mgd) |
|------------|----------------------------|------------|
| 8" | 0.400 | 0.49 |
| 10" | 0.280 | 0.75 |
| 12" | 0.220 | 1.07 |
| 14" | 0.170 | 1.43 |
| 15" | 0.150 | 1.61 |
| 16" | 0.140 | 1.85 |
| 18" | 0.120 | 2.35 |
| 21" | 0.100 | 3.23 |
| 24" | 0.080 | 4.13 |

- E. Uniform Slope – Sewers shall be laid with uniform slope between manholes.
- F. Steep Slope Protection - Sewers on 20 percent slope or greater shall be anchored securely with concrete anchors or equal, spaced as follows:
- 1) Not over 36 feet center to center on grades 20 percent and up to 35 percent.
 - 2) Not over 24 feet center to center on grades 35 percent and up to 50 percent.
 - 3) Not over 16 feet center to center on grades 50 percent and over.
- G. Alignment – Gravity sewers 24 inches or less in diameter shall be laid with straight alignment between manholes.
- H. Changes in Size – When a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. If possible, place the top of the pipes at the same location. Any alternate approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.
- I. High Velocity Protection – Where flow velocities greater than 15 feet per second may be attained, special provisions shall be made to protect against pipe displacement, erosion, and impact. Proper thrust restraint shall be provided at all locations where a change in flow velocity or direction occurs.
- J. Manholes
- 1) Location – Manholes shall be installed on gravity sewers as follows:
 - a) At the end of each sewer line; (see K-Cleanouts)
 - b) At all changes in size, slope, or alignment;
 - c) At all sewer pipe intersections (except service connections);
 - d) At intervals not exceeding 400 feet for sewers 15 inch or less and 500 feet for sewers 16 inches to 24 inches.

- 2) Drop Pipe Manholes – A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the exit pipe flow line. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to provide a flow directing channel to the outlet sewer to prevent solids deposition. Drop manholes should be constructed with an inside drop unless an outside drop is approved by the City.
- 3) Diameter – The minimum inside diameter of manholes shall be 48 inches. The minimum diameter of manhole access openings shall be 24 inches. For manholes with an inside drop, the inside diameter shall be 60 inches.
- 4) Construction – Manholes shall be of precast concrete sidewall with integrally precast base and bottom sidewall unit. Manhole lift holes and grade adjustment rings shall be sealed with non-shrinking grout or other material approved by the Engineer. However with approval of the City Engineer, if circumstances such as installation over an existing sewer or when orientation of a line must be established in the field, a poured in place concrete base may be allowed.
- 5) Watertightness – Joints in the manhole sidewall shall be rubber gasket type conforming to ASTM C443, to provide a watertight connection. Pipe connections to manholes shall comply with ASTM C923 and shall be “A-Lok” compression ring or boot type or as approved by the Engineer. Manholes shall have internal chimney seals that conform to ASTM C923. Pipe connections shall accommodate differential settlement between the pipes and the manhole and remain watertight. Any irregularities in the side wall joints shall be sealed with Kent Seal (or equal), mastic, and/or wrapped with Cretex Manhole Joint Wrap (or equal) to assure watertightness.
- 6) Frame and Cover – Manhole frames shall have a minimum clear opening of 24 inches. Manhole covers shall have a “T” shaped watertight gasket and concealed pickhole. Manhole frame and cover assemblies subject to vehicular traffic shall be rated for traffic loads. Standard manhole frames and covers shall be Neenah R-1642-A, or approved equal. The frame shall be sealed to the concrete manhole cone, flat top or spacers with Kent Seal, or equal. Pick holes for cover removal shall permit easy removal with standard tools.

Watertight cover assemblies with tee gasket and bolted lid shall be installed whenever the manhole type may be flooded by high water or be subject to inundation on a floodplain or by displacement due to sewer surcharging. Manhole frame and covers with bolted and gasketed lid shall be Neenah R-1919-F or approved equal.

Flow Channel – The flow channel straight through a manhole should be made to conform as closely as possible in shape and slope to that of the connecting sewers. The channel walls should be formed or shaped to the full height of the crown of the outlet sewer in such manner to not obstruct maintenance, inspection, or flow in the sewers. When curved flow channels are specified in manholes, including branch inlets, minimum slopes indicated in Section 6.D should be increased to maintain acceptable flow, 0.10 foot minimum drop from inlet(s) to outlets.

Bench – A bench shall be provided on each side of any/all manhole channel. The bench shall be sloped at no less than 0.5 inch per foot. No connecting sewer or sewer service lines or drop manhole shall discharge on to the surface of a bench; a flow channel shall be installed.

K. Cleanouts – Cleanouts may be permitted for special conditions and shall not be substituted for manholes nor installed at the end of sewers greater than 150 feet in length when approved by the Engineer, City, and IEPA.

L. Protection of Water Supplies

- 1) Cross Connections – There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto, which would permit the passage of any wastewater or polluted water into the potable water supply. No water pipe shall pass through or come into contact with any part of a sewer manhole.
- 2) Wells and Below Ground Storage Facilities– Gravity sewers constructed of standard sewer materials shall not be laid within 75 feet of a public well or 50 feet of a private well or below ground level finished storage facility. Gravity sewers constructed of water main materials shall not be laid within 25 feet of a well or below ground level water storage facility. Sewer force mains constructed of water main materials shall not be laid within 75 feet of a public well or 50 feet of a private well or below ground level water storage facility. Force mains constructed of other materials shall not be laid within 400 feet of a public well or 50 feet of a private well or below ground level storage facility.
- 3) Horizontal Separation of Gravity Sewers from Water Mains:
 - a) Water mains shall be located at least 10 feet horizontally from any existing or proposed drain, storm sewer, sanitary sewer, combined sewer or sewer service connection.
 - b) Water mains may be located closer than 10 feet to a sewer line when:
 - i. Local conditions prevent a lateral separation of 10 feet; and
 - ii. The water main invert is at least 18 inches above the crown of the sewer; and
 - iii. The water main is either in a separate trench or in the same trench on an undisturbed earth shelf located to one side of the sewer.
 - c) When it is impossible to meet 3).a or 3).b above, both the water main and sewer shall be constructed of slip-on or mechanical joint cast or ductile iron pipe, PVC pipe, or HDPE pipe equivalent to water main standards of construction. The sewer shall be pressure tested to the maximum expected surcharge head before backfilling.
- 4) Separation of Sewer Force Mains from Water Mains:
 - a) Force mains shall not be installed over water mains. There shall be at least a ten (10) foot horizontal separation between water mains and sewer force mains. There shall be an eighteen (18) inch vertical separation between the invert of the water main and the crown of the force main.
- 5) Vertical Separation Water Mains and Sewers:
 - a) A water main shall be separated from a sewer so that its invert is a minimum of 18 inches above the crown of the sewer whenever water mains cross sanitary sewers or sewer service connections. The vertical separation shall be maintained for that portion of the water main located within ten feet horizontally of any sewer or drain crossed. A length of water main pipe shall be centered over the sewer to be crossed with joints equidistant from the sewer or drain.
 - b) Both the water main and sewer shall be constructed of slip-on or mechanical joint cast or ductile iron pipe, prestressed concrete pipe, PVC pipe, or HDPE pipe equivalent to water main standards of construction when:
 - i. It is impossible to obtain the proper vertical separation as described in 5).a above; or
 - ii. The water main passes under a sewer drain.

- c) Vertical separation of 18 inches between the invert of the sewer and the crown of the water main shall be maintained where a water main crosses under a sewer. Support the sewer to prevent settling and breaking the water main, as shown on the Plans or as approved by the Engineer.
 - d) Construction of water main quality pipe shall extend on each side of the crossing until the perpendicular distance from the water main to the sewer is at least 10 feet.
- M. Connection of Dissimilar Pipe or Flexibility – Suitable couplings complying with ASTM C1173 shall be used when joining sewers of dissimilar materials to provide flexibility. Joints connecting dissimilar pipe materials shall be subject to the same infiltration and air testing standards as applied to all other pipe joints.
- N. Inverted Siphon –Use of inverted siphons should be discouraged where initial average flows will not be sufficient to secure adequate velocities to prevent deposition of suspended solid and where other practical alternatives exist. With the approval of the Engineer, if conditions leave no reasonable alternative to the use of an inverted siphon, the siphon shall have not less than 2 barrels, each with a minimum size of 6 inches and shall be provided with necessary appurtenances for convenient flushing and maintenance. The manholes shall have adequate clearance for cleaning equipment and, in general, sufficient head shall be provided and pipe sizes selected to secure velocities of at least 3.0 feet per second for design average flows. The inlet and outlet details shall be arranged so that the normal flow is diverted to one barrel and so that either barrel may be cut out of service for cleaning. The vertical alignment should permit cleaning and maintenance.
- O. Sewer Crossing Under a Waterway – The top of all sewers entering or crossing streams shall be at a depth below the natural bottom of the stream bed sufficient to protect the line. A minimum of 2 feet of cover is required where the sewer is located in rock or cased. The minimum cover shall be 3 feet where the sewer is located under a continuous flow stream. Minimum cover for other drainage ways shall be 4 feet.

Sewers, manholes, or other structures shall be located so that they do not interfere with the free discharge of flood flows of a stream. Sewers located along streams shall be constructed outside of the stream bed.

Sewers crossing flowing streams shall be constructed of AWWA C900/905 DR18 PVC with restrained joints. Sewers crossing streams shall be anchored to resist horizontal forces using PVC/steel casing, concrete encasement, and/or riprap. Sewer systems shall be designed to minimize the number of stream crossings. Where used, stream crossings shall be designed as perpendicular to the stream as possible. Construction methods that will minimize siltation shall be employed. Material used to backfill a stream crossing trench shall be crushed stone and riprap that will not cause siltation. Upon completion of construction the stream bed shall be returned as soon as possible to its original condition. The stream banks shall be riprapped to prevent erosion. The Design Engineer shall indicate the method or methods to be employed in the construction of sewers in or near a stream to provide adequate control of siltation and erosion.

Stream crossing construction may require special floodplain construction permitting. The IEPA shall be consulted to determine if such permitting is required.

- P. Floatation – Manholes to be installed in areas of high groundwater or subject to flooding shall be designed to prevent floatation. Extended bases shall be installed to counteract buoyancy forces.

- Q. Manhole Installation In Existing Sewers – Manholes installed into existing sewer lines shall conform to the Part III requirements including an integrally precast base and bottom sidewall section, A-Lok sewer connections, semi-circular invert, steps, gasketed sidewall, cone or flat top, up to 12 inches of spacers, and a gasketed frame and cover. Two stubs of sewer shall be installed into the manhole connections. These sewer stubs shall be connected to the existing sewer with flexible couplings as specified in Part III.

CITY OF EAST DUBUQUE, ILLINOIS
WASTEWATER COLLECTION SYSTEM REQUIREMENTS

PART II
CONSTRUCTION SPECIFICATIONS FOR
SITE PREPARATION, EXCAVATION AND BACKFILL

1. GENERAL

- A. The project site shall be kept free from ponding water due to construction operations at all times during the progress of the work. The contractor shall make arrangements for disposal of all water and wastewater received at the site from temporary connections or stoppages.
- B. The contractor shall strip topsoil and separately store them to provide topsoil replacement. All obstructions such as culvert pipe, signs, shrubbery, and fences shall be removed and stored for replacement upon completion of construction. The contractor shall provide temporary fencing if necessary to control livestock or to prevent accidents until permanent fencing is restored.
- C. Site preparation, excavation, and backfill for sanitary sewer construction shall be in accordance with these specifications and with the requirements of Illinois Environmental Protection Agency (IEPA).

2. SCOPE

- A. Provide the labor, material, facilities, and administration as required to complete all work covered by this section.

3. EXISTING UTILITIES AND CONDITIONS

- A. Location – The contractor shall be fully responsible for liaison with owners of existing facilities encountered during the construction of wastewater collection improvements and extensions. The contractor shall obtain and/or verify the location of all utilities.
- B. Protection – All existing utilities shall be protected by the contractor during the progress of the work. Such protection shall allow the utilities to remain in continuous operation. Any utility damaged by the contractor during the course of the work shall be repaired at the contractor's expense.
- C. Streets – The contractor shall conduct the work in a manner which will cause a minimum interruption to traffic. The contractor shall conform to requirements of the current Manual on Uniform Traffic Control Devices and IDOT Standard Details indicating that a street is closed or full use is restricted and place necessary control and detour signs for the proper maintenance of traffic. Prior to the closing of any street the contractor shall notify city officials, police, fire department, sheriff, and schools. If county roads will be affected, the contractor shall comply with county construction permit requirements.

4. LINE AND SLOPE

- A. Laser – Gravity sanitary sewer shall be installed utilizing an in-pipe laser to maintain alignment and slope.

- B. Line and Slope Stakes – The Design Engineer shall place alignment and slope control stakes for the construction of sanitary sewers. The contractor shall be responsible for continuously checking the alignment and slope of the laser beam and the pipe. The contractor shall be responsible for protecting the original line and grade control stakes set by the Design Engineer.
- C. Obstruction to Alignment and Slope - Whenever obstructions are encountered during the progress of the work and interfere to such an extent that an alteration in the plans is required, the Design Engineer shall have the authority to change the plans and order a deviation from the alignment and slope or arrange for the removal, relocation, or reconstruction of the obstructions with the approval of the Engineer and the City.

5. EXCAVATION

- A. General – The ground shall be excavated by the open trench method to the depth required except where boring is required or desired. Excavated material suitable for use as backfill material shall be piled in an orderly manner at a sufficient distance back from the edge of the trench to avoid rollback, slides or cave-ins.
- B. Width of Trench – The width of the trench shall be sufficient to allow the pipe to be installed and joined and to allow the embedment material to be placed and properly compacted. At least 6 inches of clear space is required on each side of the pipe to permit compaction of embedment material.

The width of the trench at ground surface shall not exceed that required to be consistent with safety requirements. A trench box shall be used for safety and to minimize the trench width.

- C. Extent of Open Trench – Trench excavation shall not precede completed gravity sewer pipe installation by more than 200 feet.
- D. Trench Bottom – Rock, boulders and large stones shall be removed from the trench to provide a clearance of at least 6 inches below and around all parts of the pipe and pipe appurtenances. The space between the outside of the pipe and the bottom and sides of the excavation shall be filled with compacted embedment materials.
- E. Embedment – All embedment material for sewer pipe including bedding, haunching, and initial backfill to 12 inches above the top of the pipe shall be compacted to 95% of maximum standard Proctor density.
- F. Over-Excavation – Should the excavation continue beyond or below the alignment or elevations required, all such excavated space shall be backfilled with compacted embedment material.
- G. Excavation in Poor Soil – If the trench bottom is found to be unstable or to be composed of material which includes ashes, cinders, refuse, vegetable or other organic matter or large pieces or fragments of inorganic material or any material that in the judgment of the Engineer should be removed, such unsuitable material shall be excavated and removed to the width and depth approved by the Engineer. The area from which the unsuitable material was removed shall be filled with compacted foundation stone approved by the Engineer.
- H. Rock Excavation – Rock excavation shall consist of the excavation from the trench of boulders or concrete pieces 1/2 cu yd in volume or greater and all rock in ledges, bedded deposits and conglomerate deposits exhibiting the physical characteristics and difficulty of rock removal. Boulders and pieces of concrete or masonry shall not be classified as rock unless larger than 1/2 cubic yard.

Rock shall be removed from the trench to provide the required 6 inch minimum clearance between any portion of the pipe or appurtenance and the rock. The resulting space shall be backfilled with compacted select granular material approved by the Engineer. The surface of the rock excavation shall be free from projecting points, ribs, crevices or undrained pockets. The method of rock removal shall be the option of the Contractor. However, excessive blasting or overshooting will not be permitted. The contractor shall comply with all applicable local, state, and federal safety codes and requirements. The contractor shall be responsible for securing all permits required by law for blasting operations and any additional hazard insurance required. All rock excavation operations shall precede laying of the pipe by at least 100 feet. No blasting shall be undertaken by the contractor until the contractor has notified the Engineer and City.

6. BORING

- A. Bored Sections – Steel casing pipe less than 36 inch in diameter shall be bored. Proper alignment and slope shall be maintained at all times. Excavation shall not precede the boring operation by a distance more than is necessary. When a casing pipe is used, the carrier pipe shall be AWWA C900/905 DR18 PVC pipe supported on stainless steel casing spacers installed per manufacturer recommendations. The ends of the casing pipe shall be sealed with end seals or a double wrap of woven geotextile secured to the casing and carrier with insulated copper wire or stainless steel bands.

7. SHEETING, SHORING AND BRACING

- A. General – Sheeting, shoring, a trench box, or bracing shall be provided as required by governing federal or state laws and regulations, and as may be necessary to protect life, property, or the work. Trench wall stabilization shall remain in place until backfilling of the trench progresses to the point at which no damage or accident will result from its movement or removal. Trench sheeting shall be left in place below the top of the pipe. The use of a trench box is preferred to sheeting.

8. DEWATERING

- A. General – Trenches and excavations shall be kept free from water which, in the opinion of the Engineer, would in any way impair the quality of the work being performed. Methods and materials shall be provided for handling such water encountered during the progress of the work. The method of disposal of such water shall be subject to comply with state environmental regulations. In no case shall a sanitary sewer be used for the disposal of such water, unless approved by the City.

9. BACKFILL

- A. General – The trench shall not be backfilled until the pipe elevations, gradient, alignment, and joints have been checked by the contractor. The pipe bedding, haunching, and initial backfill to 12 inches above the top of the pipe shall be as required to provide pipe support and load carrying capacity. The space between the utility pipe and the bottom and the sides of the trench shall be backfilled with required and approved materials. All materials shall be thoroughly compacted by hand for the full width of the trench to a depth of 12 inches above the top of the pipe. The backfill material shall contain no rocks or boulders and shall be free from cinders, ashes, roots, refuse, or organic material.

Consistent with pipe protection requirements, the remainder of the backfilling operation shall proceed by mechanical means in layers not to exceed 12 inches (loose). This backfill material shall contain no rock or stones greater than 3 inches in their greatest dimension for a distance of 2

feet above the top of the pipe. No rock or rock excavation debris shall be placed within the upper 12 inches of the trench. Rock or rock excavation debris may be used in the remainder of the trench provided that it is separated and arranged so that no interference with proper backfill and no excessive settlement will result. Trench excavation backfill material shall be compacted to 88% of maximum standard Proctor density.

All backfill material shall be carefully placed in the trench to avoid movement or damage to the sewer pipe. The contractor shall be fully responsible for any backfill settlement which occurs. Jetting and flooding of backfill materials shall not be used.

- C. Select Backfill – Select granular backfill shall be placed and compacted to 95% standard Proctor density at plus or minus 2% of optimum moisture in those locations designated on the plans, and where the utility is constructed under or within 5 feet of pavement, sidewalk, driveways, and other utilities and structures. The select granular backfill material shall conform to Part III – 3H of these specifications.

The select granular backfill must have approval of the Engineer prior to its use. At the time of use, select granular backfill material shall be free from frozen lumps, and foreign materials that may become mixed with it during handling.

10. TREE REMOVAL

- A. General – Approval of the City shall be obtained prior to removing any trees. The contractor shall be responsible for removal and disposal of such approved trees from the work area and grubbing and removal of stumps and roots.

11. PAVEMENT REMOVAL

- A. General – Pavement shall be removed to a minimum of one (1) foot from the edge of the trench. Absolutely no under-cutting of pavement will be permitted. The pavement removal shall be conducted along straight lines approximately parallel to the centerline of the trench.
- B. Concrete Pavement and Drives – Concrete pavement and drives shall be removed to the adjacent existing joint or the concrete shall be sawed to a depth of at least 6 inches.
- C. Asphalt Pavement – Asphalt pavement shall be removed by full depth sawing with neat square edges.
- D. Sidewalk – Sidewalk shall be removed to the nearest joint beyond the minimum distance of one foot from the edge of the trench.
- E. Other Surfaces – Other types of surfaces may be removed by the machine used for excavating the trench.
- F. Disposal – The contractor shall be responsible for disposal of removed pavement and surplus excavated material.

12. PAVEMENT REPLACEMENT

- A. General – No permanent pavement may be restored unless the condition of the backfill will properly support the pavement without settlement. Approval to replace pavement will not relieve the contractor of responsibility for settlement.

- B. Replacement – The contractor shall restore/replace all pavement, sidewalks, curbing, and gutters (as well as other site features) removed or disturbed as a part of the work, to a condition equal to that before the work began (or better), unless approved otherwise in writing by the Engineer.
- C. Standards – If specifications for pavement restoration and/or replacement are not set forth by the City, the materials and installation shall conform to current edition of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, unless otherwise approved by the Engineer.

13. ACCESS DURING CONSTRUCTION

- A. General – A suitable means of access to property which abuts easements, streets, and roads involved in the construction of the project shall be maintained. Suitable access shall mean a roadway of sufficient width, free from ruts, potholes, and mudholes, and capable of carrying a passenger car without damage to the car. All adjoining property owners shall be notified by the contractor at least 24 hours in advance of a street closure. Whenever access must be denied due to construction operations, a suitable access shall be provided within 24 hours after that portion of the construction responsible for the access denial is completed. Whenever construction is halted due to inclement weather, weekends, holidays, or any other reason, a suitable access shall be provided for all adjoining property owners.

14. DISPOSAL OF DEBRIS AND REFUSE

- A. General - All surplus excavated material shall be disposed by the contractor. Such excess excavated material may be hauled to a site provided by the contractor. All rubbish, debris, and refuse shall be disposed at a proper disposal site.

15. SAFETY

- A. Neither the City nor the Engineer nor any of their employees will be responsible for the contractor's compliance with safety and health requirements and regulations.

CITY OF EAST DUBUQUE, ILLINOIS
WASTEWATER COLLECTION SYSTEM REQUIREMENTS
PART III
CONSTRUCTION SPECIFICATIONS
FOR SANITARY SEWER

1. GENERAL

- A. Reference to materials or systems herein by name, make, or catalog number is intended to establish a standard of quality, and not to limit competition; the words "or approved equal" are implied following each brand name.
- B. Sanitary sewer shall be constructed in accordance with these specifications which are to establish minimum requirements and with the requirements of Illinois Environmental Protection Agency (IEPA).

2. SCOPE

- A. Provide labor, material, facilities, and administration necessary to complete all work covered by these specifications in accordance with the best installation and construction techniques.

3. MATERIALS

A. Sanitary Sewer Pipe

- 1) Polyvinyl Chloride (PVC) Pipe To 30 Feet Deep – For sewers up to 30 feet deep (to flow line), all polyvinyl chloride plastic sewer pipe shall conform to the requirements of ASTM D3034 (6 inch to 15 inch) or ASTM F679 (18 inch and larger). The PVC sewer pipe shall have SDR 35 for depths to 20 feet and SDR 26 for depths to 30 feet. Pipe stiffness when measured at 5% deflection in accordance with ASTM D2412 shall be 46 psi for SDR 35 and 115 psi for SDR 26.
- 2) Polyvinyl Chloride (PVC) Pipe 30 to 40 Feet Deep – For sewers 30 to 40 feet deep (to flow line), influent pipes at pumping stations, inside casing for drainageway/stream crossings, and where required or desired, the polyvinyl chloride plastic sewer pipe shall conform to the requirements of AWWA C900 (8 inch through 12 inch) or C905 (14 inch and larger). The C900/905 PVC shall be DR 18 with a stiffness of 364 psi. All PVC pipe shall be USA made.
- 3) Ductile Iron Pipe (DIP) – Ductile iron pipe shall conform to ANSI A21.51 (AWWA C151), class thickness designed per ANSI A21.50 (AWWA 150), cement lined with bituminous coating per ANSI A21.4 (AWWA C104), with mechanical or rubber ring push-on joints per ANSI A21.11 (AWWA C111 and C600). Gray or ductile iron fittings, cement lined with bituminous coating per ANSI A21.4 (AWWA C104), shall conform to ANSI A21.11 (AWWA C111 and C600) for mechanical or rubber ring push-on joints or ANSI A21.10 or A21.53 (AWWA C110 or C153) for flanged joints. All DIP and ductile iron fittings shall be polyethylene encased per AWWA C105. The polyethylene shall be linear low density with a clear or green color. DIP shall be minimum class 350 in 4 inch to 12 inch and minimum class 250 in 14 inch to 24 inch. All DIP shall be USA made.

B. Sanitary Sewer Pipe Joints

- 1) Joint Lubricant – Sufficient joint lubricant shall be supplied by the pipe manufacturer and used in accordance with manufacturer's recommendations.

- 2) Polyvinyl Chloride Pipe Joints – The joints for ASTM D3034 and F679 PVC pipe shall be elastomeric - gasket bell end in accordance with ASTM D3212. Gasket material shall conform to ASTM F477. Joints for AWWA C900/905 PVC pipe shall comply with ASTM D3139. No solvent cement joints will be allowed.
- 3) Ductile Iron Joints – Joints for DIP shall be push-on type (pipe) and mechanical joints (fittings) with rubber gaskets in accordance with AWWA Specification C111. Field welding of ductile iron will not be allowed.
- 4) Transitions – Connections between dissimilar pipe materials or where required shall be made by using flexible watertight couplings with stainless steel shear rings such as Fernco, Mission or approved equal. Transition bushings shall be used as necessary. Flexible couplings shall comply with ASTM C1173.

C. Fittings

- 1) PVC Sewer Fittings – Branch fittings in PVC sewers shall be wyes only. All PVC fittings shall comply with ASTM F1336. The SDR of the fitting shall match the connecting pipe SDR/DR rating. Fittings for clean outs shall be SDR 26. Fittings for outside sewer drops shall be DR 18 and SDR 26 as indicated. Fittings shall have gasket joints per ASTM D3212 with gaskets per ASTM F477. Refer to Part IV. All fittings shall be USA made.
- 2) DIP Sewer Fittings – Branch fittings in DIP sewers shall be compact ductile iron tees conforming to AWWA C153 with mechanical joints per AWWA C111. Ductile iron fittings elsewhere if allowed, shall comply with AWWA C153 and have mechanical joints per AWWA C111. All ductile iron fittings shall have an interior coating as specified for DIP. All ductile iron fittings shall be USA made.

D. Manholes

- 1) General – Manholes shall be of precast concrete. The manhole base shall be integrally cast with the bottom sidewall section.
- 2) Manhole Bases – Manhole bases shall be an integral base and lower riser section according to ASTM C478. The integral base shall have a minimum thickness of 6 inches and be reinforced as required with reinforcing extended into the lower riser section.
- 3) Manhole Sidewall – Precast concrete manhole sidewall shall be manufactured in compliance with ASTM C478. The minimum inside diameter of manhole sidewall shall be 48 inches with 5 inch wall thickness. An eccentric cone shall be used at the top of manholes when the height is 6 feet or greater measured from the top of the cone to the sewer flowline. A flat top with eccentric opening shall be used for shallower manholes or when required elsewhere. Eccentric cones and flat tops shall have 24 inch minimum openings. Lift holes on precast manhole sections shall not penetrate the entire wall. Holes shall be filled with a nonshrinking cement grout to insure water tightness.
- 4) Larger Manholes – If manhole diameters larger than 48 inches are required to meet special conditions, the larger manholes shall conform to the requirements of these specifications.
- 5) Spacer Rings – The contractor shall provide concrete or high density polyethylene (HDPE) spacer rings on manholes as necessary to place the manhole cover in accordance with surface elevations. The height of spacer rings shall not exceed 12 inches. Spacer rings shall be sealed to the cone or flat top and casting.

- 6) Sewer Connections – Sewer pipe connections to manholes shall use a gasket conforming to ASTM C923, A-Lok, Press Seal PSX Direct Drive, or as approved by the Engineer. The angle between any inlet pipe and outlet pipe shall be 90 degrees or greater.
- 7) Joints – All joints between sidewall sections, spacer rings, and beneath the frame shall be sealed watertight. Joints between precast sections shall be designed for preformed flexible gaskets, rubber gaskets, butyl rope or other equivalent bituminous material to ensure a watertight joint and shall be as shown on the Plans. Preformed flexible gaskets to be used for sealing structure sections shall conform to the requirements of ASTM C990. Rubber gaskets shall conform to the requirements of ASTM C443.
- 8) Manhole Chimney Seal – All manholes shall have an internal chimney seal that complies with ASTM C923 and seal all joints between the cone or flat top and the frame casting. Chimney seals shall be installed per manufacturer requirements.
- 9) Manhole Steps – All manholes shall have manhole steps per ASTM C478 of copolymer polypropylene reinforced with a 1/2 inch steel reinforcing rod (ASTM A615 Grade 60). Steps shall be at uniform 12 inch centers unless otherwise approved. Steps shall be level and perpendicular with the wall. Steps shall comply with OSHA.
- 10) Frame and Cover – Standard manhole frames and covers shall be Neenah R-1642-A, or approved equal with a continuous self-sealing “T” gasket secured within a machined groove and a concealed pick hole. The frame shall be sealed to the concrete manhole cone, flat top, or spacers with an internal chimney seal and Kent Seal, or equal. Pick holes for cover removal shall permit easy use of standard tools. Bolt down cover assemblies shall be required on manholes subject to inundation or on a flood plain. Install Neenah R-1916-F or approved equal when sealed and bolt down covers are required.
- 11) Drop Manholes – A drop pipe should be provided for a sewer entering a manhole at 24 inches or more above the manhole invert. The drop shall be inside unless outside drops are approved by the City.
 - a) Outside drops shall be constructed using properly secured and supported PVC pipe and PVC fittings as shown.
 - b) Inside drops shall be constructed by installing a “half pipe” from the influent sewer center line to the manhole fillet. The diameter of the “half pipe” shall be 2 to 4 inches larger than the influent sewer. The “half pipe” shall be secured to the manhole sidewall with stainless steel straps and drill-in SST anchor bolts (minimum spacing at 2 feet and maximum spacing at 4 feet). The bottom of the “half pipe” shall be tapered to provide support and clearance for wastewater flow. Inside drop manholes shall have a minimum diameter of five (5) feet.
 - c) The influent sewer for outside or inside drops shall be PVC from the manhole to a standard trench (minimum 9 feet).

E. Cleanout

- 1) General – Cleanouts may be permitted for special conditions and shall not be substituted for manholes nor installed at the end of laterals greater than 150 feet in length when approved by the Engineer and the City. Terminal cleanouts shall be constructed so that flexible cleaning equipment can be passed through them. Clean out lids shall be bolted down to prevent entry of foreign objects. The diameter of the cleanout shall be the same as the sewer line. Sewers larger than 8 inches require a terminal manhole. Cleanouts shall be of SDR 26 PVC pipe and fittings for PVC sewer pipe. Refer to construction details.

- 2) Fittings – The change in direction from horizontal to diagonal at the cleanout shall be by the use of one 45 degree end fittings. Flexibility shall be provided by installing flexible couplings as shown in the detail.
- 3) End-of-Pipe Plug – An end-of-pipe plug shall be installed at the top of the clean-out pipe. The plug shall be Cherne Industries Gripper End-of-Pipe Gripper plugs with plastic plates, or equal.
- 4) Casting – The cleanout shall be terminated in a Neenah R-1642-A, or equal, frame and cover as shown.

F. Casing

- 1) General – Sewer lines installed under highways, structures, railroads or other locations require casing. Casing shall be installed by boring.
- 2) Carrier Pipe - Carrier pipe shall be PVC C900/905 with SST casing spacers installed per the spacer manufacturer.
- 3) Casing Pipe – Casing pipe shall be steel conforming to AWWA C200. The size of the casing pipe shall be as necessary to provide proper clearance for the carrier pipe. Wall thickness and grade shall be as necessary to withstand anticipated loads. Joints shall be fully welded. Casing pipe size and wall thickness shall be as approved by the Engineer.
- 4) Casing Fill – The annular space between the O.D. of the carrier pipe and the I.D. of the casing pipe shall not be filled unless required by the railroad. The ends shall be sealed with a double wrap of woven geotextile secured to casing and carrier with insulated copper wire or stainless steel bands or with Engineer approved end seals.
- 5) Carrier Pipe Support – Carrier pipe shall be installed into the casing pipe with stainless steel casing spacers, Cascade Waterworks CCS, or approved equal.
- 6) Other Requirements – When the casing and/or boring operations are to be completed on property, other than the right-of-way of the City, materials for casing pipe shall be as specified by the property owner (i.e. IDOT, county, utility, railroad). Permits shall be obtained from other agencies as appropriate and when required.

G. Concrete

- 1) General – Concrete for sanitary sewer construction shall be prepared at a ready mixed concrete plant in accordance with ASTM C94 or IDOT requirements. The concrete shall have a 28 day compressive strength of 4500 psi. Strength determination shall be in accordance with ASTM C39, unless otherwise approved by the Engineer. Concrete aggregate shall conform to ASTM C33 or IDOT requirements. Portland cement shall conform to ASTM C150 Type I or III. Water shall be potable. Concrete shall have a slump of 3 to 5 inches.

H. Sanitary Sewer Foundation, Bedding, Haunching, Initial Backfill, and Final Backfill

- 1) General – Sanitary sewer pipe embedment material shall include foundation, bedding, haunching, initial backfill, and final backfill. Trench cross-section terminology is indicated in the standard details for rigid pipe (DIP) and flexible pipe (PVC and HDPE).

- 2) Foundation Material – Foundation material, to the width and depths necessary, is required when the trench bottom is unstable. If suitable for conditions encountered, the pipe bedding material may be used for foundation material. Foundation stone shall be IDOT gradation CA2, CA4 or alternate gradation (3 inch maximum) as approved by Engineer.
- 3) Bedding And Haunching Material – The bedding and haunching stone material for sanitary sewers shall be either Select Granular Stone or Clean Stone.
 - a) Select Granular Stone – Sanitary sewer embedment stone including bedding, haunching, pipe zone, and initial backfill shall be IDOT Stone Gradation CA-6, CA-7, CA-9, CA-10, CA-18 or Engineer approved equivalent.
 - b) Clean Stone Embedment – Sanitary sewer embedment stone for use in wet trenches shall be coarse aggregate for Portland cement concrete per IDOT Section 1004.02. A screened but unwashed concrete coarse aggregate would be considered for approval by the City. The use of this clean or relatively clean product will require the installation of ground retarders if the sewer slope exceeds 2% in fine grained soil or in trenches in rock.
 - c) Groundwater Retarder Sand – The sand for groundwater retarders shall be concrete fine aggregate per IDOT Specification Section 1003.01 (FA 1 or FA 2) or approved equal
- 4) Initial Backfill – Initial backfill material shall be select granular material meeting the requirements above for Bedding and Haunching Material.
- 5) Final Backfill – Final backfill material shall be suitable material excavated from the trench, selected granular material meeting the requirements above for bedding and haunching materials.
- 6) Bedding, Haunching, Initial Backfill, and Final Backfill in Rock Excavation – In locations where rock is encountered, the rock shall be removed to the required depths indicated in the Plans. Select granular material shall be used to replace foundation, bedding, haunching, initial and final backfill to the extents of where rock excavation occurs.

4. PIPE INSTALLATION GENERAL

- A. Pipe installation shall commence only after the trench has been dewatered below the trench bottom, trench support is in place, and the bedding has been prepared. Pipe laying shall begin at the lowest point and the pipe shall be laid to line and gradient with the bell end upgrade. The pipe shall be laid at the line and levels required. Dewatering operations shall continue until backfill operations have been completed. No sewer shall be installed until the downstream sewer is placed unless otherwise approved by the Engineer.
- B. Pipe shall be handled in a manner that eliminates any possibility of high impact or point loading. Each pipe shall be given a thorough visual inspection at the time it is laid. Rejected pipe shall be promptly removed from the construction site.
- C. The contractor shall maintain vertical and horizontal alignment at all times by using an in-pipe laser. Survey line and elevation control stakes shall be placed at manholes and clean-outs (if allowed).
- D. Both ends of the pipes to be joined shall be wiped clean before joining operations are started. Extreme care must be exercised to ensure that the ends are clean and free from foreign material. Joints shall be prepared with lubricants as recommended by the manufacturer.

- E. All pipe shall be laid in position so as to maintain alignment and joint closures until sufficient backfill has been completed to adequately hold the pipe in place. Backfill shall commence downgrade.
- F. When pipe installation is not in progress, the forward end of the pipe shall be kept tightly closed with a temporary watertight plug. The interior of the sewer shall, as the work progresses, be cleared of all dirt, jointing materials, and other materials of every description.
- G. Pressure must be applied to each pipe as it is laid by a wedge, cable or other mechanical means to ensure that the spigot is properly inserted into the bell. Pressure shall not be applied to the PVC bells. Care shall be taken so that the pipes are not pulled apart or damaged during construction when using a "trench" box.
- H. When a new sewer is to be connected to an existing sewer not terminating in a manhole, the contractor shall uncover the end of the existing sewer to allow any adjustments in line and gradient to be made before any pipe is laid.
- I. Gravity sewer pipe shall be loaded and unloaded so as to avoid shock or damage. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

5. POLYVINYL CHLORIDE (PVC) INSTALLATION

- A. General – The installation of PVC sewer pipe shall be in accordance with ASTM D2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications" and the recommendations of the pipe manufacturer, except as modified herein. Copies of ASTM D2321 are available from the pipe supplier or ASTM. The trench shall be prepared in accordance with Part II Construction Specifications for Site Preparation, Excavation and Backfill.
- B. Pipe Handling and Inspection – Upon receipt, the contractor shall carefully inspect all pipe for damage. Defective pipe must be rejected and removed from the site.

PVC pipe shall be unloaded in units or individually. If the PVC pipe is unloaded in units, unloading should be done according to manufacturer suggestions and cautions with recommended equipment. When unloading pipe individually, care shall be taken to ensure that pipe is not dropped or damaged. As the temperature drops, the flexibility and impact resistance of PVC pipe is reduced. Extra care shall be taken in handling during cold weather. PVC pipe shall be stockpiled on a flat base, so bending or joint point loads are avoided. If pipe is to be stored outside for periods longer than 60 days, the pipe shall be covered to protect it from prolonged exposure to the sun. Cover with canvas or other opaque material.

Gaskets shall be kept clean, away from oil, grease, excessive heat, and electric motors which produce ozone.

- C. Trench Width – The minimum trench width shall be 12 inches greater than the O.D. of the PVC sewer pipe. Maximum trench width should not exceed the outside diameter of the pipe plus 2 feet. Trench width is measured at the top of the pipe.
- D. Trench Depth – PVC sewer pipe depth of cover shall be at least 4 feet, but no more than 20 feet for SDR 35 and 30 feet for SDR 26. For deeper applications, C900 PVC or DIP shall be used (to 40 feet).

- E. Bedding – All embedment material including bedding, haunching, and initial backfill to 12 inches above the top of the pipe for all depths and shall be crushed stone material as specified. Embedment material shall be compacted to 95% of maximum standard Proctor density.
- F. Pipe Laying – Care should be taken when handling PVC pipe to avoid damage. Pipe shall not be dropped on the surface or into the trench. The PVC pipe joints shall be elastomeric gasket type assembled in accordance with manufacturer recommendations (cemented joints are not acceptable). Joints shall be cleaned prior to assembly and properly lubricated. Insert spigot only to the depth marked on the pipe. Wood blocking shall be used to push the joint "home". Extreme care must be taken to assure that the haunches of the pipe are totally filled with embedment material and that no voids are left. The embedment material and backfill within three feet of the pipe shall be free from large lumps or stones. Embedment material shall be compacted to the degree specified.

6. DUCTILE IRON PIPE (DIP) INSTALLATION

- A. General – The installation of DIP sewer shall be in accordance with applicable portions of AWWA C600 and the recommendations of the Ductile Iron Pipe Research Association. Copies of AWWA C600 are available from the pipe supplier or AWWA. The trench shall be prepared in accordance with Part II Construction Specifications for Site Preparation, Excavation and Backfill.
- B. Pipe Handling and Inspection – All pipe should be carefully inspected. Pipe unloading shall be accomplished using slings or skids. Under no circumstances should pipe be dropped or rolled against pipe already on the ground. Care should be exercised to avoid damaging coatings or linings. Defective pipe must be rejected and removed from the site.
- C. Installation Conditions – DIP shall be installed in a trench as required for PVC sewers. For depths of cover of 4 feet minimum to 20 feet maximum the DIP shall be embedded in Special Backfill or clean stone from 4 inches below the pipe to 12 inches above the top of the pipe. For cover depths that exceed 20 feet, the embedment shall include bedding, haunching, pipe zone, and initial backfill. The embedment shall exceed the "deep bury" trench requirements of ASTM A746.
- D. Pipe Laying – Proper implements shall be used for handling and laying pipe to prevent damage to the pipe, coating, and lining. Under no circumstances shall the DIP be dropped into the trench. Lumps, blisters, and excess coating shall be removed from the socket and plain end of each pipe and the joining surfaces wiped clean. Properly install the gasket in accordance with the manufacturer's instructions and apply sufficient lubricant for push-on joints. Make certain that the plain end is beveled for push-on joints. Push the plain end home into the socket. Backfill the pipe in accordance with the required laying condition type and surface to be constructed.

7. MANHOLE CONSTRUCTION

A. Manhole Bases

- 1) Precast Manhole Bases – Precast manhole base and bottom sidewall sections shall be placed on an unyielding foundation at an elevation to allow sewer connection at the correct elevations. Concrete manhole fillet/invert shall be precast (A-Lok) unless otherwise approved. The top of manhole fillets inverts shall extend to above the centerline of the pipe. The invert channels shall be smooth and semi-circular in shape conforming to the inside diameter of the adjacent sewer section. Changes in alignment shall be made with a smooth

curve. Changes in size and slope of the channels shall be made gradually and evenly. The bench shall slope at a minimum 1/2 inch per foot. Invert channels shall be provided for interior drops.

B. Manhole Sidewall

- 1) Manhole sidewall shall be placed spigot up. The rubber gasket shall be evenly installed and receive sufficient joint lubricant prior to assembly (if lubrication is required). Joint assembly shall be in accordance with manufacturer recommendations. Alternate sealing methods shall be done in accordance with Standard Specifications for Water and Sewer Construction in Illinois. All joint irregularities and non-rubber gasket joints shall be filled with a mastic joint sealer. Manhole sidewall shall be assembled so that, in general, the steps are on the upstream side of the manhole and the steps are in line and directly below the cone or flat top opening. Backfill shall be carefully placed and compacted around manholes to minimize settlement. Areas around manholes shall be graded to prevent ponding of water. Special care shall be taken in placing initial backfill material around sewers so no shifting or movement occurs. All holes in precast elements shall be completely filled with non-shrinking cement grout.

- C. Spacer Rings – Spacer rings shall be provided as necessary between the top of the cone or flat top and the manhole frame so that the cover is placed at the surface elevation or an elevation specified on the drawings. The height of spacer rings shall not exceed 12 inches. Spacer rings shall be sealed to the cone or flat top. If future grade adjustment is contemplated, the contractor may be required to place a minimum height of spacer rings on manholes.
- D. Manhole Frame and Cover – Manhole frame and cover shall be placed on top of and sealed to manhole cones, spacers, or flat tops. The frame and cover shall be placed directly over the manhole steps. Minor height adjustment (i.e. without precast spacers) shall be done using concrete. Adjusting with wood is not acceptable.
- E. Chimney Seal – Interior chimney seals shall be of sufficient height to seal all joints between the frame and the manhole cone or flat top. The chimney seals shall prevent water entrance but allow for movement of the frame and cover.
- F. Special Manholes – Special manholes for shallow sewer depths, larger sewers, flat top manholes, etc., shall be as approved by the Engineer.
- G. Drop Manholes – The construction of drop manholes shall be in accordance with the specification details.

8. BACKFILLING

- A. General – The contractor shall not backfill trenches until sewer connections have been located and recorded, and the sewer elevations, gradient, alignment, joints, and manhole sections and bases have been reviewed. Backfilling of the trench shall be in accordance with Part II Construction Specification for Site Preparation, Excavation and Backfill. Should settlement of backfill material occur, the contractor shall be responsible for refilling, compacting, leveling off, and resurfacing settled areas.

9. TESTING

- A. General – After completion of construction, (except for possible vacuum manhole testing), testing shall be performed by the contractor in the presence of the Engineer. Prior to testing, all visible or

detectable leaks shall be sealed. Any deficiencies found by testing shall be corrected by the contractor at their expense and the repair/replacement work retested as required.

- B. PVC Sewer Deflection Testing – All PVC (plastic) sewer pipe shall be tested for deflection, no sooner than 30 days after final trench backfill. A rigid mandrel used for the deflection test shall have an outside diameter not less than 95% of the published ASTM specification base inside diameter or average inside diameter of the sewer being tested. The rigid mandrel must be pulled by hand. A properly calibrated electronic deflectometer may be used at the expense of the contractor. Pipe lines with deflection greater than 5% will not be accepted.
- C. Sewer Infiltration Testing – Sewer line infiltration testing shall be performed whenever the groundwater is 2 feet or more above the top of the pipe. No more than 4,000 feet of sewer may be tested at one time with the upper end of the section plugged and a V-notch weir installed at the lower end. The weir shall remain in place for at least 24 hours after the flow rate has stabilized and the infiltration flow rate recorded at that time. If the measured infiltration rate exceeds 200 gallons per day per inch diameter per mile of sewer, the section being tested will not be accepted. An allowance will be added for any service lines but no allowance will be permitted for manholes. The contractor shall determine the groundwater elevation. Where the pipe fails to meet or exceed the minimum test requirements, the contractor shall remedy the failure to the satisfaction of the Engineer and Owner and retest.
- D. Exfiltration Testing – When the groundwater elevation is below the pipe at the time of testing or when required by the Engineer, sewers and manholes shall be tested for exfiltration. The inlet of the upstream and downstream manholes shall be closed with watertight plugs. The sewer and the upstream manhole shall be filled with water until the elevation of the water in the upstream manhole is 2 feet higher than the top of the pipe in the line being tested or 2 feet above the existing groundwater in the trench, whichever is the higher elevation. The contractor shall determine the elevation of the groundwater. The exfiltration rate shall be determined by measuring the amount of water required to maintain the initial water elevation for one hour from the start of the test. If the measured exfiltration rate exceeds 240 gallons per day per inch diameter per mile of sewer (including manholes), the section being tested will not be accepted. An allowance will be added for any service lines and manholes if the exfiltration rate for manholes is tested separately. If the average groundwater elevation is more than 2 feet above the sewer line, the allowable leakage may be increased by 5% for each additional foot of head. Where the pipe fails to meet or exceed the minimum test requirements, the contractor shall remedy the failure to the satisfaction of the Engineer and Owner and retest.
- E. Alignment – All sewers shall be checked for alignment after completion of construction by laser beam or lamping. The alignment test shall be conducted by shining a light between manholes or by observing a laser beam. If the pipe interior shows poor alignment or displaced pipe or any other defect, the defects shall be repaired by the contractor at the contractor's expense and retested.
- F. Low Pressure Air Testing – Low pressure air testing shall be performed on all sanitary sewers (PVC and DIP). The testing shall be conducted in accordance with ASTM F1417 or Uni-Bell Plastic Pipe Association UNI-B-6. Air testing shall be performed by an individual familiar with the standards and the necessary safety precautions.

The sewer being air tested shall be clean. Both ends of the test section shall be plugged and the plugs properly braced. The groundwater elevation shall be determined by the contractor and the equivalent pressure of the groundwater over the top of the pipe shall be added to the test pressure. Air shall be added slowly to bring the pressure to 4.0 psig (plus the groundwater elevation adjustment). After an internal pressure of 4.0 psig (plus groundwater) is obtained, allow at least 2

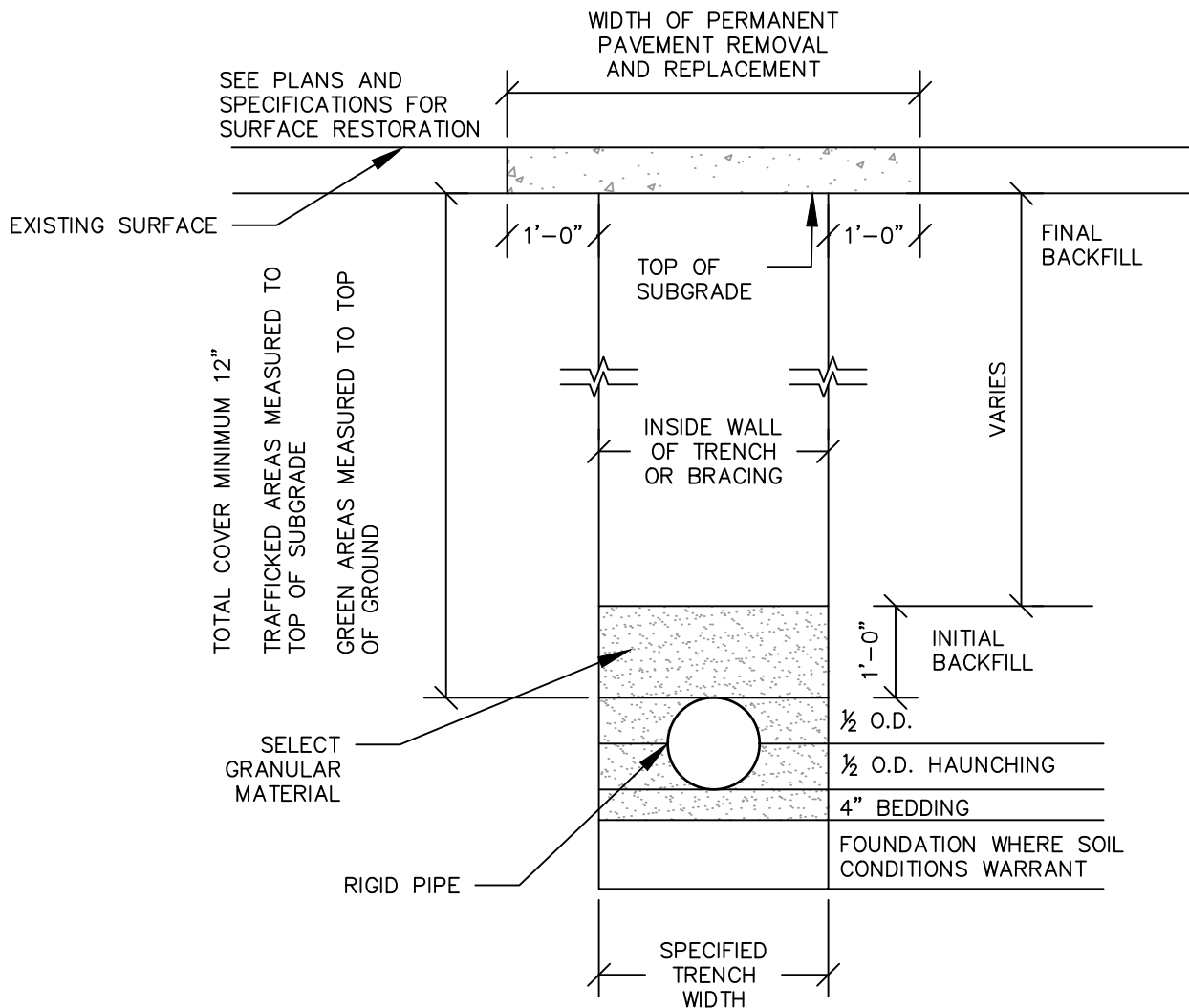
minutes for the temperature to stabilize, adding only the amount of air required to maintain the pressure. Measure the time for the pressure to decrease from 3.5 psig (plus groundwater) to 3.0 or 2.5 psig (plus groundwater), the time for the 0.5 or 1.0 psi drop in pressure must exceed the minimum established by the referenced standard.

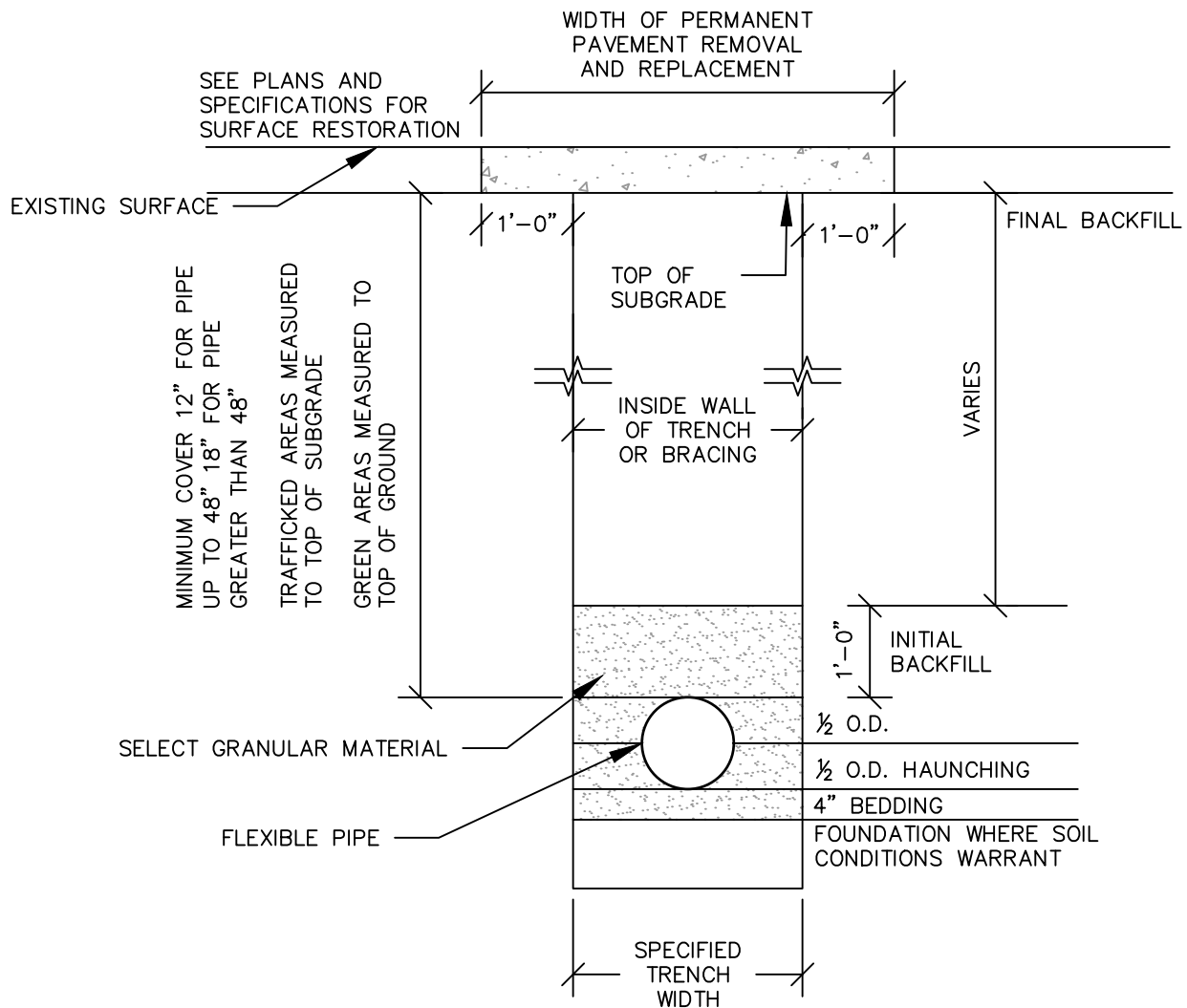
Safety precautions during air testing shall be taken, including bracing plugs, using a pressure regulator set at no more than 5.0 psi above the required test pressure, and preventing entry into manholes during testing.

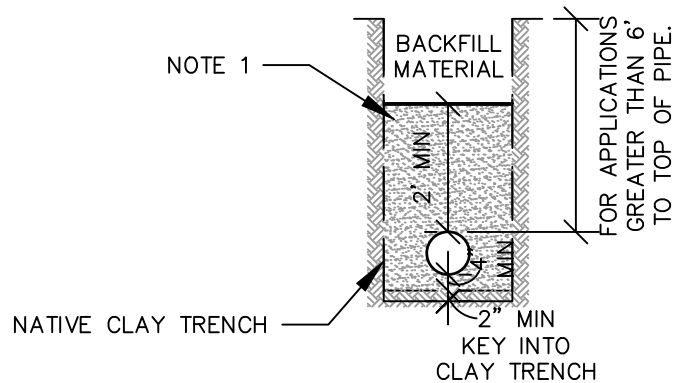
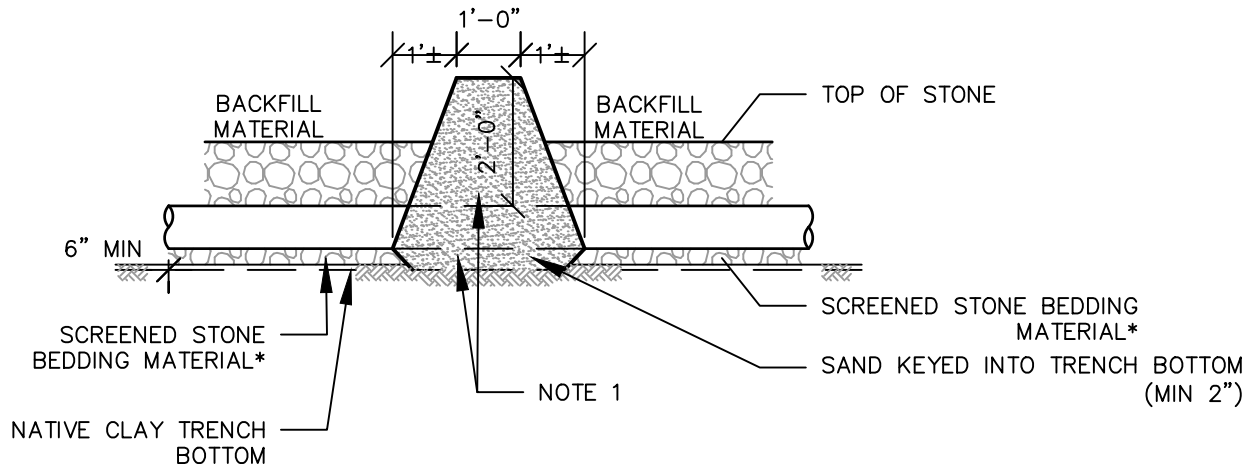
- G. Television Inspection – The City may perform an inspection of the completed sewer by closed circuit television. The cost of the televising shall be paid by the City unless the sewer fails to conform to the requirements of these specifications. The contractor may arrange for and pay for sewer televising to locate and identify defects.
- H. Manhole Vacuum Testing – If required on the Plans, manholes shall be tested by the Contractor or by others according to ASTM C1244. The Contractor shall repair any manholes that fail the testing.

10. CONSTRUCTION DETAILS

- A. Construction details are part of these standard specifications. The details include:
 - Rigid Pipe Installation Detail
 - Flexible Pipe Installation Detail
 - Groundwater Retarder
 - Sanitary Manhole
 - Flat Top Sanitary Manhole (Cast in Frame)
 - Flat Top Sanitary Manhole
 - Inside Drop Manhole
 - Outside Drop Manhole
 - Manhole No-Box Out
 - Cleanout
 - Stream Crossing







| SLOPE OF PIPE | RETARDER SPACING |
|---------------|----------------------------------|
| 0.03 - 2.00% | NOT REQUIRED |
| 2.00 - 3.00% | UPSTREAM SIDE OF MH |
| 3.00 - 5.00% | © MH AND MIDPOINT OF SEWER RUN |
| 5.00% + | © MH AND 3RD POINTS OF SEWER RUN |

*RETARDER NOT REQUIRED IF BEDDING STONE CONTAINS MORE THAN 20% PASSING THE #8 SEIVE.

NOTES

- ILLINOIS DOT FINE AGGREGATE FOR PORTLAND CEMENT CONCRETE AND MORTAR (FA 1 OR FA 2) PER SECTION 1003.02 OF IDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION OR APPROVED EQUIVALENT.

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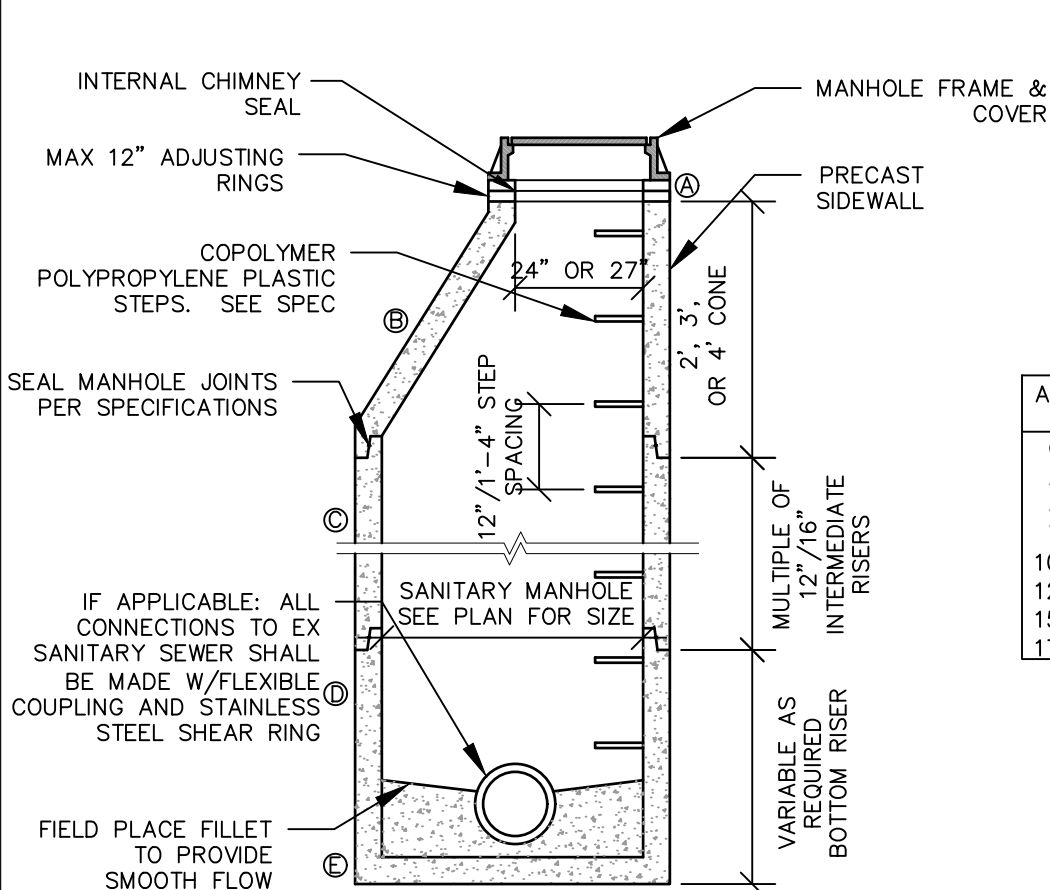
Project Description

GROUNDWATER RETARDER CITY OF EAST DUBUQUE, ILLINOIS

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Drawing Issue Information

Drawing No: E3
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175



FRAME & COVER TO BE NEENAH R-1642A OR EQUAL.
FRAMES WITH BOLT-DOWN LIDS SHALL BE NEENAH R-1916F

| AVERAGE GRADE | MINIMUM DROP THROUGH MANHOLE |
|---------------|------------------------------|
| 0.00 - 2.5% | 0.10' |
| 2.51 - 5.0% | 0.20' |
| 5.01 - 7.5% | 0.30' |
| 7.51 - 10.0% | 0.40' |
| 10.01 - 12.5% | 0.50' |
| 12.51 - 15.0% | 0.60' |
| 15.01 - 17.5% | 0.70' |
| 17.51 - 20.0% | 0.80' |

- Ⓐ ADJUSTING RINGS TO ADJUST TO FINAL GRADE. (MAX 12")
- Ⓑ ECCENTRIC MANHOLE CONE SECTION
- Ⓒ INTERMEDIATE SECTIONS ARE USED IN MULTIPLES OF 12" OR 16" INCREMENTS AS REQUIRED.
- Ⓓ BOTTOM SECTION IS CAST TO A LENGTH REQUIRED TO MAKE THE PROPER MANHOLE HEIGHT AND HAS PIPE CONNECTIONS AS NEEDED.
- Ⓔ INTEGRALLY PRECAST BASE SECTION.

NOTE:
MANHOLES ARE MANUFACTURED IN ACCORDANCE WITH ASTM SPECIFICATION C478.

MANHOLES FURNISHED WITH OR WITHOUT STEPS AS REQUIRED.

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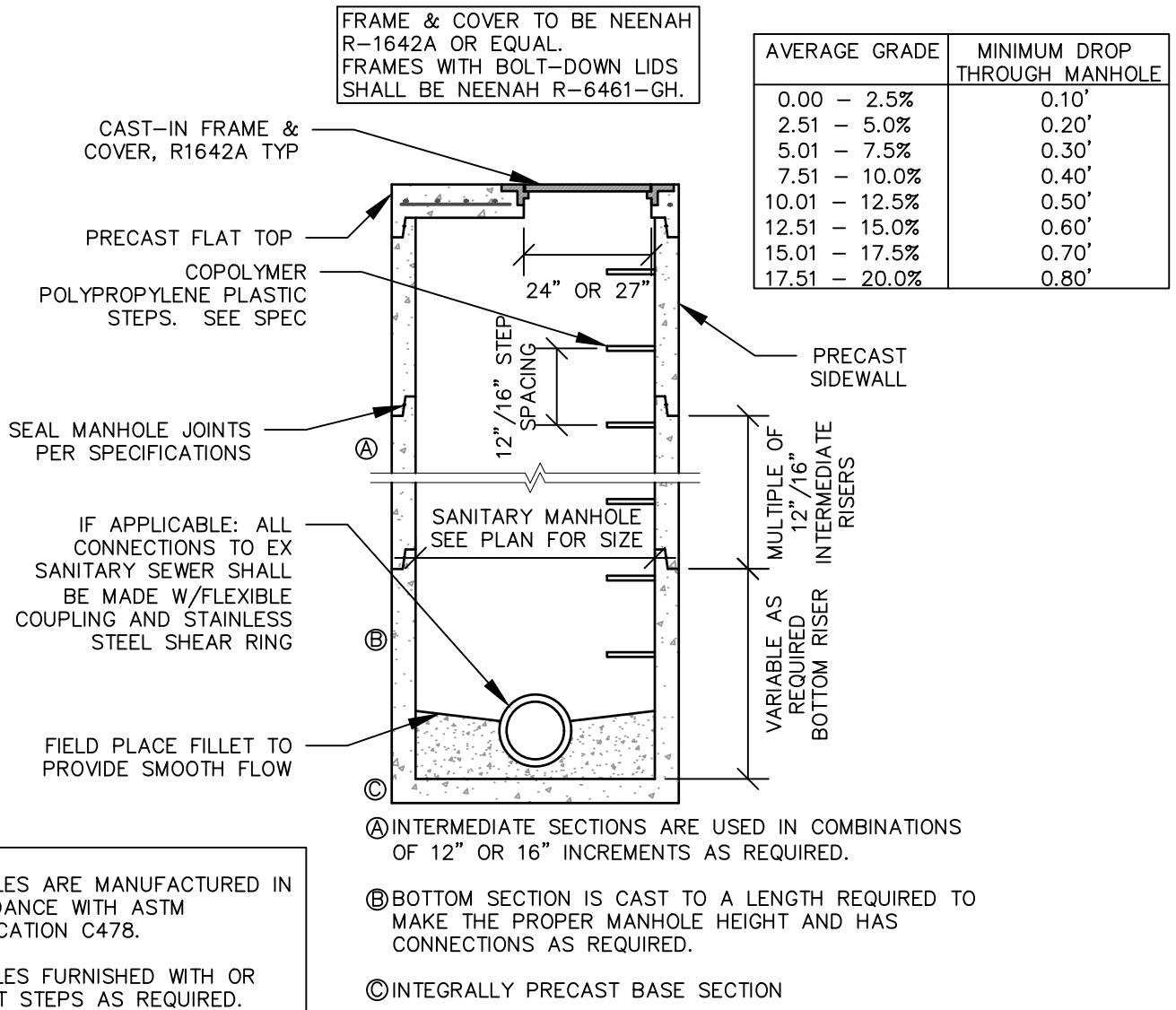
Project Description

SANITARY MANHOLE CITY OF EAST DUBUQUE, ILLINOIS

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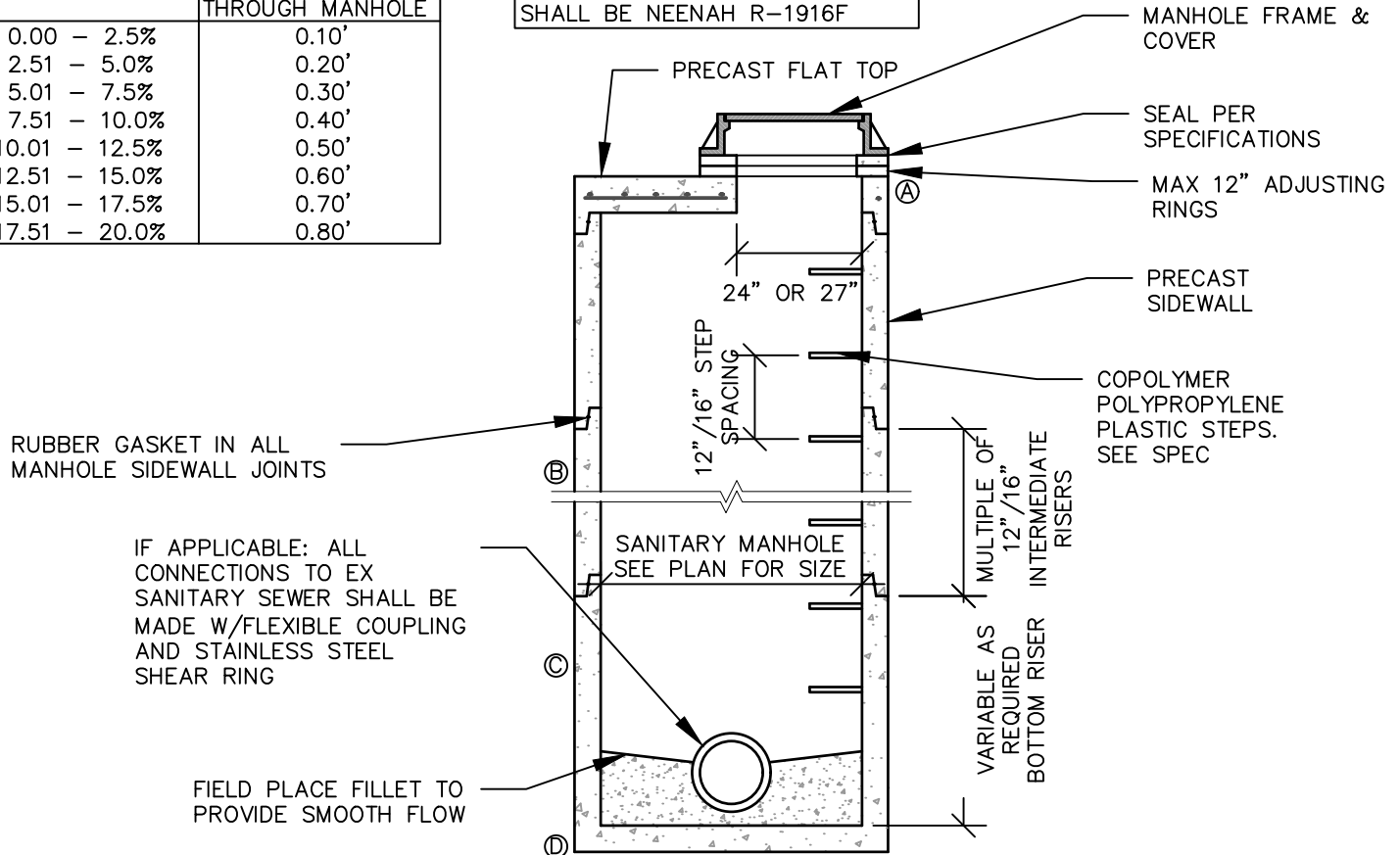
Drawing Issue Information

Drawing No: E4
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175



| AVERAGE GRADE | MINIMUM DROP THROUGH MANHOLE |
|---------------|------------------------------|
| 0.00 - 2.5% | 0.10' |
| 2.51 - 5.0% | 0.20' |
| 5.01 - 7.5% | 0.30' |
| 7.51 - 10.0% | 0.40' |
| 10.01 - 12.5% | 0.50' |
| 12.51 - 15.0% | 0.60' |
| 15.01 - 17.5% | 0.70' |
| 17.51 - 20.0% | 0.80' |

FRAME & COVER TO BE NEENAH R-1642A OR EQUAL.
FRAMES WITH BOLT-DOWN LIDS SHALL BE NEENAH R-1916F



NOTE:
MANHOLES ARE MANUFACTURED IN ACCORDANCE WITH ASTM SPECIFICATION C478.

MANHOLES FURNISHED WITH OR WITHOUT STEPS AS REQUIRED.

Ⓐ ADJUSTING RINGS TO ADJUST TO FINAL GRADE (MAX 12")

Ⓑ INTERMEDIATE SECTIONS ARE USED IN COMBINATIONS OF 12" OR 16" INCREMENTS AS REQUIRED.

Ⓒ BOTTOM SECTION IS CAST TO A LENGTH REQUIRED TO MAKE THE PROPER MANHOLE HEIGHT AND HAS CONNECTIONS AS REQUIRED.

Ⓓ INTEGRALLY PRECAST BASE SECTION

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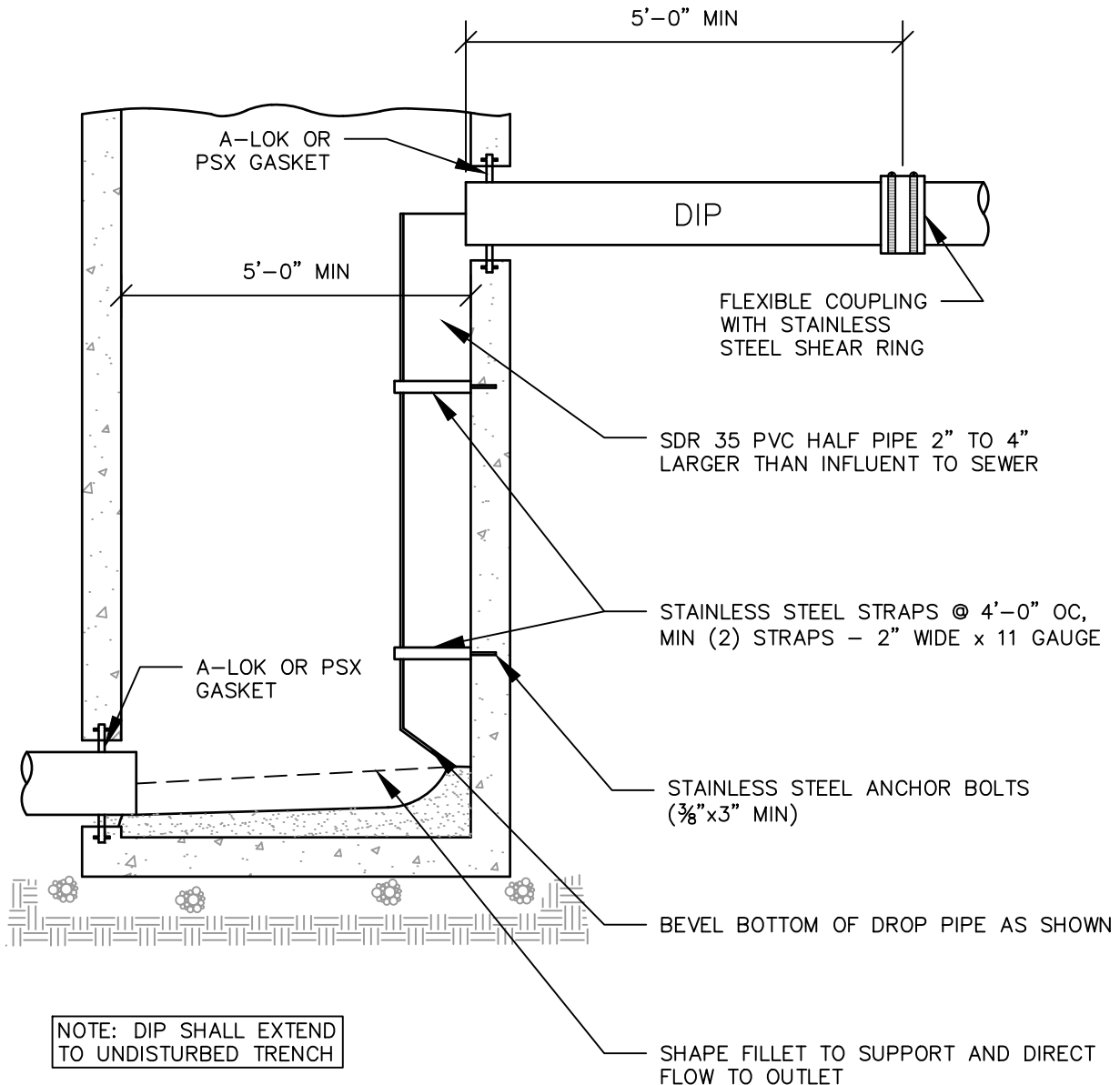
FLAT TOP MANHOLE CITY OF EAST DUBUQUE, ILLINOIS

Drawing Issue Information

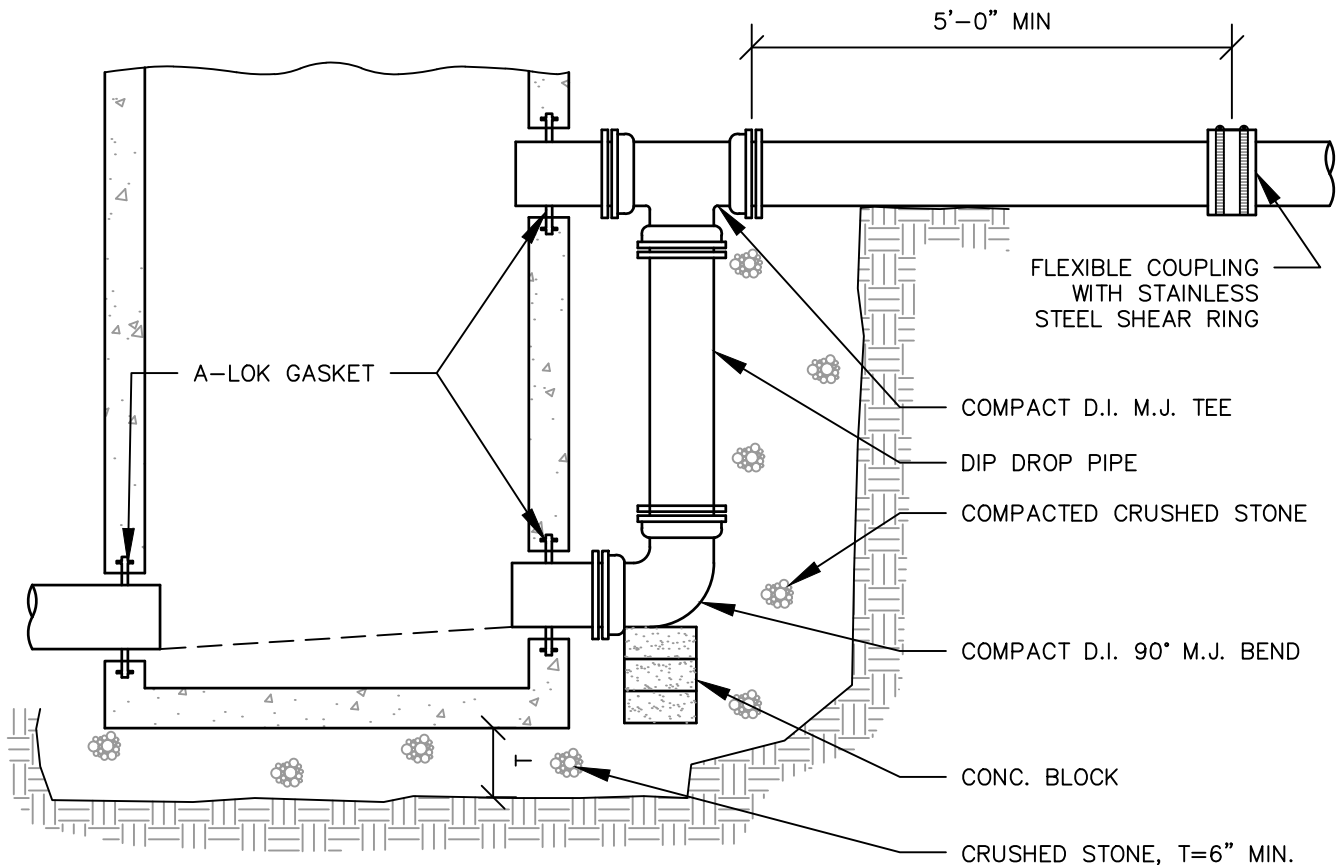
Drawing No: E6
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175

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| AVERAGE GRADE | MINIMUM DROP THROUGH MANHOLE |
|---------------|------------------------------|
| 0.00 – 2.5% | 0.10' |
| 2.51 – 5.0% | 0.20' |
| 5.01 – 7.5% | 0.30' |
| 7.51 – 10.0% | 0.40' |
| 10.01 – 12.5% | 0.50' |
| 12.51 – 15.0% | 0.60' |
| 15.01 – 17.5% | 0.70' |
| 17.51 – 20.0% | 0.80' |



| AVERAGE GRADE | MINIMUM DROP THROUGH MANHOLE |
|---------------|------------------------------|
| 0.00 – 2.5% | 0.10' |
| 2.51 – 5.0% | 0.20' |
| 5.01 – 7.5% | 0.30' |
| 7.51 – 10.0% | 0.40' |
| 10.01 – 12.5% | 0.50' |
| 12.51 – 15.0% | 0.60' |
| 15.01 – 17.5% | 0.70' |
| 17.51 – 20.0% | 0.80' |



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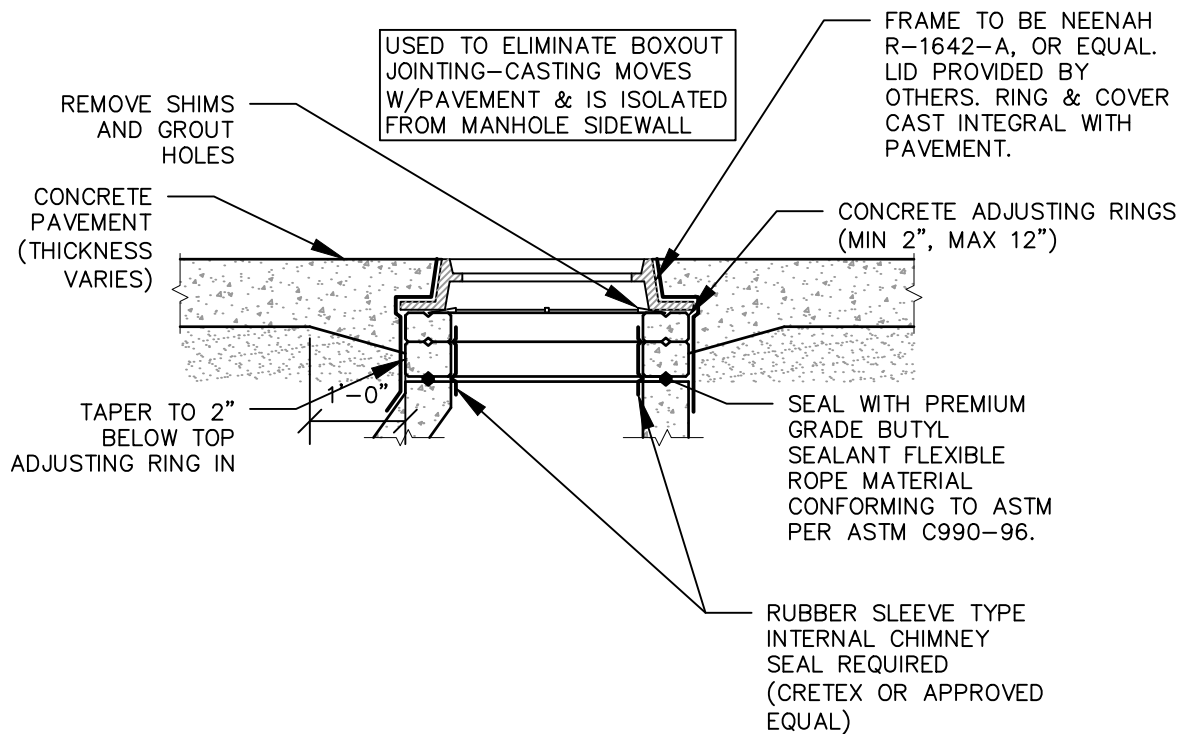
Project Description

OUTSIDE DROP MANHOLE CITY OF EAST DUBUQUE, ILLINOIS

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Drawing Issue Information

Drawing No: E8
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175



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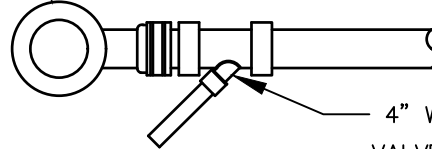
MANHOLE-NO BOXOUT CITY OF EAST DUBUQUE, ILLINOIS

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Drawing Issue Information

Drawing No: E9
Sheet: 1 of 13
Date: 6-28-23
Drawn By: AMH
Project No: 22175

VALVECO #888 TUBE & COVER
OR APPROVED EQUAL
ADJUST TO GRADE



4" WYE (IF SERVICE REQUIRED)

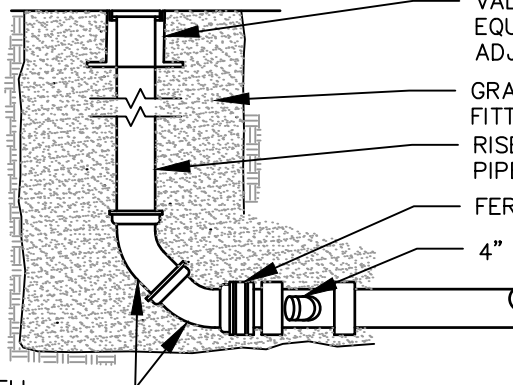
VALVECO #888 TUBE & COVER OR APPROVED
EQUAL
ADJUST TO GRADE

GRANULAR BACKFILL AROUND RISER PIPE AND
FITTINGS, COMPACTED

RISER PIPE AND FITTINGS TO BE SDR-26 P.V.C.
PIPE OR D.I.P.

FERNCO OR EQUAL FLEXIBLE COUPLING

4" WYE (IF SERVICE REQUIRED)



BELL x PE OR BELL x BELL
45° BENDS (RESILIENT GASKET)

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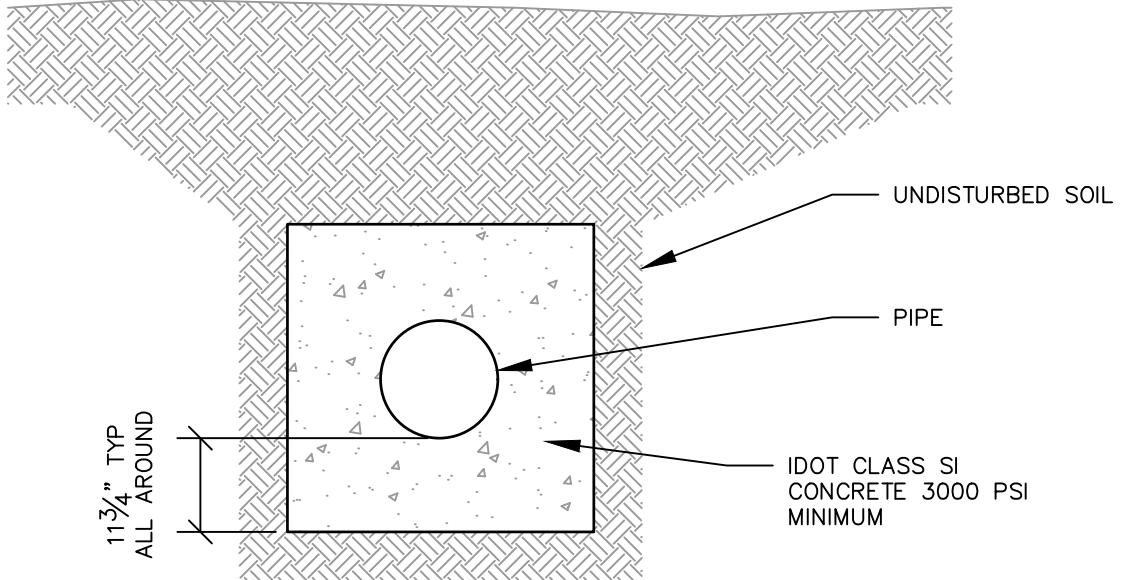
CLEANOUT CITY OF EAST DUBUQUE, ILLINOIS

Drawing Issue Information

Drawing No: E10
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175

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STREAM BED



CITY OF EAST DUBUQUE, ILLINOIS
WASTEWATER COLLECTION SYSTEM REQUIREMENTS

PART IV
CONSTRUCTION SPECIFICATIONS FOR
CONNECTIONS TO SANITARY SEWERS

1. GENERAL

- A. Reference to materials or systems herein by name, make, or catalog number is intended to establish a standard of quality, and not to limit competition; the words "or approved equal" are implied following each brand name.
- B. Connections to sanitary sewers shall be constructed in accordance with the City Code and these specifications. If a conflict exists between these specifications and the City Code, the provisions of the City Code shall govern.
- C. Building sewers are defined as that part of the wastewater collection system from and including the connection of the public sewer to within 5 feet of a building.
- D. Building sewers shall conform to these specifications when constructed as part of a public or individual sewer project. This shall include construction on public and private property.
- E. Building sewers shall be constructed in accordance with applicable provisions of the State Plumbing Code and these specifications.
- F. The property owner shall be responsible for maintaining the building sewer serving their property, keeping it free of defects, and shall be held liable for any consequential damages whether the building sewer is on private or public property. The responsibility includes the public sewer connection.

2. SCOPE

- A. Provide labor, materials, facilities, and administration required to fully complete all work required for connections to sanitary sewers from and including the public sewer branch fitting and the building sewer to the building drain.
- B. Applicable portions of Part II "Construction Specifications for Site Preparation, Excavation and Backfill," shall govern construction of connections to sanitary sewers.
- C. The requirements of this part are applicable to 4 inch and 6 inch services connected to the public sewer with fittings. Larger sizes shall be installed per the requirements of Part III including installation of a manhole in the public sewer.

3. MATERIALS

A. Public Sewer Branch Fittings

- 1) PVC Sewer Pipe Branches – Branch fittings shall be wyes or tee only and the fittings shall comply with ASTM F1336, D3034, and F679. The SDR rating of the branch fitting shall match the SDR of the connecting pipe. Branch fittings for AWWA C900 and C905 PVC sewer shall be fabricated of PVC pipe that complies with AWWA C900 or C905. The joints

in PVC sewer pipe branch fittings shall be elastomeric gasket type and conform to ASTM D3212 with gasket material conforming to ASTM F477. No solvent cement joints will be allowed.

- 2) DIP Branches – Branch fittings (tees) in DIP sewers shall be compact ductile iron fittings conforming to AWWA C153, with push-on or mechanical joints conforming to AWWA C111. The interior of fittings shall be coated with ceramic epoxy lining and the exterior asphaltic coated in accordance with AWWA C153. Ductile iron branch fittings require a segment of DIP or C900 PVC connected to the tee or a transition gasket installed in the branch.

B. Flexible Couplings – Flexible couplings used for installing a branch fitting into an existing public sewer, for making connections between dissimilar types and/or sizes of building sewers/drains, for making tie-ins, and where required, shall be Fernco, Mission, or approved equal. Flexible couplings shall conform to the requirements of ASTM C1173 and have 300 Series stainless steel bands. Stainless steel shear rings shall be installed with couplings in the public sewer.

C. Sewer Pipe Saddles

- 1) Sewer pipe saddles may be used for connections to existing sewers. Saddles on PVC sewers shall have a wye branch. Tee saddles are acceptable for DIP sewer material.
- 2) Flexible PVC saddles shall be Fernco part number TSW (wye) or TST (tee) or approved equal.
- 3) Rigid PVC saddles to be used only on PVC public sewers shall have a gasketed branch, a gasketed skirt, and stainless steel straps, and shall be GPK part 135 with wye branch, or approved equal. A 45 degree bend is to be installed into the saddle outlet.
- 4) Adjustable O.D. branch saddle shall have rubber gasket to conform to various sewer pipe diameters and to seal the service line connection and shall be held in place with a stainless steel strap. The saddle shall be Romac Style “CB” or equal. The connection to the service line shall be part of the gasket.

D. Building Sewer Pipe (Laterals) and Fittings

- 1) PVC Pipe – All PVC pipe shall be SDR 26 and conform to ASTM D3034. All joints shall be elastomeric gasket joints conforming to ASTM D3212. Gaskets shall conform to ASTM F477. No solvent cement joints will be allowed.
- 2) PVC Fittings – The PVC service line fitting shall be SDR 26 and conform to ASTM F1336 and ASTM D3034 (as applicable). All joints shall be elastomeric gasket type conforming to ASTM D3212. Gaskets shall conform to ASTM F477. No solvent cement will be allowed. Bedding, haunching, initial backfill, and final backfill materials for building sewer pipe shall be as required for sanitary sewer main as specified in Part III.

4. PUBLIC SEWER BRANCH FITTING INSTALLATION

A. General – Branch fittings of the same material as specified or approved for the public sewer shall be installed when the public sewer is constructed. Connections to existing sewers shall use a saddle or a “cut-in” branch fitting.

B. Location – A branch fitting shall be installed in the public sewer at locations shown on the drawings and where necessary to serve all existing and proposed buildings. The location of each branch connection shall be accurately recorded.

C. Installation – The installation including embedment of public sewer branch fittings shall be as required for the public sewer.

Cut-In Branch Fittings – For cut-in branch fittings the sewer shall be cut with a saw or special cutter to form a straight end. Any pipe cracked or broken in the process of installing a fitting shall be replaced by the contractor. Fittings installed in the public sewer shall be of the same material as the public sewer unless otherwise approved. Flexible couplings of the correct size shall be used to install the cut-in branch fitting.

D. Branch Orientation – The fittings shall be installed with the branch 45 degrees from the vertical centerline of the sewer unless otherwise approved.

E. Service Line Segment – A segment of service line with fittings shall be connected to each branch fitting, PVC pipe for PVC branch fittings and DIP or C900 PVC for DIP branch fittings. Minimum length of segment shall be 3 feet unless otherwise required (e.g. to property line). Install an air and watertight cap (Fernco Qwik Cap, or equal) on the end of the pipe segment.

5. SEWER PIPE SADDLE INSTALLATION

A. General – When a branch fitting in the public sewer does not exist, a branch fitting shall be installed with flexible couplings, or a sewer pipe saddle shall be installed.

B. Installation – Installation of a sewer pipe saddle shall be in accordance with the recommendations of the manufacturer. The hole in a vitrified clay pipe (VCP) public sewer must be drilled or sawed; using a hammer and chisel is not acceptable. Holes in PVC pipe shall be drilled or accurately cut to a template furnished with the saddle using a keyhole or reciprocating saw. A hole in DIP shall be made by sawing or drilling. No part of the saddle or building sewer may protrude into the public sewer. The "coupon" cut from the public sewer must be removed.

C. Branch Orientation – The saddle shall be installed with the branch at 45 degrees from the vertical centerline of the sewer unless otherwise approved.

D. Stainless steel bands shall be tightened to provide a leak-free connection.

E. Maintain Service: The installation of a saddle shall be done without interrupting sewage service in existing lines.

F. Records: The location of all sewer pipe saddles shall be recorded and provided to the City by the contractor.

6. RISER INSTALLATION

A. General – Risers in the building sewer shall be installed at locations shown on the drawings or where necessary to raise the building sewer from a connection to a deep public sewer up to an appropriate elevation below the surface or some other elevation deemed appropriate (typically 10 to 12 feet). If a riser is to be installed the branch fitting shall be a T-Y or Tee saddle.

B. Riser Installation Without Trench Box – Risers installed at a one-to-one slope are preferred. The risers shall be connected to branch fittings in the public sewer or to saddles installed on the public

sewer. The branch of the T-Y or saddle shall be at 45 degrees from the vertical. Riser pipe shall be as required for building sewers (laterals). A flexible coupling shall be installed within one (1) foot of the branch fitting. The branch fittings or saddle shall be installed with the same embedment as required for public sewers. A minimum of 4 inches of embedment stone shall be placed around the riser pipe that is to be installed at 45 degrees from the vertical. A 45-degree bend is to be placed at the top of the riser. The sanitary sewer service is to be extended at the required slope. A cap is to be installed at the temporary end of the service line at the right-of-way or edge of easement.

- C. Riser Installation with Trench Box – When risers cannot be installed at a slope of 45 degrees from vertical because of the use of a trench box or other acceptable reason, the riser may be installed with a vertical section. The branch of the T-Y or Tee saddle shall be at 45 degrees from the vertical. A 45-degree bend shall be installed at the trench wall. A GPK Deep Socket Adapter/Settler (part number 925) shall be installed into the lower 45-degree bend. Riser pipe shall be as required for building sewers (laterals). The branch fitting or saddle shall be installed with the same embedment as required for public sewers. A minimum of 6 inches of embedment stone shall be placed around the vertical riser. Two 45-degree bends shall be placed at the top of the vertical riser. The sanitary sewer service is to be extended at the required slope. A cap is to be installed at the temporary end of the service line at the right-of-way or edge of easement.
- D. Temporary Cap – A temporary airtight and watertight cap (Fernco Qwik Cap or equal) shall be placed at the end of the service line riser. The plug must be secured to withstand air test pressures.
- E. Location – The capped end of the service line shall be marked with a treated wood 2x2 or 2x4 stake, extending from the end of the pipe to above the ground surface. The contractor shall locate the end of the pipe by recording measurements to at least three permanent aboveground surface features.
- F. See attached details to this section.

7. BUILDING SEWER INSTALLATION

- A. General – All excavations required for the installation of a building sewer shall be open trench work unless otherwise approved by the City. All excavations shall be adequately guarded with sufficient barricades, warning signs, and lights to protect the public from risk or damages.
- B. Standards – PVC pipe installation shall conform to ASTM D2321 and public sewer requirements. The installation of building sewers shall also be governed by the manufacturer's recommendations.
- C. Water Service/Sewer Separation – Water service lines and building sewers shall be separated 10 feet horizontally throughout their length. Where conditions render such separation unfeasible, sewer and water pipe may be laid in the same trench provided that the water pipe shall be laid on a bench or on solidly tamped backfill at least 18 inches above the top of the building sewer throughout its entire length.
- D. Size and Slope – In no event shall the diameter be less than 4 inches. The slope for 4 inch should not be less than 1/4 inch per foot. The slope for 6 inch should not be less than 1/8 inch per foot. Requests from variance from minimum slope must receive City approval.
- E. Depth and Alignment – Wherever possible the building sewer shall be brought to the building at an elevation below the basement floor. No building sewer shall be laid parallel to, or within 3 feet of any bearing wall, which might thereby be weakened. The depth shall be sufficient to provide

protection from freezing. The building sewer shall be laid at uniform slope and in straight alignment insofar as possible. Changes in slope or alignment shall be made with proper fittings.

For any building drain that is too low to permit gravity flow to the public sewer, sanitary sewage carried by such drain shall be lifted by approved artificial means and discharged to the building sewer.

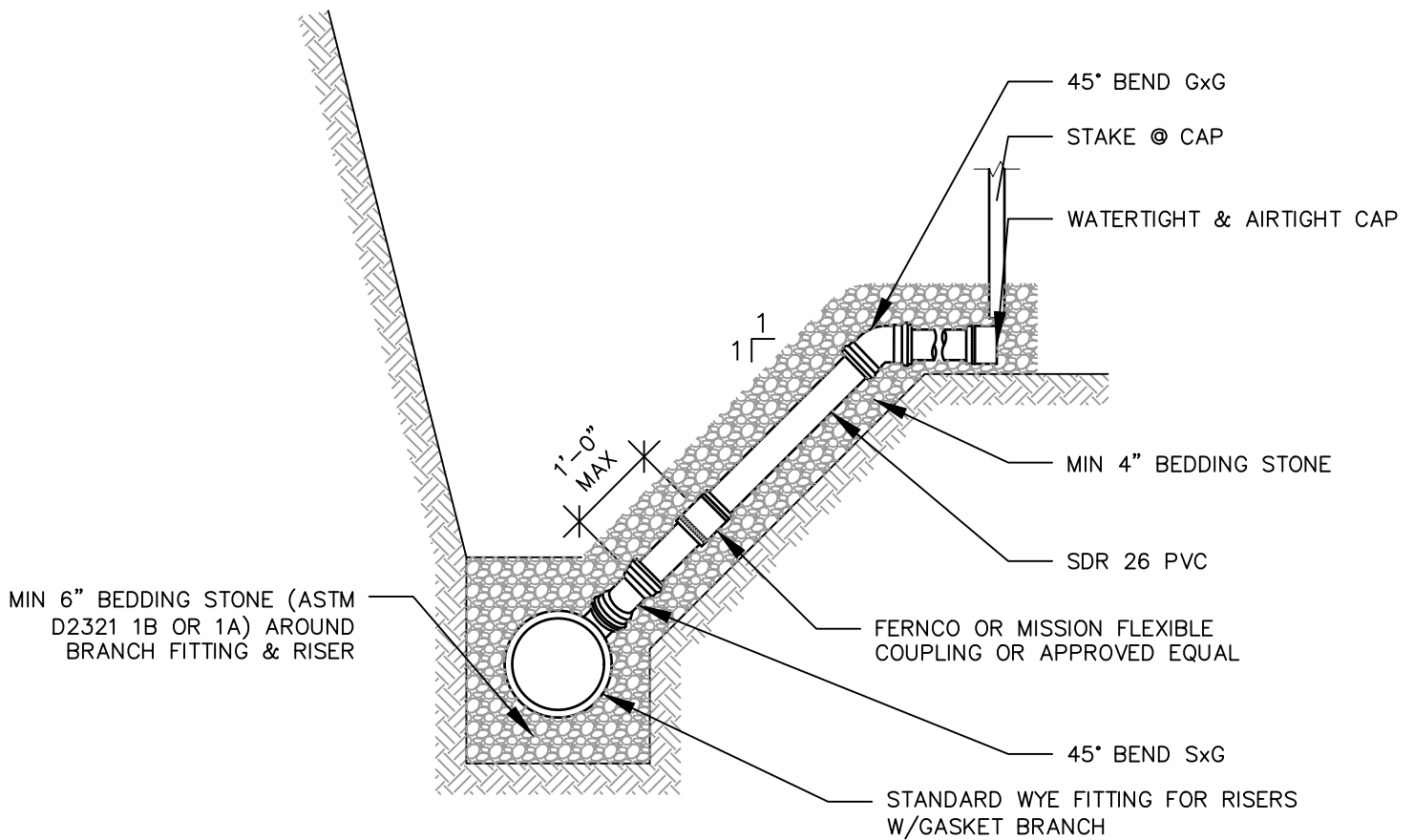
- F. Cleanouts – Cleanouts shall be installed in building sewers (or building drain) near the point of connection to the building drain, at intervals not to exceed 100 feet and at each bend or combination of bends exceeding 45 degrees. Cleanouts shall be extended up to existing or proposed ground surface. Cleanouts constructed in areas subject to vehicle loads shall be constructed in such a manner that no load is transferred to the building sewer (e.g. lamphole cover over the cleanout riser). The contractor shall record the location of all cleanouts accurately.
- G. Installation – The installation of PVC pipe building sewers shall be in accordance with Part II and Part III of these specifications. The contractor shall record the location of all building sewers.
- H. Connect to Existing – Any connections to existing building drains shall use a flexible noncorrosive water tight coupling (Fernco, Mission, or equal) with shear ring.
- I. Temporary Cap – A temporary airtight and watertight cap (Fernco Qwik Cap or equal) shall be placed at the end of a lateral if installed at the same time as the public sewer or if not immediately connected to a building.
- J. Location – The plugged end of the lateral shall be marked with a treated wood 2x2 or 2x4 stake extending from the end of the lateral to above the ground surface. The contractor shall locate the end of the lateral by recording measurements to at least three permanent above grade features.
- K. Tracer Wire – When constructing laterals to new buildings or repairing or replacing existing laterals, a tracer wire shall be placed in the newly excavated trench. The wire shall be 14 gauge (minimum) stranded copper wire with polyethylene insulation (30 mil minimum) by Kris-Tech Wire Company, or approved equal. The end of the wire shall be taped or fastened to the cleanout at the building to allow for ready access.

8. INSPECTION

- A. Each and every part of the building sewer including lateral, riser, branch fitting or saddle shall be inspected and must meet the approval of the Engineer and/or the City utility representative before being concealed or backfilled. The contractor or owner shall notify the City when the building sewer is complete and ready for inspection and connection to the public sewer. The connection shall be made under the supervision of the City utility representative or the Engineer.

9. CONSTRUCTION DETAILS

- A. Construction details are part of these standard specifications. The details include:
 - Service Detail Without Trench Box
 - Service Detail With Trench Box



NOTES:

BRACE OR BLOCK CAP TO WITHSTAND AIR TEST.

RISERS TO BE CONSTRUCTED WHERE SEWER DEPTH EXCEEDS 12' OR AS REQUIRED.

SXG IS SPIGOT BY GASKET
GXG IS GASKET BY GASKET

CONSULT ENGINEER FOR DIP RISER

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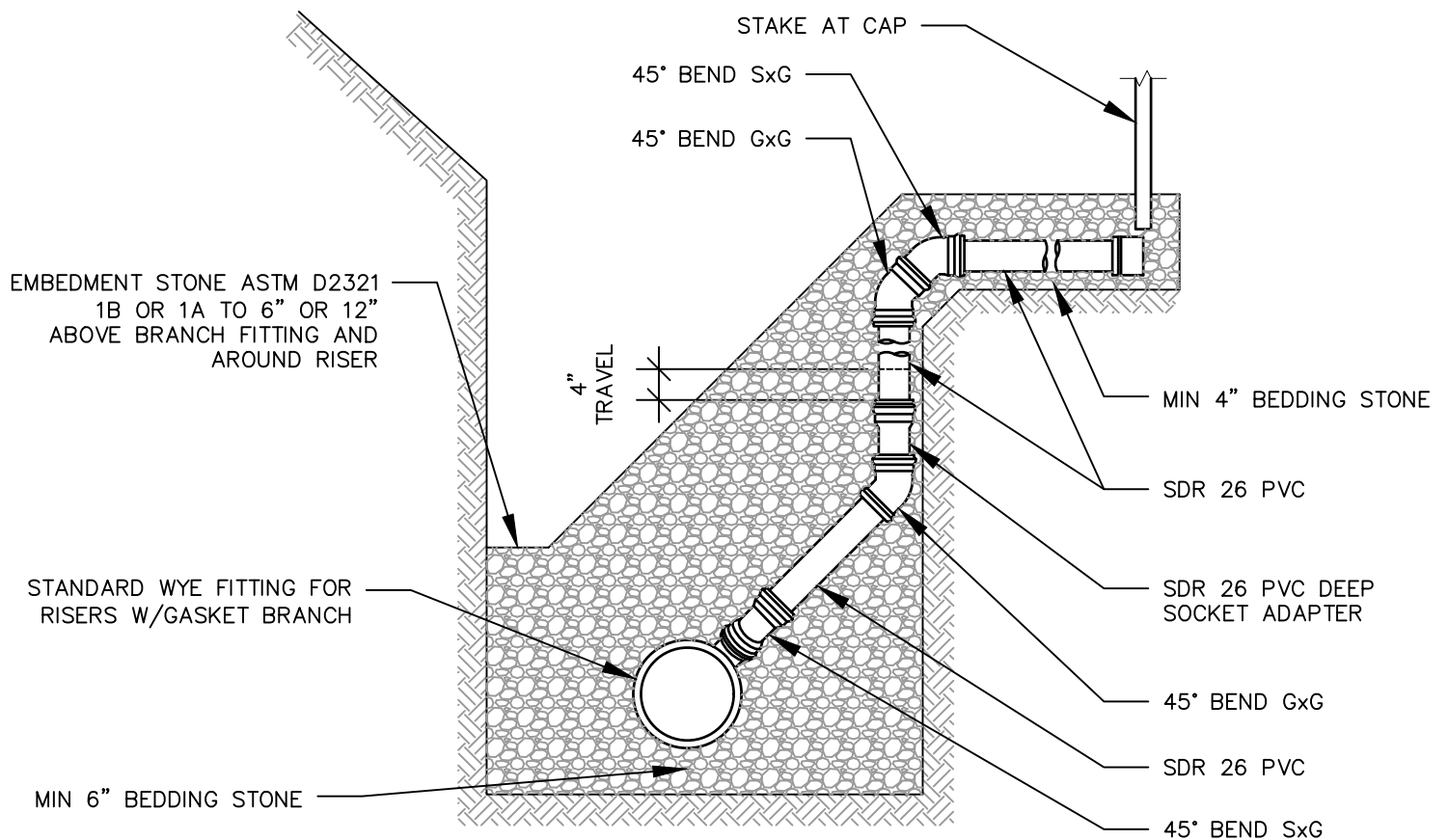
Project Description

**SERVICE DETAIL
WITHOUT TRENCH BOX**
CITY OF EAST DUBUQUE, ILLINOIS

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Drawing Issue Information

Drawing No: E12
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175



NOTES:

INSTALL VERTICAL SECTION AGAINST UNDISTURBED SOIL.

ENCASE RISER PIPE IN FITTINGS IN CRUSHED STONE

RISERS TO BE CONSTRUCTED WHERE SEWER DEPTH EXCEEDS 12' OR AS REQUIRED

SXG IS SPIGOT BY GASKET
GXG IS GASKET BY GASKET

BRACE OR BLOCK CAP TO WITHSTAND AIR TEST

CONSULT ENGINEER FOR DIP RISER

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**SERVICE DETAIL
WITH TRENCH BOX**
CITY OF EAST DUBUQUE, ILLINOIS

Drawing Issue Information

Drawing No: E13
Sheet: 1 of 13
Date: 5-12-23
Drawn By: AMH
Project No: 22175

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CITY OF EAST DUBUBQUE, ILLINOIS
WASTEWATER COLLECTION SYSTEM REQUIREMENTS

PART V
FORCE MAIN DESIGN PROVISIONS

1. GENERAL

- A. Reference to materials or systems herein by name, make, or catalog number is intended to establish a standard of quality, and not to limit competition; the words "or approved equal" are implied following each brand name.
- B. Force mains (force mains) shall be located within existing street right-of-way whenever possible. If a pressure main is located on private property it shall be within a 15 foot wide permanent wastewater pressure main easement or as otherwise approved.
- C. Force main design shall be in accordance with these provisions which are to establish minimum requirements and with the requirements of Illinois Environmental Protection Agency (IEPA).

2. SCOPE

- A. These provisions are intended for use in the design of force mains serving the City and shall set forth the minimum requirements.

Project specific construction specifications for force mains (as well as wastewater pumping stations) will be required. Construction specifications will be subject to the review of and approval by the City in addition to the IEPA.

3. BASIS OF DESIGN

- A. The capacity of and ultimate flow into a receiving sewer, pumping station, or treatment facility must be considered in the design of a pressure main. Calculations and a summary of observations shall be submitted by the Design Engineer if requested by the City.
- B. The minimum pressure main size shall be 4 inch diameter for solids handling pumps.
- C. At design pumping rates, a cleansing velocity of at least 2 feet per second should be maintained. A maximum velocity of 8 feet per second is recommended to avoid high head loss and protect valves. Calculations shall be submitted by the Design Engineer if requested by the City.

4. DETAILS OF DESIGN

- A. The minimum depth of cover above the top of the pipe shall be 5.5 feet. The future use of the pressure main route must be considered in establishing the depths of installation to prevent future problems with freezing or conflicts. If the required depth of cover cannot be maintained, suitable insulation around the pressure main shall be provided.
- B. The pressure main elevation should rise continuously to the point of discharge with intermediate high points avoided. If possible, the depth of installation of the pressure main may be increased or the alignment of the pressure main modified to avoid an intermediate high point. If an intermediate high point cannot be avoided, a Vent-O-Mat RGX automatic air release valve or approved equal, with isolation ball or plug valve shall be installed in a manhole (minimum 5 feet

I.D.) at the high point. Air release shall be connected to the branch of an upturned flanged tee. Piping to and from the tee shall be DIP with one segment of DIP utilizing a flange adapter. The details of the air release facility shall be subject to the approval of the Engineer.

- C. Force main shall be installed in straight segments whenever possible, minimizing the number of bends.
- D. Force main bends shall be properly anchored and restrained with thrust blocks or restrained joints to prevent movement.
- E. The force main shall enter the receiving manhole with a smooth flow transition to the gravity sewer system at a point not more than one (1) foot above the flowline. Corrosion protection for the receiving manhole shall be provided and should be no higher than one (1) foot above a receiving sewer in a manhole. The manhole connection shall be by Press Seal PSX Direct Drive, or equal.
- F. Force main bends shall be adequately separated from water mains and should be identified to avoid confusing wastewater force mains with water mains. A green 3 inch wide “buried force main” warning tape (Stranco, Inc. PUWT-325 or equal) or deeper bury are suggested.
- G. Force mains shall not be installed over water mains. There shall be at least a ten (10) foot horizontal separation between water mains and sewer force mains. There shall be an eighteen (18) inch vertical separation between the invert of the water main and the crown of the force main.

5. MATERIALS

A. Force main pipe with a diameter of 4 inch and larger:

- 1) DIP conforming to AWWA C151 shall be mortar lined per AWWA C104. Minimum pipe Class 53 for flanges and Class 350 elsewhere. DIP is to be used from the pump discharge to and through the valve vault and for air release piping.
- 2) PVC pipe conforming to AWWA C900 shall be DR 18.

B. Pipe Joints

- 1) Sufficient joint lubricant shall be supplied by the pipe manufacturer and used in accordance with manufacturer recommendations.
- 2) Joints for DIP shall be rubber gasket push-on joint or mechanical joint and shall conform to AWWA C111 or shall be flanged per AWWA C115.
- 3) Joints for PVC pipe shall be flexible elastomeric gasket type conforming to ASTM D3139. No solvent cemented joints will be allowed.

C. Fittings

- 1) Fittings for DIP shall be compact ductile iron per AWWA C153, with mechanical joints in accordance with AWWA C111 or flanged per AWWA C110 or C153. Fittings shall be mortar lined in accordance with AWWA C104.
- 2) Fittings for PVC pipe shall be compact ductile iron per AWWA C153 with mechanical joints per AWWA C111 and cement mortar lining per AWWA C104.

6. INSTALLATION

- A. The installation of wastewater force mains shall conform to applicable requirements for installation of sanitary sewers (including trench cross section) and water mains.
- B. A minimum 12 gauge solid copper wire with polyethylene insulation shall be installed on the top of the pressure main. Tracer wire access boxes shall be Copperhead Industries SnakePit® Lite Duty with Two-terminal Switchable Lid (LD14*2T-SW), or approved equal. A two (2) inch PVC extension riser shall be installed at the valve vault and at 600 foot intervals along the force main.