

SECTION 33 4000

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction 2023 Edition with latest addenda applies to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Extents of storm drainage system work as indicated on the drawings and by the requirements of this section.
 - 2. Requirements to adjust all manholes and catch basins as indicated on the drawings and as specified.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - 1. A48-94a, Specification for Gray Iron Castings.
 - 2. C32-93, Specification for Sewer and Manhole Brick (Made from Clay or Shale).
 - 3. C139-73 (1989), Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
 - 4. C150-95, Specification for Portland Cement.
 - 5. C207-91 (1992), Specification for Hydrated Lime for Masonry Purposes.
 - 6. C478-94, Specification for Precast Reinforced Concrete Manhole Sections.

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 3300 Submittals and Administration.
- B. Shop Drawings: Submit shop drawings for all precast components of storm sewage systems. Submit shop drawings for all castings including frames and grates and frames and covers.

1.5 DELIVERY, STORAGE AND HANDLING

- A. The contractor shall arrange for the delivery of the products at approved locations in the vicinity of the portion of the project in which the products are to be installed. To this end, he shall do such work as is necessary for access and for delivery of the products. All products shall be stored in an approved, orderly manner so that there will be a minimum of re-handling from the storage area to the final position in the trench and so that there is a minimum of obstruction and inconvenience to any kind of traffic. Deliveries shall be scheduled so that the progress of the work is at no time delayed and also so that large quantities of products shall not be stored for excessive lengths of time in crowded locations or in locations where large storage areas might be considered objectionable. Storage of products will be restricted to approved or permitted areas.

- B. Products shall not be stored on areas over the newly laid pipeline or other pipelines which might be damaged by the superimposed load. Products may be strung out along the route of the job but shall be laid between work limits. Products may not be stored on private property unless permission to do so has been granted by the property owner.
- C. Products may not be stored in any areas of vehicular or pedestrian traffic.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials shall conform to the appropriate section of the Rhode Island Standard Specifications.

2.2 PRECAST MANHOLES

- A. Precast manholes shall conform to the requirements of Section 702 of the Rhode Island Standard Specifications and according to the following:
 1. Top Section: Precast concrete of concentric cone, eccentric cone, or flat slab top type, as indicated.
 2. Base: Precast concrete, with base riser section and separate base slab, or base riser section with integral floor, as indicated.
 3. Steps: Polypropylene, ductile-iron or aluminum, integrally cast into manhole sidewalls. Parts which are embedded in the concrete shall be thoroughly cleaned and given a heavy coating of zinc chromate, conforming to federal specification TT-P-645.
 4. Horizontal Joints: Horizontal joints between sections shall be sealed using a flexible butyl resin sealant and shall conform to federal specification SS-S-210A and AASHTO M-1988.
 5. Pipe Connectors: Resilient, complying with ASTM C 923.
 6. Clay Brick: Clay brick shall conform to the requirements of AASHTO M91, Grade SM.
 7. Frame and Cover: Manhole frames and covers shall be of tough gray cast-iron, true to pattern and free from flaws. The bearing surfaces of the covers and frames shall be machined so as to give continuous contact throughout their circumference. Cast into the cover shall be the reading "drain", or other wording as indicated on plan details. Before delivery, the frames and covers shall be thoroughly cleaned and coated with hot coal tar.

2.3 PRECAST CATCH BASINS

- A. Precast catch basins shall conform to the requirements of Section 702 of the Rhode Island Standard Specifications and according to the following:
 1. General: Provide precast reinforced concrete catch basins sized as indicated.
 2. Basin: Precast reinforced concrete, 48-inch diameter, or larger if indicated on the drawings, flat slab top and base riser section with integral floor.
 3. Steps: Polypropylene, ductile-iron or aluminum, integrally cast into manhole sidewalls. Parts which are embedded in the concrete shall be thoroughly cleaned and given a heavy coating of zinc chromate.
 4. Horizontal Joints: Horizontal joints between sections shall be sealed using a flexible butyl resin sealant and shall conform to federal specification SS-S-210A and AASHTO - 1988.
 5. Pipe Connectors: Resilient, complying with ASTM C 923.
 6. Clay Brick: Clay brick shall conform to the requirements of AASHTO M91, Grade SM.
 7. Frames and Grates: Catch basin frames and grates shall conform to the plan dimensions and to the following specification requirements for the designed materials.
 8. Cast-Iron: Cast-Iron shall conform to the requirements of AASHTO M105.
 9. Cast Steel: Cast steel shall conform to the requirements of ASTM A27.

10. Structural Steel: Structural steel shall conform to the requirements of ASTM A283, grade B or better.
11. Reinforcement: All reinforcement shall be new billet steel and shall conform to ASTM A615. The grade shall conform to ASTM A615. The grade shall be 40. The contractor shall furnish certified copies in quadruplicate of mill tests of steel used in the manufacture of bar reinforcement. The finished bars shall be properly marked for easy correlation with the laboratory reports, and the chemical and physical properties of each melt of steel used shall conform to all the requirements of the ASTM specifications.

2.4 BRICKS

- A. Bricks shall be sound, hard, uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Brick shall conform to ASTM C32 for grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.
- B. Rejected brick shall be immediately removed from the work.

2.5 MORTAR FOR BRICKWORK

- A. The mortar shall be composed of Portland cement, hydrated lime, and sand, in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense, hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the proportions of 1-1/2:4-1/2.
- B. Cement shall be Type II Portland cement conforming to the ASTM C-150.
- C. Hydrated lime shall be Type S conforming to the ASTM C207.
- D. The sand shall comply with the specifications for fine aggregate, specified in Section 31 23 00, except that all of the sand shall pass a No. 8 sieve.

2.6 MORTAR FOR MASONRY UNITS

- A. Mortar shall be composed of one part Type II Portland cement and two parts of sand by volume with sufficient water to form a workable mixture. Cement and sand shall be as specified for mortar for brickwork.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Dig-Safe Damage Prevention System: All contractors or subcontractors performing drilling, boring, auguring, jetting, sheeting or pile installation, demolition, excavation or like work shall, prior to commencement of these activities, contract utility companies having responsibility for underground transmission systems for information relative to locations of existing underground utilities and/or an appropriate dig-safe damage prevention and notification agency.

3.2 INSPECTION

- A. All storm sewage system products shall be subject to inspection and approval by the engineer at the place of manufacture and/or at the site after delivery. The products shall be subject to rejection at any time due to failure to conform to the specifications. Rejected products shall be

removed from the site immediately. All the products shall be carefully examined for defects, and if any are found to be broken or defective, prior to or after being placed they shall be removed and replaced by the contractor without any further compensation.

3.3 PRODUCT HANDLING

- A. Each product shall be handled into its position in the trench in such a manner and by such means as the manufacturer recommends as satisfactory, and these operations will be restricted to those considered safe for the workmen and such as to cause no injury to the project or any property.
- B. The contractor will be required to furnish slings, straps and/or other devices to provide satisfactory support of the pipe when it is lifted. Transportation from delivery areas to the trench shall be restricted to operations which can cause no injury to the product. The products shall not be dropped from trucks or into the trench.
- C. The contractor shall have on the job-site with each crew, all the proper tools to handle the projects being installed. The use of hammer and chisel, or any other method which results in rough edges, chips and damages, shall be prohibited.

3.4 CONTROL OF ALIGNMENT AND GRADE

- A. All work shall be constructed in strict accordance with the lines and grades shown on the contract drawings and the contractor shall be held fully responsible for keeping correct alignment and grade.
- B. All lines, grades, measurements, layout staking and reference staking necessary for the proper location and satisfactory completion of the pipeline, appurtenances and other construction, shall be the responsibility of the contractor.
- C. All stakes, references and batter boards including original, additional or replacement, which may be required for the construction operation, shall be furnished, set and properly referenced by the contractor. The contractor shall be solely and completely responsible for the accuracy of the line and grade of all features of the work. Any errors or apparent discrepancies found in previous surveys, plans, specifications or special provision shall be called to the engineer's attention by the contractor for correction or interpretation prior to proceeding with the work.
- D. Upon request of the engineer, the contractor shall furnish copies of all data used in setting and referencing all stakes and other layout markings used by the contractor.
- E. All staking shall be performed by qualified engineering or surveying personnel who are trained, experienced and skilled in construction layout and staking of the type required under the contract and who are acceptable to the engineer. The personnel shall perform this staking under the direct supervision of a land surveyor registered within the state within which the work occurs.
- F. The contractor shall use a laser beam to assist in setting the pipe, provided he can demonstrate satisfactory skill in its use.
- G. The use of string levels, hand levels, carpenters' levels or relatively cured devices for transferring grade or setting pipe will not be permitted.
- H. During construction, the contractor shall provide the engineer, at his request, all reasonable and necessary materials, opportunities and assistance for checking the control of the work, as established by the contractor. The contractor will be informed of the results of these checks, but

the engineer by so doing, in no way relieves the contractor of his responsibility for the accuracy of the layout work. The contractor shall, at his expense, correct or replace as required, any deficient layout and construction work which may be the result of inaccuracies in his staking operations or of his failure to report inaccuracies found in work done by the engineer or by others. If, as a result of these inaccuracies, the engineer is required to make further studies, redesign, or both, all expenses incurred by the engineer due to such inaccuracies will be deduced from any monies due to the contractor.

- I. The contractor's field survey notes shall be kept neat, orderly and in conformance with accepted practice. Copies of all field survey books and notes shall be made available to the engineer upon request.
- J. The contractor shall carefully preserve bench marks, reference points and stakes, and in case of willful or careless destruction, by his own men, he will be charged with the resulting expense and shall be responsible for any mistakes or delay that may be caused by their unnecessary loss or disturbance.

3.5 MANHOLES AND CATCH BASINS

- A. General: Place precast concrete sections as indicated. Top of frames and covers to be set at finish grade surface elevation unless otherwise indicated. Installation to conform to requirements of ASTM C 891.

3.6 BACKFILLING

- A. General: Conduct backfill operations of open-cut trenches closely following laying, jointing, and bedding of pipe, and after initial inspection and testing are completed.
- B. Backfilling to conform to the applicable sections of Section 31 00 00 – Earthwork and Section 31 23 00 – Aggregate and Soil Materials.

3.7 TESTING AND CLEANING

- A. Perform testing of completed piping in accordance with local authorities having jurisdiction.
- B. All structures shall be clean and free of debris prior to final inspection and testing.

3.8 LAYING BRICKWORK AND GRADING RINGS

- A. Only clean bricks and grading rings shall be used. Bricks shall be moistened by suitable means, as directed, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
- B. Each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded as directed.
- C. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

3.9 PLASTERING AND CURING BRICK MASONRY

- A. Outside faces of brick masonry shall be plastered with mortar from 1/4 to 3/8 inches thick. If required, the masonry shall be properly moistened prior to application of the mortar. The plaster shall be carefully spread and troweled. After hardening, the plaster shall be carefully checked by tapping for bond and soundness. Unbonded or unsound plaster shall be removed and replaced.

- B. Brick masonry and plaster shall be protected from too rapid drying by the use of burlaps kept moist, or by other acceptable means, and shall be protected from the weather and frost, all as required.

3.10 SETTING CATCH BASINS AND MANHOLE FRAMES AND COVERS

- A. Curb inlets and frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the drawings or directed. Circular frames shall be set concentric with the top of the masonry and in a full bed of mortar so that the space between the top of the catch basin masonry and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on the top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.
- B. Grates shall be left in place in the frames on completion of other work at the catch basins.

3.11 CATCH BASINS AND MANHOLES ADJUSTED TO GRADE

- A. Existing catch basin tops shall be adjusted to line and grade as indicated on the drawings or as directed by the Engineer.
- B. All catch basins adjusted to grade shall be provided with grading rings of brick as specified for new drain manholes.

END OF SECTION