SECTION 02721

STORM DRAINAGE SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Installation of storm drainage systems.

1.02 RELATED WORK

A. Section 02221: Trenching, Backfilling and Compaction

B. Section 02305: Boring and Jacking

C. Section 02605: Separation of Piped Utilities

D. Section 03300: Concrete Work

1.03 REQUIREMENTS

A. All drainage to be cleaned and visually inspected with all repairs made before installation of base asphalt.

B. All drain manholes will have standard necks. All brick adjustments to manhole necks will not exceed 18" including frame and cover.

C. Drainage pipe must have gasket joints within the right of way and public drainage easements.

D. Twenty four (24) hours notice is required to schedule an inspector for his presence on the job site.

E. Manholes 8 ft deep or deeper shall have cone sections.

F. Manholes less than 8 ft deep can have flat tops.

PART 2 PRODUCTS

2.01 CONCRETE PIPE (CP)

A. Culverts: AASHTO M-170 or ASTM C-76

B. Elliptical Culverts: AASHTO M-207 or ASTM C-507

C. Reinforced Low-Head: ASTM C-361

2.02 CONCRETE MATERIALS

A. 4000 PSI in accordance with section 03300.

2.03 BRICK

A. AASHTO M-91 for the grade specified.

B. Concrete brick only

C. Test brick by AASHTO T-32.

2.04 MASONRY CEMENT

A. AASHTO M-150, ASTM C-91

B. Methods of sampling and testing of masonry cement, when required, shall be by the methods of AASHTO:

Sampling	T-127
Fineness	T-192
Normal Consistency	T-129
Soundness	T-107
Time of Setting	T-154
Specific Gravity	T-133
Staining Test	T-105
Compressive Strength	T-106
Plastic Consistency	T-162
Air Content	T-137
Mixing of Mortar	T-162

C. Fine Aggregate: AASHTO M-45 consisting of hard, strong, durable uncoated mineral or rock particles free from injurious amounts of organic or other deleterious substances.

1. Sand for mortar shall be uniformly graded from coarse to fine within the following limits:

Sieve	Total Percent Passing by Weight
8	100
50	15-40
100	0-15
200	0-5

2. Methods of test for fine aggregate, when required, shall be by the following methods of AASHTO:

Sampling	T-2
Organic Impurities	T-21
Mortar Making Properties	T-71
Sieve Analysis	T-27
Material Passing 200 Sieve	T-11

D. Mix mortar in the following proportions:

1. 1 part masonry cement
2. 2 parts fine aggregate
3. Hydrated lime not exceeding 10% of the cement used
4. Water free of injurious substances, added to form a stiff workable paste.

2.05 CASTINGS FOR FRAMES, GRATES AND COVERS

A. Gray Iron, Class 30, AASHTO M-108

B. Bituminous paint finish not affected by hot or cold weather.

C. Stamped with Stormwater Logo, Drains to River, or as approved by Town Engineer.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to laying pipe, prepare a suitable bedding according to Section 02221.

B. Before placing pipe in the trench, field inspect for cracks or other defects; remove effective pipe from the construction site.

C. Swab the interior of the pipe to remove all undesirable material.

D. Prepare the bell end and remove undesirable material from the gasket and gasket recess.

3.02 INSTALLING STORM SEWER PIPE

A. Lay pipe in a straight line on a uniform grade from structure to structure with the bell or groove upgrade.

B. Firmly support each section throughout its length and form a close concentric joint with the adjoining pipe.

C. Make junctions and turns with standard or special manholes.

D. Do not open up more trench at any time than pumping facilities are able to dewater.

E. Whenever the work ceases, close the end of the pipe with a tight fitting plug, cover end protection as per Erosion Control Specifications Section 2200.

F. Close all openings provided for future use and abandoned pipe with a tight fitting plug sealed to avoid leakage.

G. When the pipe connects with structures, the exposed ends shall be placed or cut off flush with the interior face of the structure and satisfactory connections made.

H. Any pipe which is not in good alignment or which shows any undue settlement or damage shall be taken up and re-laid.

I. Laying pipe and sealing joints shall be a continuous operation.

1. Seal all joints during the same day in which the pipe is laid.
2. Construct the joints in such a manner that a watertight joint will result.

J. Joints for rigid pipe:

1. Rubber gaskets; or
2. Other types of joints recommended by the pipe manufacturer and approved.

K. Install rubber ring gaskets to form a flexible watertight seal.

L. When other type joints are permitted, install or construct in accordance with the recommendations of the manufacturer.

M. Inspect the pipe before any backfill is placed.

N. When strutting or vertical elongation is required, it shall be performed in accordance with the details shown on the Plans.

O. Leave ties and struts in place until the embankment is completed, unless otherwise specified.

P. As the work progresses, clean the interior of all pipe in place.

Q. Make connections by constructing catch basins, other structures, or by installing wyes or tees as shown on the Plans. Wyes and tees for future connections shall be installed as indicated.

3.03 CAST-IN-PLACE CONCRETE CATCH BASINS

A. Perform all concrete construction in accordance with Section 03300.

B. Inverts: 4000 PSI concrete of the shapes indicated on the Plans and constructed to cause the least possible resistance to flow. The shape of the inverts shall conform uniformly to inlet and outlet pipes with a smooth and uniform finish.

3.04 BRICK CATCH BASINS

A. Do not construct brick masonry in freezing weather nor when the bricks contain frost.

B. Select brick for exposed surfaces, corners, etc., from brick approved for color and uniformity.

C. All brick and the receiving bed shall be thoroughly cleaned and well moistened with water immediately before being laid.

D. Lay all brick in freshly made mortar, in a substantial and workmanlike manner and true to the lines and grades indicated on the Plans.

E. Arrange headers and stretchers to thoroughly bond the masonry and, unless otherwise indicated or directed, alternate headers and stretchers with consecutive courses breaking joints.

F. Face joints shall be neatly struck, using the weather joint.

G. Finish joints properly as the laying of brick progresses with each not less than ¼" nor more than ½" in thickness.

H. Do not use spalls or bats except in shaping around irregular openings or when unavoidable to finish out a course, in which case, place a full brick at the corner and the bat in the interior of the course.

I. Filling materials for the interior of the walls shall be of the same quality as used in the face of the unit, unless otherwise indicated on the Plans.

J. The surface of brick masonry against which embankment or backfill is to be placed, shall be neatly plastered with mortar to a thickness of not less than ½", and the mortar shall be finished to a true and uniform surface. The mortar shall be protected and kept wet for 48 hours after completion.

3.05 CATCH BASIN – INLET AND OUTLET PIPES

A. Extend inlet and outlet pipes through the walls of catch basins, for a sufficient distance beyond the outside surface to allow for connections, cut off flush with the wall on the inside surface, unless otherwise directed.

B. The concrete or brick and mortar shall be so constructed around the pipes as to prevent leakage and form a neat connection. Use non-shrink grout and bonding agent when applying a layer of mortar less than 2" thick.

3.06 CASTINGS AND FITTINGS

A. Handle in a manner that will prevent damage. Reject all damaged castings and fittings.

B. Place all castings and fittings in the positions indicated on the Plans and set true to line and grade.

C. If castings are to be set in concrete or cement mortar, place all anchors or bolts and position before the concrete or mortar. The casting shall not be disturbed until the mortar or concrete has set.

D. When castings are to be placed upon previously constructed masonry, the bearing surface of masonry shall be brought true to line and grade and present an even bearing surface in order that the entire face or back of the casting will come in contact with the masonry. Castings shall be set in mortar beds or anchored to the masonry as indicated on the plans.

END OF SECTION