

PRECAST CONCRETE RETENTION STRUCTURE

**\*\*From Randolph CMG PARK(21)S**

- xx. DESCRIPTION. This work shall consist of furnishing and installing precast concrete retention structures in accordance with the Contract Documents and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 540 and 604 of the Standard Specifications.

- xx. GENERAL REQUIREMENTS. A 900 mm (3 foot) concrete weir with a 150 mm (6inch) ductile iron pipe with gate valve shall be constructed as shown on the Plans. A valve box with cast iron cover shall be used to house the valve operating nut at the top of the precast concrete retention structure.

- xx. VALVE BOXES. Valve boxes shall be cast iron, heavy pattern, sliding adjustable type with cast iron cover. The valve box shall be centered over the valve operating nut. The upper section shall have a flange to prevent settling. Valve boxes shall have barrels not less than 125 mm (5 inches) inside diameter and lengths adapted to valve depth. The barrels shall lap a minimum of 150 mm (6 inches) when in the most extended position. Valve boxes shall be installed in accordance with the manufacturer's instructions.

- xx. GATE VALVES. Gate valves shall meet or exceed requirements of AWWA Standard C509 "*Resilient-seated Gate Valves for Water Supply Service.*" The gate valve shall be sized as shown on the Plans. The gate valve shall be installed with a riser stem to be accessed through the valve box installed at the top of the precast concrete retention structure.

(a) Materials.

- (1) Mechanical joint with retainer glands.
- (2) Rising stem, low operating torque, wedge design, seal flow in either direction.
- (3) Nut operated, open left (counter-clockwise).
- (4) Double "O" Ring seal.
- (5) Body and Bonnet: Ductile iron, smooth full diameter waterway, epoxy coated inside and out.
- (6) Stem: Bronze.
- (7) Disc Assembly: Wedge styrene butadiene rubber (SBR) bonded to ductile iron wedge.

(b) Installation. Valves shall be set on a concrete foundation, with the stem vertical.

Couplings and fittings shall be installed in accordance with the manufacturer's recommendations.

xx. PRECAST CONCRETE STRUCTURE.

- (a) Materials. Concrete shall conform to the requirements of ASTM C 478 for Portland Cement, Type II.

Brick masonry shall conform to the requirements of ASTM C 32, Grade MS or ASTM C 55, Grade N-1.

Masonry cement shall conform to the requirements of ASTM C 91.

Mortar shall conform to the requirements of ASTM C 270, Type S.

Premixed materials shall conform to the requirements of ASTM C 387.

Catch basin frames and grates, and manhole frames and covers shall conform to the requirements of Section 604.

Bedding material shall consist of crushed stone conforming to the requirements of Section 301 for Subbase of Crushed Gravel, Fine Graded.

Grade rings for manhole grade adjustment shall be precast.

Concrete grout shall be premixed, prepackaged non-shrink cement based grout. The grout shall be non-shrink when tested in accordance with ASTM C 827. The grout shall have minimum compressive strength of 35 Mpa (5000 psi) at 28 days when tested in accordance with ASTM C 109.

- (b) Submittals. Prior to commencement of the work, the Contractor shall submit shop drawings to the Engineer showing details of construction, reinforcing, joints, embedded appurtenances, method of sealing pipe penetrations, and pertinent dimensions.

The shop drawings and pertinent calculations shall be signed and stamped by a Profession Engineer licensed in the State of Vermont.

- (c) Design Criteria.

- (1) Design of precast structures and components shall conform to ASTM C478.
- (2) Precast structure shall be capable of withstanding AASHTO H-20 loading without failure.
- (3) The base section shall be monolithic to a point at least 150 mm (6 inches) above the openings cast to receive the storm sewer lines. Any opening shall be a minimum of 6 inches from any joint. The base shall be a minimum of 200 mm (8 inches) thick and walls shall be a minimum of 125 mm (5 inches) thick.

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- (4) The minimum compressive strength of concrete shall be 4000 psi at 28 days.
  - (5) Buoyancy calculations shall be performed and ballast added to the precast structure if necessary to prevent floating of the structure.
- (d) Quality Control. Concrete shall be tested in accordance with ASTM C 478.

Retain plant records and quality control program used during production of precast concrete catch basins and make such records and test results available to the Engineer, if requested.

All precast concrete sections shall have the date of manufacture and name or trademark of the manufacturer indelibly marked on the inside of the wall.

- (e) Inspection and Repairs. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, and/or on the project site after delivery.

Sections shall be subject to rejection due to failure to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the project site shall be marked for identification and shall be removed from the project site immediately. All sections which have been damaged after delivery will be rejected, or if already installed, shall be repaired or removed and replaced entirely at the Contractor's expense as directed by the Engineer.

All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close-textured, and free of blisters, cracks, roughness, and exposed reinforcement.

Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Concrete grout shall be used for repair. Epoxy grout may be used for repair, subject to the approval of the Engineer.

- (f) Delivery, Storage, and Handling. Precast sections shall not be shipped until the concrete has attained a compressive strength of 21 Mpa (3000 psi) or until 5 days after fabrication and/or repair, whichever time is longer.

Conform to manufacturer's instructions for delivery and handling.

Protect edges to prevent chipping or spalling.

Lift and support structure sections from lifting points using lifting or handling devices.

- (g) Joints and Pipe Seals. Horizontal joints between precast sections shall be tongue and groove and shall have a butyl rubber joint gasket (O-ring) conforming to ASTM C 443. All horizontal joints shall be watertight.

Pipe to structures joints shall be sealed with non-shrinking mortar or concrete grout. Pipe to structures connections and joints shall be watertight.

- (h) Installation. Precast bases shall be placed on a layer of compacted bedding material. The excavation shall be properly dewatered to allow placing of bedding material and setting the catch basin base on completely drained subgrade. Intermediate sections and top slab shall then be placed, using manufacturer's recommended procedure for sealing the horizontal joints. All joints shall be pointed. Catch basin sections shall be set vertical with sections in true alignment within 6 mm (1/4 inch) maximum tolerance.

Inlet and outlet pipes shall be connected and sealed in accordance with the manufacturer's recommended procedure, and as shown on the drawings.

Holes in the concrete sections and around pipe entrances shall be plugged with concrete grout.

The frame and grate shall be placed on the top of the catch basin, or some other means shall be provided to prevent accidental/unauthorized entry until the Contractor is ready to make final adjustment to grade.

Mortar shall be mixed in accordance with ASTM C 270 or in accordance with the recommendations of the manufacturer.

Only clean bricks shall be used in brick work for grade adjustment. The brick shall be moistened until in a surface dry, saturated condition.

Precast grade rings shall be used for manholes.

Each brick and grade ring shall be laid in full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded.

Brick masonry shall be protected from too rapid drying too rapidly. Use an approved cover and protect from the weather and frost.

All masonry joints which are exposed to view shall be examined to locate cracks, and shall be pointed up and filled with mortar if required. Where necessary, in the opinion of the Engineer, the joints shall be cut out and repointed with mortar.

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- (i) Setting Frames, Grates, and Covers. Frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface, or as indicated on the Plans. Frames shall be set concentric with the opening in the masonry and in a full bed of mortar so that the space between the top of the brick masonry or grade ring 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.

Grates and covers shall be left in place in the frames on completion of other work at the catch basins.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Precast Concrete Retention Structure) to be measured for payment will be the number of complete retention structure units installed in the complete and accepted work.

- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Precast Concrete Retention Structure) will be paid for at the Contract unit price for each. Payment shall be full compensation for furnishing, transporting, handling, and placing the materials specified, including bedding material and frames, grates, and covers; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Excavation for new retention structures will be paid for as Trench Excavation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Precast Concrete Retention Structure)	Each