Payment will be made under:

Item No.	Pay Item	Pay Unit
7181000	Brick Masonry	Cubic Yard
7182000	Brick Masonry (Reinforced)	Cubic Yard
7183000	Rubble Masonry	Cubic Yard
7183006	Rubble Masonry Tree-Well	Cubic Yard
7184000	Concrete Block Masonry	Cubic Yard

SECTION 719

CATCH BASINS
DROP INLETS
MANHOLES
JUNCTION BOXES
AND
SPRING BOXES

719.01 Description. This work shall consist of the construction or adjustment to grade of catch basins, drop inlets, manholes, junction boxes and spring boxes at the location shown on the plans or directed by the Engineer in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the Engineer.

MATERIALS

719.02 Portland Cement Concrete. Unless specified otherwise on the plans or in the special provisions, all cast-in-place concrete shall be Class 4000 concrete conforming to the requirements of Section **701**

719.03 Clay or Shale Brick. Clay or shale brick shall conform to the requirements of Subsection **718.02**.

719.04 Concrete Brick. Concrete brick and similar solid units shall conform to the requirements of Subsection **718.03**.

719.05 Mortar Materials. Mortar materials shall conform to the requirements of Subsection **718.06**.

719.06 Castings. All iron castings for frames, grates, covers, etc., shall conform to the requirements of AASHTO M 105, Class 35B, and the alternate load test of AASHTO M 306.

Castings shall be cast in closed molds, be boldly filleted at angles. The arises shall be sharp and perfect. They shall be true to pattern in form and dimensions; free from pouring defects, sponginess, cracks, blow holes and other defects affecting their strength and value for the service intended. The castings shall be clean and neatly finished. Gratings and covers shall fit firmly into their respective frames.

Steel grates and frame may be used instead of cast iron as long as the loading and hydraulic requirements are met and they conform to the following:

1. Steel grates and frame shall be hot dipped zinc coated in accordance with AASHTO M 111.

2. Steel grates and frame shall be dimensioned to be interchangeable with each piece of the cast iron grate and frame shown in the plans.

3. Steel grates and frames have sufficient strength to meet or exceed the loading requirements of Federal Specification RR-F-621 (latest edition).

The manufacturer shall have a testing program to verify that the castings comply with the strength requirements of AASHTO M 105. Test bars shall be Type B and shall be

made and tested in accordance with AASHTO M 105. Manufacturers desiring to be placed on the Department's list of approved sources should contact the Research and Materials Engineer for procedures.

719.07 Reinforcing Steel. Reinforcing steel shall conform to the requirements of AASHTO M 31, Grade 60.

719.08 Structural Steel. Structural steel shall conform to the requirements of AASHTO M 270, Grade 36.

719.09 Steel Tubular Section. Steel tubular sections shall conform to the requirements of ASTM A 53, Schedule 80.

719.10 Precast Reinforced Concrete Drainage Structures. Subject to the approval of the Engineer, the Contractor may substitute precast reinforced concrete drainage structures for constructed-in-place structures shown on the plans. If precast structures are specified on the project, or if the Contractor is allowed to substitute precast alternates, they shall conform to the details shown on the plans and the applicable provisions of this specification. Precast concrete drainage structures shall be designed for HS-25 loading. Concrete shall be Class 4000 portland cement concrete conforming to the requirements of Section **701**. Reinforcing steel shall conform to AASHTO M 31, Grade 60. Wire Mesh shall conform to AASHTO M 55 and M 221.

A. Precast Drainage Base. Drainage bases shall be manufactured to the sizes shown on the plans and in accordance with the requirements of AASHTO M 199 as applicable. Drainage bases shall be manufactured with all required openings to accept all prescribed inlet and outlet pipes.

B. Precast Concrete Transition Section. A precast concrete transition section may be used to transition from a larger diameter riser to a smaller diameter riser. Transition sections may be either cone shaped or a flat slab as

specified on the plans. They shall be manufactured in accordance with the requirements of AASHTO M 199.

C. Precast Concrete Risers. Risers shall be manufactured to the diameters and lengths shown on the plans and in accordance with the requirements of AASHTO M 199. Risers shall be placed plum and backfilled in such a manner as to preserve their alignment.

D. Flat Slab Adapter. Flat slab adapters are required to change a round precast concrete risers to a rectangular openings to facilitate construction of the prescribed catch basins or drop inlets to grade. The flat slab adapters will be used as foundations for the necessary courses of brick. Flat slab adapters are not required for manholes. A flat slab top with an eccentric 24 inch diameter hole shall be used on top of the manhole riser when the casting is to be placed directly thereon and is shown on the plans. The distance from the top of the adapter to the top of the cover or casting shall not be more than 6 feet.

CONSTRUCTION REQUIREMENTS

719.11 Excavation. Excavation shall be made to the required depth and the material on which the masonry is to be constructed shall be compacted to a firm even surface. The excavation shall include the removal of all obstructions, and the removal and replacement of unstable materials as necessary for a proper foundation. Excavation will not be measured nor paid for as a separate item.

719.12 Brick Masonry. Brick masonry shall be constructed in accordance with Section **718**.

719.13 Concrete Masonry. Concrete masonry shall be constructed in accordance with Sections **701** and **702**. Reinforcing steel, if required, shall be placed in position as shown on the plans, and securely held in place.

719.14 Placing Pipe. Inlet and outlet pipes shall be incorporated into the structure at the elevation, direction, and grade required. These pipe connections shall be neatly and substantially held in the masonry. The inner ends of the pipe shall be placed flush with the inner faces of the walls, unless the Engineer directs otherwise.

719.15 Placing Castings. The castings shall be set in full mortar beds composed of one part portland cement to two parts of fine aggregate, meeting the requirements of Subsections **718.06** and **718.08**.

719.16 Precast Concrete Drainage Structures. Precast concrete drainage structures shall be fabricated and installed in accordance with these standard specifications and applicable AASHTO specifications.

Components of precast concrete drainage structures must be supplied from a single source precast manufacturer. The manufacturer shall supply recommendations for all field connections of precast sections and piping.

The manufacturer shall inform the Engineer of his planned concrete placement and curing schedule in advance of the start of any fabrication work to afford time for the testing of materials, the inspection of equipment, and the review of the procedures that will be used in casting the units. The Engineer or his representative shall have free access to the fabrication plant at all times for the purpose of inspecting materials, plant facilities and fabrication and curing procedures.

Proper bedding for precast concrete drainage structures is required for proper installation and elimination of point bearing. Bedding shall be sand, gravel, or crushed stone and shall be included in the cost of the respective drainage item.

All joints shall be sealed with a butyl rubber joint sealant that meets the requirements of Section **714** and AAHSTO M 198, Type B. The amount of sealant applied shall be in accordance with the manufacturer's recommenda-

tions, a copy of which shall be supplied to the Engineer by the Contractor.

719.17 Grade Adjustment of Existing Structure. When grade adjustment of existing structure is specified, the frames, covers, and gratings shall be removed and the walls reconstructed as required. The work shall be performed in such a manner as to use salvaged materials when practicable. The Contractor shall furnish new materials necessary to complete the adjustment.

Existing structures shall be adjusted to the required grade and elevation by carefully removing the grating, removing or adding masonry below or above the existing masonry, and replacing the casting on a full mortar bed to the new elevation.

In contracts where the pavement consists of an asphaltic mix or mixes, the casting shall, unless otherwise permitted or directed, be adjusted to grade after the last base or binder course has been laid and before placing the surface course. Where the pavement, base, or subgrade is removed from around the structure to make the adjustment, the area shall be filled with concrete before placing the surface course.

719.18 Backfilling. The excavated areas that are not occupied by the structure shall be backfilled with suitable material that shall be placed and thoroughly compacted in layers of not more than six inches.

719.19 Method of Measurement. Catch basins, drop inlets, manholes, junction boxes, and spring boxes, both new and adjusted, complete in place and accepted, will be measured by the unit and shall include all frames, covers, gratings and fittings necessary to complete the unit.

When the depth of a catch basin, drop inlet, manhole, junction box, or spring box is greater than 6 feet, the quantity for the item Extra Depth of Box will be measured as the actual linear feet of depth in excess of 6 feet. The depth of the

drainage unit shall be measured from the top of manhole cover, concrete masonry, hood, or grate in the case of drop inlets, to the top of the bottom slab.

Precast drainage structures, complete in place and accepted, will be measured by each unit and shall include all frames, covers, gratings and fittings necessary to complete the unit. There will be no Extra Depth of Box measured for precast drainage structures. The lay length of a precast transition section shall not be included in the measurement for the precast concrete drainage structure to which it is connected.

719.20 Basis of Payment. The quantities, as measured in Subsection **719.19**, will be paid at the contract unit price for Catch Basin, Drop Inlet, Manhole, Junction Box, or Spring Box, or the contract unit price for Adjusted Catch Basin, Drop Inlet, Manhole, Junction Box, Utility Box, or the respective precast concrete drainage structure, which price and payment shall be full compensation for furnishing all materials, equipment, tools, labor, and incidentals necessary to complete the work.

Partial payments will be allowed for Catch Basins (Types 15 16, 17, & 18) as follows:

Portion of Catch Basin Constructed	Percent of Bid Price Payable
Box only	40
Box and Bottom Concrete	70
Set Top	100

Extra Depth of Box, as measured in Subsection **719.19**, will be paid for at the contract unit price for each foot of extra depth. Extra Depth of Box is not applicable to precast drainage structures.

Making connection with existing culverts or drains, joint sealant, drainage openings, excavation, bedding material, backfilling, disposal of surplus material, replacing pavement,

reinforcing steel, bricks, mortar and other miscellaneous items needed to complete the work will not be paid for separately, but the cost thereof shall be included in the cost of the pay item that requires it.

Payment for each item will include all direct and indirect costs and expenses necessary to complete the work.

Payment will be made under:

Item No.	Pay Item	Pay Unit
7191XX5	Catch Basin (type)	Each
7192XX0	Drop Inlet *(size)*	Each
7192105	Manhole	Each
71922XX	*(size)* Junction Box	Each
7192300	Spring Box	Each
71930XX	Precast Concrete Riser - *(size)*" Diameter	Linear Foot
71931XX	PC Drainage Base - *(size)*" Diameter	Each
719315X	PC Transition (Flat Slab) - *(size)*" to *(size)*"	Each
719317X	PC Transition (Cone) - *(size)*" to *(size)*"	Each
7196000	Extra Depth of Box	Linear Foot
7197110	Adjust Catch Basin	Each
7197120	Adjust Manhole	Each
7197130	Adjust Drop Inlet	Each
7197140	Adjust Utility Box	Each
7197150	Adjust Junction Box	Each