717.03 Method of Measurement. The quantities to be paid for shall be measured in accordance with Subsection **714.18**.

717.04 Basis of Payment. The quantity of re-laid pipe culvert, measured as provided in Subsection **714.18** will be paid for at the contract unit price for the respective items, which price and payment shall be full compensation for excavating existing pipe, removing mortar or preformed flexible plastic gasket material from joints, removing headwalls, transporting, excavating, and backfilling new or existing trench, relaying pipe, constructing connections, cleaning out pipe, disposal of surplus materials and for furnishing all materials, equipment, tools, labor and incidentals necessary to satisfactorily complete the work.

The excavation of unyielding or unstable material, measured as provided in Subsection **714.18**, will be paid for at the contract unit price per cubic yard for Unclassified Excavation in accordance with Subsection **203.16**.

Payment for this 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**
7170XX0	*(diameter)*" Re-Laid Pipe Culvert	Linear Foot

SECTION 718

BRICK MASONRY
RUBBLE MASONRY
AND
CONCRETE BLOCK MASONRY

718.01 Description. This work shall consist of brick, rubble

or concrete block, whichever is specified, laid in full beds of masonry mortar and constructed in accordance with these specifications to conform to the plans and to the shapes, lines and grades set by the Engineer. This work shall include the placing of reinforcing steel when shown on the plans or specified in the special provisions.

MATERIALS

718.02 Clay or Shale Brick. Clay or shale brick used in the construction of manholes, catch basins and other drainage related structures shall conform to the requirements of AASHTO M 91, Grade MM. Clay or shale brick used in the construction of buildings, retaining walls, steps and other above the ground structures shall conform to the requirements of AASHTO M 114, Grade SW. Back-up brick for buildings above ground may be Grade MW.

718.03 Concrete Brick. Concrete brick and similar solid units shall conform to the requirements of ASTM C 55, Grade S-II.

718.04 Stone Rubble. Stone for rubble masonry shall be of an approved quality, sound, durable, and free from seams, cracks and other structural defects or imperfections tending to reduce its resistance to weathering. It shall be free from rounded, worn or weathered surfaces.

In general, stones shall have a thickness of not less than six inches, a width of not less than 1 1/2 times their thickness, and a length of not less than 1 1/2 times their width.

In walls 18 inches or less thick, the stone for headers shall be of sufficient length to extend entirely through the wall.

718.05 Concrete Block. Unless otherwise indicated on the plans or in the special provisions, concrete block shall be Grade A, Hollow Load-Bearing Concrete Masonry Units made from portland cement and suitable aggregates such as sand, gravel, crushed stone, bituminous or anthracite cinders, or

blast-furnace slag and shall conform to the requirements of ASTM C 90.

718.06 Mortar Materials.

A. Portland Cement. Portland cement shall comply with the provisions set forth in Subsection **701.02**.

B. Masonry Cement. Masonry cement shall conform to the requirements of ASTM C 91 for the type necessary to make the type of ASTM C 270 mortar specified.

C. Hydrated Lime. Hydrated lime shall conform to the requirements of ASTM C 207, Type S.

D. Aggregate. Aggregate shall be fine aggregate and shall conform to the requirements in Subsection **701.10**.

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

CONSTRUCTION REQUIREMENTS

718.08 Proportioning and Mixing Mortar. Mortar shall be prepared in accordance with the required ASTM C 270 proportioning by blending the required materials to produce Type M, Type S, or Type N, as specified. Proportioning for each is shown as follows:

Proportions By Volume (Cementitious Materials)					
Mortar	Type	Portland Cement or Blended Cement	Masonry Cement	Hydrated Lime or Lime Putty	Aggregate Ratio (Measured in Damp Loose Conditions)
Cement-lime	M	1	---	1/4	Not less than 2 1/4 and not more than 3 times the sum of the separate volumes of cementitous materials
	S	1	---	1/4 to 1/2	
	N	1	---	1/4 to 1 1/4	
Masonry Cement	M	1	1		
	S	1/2	1	---	
	N	---	1	---	

The minimum 28 day strength of the mortar types shall be as follows:

Type M	2500 psi
Type S	1800 psi
Type N	750 psi

For general construction, the mortar shall be Type N or better. Mortar for use in constructing masonry retaining walls shall be Type S or Type M. Mortar for use in constructing masonry in contact with water shall be Type S or Type M.

The material shall be mixed dry in a mixer or in a clean tight box until a uniform mixture is produced. The appropriate amount of clean water shall be added and mixing shall be continued until the desired consistency is obtained. Mortar that is not used within sixty (60) minutes after water is added shall be discarded. Re-tempering of mortar will not be permitted.

718.09 Brickwork. Brick shall be laid to line in courses in full and close joints of mortar that shall not be less than 1/4 inch nor more than 1/2 inch thick. The thickness of the mortar joint shall be uniform throughout. All brick shall be pre-wetted and shall be moist when being laid. Adjoining courses shall break joints at 1/2 a brick as nearly as practicable. Courses shall be level except where otherwise necessary. At least one course in seven shall be composed entirely of headers. All joints shall

be finished properly as the work progresses and, on exposed faces, they shall be neatly struck. Broken or chipped brick will not be allowed in the face of the structure. In making closures, no piece of brick less than the width of a whole brick shall be used, and wherever practicable in making such closures, whole brick shall be laid with the long side at right angles to the face of the structure. The exposed surface of the masonry structure shall be thoroughly cleaned of mortar stains and pointed satisfactorily.

When Brick Masonry (Reinforced) is specified, care shall be taken to insure that the reinforcing steel is placed as specified in the plans.

718.10 Shaping Stone. All shaping and dressing of stone shall be done before the stone is laid, and no dressing or hammering that could loosen the stone already set shall be permitted.

718.11 Stonework. All stones shall be laid in full mortar beds and bonded firmly in all directions. Stratified stone shall be laid on their natural beds and not on their edges. The stones shall be laid to form good, substantial masonry of neat and finished appearance on the face. All spaces between the stones shall be flushed with mortar and then packed with spalls. Spalls will not be permitted in the beds. The joints on exposed faces shall be raked clear of loose mortar and pointed neatly with the mortar specified. The masonry shall be kept wet while the pointing is being done, and in hot or dry weather, the pointed masonry shall be protected from the sun and kept wet for a period of three (3) days after completion. Pointing will not be permitted in freezing weather and any work that is damaged by frost shall be removed and replaced.

718.12 Stonework for Walls. Foundations and bottom courses shall be composed of the larger stones, with the stones decreasing in thickness from the bottom to top of wall. At least one-quarter of the stone area of the face of the wall shall be headers, which shall extend for a distance of twice their thickness into the backing. For walls up to 18 inches

thick, the headers shall extend through the wall. The cross-section area of the header in the heart of the wall shall be approximately the same area as visible in the face of the wall. Selected stones, roughly squared and pitched to line, shall be used at all angles and ends of walls. All stones shall break joints at least four inches on the face of the wall, and no joints in the face shall be more than 2 inches thick.

Backing shall consist of large stone, well shaped and laid so as to break joints. Voids shall not be allowed in any part of the wall. The rear face of walls shall be an approximately plane surface. Walls should be provided with weep holes where called for on the plans or directed by the Engineer.

718.13 Blockwork. The provisions of Subsection **718.09**, shall apply to laying concrete block.

718.14 Copings. Copings of the dimensions shown on the plans, or as directed, shall be placed on the tops of walls; and, unless otherwise specified, shall be constructed of Class 2500 or Class 3000 concrete complying with the requirements of Section **701**. The coping may be cast-in-place or may be precast and shall be set in place on a full mortar bed.

The top surface of the coping shall be sloped to drain. Copings shall be constructed in sections not less than 6feet and not more than 10 feet in length; and joints, except expansion joints, shall be completely filled with mortar.

718.15 Backfilling. The excavated areas that are not occupied by masonry shall be backfilled to the required elevation with suitable material, which shall be tamped in layers of not more than 6 inches of loose material until firm and solid.

718.16 Method of Measurement. The quantity measured for payment shall be the cubic yards of brick, rubble or concrete block masonry actually placed in the structure, completed and accepted.

Brick masonry used in manholes, catch basins, drop inlets and similar items will not be measured for payment. No separate payment will be made for masonry used in those items because they are measured and paid for per unit.

Copings constructed with brick, rubble or concrete block masonry will be measured as part of the masonry.

Excavations for masonry, except for catch basins, manholes, drop inlets and similar items, will be measured as prescribed in Subsection **204.10C**

Reinforcing steel will not be measured for payment. The cost of the reinforcing steel shall be included in the bid price of Brick Masonry (Reinforced).

718.17 Basis of Payment. The quantity of brick masonry, rubble masonry or concrete block masonry, measured as provided above, will be paid for at the contract unit price for Brick Masonry, Brick Masonry (Reinforced), Rubble Masonry, Rubble Masonry Tree-Well, or Concrete Block Masonry, which price and payment shall be full compensation for furnishing all materials, equipment, tools, labor and work incidental thereto, including drainage openings, backfilling and disposing of surplus materials.

Excavation, measured as provided in Subsection **718.16**, will be paid for as Unclassified Excavation as prescribed in Subsection **203.16**.

Masonry used in constructing catch basins, drop inlets, manholes, spring boxes, junction boxes and similar items will be paid for in accordance with the provisions of Section **719**.

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
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**