

SECTION 115 – MANHOLES, INLETS, JUNCTION BOXES

1. GENERAL

This section governs the performance of all work necessary for construction of cast-in-place and precast concrete structures for inlets, manholes, junction boxes, box culverts, headwalls, and incidental structures associated with sanitary and storm sewer lines. Structures shall be constructed at designated locations, conforming to the Drawings and in accordance with this specification. Masonry or brick structures shall not be allowed under this specification.

2. EXCAVATION AND BACKFILL

Structures shall be excavated as described below and in accordance with Section 102, "Excavation and Embankment." Structures shall be backfilled as described below and in accordance with applicable methods as specified for adjacent trenches under Section 101, "Trench and Backfill."

Excavation for structures shall be carried a sufficient distance, but not less than 18 inches outside the limits of the structure, to permit efficient erection and removal of forms and laying of masonry units, and shall be sloped, stepped, or braced as required for stability. Unsuitable soils encountered at the bearing elevation of the structure shall be removed and replaced with either fill concrete or compacted granular material at the Contractor's option. Over excavation shall be corrected in like manner. The Contractor shall maintain the excavation free of standing water until backfilling is complete.

No backfill shall be placed over or around any structure until the concrete or mortar therein has attained a minimum strength of 2000 p.s.i. and can sufficiently support the loads imposed by the backfill without damage. The Contractor shall use utmost care to avoid any wedging action between the side of the excavation and the structure that would cause any movement of the structure. Any damage caused by premature backfill or by the use of equipment on or near a structure will be the responsibility of the Contractor.

Backfill shall be placed and compacted on all sides of the structure simultaneously, and operations shall be so conducted that the backfill is always at approximately the same elevation on all sides of the structure. No excavated rock larger than 4 inches maximum dimension shall be placed within 1 foot of the exterior surface of any structure except as allowed with controlled low strength material (CLSM) flowable fill placement.

3. CONCRETE MIXES

Concrete used for structures shall conform to Section 202, "Concrete" except that aggregates do not have to be supplied from KDOT pre-qualified rock quarries.

4. REINFORCING STEEL

Reinforcing bars shall conform to ASTM A 615/A 615M, Grade 60. Welded steel wire fabric shall conform to ASTM A 185.

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5. PRECAST CONCRETE STRUCTURES

The Contractor may, at his option, construct precast concrete inlets, junction boxes and box culverts, in lieu of the cast-in-place structures indicated on the Drawings; except that all concrete base slabs for pre-cast inlets, manholes, and junction boxes may be cast-in-place. Solid concrete brick or block shall be used to block inlets and similar structures to grade during placement of base slab concrete.

Precast concrete box culvert sections shall be installed on a 4 inch leveling course of untreated compacted aggregate conforming to leveling courses shall extend 1 foot past the line of the box section and be finished to a true plane surface to provide uniform bearing for the precast section. Any adjustments required for precast structures to meet field conditions shall be at the cost of the Contractor.

All precast concrete sanitary sewer manholes shall be furnished with a protective PVC sheet liner with locking extensions in accordance with Section 606, "PVC Manhole Liner." All sewers extending from precast reinforced concrete manholes shall be supported with concrete for a distance of 3 feet from the outside wall of the manhole.

The tops of the standard concrete manholes shall be laid with at least two adjustment rings with a minimum vertical distance of 12 inches. These adjustment rings shall be laid adjacent to the bottom of the cast iron manhole ring.

6. FINISHING

- A. **Formed Surfaces:** Immediately following removal of the forms, fins and irregular projections shall be removed. Form tie connections, holes, honeycomb spots, and other defects shall be chipped to ensure the voided area is exposed, and shall be chipped back to solid material. These areas shall be thoroughly cleaned, saturated with water, and pointed with a grout approved by the Engineer. The repaired surfaces shall be cured in accordance with Section 202, "Concrete."
- B. **Exposed Slabs:** Finish for exposed slabs shall be wood float texture. Exposed edges shall be beveled or edged with a radial tool.
- C. **Form Removal:** Forms shall remain in place until the concrete has attained sufficient strength to support loads imposed by backfilling, construction and traffic, but not less than:
 - a. Walls: Forms shall remain in place for a minimum of 5 days or until the concrete reaches a minimum strength of 2000 p.s.i.
 - b. Slabs: Form shall remain in place for a minimum of 7 days or until the concrete reaches a minimum strength of 3000 p.s.i.

7. MATERIALS

- A. **Manholes:** Precast manholes shall conform to the latest version of ASTM C 478. Joints between concrete manhole sections shall be made in accordance with the jointing requirements as specified in Section 606, "PVC Manhole Liner." Minimum cross sectional area of preformed compound shall be 1 inch square or 1.25 inches diameter.

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- B. End Sections for Concrete Pipe:** Shall be flared end sections of the pipe manufacturer's standard design, and shall meet all applicable requirements of the latest version of ASTM C 76 for Class II or higher classes of pipe.
- C. Rectangular Structures:** Shall conform to the inside dimension indicated on the Contract Drawings and be designed for the following loads:
- H-20 live load for all structures in/or under pavement, shoulders, driveways and other traffic areas.
 - 2,000-lb wheel live load for curb opening inlets and junction boxes in non-traffic areas.
 - 50 pcf equivalent fluid pressure for soil pressure on vertical walls.
 - 120 pcf for unit weight of soil cover on top slabs.
- D. Brick:** Brick shall conform to ASTM C 32, Grade SM, free from cracks and check and emit a metallic ring when struck with a hammer.
- E. Cement Mortar:** Premix mortar non-shrink or expansive grout in mortar for packing pipe in openings of precast structures, setting castings, and other incidental work shall consist of one part portland cement and two parts sand by volume mixed with sufficient water to form a workable stiff grout.
- F. Metal Castings:** Castings shall be gray iron conforming to ASTM A48, Class 35B. Castings shall be of the shape, dimension, and minimum weight indicated on the Drawings, and be free from manufacturing defects. If requested by special order, castings shall be cleaned and painted with one coat coal tar before delivery. Bearing surfaces between frames and covers for installation in all areas shall be machined to provide even seating.
- G. Toe Walls:** Flared end sections for concrete and steel pipe shall be set on a concrete toe wall centered on the end of the section. Toe walls shall be 8 inches thick by 24 inches deep by the width of the end section.

8. INVERT CHANNELS

Form concrete invert channels in manholes, inlets, and junction boxes to make changes in direction of flow with smooth curves of as large a radius as permitted by the inside dimension of the structure. Grade changes and transitions shall be smooth and uniform, and all parts of the invert channel and adjacent floor shall slope to drain. Channel bottom shall be finished smooth without roughness or irregularity. Invert channels for precast concrete structures may be cast integrally with the structure base slabs at the Contractor's option.

9. MEASUREMENT AND PAYMENT

Payment shall be made at the contract unit price bid per each for "Inlet," "Junction Box," "Manhole" of the specified size and type. The price shall be full compensation for excavation (including rock if necessary,) backfill, steps, castings, concrete, reinforcing steel, and other materials necessary to complete the work. Precast shop drawings shall be submitted and approved by the

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Engineer. All pipes entering or exiting precast structures shall be encased in a minimum of 6 inches of concrete all-around the pipe for a distance of 2 feet adjacent to each structure.

Reconstruction of existing structure walls or tops to match proposed elevations or for connection to proposed storm sewer systems shall be paid for at the contract unit price bid per each for "Modification of Structure" of the specified type.