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CHAPTER 5

PORTLAND CEMENT CONCRETE (PCC) BASE CONSTRUCTION

5.00 GENERAL

This Work shall be defined as the construction of a completely new pavement structure or the reconstruction of an existing pavement structure including earthwork, appurtenances, and all related construction required to connect to existing pavement around the limits of construction.

The concrete base shall be constructed on an approved subgrade in conformance with Chapter 2 of these Standard Specifications, in conformity with the lines, grades and typical cross sections shown on the plans.

5.01 MATERIAL

A. CONCRETE

Portland Cement Concrete (PCC) for base shall be LB 2750 concrete for new construction of Residential Streets only and LB-3500 for all other applications unless otherwise specified. LB-2750 and LB-3500 concrete shall meet the requirements of Chapter 3 of these Standard Specifications. The thickness of the base shall be as shown on the plans.

B. LIQUID MEMBRANE CURING COMPOUND

Curing Compound for base construction shall be either Translucent Liquid Membrane-Forming Type or Emulsified Asphalt

1. Translucent Liquid Membrane-Forming Type

Translucent Liquid Membrane Forming Type curing compound shall contain no wax, resin or solvent and shall conform to “Standard Specifications for Liquid Membrane -Forming Compounds for Curing Concrete”, ASTM Designation C 309, Type 1, Class B. Only curing compounds included on the latest edition of the NDOT Approved Products list shall be used unless otherwise approved by the City Engineer.

2. Emulsified Asphalt

Emulsified Asphalt used as cure for concrete base shall conform to “Standard Specification for Emulsified Asphalt”, ASTM D 977. The Emulsified Asphalt shall be homogeneous after thorough mixing provided separation has not been caused by freezing. Emulsified Asphalts separated by freezing shall not be used. Only Emulsified Asphalts included on the latest edition of the NDOT Approved Products list shall be used unless otherwise approved by the City Engineer.

5.02 PREPARATION OF SUBGRADE

The subgrade shall be prepared as specified in Chapter 2 of these Standard Specifications. To prevent the absorption of moisture from the newly deposited concrete, the subgrade shall be kept moist by light applications of water until the concrete base has been placed.

No direct payment will be made for preparation of subgrade. Subgrade preparation shall be considered subsidiary to other items of Work for which direct payment is made.
5.03 FORMS

The outside form for the construction of concrete base shall be the combination curb and gutter. Alternate forms, when required, shall be steel or wood. Steel forms shall have a minimum base width of 6" and a minimum length of 10', and shall be equipped with an adequate locking device. Wood forms may be used only on curves of less than 150' radius. The depth of all forms shall be equal to at least the depth of the concrete being placed. No built-up forms will be permitted.

All forms shall be free from bends and warps at all times. They shall be cleaned thoroughly each time they are used and adequately oiled before concrete is placed against them. The forms shall be set so that they rest firmly through their entire length on thoroughly compacted subgrade. They shall be set accurately to line and grade and sufficiently braced to resist the pressure of the concrete. Forms shall be set at least 150' ahead of the paving operation.

Sufficient forms shall be provided so they may remain in place 12 hours or more after the concrete has been placed.

No direct payment will be made for forms. Form work shall be considered subsidiary to other items of Work for which direct payment is made.

5.04 CONCRETE PLACEMENT

A. GENERAL

The concrete shall be deposited uniformly on the prepared subgrades and distributed to the required depth over the entire width of the pavement by approved methods, struck off and finished as hereinafter provided. The Concrete placement operation shall be carried out in such a manner as to ensure that there will be no separation of the aggregate and the mortar.

Concrete shall be leveled, consolidated and finished within 30 minutes after being placed on the grade. A lesser time may be specified by the City’s Project Manager if, in his/her opinion, conditions warrant. Concrete which will exceed the allowed time between placement on grade and finishing operations shall be subject to removal and replacement.

B. VIBRATING

All concrete shall be thoroughly consolidated by means of approved mechanical vibrators. The vibrator shall uniformly consolidate the full depth and width of the concrete without segregation. Vibrating frequency shall be within the manufacturers’ Specifications and shall be verified by the Contractor.

Vibrators shall not contact side forms nor transmit vibration to finishing machines or spreaders.

Machine mounted vibrators shall be operated only when the machine to which they are attached is moving and shall not cause excessive surface water with a single passage of the machine. The vibrators shall be placed so as to allow a minimum of overlap vibration.

C. FINISHING

The concrete shall be deposited in such a manner that adequate concrete remains ahead of the screed and the finish machine so that they provide the cross section required. The concrete will then be further consolidated and finished mechanically with a power-driven machine approved by the City’s Project Manager. The finish machine shall be operated over the entire width of the base and shall achieve uniform consolidation.
5.04 CONCRETE PLACEMENT (Continued)

C. FINISHING (Continued)

The finishing machine shall be kept in good repair at all times and shall operate so as to give the desired finish over the entire surface of the pavement. The forward speed of the finishing machine shall be adjusted to the average progress of the concrete production, in order that the strike off operation shall be as continuous and uninterrupted as possible.

The screed on the finish machine shall be constructed of metal and shall have sufficient strength and stiffness to retain its shape under all working conditions. The working or screeding edge shall be shaped to match the required cross section of the pavement. The screed shall be operated so that when riding on the gutter pan, which shall be used as the side forms for the base, the working edge will have an excess of concrete above grade. The contact surfaces of the wheels of the finishing machine shall be kept free from concrete and earth. Hand tools that perform the function of the finishing machine shall be immediately available for use in the event of an emergency.

The pavement shall be given its final finish by means of a wet burlap drag. The drag shall be pulled in a longitudinal direction only. The drag shall be adequately maintained so that the resultant finish shall be uniform in appearance.

All small or irregular areas shall be finished by methods approved by the City’s Project Manager.

No measurement or direct payment shall be made for placing, vibrating or finishing the concrete base. These items shall be considered subsidiary to other items of Work for which direct payment is made.

5.05 JOINTS

A. CONSTRUCTION JOINTS

When placing of concrete is interrupted, for any reason, for over 1/2 hour, the concrete base shall be finished against an approved bulkhead made of at least 2" material, placed in a vertical position and extending completely across the street. Special care shall be taken to consolidate the concrete against the surface of the bulkhead. When the placing of concrete is resumed, the bulkhead shall be removed and care shall be taken not to disturb any steel or concrete placed.

B. CONTROL JOINTS

Control joints shall be placed in the concrete base both longitudinally and transversely throughout the entire length of the construction. Longitudinal joints shall be placed at approximately the 1/3 points of the slab width for pavements having a total width of 33' or less, and at the quarter points of the slab width for pavement having a total width greater than 33' but less than or equal to 44'. Transverse control joints shall be placed at intervals of 30' and shall line up with joints in the curb or combined curb and gutter.

Control joints shall be cut to a depth of at least 1/3 of the concrete thickness by such methods that may be approved by the City’s Project Manager.
5.05 JOINTS (Continued)

C. LONGITUDINAL CONSTRUCTION JOINTS

All longitudinal construction joints in concrete base shall be constructed with a metal keyway and tied to adjoining slabs with tie bars of a size and spacing as provided in the plans.

No measurement or direct payment shall be made for joint construction. The construction of joints shall be considered subsidiary to other items of Work for which direct payment is provided.

5.06 CURING AND PROTECTION

A. CURING

Curing shall be accomplished using either Liquid Membrane Curing Compound or Wet Burlap.

1. Curing With Liquid Membrane Curing Compound

Within 30 minutes after the concrete has been finished, the concrete surface shall be sealed with a uniform application of a membrane curing compound as described previously in this chapter. This time may be adjusted by the City’s Project Manager if, in his/her opinion, conditions warrant. Concrete which exceeds the allowed time between finishing and curing operations will be subject to removal and replacement.

An approved self-propelled mechanical power sprayer shall be used to apply the curing compound to the concrete pavement except that approved manual spraying equipment may be employed on narrow or variable width sections where the use of a self-propelled mechanical power sprayer is impractical, and on irregular sections of street returns and alley returns. The self-propelled mechanical power sprayer shall be of sufficient width to cover the entire width of the pavement.

2. Curing With Wet Burlap

Within 30 minutes after the concrete has been finished, damp burlap shall be carefully placed on the concrete and kept moist in a manner which will not damage the pavement surface. This time may be adjusted by the City’s Project Manager if, in his/her opinion, conditions warrant. Concrete which exceeds the allowed time between finishing and curing operations will be subject to removal and replacement.

The burlap shall be clean, evenly woven, free of encrusted concrete or other contaminating materials, and shall be reasonably free from cuts, tears, broken or missing yarns, and thin, open or weak places. The burlap shall be of sufficient length to cover all exposed surfaces.

The burlap shall be kept continuously saturated with water for at least 72 hours following the placing of the concrete or until an asphalt tack coat is applied.

B. PROTECTION

The Contractor shall provide and maintain substantial barricades, warning signs, flares and, when required, watchmen to protect the new pavement and Work site from vandalism and property destruction.

Any concrete showing injury from vandalism shall be repaired or removed and replaced at the Contractor’s expense and to the City’s Project Manager’s satisfaction. No heavy equipment,
5.06 CURING AND PROTECTION (Continued)

B. PROTECTION (Continued)

placement of asphalt or vehicular traffic shall be allowed on the new construction until the concrete has achieved a compressive strength of 2500 p.s.i. or 7 days have elapsed from date of placement. A longer period of time may be required if, in the opinion of the City’s Project Manager, the concrete is not of sufficient strength to support the equipment or vehicles.

No measurement or direct payment shall be made for curing and protection. Those items shall be considered subsidiary to other items of Work for which direct payment is made.

5.07 BASIS OF PAYMENT

The Portland Cement Concrete (PCC) base shall be measured and paid for at the contract unit price bid, per square yard for CONCRETE BASE, ___" for each thickness identified in the plans. Such payment shall be full compensation for subgrade preparation, forms if required, curing, jointing, materials, equipment, tools, labor, and incidentals necessary to construct and prepare the base to receive the asphaltic concrete surface course. No measurement or payment shall be made for base removed for the convenience of the Contractor which, in the opinion of the City’s Project Manager, would not have had to be removed to perform the Work.

5.08 CONCRETE HEADER

Concrete headers shall be as provided for in Chapter 4 of these Standard Specifications.

5.09 HOT/COLD WEATHER CONSTRUCTION

Concrete construction in hot or cold weather shall be as provided for in Chapter 3 of these Standard Specifications.

5.10 PAY FACTORS

The Portland Cement Concrete (PCC) base shall be subject to the pay factors provided for in Chapter 4.14 of these Standard Specifications.