

SECTION 1400 - CONCRETE PAVEMENT

1401 SCOPE. This section governs the furnishing of all labor, equipment, tools, and materials and the performance of all work necessary to construct concrete pavement.

1402 MATERIALS.

- A. Concrete. Concrete for pavement shall be air-entrained as specified in Section 2000 *Concrete* unless otherwise specified or approved by the Engineer.
- B. Reinforcing. Materials shall be as specified in Section 2000 *Concrete* or as indicated on the plans.
- C. Isolation Joint Fillers. Isolation joint fillers shall conform to ASTM D1751.
- D. Joint Sealing Compound. Joint sealing compounds shall conform to the following.

Joint Seals and Sealants	AASHTO	ASTM
Hot-poured, Polymeric Asphalt Based	M 301	D 3405
Hot-poured, Elastomeric Type	M 282	D 3406
Preformed Polychloroprene Elastomeric	M 220	D 2628
Lubricant for Installation of Preformed Seal	--	D 2835

- E. Curing Membrane. All material to be used or employed in curing concrete must be approved by the Engineer prior to its use. It shall be of the liquid membrane type and shall conform to ASTM C1315, Type II, Class A – white pigmented cure.

1403 CONSTRUCTION DETAILS. The Portland cement concrete pavement shall be constructed to the configuration, lines and grades shown on the plans.

- A. Grading and Subgrade Preparation. All excavation or embankment required shall be completed in accordance with Sections 1100 *Grading* and 1200 *Subgrade Preparation*.
- B. Forms. All forms shall be in good condition, clean, and free from imperfections. Each form shall not vary more than one fourth (1/4) inch in horizontal and vertical alignment for each ten (10) feet in length. Forms may be wood or steel. No aluminum forms shall be allowed.

1. Size. Forms shall have a height equal to or greater than the prescribed edge thickness of the pavement slab unless otherwise approved by the Engineer.
2. Strength. Forms shall be of such cross-section and strength, and so secured as to resist the pressure of the concrete when struck off, vibrated, and finished, and the impact and vibration of any equipment, which they may support.
3. Installation. Forms shall be set true to line and grade, supported through their length and, joined neatly in such a manner that the joints are free from movement in any direction.
4. Preparation. Forms shall be cleaned and lubricated with a release agent prior to each use and shall be so designed to permit their removal without damage to the new concrete.
5. Paving Machine. A slip-form paving machine may be used in lieu of forms. The machine shall be capable of placing the concrete pavement to the correct cross-section, thickness, line and grade within the allowable tolerances as approved by the Engineer. The machine must be equipped with mechanical internal vibrators of the same type and size, mounted with a maximum spacing of 12 inches centers. Vibrators shall be mounted so that they enter the concrete in a vertical position under the influence of their own weight, with enough flexibility to work themselves around the reinforcing steel.

1404 JOINTS. Generally joints shall be formed at right angles to the true alignment of the pavement, and to the depths and configuration specified by the standard drawings or as modified by the plans and project specifications.

- A. Isolation Joints. Isolation joints shall extend from the subgrade to one inch below the surface of the pavement or the material will have a suitable tear strip provided to allow for the application of the joint sealer. Under no circumstances shall any concrete be left across the isolation joint at any point.
 1. Location. Isolation joints shall be placed at all locations where shown on the plans and standard details or as directed by the Engineer.
 2. Material. Isolation joints shall be formed by a one-piece, preformed joint filler cut to the configuration of the correct section. For pavement the filler shall be three fourths (3/4) inch thick.

3. Stability. Isolation joints shall be secured in such a manner that they will not be disturbed during the placement, consolidation and finishing of the concrete.
 4. Dowels. If isolation joints are to be equipped with dowels they shall be of the size and type specified, and shall be firmly supported in place by means of a dowel basket which shall remain in place. The basket shall be installed in such a position that the center line of the joint assembly is perpendicular to the center line of the slab and the dowels lie parallel to the slab surface and parallel the center line of the slab. One half of each dowel shall be lightly painted or greased with an approved lubricant.
- B. Contraction Joints. Contraction joints shall be of the type and dimensions and at the spacing shown on the plans or standard drawings or as directed by the Engineer. Contraction joints shall be sawed to produce a controlled crack in the proper location unless other methods are approved by the Engineer.
1. Configuration. The standard contraction joint is a one eighth (1/8) inch wide joint to a depth of one third of the slab thickness plus one fourth inch ($D/3 + 1/4$ ") unless otherwise indicated or specified.
 2. Sawing. Sawed contraction joints shall be cut as soon as the concrete has hardened sufficiently to prevent excessive tearing and raveling regardless of the time or weather. Joints shall be sawed and finished before conditions induce uncontrolled cracks. Material created by sawing shall be removed from the pavement surface before it has had time to dry or set.
 3. Spacing. The spacing shall be as shown on the plans or as directed by the Engineer.
- C. Longitudinal and Construction Joints. Longitudinal joints or construction joints shall be placed as shown on the plans or where the Contractor's construction procedure may require them to be placed.
1. Center Joints. Longitudinal center joints shall be constructed using the methods specified in Section 1404B "Contraction Joints" or as specified for longitudinal construction joints as required.
 2. Longitudinal Construction Joints. Longitudinal construction joints (joints between constructions lanes) shall be constructed with tie-bars. Joint configuration shall conform to the dimensions shown on the plans or standard drawings.

3. Transverse Construction Joints. Transverse construction joints shall be constructed with tie-bars and placed wherever concrete placement is suspended for such a time that the concrete has begun to take its initial set.
4. Tie-bars. Tie-bars shall be of deformed steel of the dimensions specified by the plans or standard drawings. Tie-bars shall be installed at the specified spacing and be firmly secured so as not to be disturbed by the construction procedure. They shall be epoxy-coated, and free from dirt, oil, paint, grease, loose mill scale, and thick rust, which could impair bond of the tie-bar with the concrete.
5. Sawing and Sealing. All construction joints shall be sawed and sealed.

1405 PLACING, FINISHING, CURING, AND PROTECTION. Concrete shall be furnished in quantities required for immediate use and shall be placed in accordance with the requirements of Section 2000--*Concrete* of these technical specifications and as specified herein.

- A. Concrete Placement. Prior to placement of the concrete pavement, all debris and foreign material shall be removed from the inner surfaces of the forms and all forms and subgrade properly moistened. All required reinforcement shall be properly and firmly set into position to preclude movement during placement of the concrete.

The concrete shall be deposited over the entire width of the prepared subgrade between the forms in such a manner to prevent segregation and to require as little rehandling as possible. The pour shall be made to the required depth and width of the construction lane in successive batches and in a continuous operation without the use of intermediate forms or bulkheads. Concrete shall be thoroughly vibrated. Attachments on finishing machines to vibrate the concrete will be permitted provided satisfactory results are attained. Care shall be taken that the vibrator does not penetrate the subgrade or dislodge or move the joints. The vibrating shall be sufficient to produce a smooth pavement. Under no circumstances shall the vibrator be used to move concrete. Honeycomb in the edge may be cause for rejection of the pavement.

When the forward motion of the vibrating screed is stopped, the vibrator shall be shut off; it shall not be allowed to idle on the concrete. Internal mechanical vibration shall be used along all formed surfaces.

No concrete shall be placed around manholes or other structures until they have been brought to the required grade, alignment, and cross slope. All utility appurtenances shall be boxed out or otherwise isolated

using isolation joint material as indicated or as directed by the Engineer. Concrete shall not be allowed to extrude below the forms.

- B. Concrete Finishing. The pavement shall be finished to the elevations as shown on the drawings by either mechanical or hand-finishing methods.

Misting the concrete by means of a spray nozzle is acceptable. No brushes will be allowed.

1. Floating. All surfaces shall be consolidated and floated after strike-off, within 15 minutes of initial concrete placement, and prior to final surface finish. Use of a "fresno" steel trowel/ float (or walking trowel) will not be allowed for floating concrete pavement.
2. Final Surface Finish. A burlap drag or a broom finish shall be used as the final finishing method. When a drag is used it shall be at least three (3') feet in width and long enough to cover the entire pavement width. It shall be kept clean and saturated while in use. It shall be laid on the surface of the pavement and dragged in the direction in which the pavement is being laid. When broom finishing, a hard bristle broom shall be used. The broom shall be kept clean and used in such a manner as to provide a uniform textured surface.

The final surface of the concrete pavement shall have a uniform gritty texture free from excessive harshness and true to the grades and cross section shown on the plans. The Engineer may require changes in the final finishing procedure as required to produce the desired final surface texture.

- C. Curing. Curing shall conform to the requirements set forth in Section 2000 – *Concrete*.

- D. Protection. The Contractor shall, at his own expense, protect the concrete work against damage or defacement of any kind until it has been accepted by the city.

All vehicular traffic, including construction vehicles, shall be prohibited from using the new concrete pavement for a period of seven (7) days unless approved otherwise by the Engineer.

When approved or designated for use, high strength gain concrete (KCMMB 5k mix or a high early strength type mix approved by the Engineer) may be opened to vehicular traffic after ninety-six (96) hours. If a Contractor wishes to open the

concrete pavement to traffic earlier than ninety-six (96) hours, material test results indicating the concrete has reached a minimum compressive strength of 3,500 psi or a minimum flexural strength of 450 psi must be provided.

Concrete pavement, which is damaged or defaced, shall be removed and replaced, or repaired, to the satisfaction of the Engineer. All costs for replacement or repairs shall be the responsibility of the Contractor.

Pavement that develops uncontrolled or undesirable cracks shall be removed and replaced at the Contractor's expense. If approved by the Engineer, the Contractor may be allowed to make repairs to cracked pavement and/or a reduction in payment for the concrete pavement will be negotiated. All damaged sections to be removed shall be sawed a minimum of three (3) feet from a joint or removed to the nearest joint.

E. Temperature Limitation. Concrete work shall proceed in accordance with the requirements established in Section 2000-*Concrete*.

1406 BACKFILL. A minimum of twenty-four (24) hours shall elapse before forms are removed and a minimum of five (5) days shall elapse before pavement shall be backfilled unless otherwise approved by the Engineer.

1407 JOINT SEALING. All sawed joints shall be sealed with an approved joint sealer applied in accordance with the manufacturer's recommendations. The joints shall be sealed after seven (7) days following placement of the concrete and prior to the opening of the pavement to traffic.

1408 CLEANUP. The Contractor shall be responsible for the removal of excess dirt, rock, broken concrete, concrete splatters and overspray from the area of the construction.

1409 SURFACE TOLERANCES. Concrete pavement shall have a surface tolerance in all directions of one fourth (1/4) inch in ten (10) feet when checked with a ten (10) foot straightedge. Pavement surface must drain when complete. No low areas, which allow water to pond, shall be left on the surface.

When surface tolerances are not met, use one of the following methods for corrections:

- Diamond grinding
- Remove and replace the entire pavement thickness
- Other methods proposed by the Contractor as approved by the Engineer.

The corrected areas shall have uniform texture and appearance.

1410 THICKNESS TOLERANCES. It is the intent of these specifications that pavement shall be constructed strictly in accordance with the thickness shown on the plans. The thickness of the pavement may be measured by coring. If any pavement is found deficient in thickness, it may be compensated for at an adjusted unit price or shall be removed and replaced. In removing pavement, it shall be removed from the outside edge of the curb and gutter (curb and gutter with tie-bars may remain if in good condition) to a longitudinal joint and on each side of the deficient measurement until no portion of the exposed cross sections are more than two tenths (2/10) inch deficient.