

MASTER SPECIFICATION

SECTION 02520 PORTLAND CEMENT CONCRETE PAVING

A. General

1. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions apply to this section.
2. Summary
 - a. Extent of Portland cement concrete paving is shown on drawings, including curbs, gutters, walkways, sidewalks, flumes, and pavement.
 - b. Prepared sub-base is specified in "Excavation and Grading" section.
 - c. Concrete and related materials.
 - d. Joint fillers and sealers, Section 07920 "Joint Sealants".
 - e. Concrete used within buildings and structural concrete not included in this section.
3. Submittals: Provide samples, manufacturer's product data, test reports, and materials certifications as required in referenced sections for concrete and joint fillers and sealers.
4. Quality Assurance: Codes and Standards - Comply with local governing regulations if more stringent than herein specified.
5. Job Conditions - Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
 - a. Coordinate with requirements for "Temporary Facilities" specified in Division 1.

B. Products

1. Materials
 - a. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
 - (1) Use flexible spring steel forms or laminated boards to

MASTER SPECIFICATION

form radius bends as required. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

- b. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A-185.
- c. Reinforcing Steel: Deformed billet steel bars, ASTM A615, grade 40.
- d. Portland cement concrete for curb and gutter, sidewalks and miscellaneous cast-in-place flumes and other minor site structures shall have a minimum 28 day compressive strength of 3500 psi, a non-vibrated slump between 2.5 and 4 inches, minimum cement content of 564 pounds per cubic yard, an air entrainment of 5-7% and a maximum water-cement ratio of 0.57.
- e. Portland cement concrete for slab in front of loading docks shall have a minimum 28 day compressive strength of 4500 psi, a non-vibrated slump between 2.5 and 4 inches, minimum cement content of 658 pounds per cubic yard, an air entrainment of 5-7% and a maximum water-cement ratio of 0.49.
- f. Joint filler shall be self-leveling flexible polyurethane joint sealant.
 - 1. Products:
 - a. Euclid Chemical Co: Eucolastic II.
 - b. Pecora: urexpan NR 200.
 - c. Sonneborn Building Products – Sonoclastil SL 2 Sealant.
 - d. Tremco: THC 900.
 - e. Vulkem: Vulkem 45.
 - 2. Description:
 - a. Hardness- Shore “A”: A30 minimum
 - b. Movement Capability: +/-25%.
 - c. USDAQ Approved.
- g. Concrete curing agents shall be free from any impurities which may be detrimental to the concrete and meet the requirements specified in Section 296 of North Carolina Department of Transportation Standard Specifications for Roads and Structures.

MASTER SPECIFICATION

- h. Aggregate for portland cement concrete shall meet the requirements for fine and coarse aggregate of Section 914 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.
- i. Portland cement and admixtures shall meet the requirements of Section 1000-4 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.
- j. Water for mixing or curing the concrete shall be free from injurious amounts of oil, salt acid or other products injurious to the finished.

2. Concrete Mix, Design, and Testing

- a. Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control and as herein specified.
- b. Design mix to produce normal-weight concrete consisting of Portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:

For curb and gutter, sidewalks and miscellaneous cast-in-place flumes and other minor site structures:

- (1) Compressive Strength: 3500 psi, minimum at 28 days, unless otherwise indicated.
- (2) Non-vibrated slump between 2.5 and 4 inches.
- (3) Minimum cement content of 564 pounds per cubic yard.
- (4) Air entrainment of 5-7%.
- (5) Maximum water cement ratio of 0.532.

For slab in front of loading docks:

- (1) *Compressive Strength: 4500 psi, minimum at 28 days, unless otherwise indicated.*
- (2) *Non-vibrated slump between 2.5 and 4 inches.*
- (3) *Minimum cement content of 658 pounds per cubic yard.*
- (4) *Air entrainment of 5-7%.*
- (5) *Maximum water cement ratio of 0.49.*

MASTER SPECIFICATION

C. Execution

1. Surface Preparation
 - a. Remove loose material from compacted sub-base surface immediately before placing concrete.
 - b. Proof-roll prepared sub-base surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
2. Form Construction
 - a. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
 - b. Slope step treads at 1/4 inch per foot to drain.
3. Reinforcement: Locate, place and support reinforcement as indicated.
4. Concrete Placement
 - a. General: Comply with requirements of Division 3 sections for mixing and placing concrete, and as herein specified.
 - b. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
 - c. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
 - d. Curbs and Gutters: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and

MASTER SPECIFICATION

laboratory test results that meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

- e. Concrete Paving: Place concrete using a concrete pump; depositing concrete directly from a concrete truck will not be allowed for concrete paving. Driving loaded concrete trucks over prepared subgrade will not be allowed.

5. Joints

- a. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of concrete.

(1) Sawed Joints: Form weakened-plane joints with powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints one inch (1") deep into hardened concrete at maximum fifteen foot (15') spacing, in both directions, as soon as surface will not be torn, abraded, or otherwise damaged by cutting action. *Seal with joint filler material as specified below.*

(2) Expansion joints: Use pre-molded expansion joint material.
Seal joints with joint filler material as specified below.

- b. Construct transverse joints at right angles to the centerline, unless otherwise indicated. Construct contraction joints at intervals equal to the width of sidewalks and at 10' maximum spacing in curb and gutter and slabs. Seal joints with joint filler material as specified below.
- c. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints. Seal joints with joint filler material as specified below.
- d. Expansion Joints: Provide pre-molded expansion joint filler abutting concrete curbs, catch basins, manholes, inlets,

MASTER SPECIFICATION

structures, walks, and other fixed objects, unless otherwise indicated. Provide expansion joint at a maximum 50' spacing (or as indicated on the plans) for slabs, sidewalks and curb and gutter. *Seal joints with joint filler material as specified below.*

- e. Joint filler material shall be mixed and installed in strict accordance with manufacturer's printed installation instructions except where more stringent requirements are shown or specified. Joint surfaces shall be primed as required by manufacturer to insure bonding. Provide backer rod in joint at a uniform depth of $\frac{1}{2}$ the joint width, a minimum depth of $\frac{1}{4}$ " and a maximum depth of $\frac{1}{2}$ ". Take all necessary steps to prevent three sided adhesion. Final cured profile shall be flush with concrete slab surface. *See Section 07920 Part 2 – Products (~~32-1313 B.1.g. — Products.~~)*

6. Concrete Finishing

- a. After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- b. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.
- c. Work edges of gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- d. After completion of floating and troweling when excess moisture or surface sheen has disappeared, broom surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to owner.
- e. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Owner.

MASTER SPECIFICATION

f. For joint sealing see Section C.5. - Joints

7. Curing: Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections.
8. Repairs And Protections: Repair or replace broken or defective concrete, as directed by Owner.

D. QUALITY ASSURANCE

A. General

1. The Owner will employ and pay for the services of an independent testing agency to provide testing and inspection of the Portland Cement Concrete and stone base work. The testing agency shall be licensed in the state where the structure is located and shall meet the requirements of "Recommended Practices for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction" (ASTM E329). All testing and inspections shall be performed under the supervision of an engineer registered in the state where the structure is located.
2. Portland cement concrete and stone base materials and operations shall be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Owner's Representative for final acceptance.
3. The testing agency shall report all test and inspection results to the Project Manager, Owner and Contractor immediately after they are performed. All test and inspection reports shall be signed and sealed by an engineer registered in the state where the structure is located and shall include the exact location of the work represented by the test.
4. The testing agency and its representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the contract documents, approve or accept any portion of the work, perform any duties of the Contractor, or be a party to scheduling of work.
5. The Contractor shall notify the testing agency a minimum of 24 hours in advance of all Portland cement concrete and stone base work.

MASTER SPECIFICATION

6. Records of inspection shall be kept available to the building official during progress of work and for two years after completion of the project. Records shall be preserved by the independent testing agency.
- B. The testing agency shall conduct pre-placement inspections as necessary to determine that:
1. Paving subgrade areas have been constructed per the Soils Report and specifications criteria.
 2. All paving section subgrade areas have been inspected, tested and accepted.
- C. The testing agency shall conduct tests as necessary to determine that:
1. All materials used in the production of Portland concrete and stone base shall meet the requirements of the project specifications.
- D. The testing agency shall conduct Portland cement concrete and stone base placement inspections as necessary to determine that:
1. Portland cement concrete has been mixed and transported in accordance with the project specifications.
 2. Portland cement concrete is conveyed to the place of final deposit by methods which prevent separation or loss of material.
 3. Portland cement concrete and stone base are properly compacted. Perform at least one density test for every 20,000 SF of pavement area. [Verify stone base thickness by checking stone base thickness at least once for every 20,000 SF of pavement area.]
 4. Portland cement concrete is finished free from depressions exceeding one-eighth ($\frac{1}{8}$) inch as measured with a ten (10) foot straight edge in any direction.
- E. The Owner shall conduct post-placement inspection as necessary to determine that:
1. All surface defects are repaired in accordance with the project specifications.

MASTER SPECIFICATION

-END OF SECTION-