

**SECTION 32 13 13
CONCRETE PAVING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Extent of concrete curbs, pavement, and walks, as shown on the drawings
- B. Earthwork and prepared sub-base
- C. Concrete and related materials
- D. Joint Fillers and Sealers

1.2 QUALITY ASSURANCE

- A. Comply with local governing regulations if more stringent than herein specified.

1.3 JOB CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as require for other construction activities.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Form shall be 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.
 - 1. Use straight forms, free of distortion and defects.
- B. Use flexible spring steel forms or laminated boards to form radius bends as required.
- C. Coat forms with a non-staining form release agent that will not discolor or deface the surface of the concrete.
- D. No Earth Forming allowed.
- E. Concrete Materials: Comply with requirements of applicable sections for concrete materials, admixture, bonding materials, curing materials, and others as required.
- F. Expansion Joint Materials: Comply with requirements of Sections for preformed expansion joint fillers and sealers.

2.2 CONCRETE MIX, DESIGN AND TESTING

- A. Comply with requirements of applicable Section for concrete mix design, sampling and testing, and quality control, and as herein specified.
- B. Design mix to produce standard-weight concrete consisting of Portland cement, aggregate, air-entraining admixture and water to produce the following properties:
 - 1. Compressive Strength: 3000 psi, minimum at 28 days for sidewalks.
 - 2. Compressive Strength: 3500 psi, minimum at 28 days for driveways and parking lots.
 - 3. Slump Range: 2" (slip-formed) to 4" (standard)
 - 4. Air Content: 5% to 6%

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions for the installation of concrete curbs, walks, and paving, if there are conditions detrimental to the proper and timely completion; notify the A/E in writing immediately.
- B. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 SURFACE PREPARATION

- A. Remove loose material from the compacted subgrade surface immediately before placing concrete.

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- B. Proof-roll prepared subgrade surface to check for unstable areas and need for additional compaction.
- C. Do not begin paving work until such conditions correct and ready to receive paving (95%, modified proctor).

3.3 FORM CONSTRUCTION

- A. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork for grade and alignment to the following tolerances:
- C. Top of forms not more than $\frac{1}{8}$ " in 10' deviation in alignment.
- D. Vertical face on longitudinal axis, not more than $\frac{1}{4}$ " in 10'.
- E. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

3.4 REINFORCEMENT

- A. Use fibermesh concrete for sidewalks and courtyards unless otherwise noted, following the requirements of Section 03 24 00 "FIBROUS CONCRETE REINFORCING".
- B. Concrete roadway pavement may be unreinforced aside from construction joints. See below.
- C. Construction Joint Reinforcement
 - 1. Reinforce construction joints for bus driveways, service yards, and service yard driveways.
 - 2. Construction joints will have a formed or slipped face.
 - 3. Reinforce construction joints with rebar, round dowels, square dowels, or plate dowels.
 - 4. Separate one side of the construction joint reinforcement from the concrete to allow for horizontal movement. Firmly embed the other side of the reinforcement in the concrete.
 - a. The engineer's drawings will show how to create the separation between reinforcement and concrete.

3.5 CONCRETE PLACEMENT

- A. General: Comply with the requirements of Sections for mixing and placing concrete, and as specified.
- B. Do not place concrete until subgrade and forms are checked and Architect approves for line and grade.
 - 1. Moisten subgrade if require to provide a uniform dampened condition at the time concrete is placed.
 - 2. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete using methods, which prevent segregation of mix.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator.
 - 2. Keep vibrator away from joint assemblies, reinforcement, or side forms.
 - 3. Use only square-faced shovels for hand spreading and consolidation.
 - 4. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
- D. Deposit and spread concrete in continuous operation between transverse joints, as far as possible.
 - 1. If interrupted for more than $\frac{1}{2}$ - hour, place a construction joint.
- E. Curbs and Gutters:
 - 1. Contractor, with the Architect's approval, may use an automatic machine for curb and gutter placement.

2. If machine placement is used, submit revise mix design and laboratory test results, which meet or exceed minimums specified.
3. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete.
4. If results are not acceptable, remove and replace with formed concrete as specified.
5. Do not extrude curbs on bituminous paving.

3.6 JOINTS

- A. The engineer's drawings will show details for all types of joints.
- B. General: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of the concrete, unless otherwise indicated.
 1. Construct transverse joints at right angles to the centerline, (distance equal to width) unless otherwise indicated.
- C. Control (weakened-plane or contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on the drawings or every ten linear feet for curbs.
 1. Control joint spacing (in feet) shall not exceed 2 times the concrete pavement thickness (in inches).
 - a. Example: 4" thick conc. pavement, maximum control joint spacing is 8 feet ($2 \times 4 = 8$).
 - b. Construct sidewalk control joints at six feet on center.
 2. Construct control joints for a depth equal to at least $\frac{1}{4}$ of the concrete thickness.
 3. Sawed Joints: Form control joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades.
 - a. Cut joints into hardened concrete as soon as the surface will not be torn, abraded or otherwise damaged by the cutting action, but no later than 48 hours.
- D. Construction Joints: Place construction joints at end of all pours and locations where concrete placement operations stop for a period of more than $\frac{1}{2}$ - hour, except where such pours terminate at expansion joints.
- E. Construct joints as shown or, if not shown, use standard metal key-way section forms.
- F. Expansion Joints: Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, buildings and other fixed objects, and changes in direction, and as shown on plans.
 1. Extend joint fillers full-width and depth of joint, and not less than $\frac{1}{2}$ " or more than 1", and 1" below finished surface for joint sealer.

3.7 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth surface by screeding and floating.
 1. Use hand methods only where mechanical floating is not possible.
 2. Adjust floating to compact surface and produce a uniform texture.
- B. After floating, test surface for trueness with a ten-foot straight edge.
 1. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous smooth finish.
- C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to $\frac{1}{2}$ " radius, unless otherwise indicated. Eliminate any tool marks on concrete surface.
- D. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
- E. Broom finish by drawing fine-hair broom across concrete surface perpendicular to line of traffic.
 1. Repeat operation if required to provide a fine line texture acceptable to Architect.
- F. Do not remove forms for 24 hours after placing concrete.
 1. After form removal, clean ends of joints and point-up any minor honeycombed areas.

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2. Remove and replace areas or section with major defects, as directed by Architect.

3.8 CURING

- A. Protect and cure finished concrete paving, complying with applicable requirements of Division 3 Concrete, using moist-curing methods for initial curing whenever possible.

3.9 REPAIRS AND PROTECTIONS

- A. Repair or replace broken or defective concrete, as directed by Architect.
- B. Drill test cores when directed by Architect, when necessary to determine magnitude of cracks or defective areas.
 1. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with suitable bonding agent.
- C. Protect concrete from damage until acceptance of work.
 1. Exclude traffic from pavement for at least 14 days after placement.
 2. Once construction traffic resumes, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Sweep concrete pavement as wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- E. Repair/Replace existing sidewalks adjacent to property and on property if broken.

3.10 CONCRETE THICKNESS

- A. Sidewalks shall be 4" thick (6" at driveways) on 4" compacted subgrade minimum 6' wide, with 3000-psi fiber mesh reinforcement.
 1. Slopes between 1:12 and 1:20 indicate accessible ramps and shall comply with the requirements of FBC-Accessibility.
 2. Cross slopes on sidewalks shall be a maximum of 1:50.
 3. Extend curbs/sidewalks a minimum 24" from covered walkway columns.
 4. Provide raised sidewalks or curbs to separate students from vehicle traffic.
- B. Concrete Pavement for vehicle traffic areas shall be a minimum 6" thick 3500 psi concrete on 6" compacted (98% AASHTO T180, min.) base.
 1. Slope concrete $\frac{1}{8}$ " per foot.

3.11 CURB RAMPS AND PASSENGER LOADING ZONES

- A. Provide accessible curb ramps meeting the requirements of FBC-Accessibility and the District.
 1. Flush curbs and bollards are not allowed as replacements for passenger loading zones or curb ramps, unless reviewed and approved as part of a construction document submission.
 2. Provide curb ramps at the following locations.
 - a. All crosswalks (including perimeter sidewalks)
 - b. Bus drop-off area, one per 100 linear feet of drop-off area (minimum two).
 - c. Parent drop-off area, two places, and one shall meet the requirements of a passenger-loading zone per District Criteria.
 - d. Accessible parking areas and main entrances.

END OF SECTION