

## **SECTION 8 ASPHALT AND CONCRETE PAVEMENT**

### **8.01 ASPHALT PAVEMENT DESCRIPTION**

All Hot Mix Asphalt (HMA) shall be installed per provisions in Section 39 of the State Standard Specifications, except as amended by this Section 8, "Asphalt and Concrete Pavement," of these City Standard Construction Specifications and City Standard Details. HMA shall be Type "A" Asphalt using PG6410 Asphalt Binder unless otherwise required by the City CIP Technical Specifications or required by the City Engineer.

No paving shall occur until all underground work is completed, tested, and subgrade and aggregate base, including treated aggregate base, have been accepted by the City.

### **8.02 TACK COATS**

Tack coat shall be required at all locations where concrete meets HMA and between HMA lifts and in accordance with State Standard Specifications Section 39-2.01C (3) (f). Tack Coat material shall be CSS1 unless otherwise defined in the approved Capital Improvement Plans or as directed by the City Engineer.

### **8.03 ADJUSTMENT OF METAL CASTINGS**

Adjustment of metal castings shall conform to Section 10, "Adjustment of Castings" of these City Standard Construction Specifications. All castings for City-owned facilities and private utilities within the pavement area shall be brought to finish grade after the final pavement lift has been installed. All metal castings shall be lowered prior to any pavement cold planing or grinding.

### **8.04 MIX DESIGN**

The Contractor shall submit the HMA mix design to the City at least ten (10) working days prior to the start of the work on the project for review and approval. The mix design must have written City approval prior to commencement of work.

The mix design shall include the following: source of plant materials, grade of asphalt (PG6410 unless otherwise specified), lab unit weight, percent of asphalt, aggregate gradation, stability, and percent of air voids (four (4) percent preferred). The mix design shall be certified by the supplier.

The HMA mix design shall indicate and meet the requirements of State Standard Specifications Section 39-2.01 and 39-2.02. Rubberized HMA must meet the requirements of

State Standard Specifications Section 39-2.03. Open Grade HMA must meet the requirements of State Standard Specifications Section 39-2.04.

## **8.05 SPREADING AND COMPACTING EQUIPMENT**

Paving equipment for spreading must conform to State Standard Specifications Section 39-2.01C(2) for Standard HMA, Section 39-2.03C for Rubberized Asphalt, and Section 39-2.04C for Open Graded Asphalt. State Standard Specifications are amended to allow a spreader box for projects involving less than fifty (50) tons of HMA, as approved by the City Engineer. In addition, pneumatic-tired rollers shall be required to be used on all types of HMA paving unless otherwise approved by the City Engineer.

HMA placed in layers less than fifteen hundredths (0.15) foot in compacted thickness or widths of less than five (5) feet shall be spread and compacted with equipment and by the methods specified in State Standard Specification Section 39.

HMA placed in layers of fifteen hundredths (0.15) foot and greater in compacted thickness or widths of five (5) feet and greater shall be spread and compacted with the equipment and by the methods specified in State Standard Specification Section 39, except as amended as follows: When method compaction of HMA is used, State Standard Specifications Section 39-2.01C(2)(c) requirements for Compaction Equipment shall be followed.

## **8.06 COMPACTING**

Asphalt concrete shall be spread at a temperature of not less than two-hundred-sixty (260) degrees Fahrenheit.

A pass shall be one movement of a roller in either direction. Coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage, made to ensure compaction without displacement of material, shall be considered part of the coverage being made and not part of a subsequent coverage. Each coverage shall be completed before subsequent coverage is started.

Rolling shall commence at the lower edge and shall progress toward the highest portion, except when compacting layers which exceed twenty-five hundredths (0.25) foot in compacted thickness, and, if directed by the City, rolling shall commence at the center and shall progress outwards.

Rolling shall be performed so that tearing, cracking, shoving, or displacement does not occur. Rolling must leave the completed surface compacted and smooth.

When placing HMA, large aggregate that migrates to the surface during any handwork shall

be returned to the pave box rather than scattered over the surface of the mat.

## **8.07 FINISHING**

Finish rolling or final compaction shall be completed while the temperature of the mixture is at or above one-hundred-fifty (150) degrees Fahrenheit. A vibratory roller may be used as the finish roller provided it is operated with the vibratory unit turned off.

Upon completion of rolling operations, if ordered by the City, the HMA shall be cooled by applying water.

HMA shall be compacted to not less than ninety-one (91) percent or more than ninety-seven (97) percent of the theoretical maximum density as determined by AASHTO T 209 Method A and shall be finished to the lines, grades, and cross section shown on the Project Improvement Plans.

Finish, compacted pavement height shall be one-fourth (1/4) inch above and over the gutter lip, except for six (6) feet at the curb ramp opening, where it shall be flush with the top surface of the gutter lip. Corrective operations for recently placed pavement more than one-fourth (1/4) inch above the gutter lip may include reheat, knead, and re-compact with pneumatic tired rollers, to bring the improvements into compliance.

The horizontal surface of HMA paved against an existing HMA surface shall be flush with the existing surface.

The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations, or other objectionable marks left on the surface of the HMA by blading or other equipment shall be eliminated by rolling or other means approved by the City. The use of any equipment that leaves ridges, indentions, or other objectionable marks in the HMA shall be discontinued, and the Contractor shall furnish acceptable equipment.

## **8.08 QUALITY ASSURANCE TESTING**

The pavement will be accepted for density on a lot basis. A lot will consist of seven hundred fifty (750) tons or portions thereof. Nuclear density gage will be used to determine in-place density. If failing tests occur by nuclear gage method, or a dispute arises regarding pavement density, then HMA cores for determining the density of the compacted pavement will be taken on a lot basis. A minimum of three (3) cores will be taken per lot. The density of each core shall be determined in accordance with AASHTO T 275. For a lot to be accepted for density, all nuclear gage or core density results shall be between ninety-one (91) and ninety-seven (97) percent. Averaging core results is not permitted.

The City reserves the right to gather samples for material testing at random for the hot mix asphalt (HMA) material from behind the paving machine in accordance with California Test Method (CTM) 125 to determine the maximum theoretical density of the HMA mixture in accordance with AASHTO T 209, Method A. The theoretical maximum density results derived from the samples shall be used to determine the relative density achieved for the same seven hundred fifty (750) ton lot.

The Contractor shall provide daily quality control field nuclear density results and laboratory results per AASHTO T 275 and AASHTO T 209, Method A to the City within two (2) days of the tests being conducted.

In-place pavement density will be determined by comparing the density of nuclear gauge densities or cores taken from the compacted pavement to the theoretical maximum density as determined by AASHTO T 209, Method A, and as stated in these City Standard Specifications. Pavement cores if utilized shall be collected using a four (4) to six (6) inch diameter core barrel when the pavement has cooled sufficiently to minimize disturbance to the cores at the discretion of the City. Cores shall be taken by either the Contractor's quality control lab, as proposed at the start of construction, or the City's consultant lab. The City's quality assurance consultant testing results shall be utilized in determining acceptance.

## **8.09 SMOOTHNESS**

When a straightedge twelve (12) feet long is laid on the finished surface and parallel with the centerline, the surface shall not vary more than one-hundredth (0.01) feet from the lower edge of the straightedge (for low volume roadways, the surface shall not vary more than two-hundredths (0.02) ft). The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than two-hundredths (0.02) feet are present when tested with a straightedge twelve (12) feet long laid in a direction transverse to the center line and extending from edge to edge of a twelve (12) foot traffic lane.

If the finished surface of the HMA does not meet required surface tolerances, as specified above, the Contractor shall, at its own expense, bring pavement surface within tolerance by:

- A. COLD PLANE ASPHALT PAVEMENT to a minimum depth of fifteen-hundredths (0.15) feet from specified finish surface; (lateral limits shall be from edge of HMA to edge of HMA; longitudinal limits shall extend a minimum of fifty (50) feet, starting from the outer edge of tolerance area and extending outward, and as directed by the City). All grindings shall be removed and disposed of in accordance with City Standard Construction Specifications.
- B. THE CONTRACTOR SHALL apply tack coat and place an overlay of HMA in accordance with the requirements of the City Standard Specifications.

- C. THE AREA TO WHICH ASPHALT emulsion has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

Pavement within fifty (50) feet of an approach to a bridge structure or approach slab shall conform to the smoothness tolerances specified in State Standard Specifications Section 51-1.01D(3)(b)(ii), "Surface Smoothness."

Prior to City acceptance of the improvements (Certificate of Completion) and following the twelve (12) foot straightedge test and any remove and replace areas with new overlay pavement, streets may be flooded to check for standing water. This procedure may be repeated prior to the expiration of the warranty period. This may be accomplished with a water truck or with rainwater. All low areas in the HMA pavement holding one-thousandths (0.01) feet for longitudinal and two-thousandths (0.02) feet for transverse depressions or more of water shall be marked by the City's Construction Inspector and milled fifteen-thousandths (0.15) feet and replaced with similar material. A second water test may be necessary at the discretion of the Inspector.

A micropave surface treatment or Caltrans slurry seal may be required at the City's discretion following cold planing as described above if it is determined the paving surface is sufficiently irregular, boney, discolored, or unsealed to warrant it.

In addition, the Contractor shall be required to perform a water flow test on all new pavement placed. A water flow test is to identify any standing water not in conformance with the requirements of this Section. All corrections required shall be done at the Contractor's expense and to the satisfaction of the City Engineer.

#### **8.10 JOINTS AND PAVEMENT EDGE TREATMENT**

The Contractor shall schedule paving operations such that at the end of each work shift, each layer of HMA is placed on all contiguous lanes and shoulders of a traveled way to be opened to public traffic.

At the end of each work shift, the distance between the ends of the layers of HMA on adjacent lanes shall not be greater than ten (10) feet nor less than five (5) feet. A drop-off of more than fifteen-thousandths (0.15) of a foot will not be allowed at any time between adjacent lanes open to public traffic.

Additional HMA shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

Additional HMA surfacing material shall be placed along the edge of the surfacing at private drives, hand raked, if necessary, and compacted to form smooth tapered conforms.

Longitudinal joints in successive pavement lifts shall be offset from lift to lift a minimum of one (1) foot. The surface pass seam shall be located on the lane line. Where extruded concrete curb is removed for pavement widening, Contractor shall grind one and one-half (1-1/2) inch of pavement between the nearest lane line and the existing curb and gutter line (including bike lanes). Following placement of the HMA base lift within the widening section, one and one-half (1-1/2) inch below the new gutter lip, Contractor will replace Petromat fabric or approved equal in grounded area, place HMA overlay, and restripe and/or replace any delineators removed during the grind.

### **8.11 TEMPORARY PAVEMENT**

Prior to permanent patching in a pavement removal area, fresh cut-back (temporary pavement) in a minimum thickness of two (2) inches shall be placed as a driving surface.

Whether the surface material is fog sealed or cutback or slurry, the Contractor shall be tenacious in maintaining the surface in a condition and to a grade comparable to the permanent patch. No other materials are allowed as temporary pavement.

The temporary surface shall be flush with the surrounding pavement and shall accommodate a smooth drive across it.

Sand and dirt shall not be allowed to accumulate on the slurry surface and adjacent street. It shall be swept daily if necessary.

### **8.12 EXISTING PAVEMENT**

- A. RECONSTRUCTION OF EXISTING pavement section shall be a minimum four (4) inches thick or thickness of the existing pavement, whichever is greater.
- B. CUT LINES MADE ON existing pavement, both longitudinally and transversely, for the placing of new structural section, shall be straight and smooth.
- C. EDGE GRINDING (COLD PLANNING) shall be required where existing asphalt is to be overlaid. The edge grind shall match the depth of the HMA overlay along the length of the gutter lip and abutting pavement where the HMA pavement is proposed to conform to the existing pavement.
- D. EXISTING PAVEMENTS TO BE OVERLAID with HMA may include the installation of pavement reinforcing fabric meeting the requirements of State Standard Specifications Section 96-1.02J, Paving Fabric of the Caltrans Standard Specifications at the discretion of the City.

- E. EXISTING AC SURFACES TO REMAIN shall be cut in a straight line parallel to the street centerline, and the exposed edge shall be tracked with SS1H emulsion or equivalent prior to paving. The exposed base material shall be graded and re-compacted per State Standard Specifications Section 19-5. Graded and re-compacted areas shall be approved by the City prior to paving.
- F. WHERE CRACK SEALING IS REQUIRED, cracks less than one-quarter (1/4) inch in width shall be sealed with SS1-H asphalt emulsion and thirty (30) grit sand. Cracks from one-quarter (1/4) inch to three-quarter (3/4) inch shall be sealed in accordance with State Standard Specification Section 37-6. Excess sealant shall not extend more than one (1) inch outside the crack onto the pavement surface or above the finished surface of the street. Where cracks are larger than three-quarter (3/4) inch (or pavement alligator cracks) occur, asphaltic concrete patching may be required at the discretion of the City's Construction Inspector.
- G. WHERE AN EXCAVATION IN the public right-of-way is backfilled with Slurry Cement Backfill per State Standard Specifications Section 19-3.02E, the slurry may be brought to the top of the trench until permanent patching. Where rock-saw utility trenching is necessary in the bottom lift of HMA and prior to placement of top lift of HMA, the rock saw trench shall be covered with pavement fabric meeting the requirements of State Standard Specification Section 96-1.02J, or approved equal, at the manufacturer's recommendations prior to the placement of top lift of asphalt.
- H. IF THE WIDTH OF EXISTING PAVEMENT between the gutter lip and excavated patch/pave area is three (3) feet or less, all existing pavement between the patch/pave area and the gutter lip shall be removed and replaced per City Standard Detail. In the event that an excessive number of potholes are in close proximity, the City may require a grind and overlay to reestablish continuity and rideability to the roadway surface.

### **8.13 HMA MEASUREMENT AND PAYMENT**

HMA shall be measured by the ton as placed on the street, driveways, multi-use trails, and other areas shown on the improvement plans or as designated by the City Engineer.

Payment shall be made at the contract price per ton and shall include full compensation for furnishing all labor, materials, tools, equipment, traffic control, incidentals, and for doing all the work in placing asphalt concrete, tack coat, and fog seal, complete in place as shown on the plans, as specified in these specifications and as directed by the City Engineer.

### **8.14 THROUGH 8-19 RESERVED**

## **8.20 PORTLAND CEMENT CONCRETE PAVING DESCRIPTION**

- A. ALL PORTLAND CEMENT CONCRETE (PCC) pavement shall be installed per provisions in Section 40 of the Caltrans Standard Specifications, except as amended by these City Standard Construction Specifications.
- B. NO PAVING SHALL OCCUR UNTIL ALL underground work is completed, tested, and subgrade and/or aggregate base and/or soil stabilization has been tested and accepted by the City.
- C. RAVELING SHALL BE DEFINED AS - Progressive disintegration of the concrete pavement surface resulting in dislodged aggregate.

## **8.21 MIX DESIGN**

The Contractor shall provide a concrete mix design to the City at least fifteen (15) working days prior to the start of work on the project for review and approval. The mix design must be approved prior to commencement of all paving work. The PCC pavement mix design shall:

- A. MEET THE REQUIREMENTS of Section 40 of the Caltrans Standard Specifications.
- B. FOR STREETS AND PARKING lot pavement the minimum allowable average flexural strength of the concrete per ASTM C 78, or California Test Method 523, is five hundred seventy (570) psi at twenty-eight (28) days age or desired opening age. The average must be calculated using at least two (2) replicate specimens.
- C. RAPID SET CONCRETE PAVEMENT shall be tested per ASTM C 78 or California Test Method 524 and sampled per California Test Method 539. The rapid strength concrete must not have an opening modulus of rupture of less than four hundred (400) psi and a three (3) day modulus of rupture of not less than five hundred (500) psi.
- D. PROVIDE A CORRELATION CURVE between flexural strength and compressive strength using the same mix design.
  - 1. Approval of acceptance based on compressive strength in place of flexural strength is at the City's discretion based on mix design trial batch information and correlation of flexural strength to compressive strength for each mix design used to establish minimum compressive strength values.
- E. CERTIFICATION THAT THE MIX design will meet the requirements for strength, schedule, and road opening.

## **8.22 SUBMITTALS**

Contractor shall submit the following to the City at least fifteen (15) working days prior to start of work on the project for review and approval:

- A. CONSTRUCTION SCHEDULE FOR ALL PCC paving related operations.
- B. QUALITY CONTROL PLAN - The Contractor shall provide a Quality Control (QC) plan for concrete paving to the City for review at least fifteen (15) working days prior to the start of work on the project for review and approval. If the pavement is at least two

thousand (2,000) cubic yards the contractor shall supply a Quality Control manager. The QC plan shall address the elements affecting concrete pavement quality. The QC plan shall include action and suspension limits and details of corrective actions to be taken if any process is outside those limits.

- C. PCC PRODUCTION PROCEDURES:
  - 1. Description of batching or batching and mixing plant used, and
  - 2. PCC delivery methods. List of all equipment proposed for the use to perform the placement of PCC including paving equipment and compaction equipment. The paver and mixing equipment used must match that listed on the submittal, unless a substitution is made, which meets these specifications and is approved by the Engineer.
- D. OUTLINE OF PROCEDURES FOR calibrating the mixing plant, if a mobile plant is used, and monitoring materials during construction shall also be submitted.
- E. COMPLETE PAVING PROCEDURES INCLUDING, but not limited to, line and grade control, direction of paving operations, paving widths, jointing plan for planned longitudinal and transverse construction joints, and curing method.
  - 1. Spacing between joints shall not exceed fifteen (15) feet unless approved by City.
  - 2. Larger horizontal dimension of each slab panel shall not exceed one hundred fifty (150) percent of smaller horizontal dimension, unless approved by the City.
  - 3. Contraction joint depth shall be one-third (1/3) pavement thickness.
  - 4. Concrete pavement joints need to mesh with the traffic control plan and final pavement delineation. Joints shall be either coincidental with or bifurcate the final traffic lane lines.
- F. CERTIFICATION OF AGGREGATE SOURCE.
- G. CERTIFICATION OF PORTLAND CEMENT and supplementary cementing materials.
- H. CERTIFICATION OF MIXING WATER FOR PCC.
- I. CERTIFICATION OF CHEMICAL ADMIXTURES for PCC.
- J. CERTIFICATION OF CURING COMPOUND.
- K. CONTINGENCY PLAN, INCLUDING but not limited to backup paving equipment and backup batching facility.
- L. METHODS OF HANDLING, STORING, delivering and mixing of materials.
- M. OPERATING PROCEDURES FOR corrective action(s) necessary to assure a tight, smooth surface on the PCC pavement, free of tears larger than one-quarter (1/4) inch width and one-quarter (1/4) inch depth and other surface imperfections, including surface pitting.

### **8.23 PRE-PAVING MEETING**

The Contractor shall schedule a pre-paving meeting prior to start of production to discuss the Quality Control Plan and methods of performing each item of the work. Attendees to include:

- A. CONTRACTOR'S PROJECT SUPERINTENDENT;
- B. CONCRETE PAVING FOREMAN;

- C. FOREMEN RESPONSIBLE FOR EARTHWORK and pavement base;
- D. REPRESENTATIVES FROM SUBCONTRACTORS for adjacent and related work;
- E. ENGINEER OF RECORD;
- F. CITY PROJECT MANAGER;
- G. TESTING LABORATORY; and
- H. TESTING STAFF.

#### **8.24 CONSTRUCTION EQUIPMENT**

PCC pavement shall be placed with approved paver and/or other approved equipment.

- A. CONCRETE PAVEMENT SHALL be spread, screeded, shaped, slip formed, and/or consolidated by one or more self-propelled machines. These machines shall perform in a manner so that the completed pavement will conform to the required cross section with a minimum amount of handwork. Consolidate the concrete with internal vibrators or other authorized method.
- B. THE EQUIPMENT SHALL OPERATE in a manner that will prevent segregation and produce a smooth continuous surface without tearing, pulling, or shoving. The spread of the PCC shall be limited to a length that can be placed and finished within the appropriate time limit under the prevailing air temperature, wind, and climatic conditions.
- C. THE EQUIPMENT SHALL PROCEED in a steady, continuous manner. Equipment speed during placement operations shall not exceed the speed necessary to ensure that thickness and smoothness requirements are met, and surface distress is minimized.

#### **8.25 WEATHER LIMITATIONS**

Do not place PCC pavement when the ambient temperature is below 45° Fahrenheit or is expected to fall below 32° Fahrenheit within forty-eight (48) hours of placement, unless otherwise permitted in writing by the City.

- A. DO NOT PLACE PCC PAVEMENT when the ambient temperature is above 95° Fahrenheit unless otherwise permitted in writing by the City.
- B. IF YOU PLAN TO PLACE PCC pavement in the above conditions, submit a plan to the City outlining procedures and methods for curing and weather protection.
- C. DO NOT PLACE PCC PAVEMENT when the wind, heat, or humidity do not allow enough time to place, properly joint, compact, edge, finish, and cure before the surface dries.

#### **8.26 CONDITION OF THE SUBGRADE/SUBBASE**

Prior to PCC pavement placement, the surface of the subgrade/subbase shall be clean and free of foreign material, ponded water, and frost prior to the placement of the PCC pavement mixture. The subgrade/subbase must be uniformly moist at the time of PCC placement. If

sprinkling of water is required to remoisten certain areas, the method of sprinkling shall not be such that it forms mud or pools of free-standing water. Prior to placement of PCC, the subgrade/subbase shall meet required relative compaction and be accepted by the City. Soft or yielding areas shall be corrected.

## **8.27 JOINTS**

The jointing plan shall be consistent with the recommendations and requirements in ACI 325.12R, "Guide for Design of Jointed Concrete Pavements for Streets and Local Roads" in addition to the requirements of these Standard Construction Specifications Standards including Section 3.e. Prior to placement of the PCC pavement, joint locations shall be marked by the Contractor in the field to ensure cold joints will align with the jointing plan. Following PCC placement, and before sawcutting the joints, the jointing plan shall be marked on the PCC by the Contractor with a temporary marking material to demonstrate to the City Inspector that the sawcuts are being placed per the plan.

- A. NEW JOINTS IN PLASTIC concrete or recently hardened concrete shall align with joints in older concrete. Joints abutting curbs and other fixed concrete shall be installed within 10 degrees of perpendicular to the older concrete.
- B. IF JOINTS ARE TO BE SEALED, they shall be clean and dry before sealing. The Contractor shall not place joint sealant or fillers prior to seventy-two (72) hours after the joint was sawcut. The Contractor shall remove all loose debris from the joints immediately prior to placing joint sealant or filler.
- C. EXPANSION JOINTS SHALL BE placed at intersections of concrete pavement streets.

## **8.28 FORMATION OF JOINTS**

- A. COLD VERTICAL JOINTS - Any planned or unplanned construction joints that do not qualify as fresh joints shall be considered cold joints and shall be treated as follows:
  - 1. Longitudinal and Transverse Cold Joints. Cold joints cut after two hours of placement shall be saw-cut to one-third (1/3) depth of the PCC pavement with the rest removed by hand or mechanical equipment. Any modification or substitution of the saw cutting procedure must be demonstrated to and accepted by the Engineer. All excess material from the joint cutting shall be removed.
  - 2. Prior to placing fresh PCC mixture against a cold vertical joint, the joint shall be thoroughly cleaned of any loose or foreign material. The vertical joint face shall be wetted and in a moist condition immediately prior to placement of the adjacent lane.
  - 3. Uneven surfaces or slopes greater than the maximum angle for edges determined by the Contractor prior to placement shall be cut vertically for the full depth of the PCC.
  - 4. If multiple lifts are approved by the City, the top layer shall be placed so that longitudinal joints in that layer will coincide with joints in the lower layers of the

- pavement. Transverse joints in the top layer shall coincide with transverse joints in the lower layers of the pavement.
- B. HORIZONTAL COLD LIFT JOINTS - For horizontal cold joints the surface of the lift shall be kept continuously moist and cleaned of all loose material prior to placement of the subsequent lift. The use of a cement slurry or mortar grout between lifts is required. If supplementary bonding materials are used, they shall be applied immediately prior to placement of the subsequent lift.
  - C. PCC PAVEMENT JOINTS AT STRUCTURES - The joints between PCC pavement and concrete structures shall be treated as isolation vertical joints.
  - D. CONTROL JOINTS - Control joints shall be constructed in the PCC pavement to induce cracking at pre-selected locations. Early entry saws shall be utilized as soon as possible behind the rolling operation and set to manufacturer's recommendations; saw crack control joints to the interval specified on the plans. The depth of the crack control joints shall be equal to one-third (1/3) of the thickness of PCC pavement. The width of the crack control joints shall be one-eighth (1/8) inch maximum. Extend all crack control joints the entire width of paving. When sawing crack control joints, begin as soon as the PCC cuts without excessive raveling along the saw cut and finish before conditions induce uncontrolled cracking, regardless of the time or weather. Control joints shall be sprayed with curing compound immediately.
  - E. ISOLATION JOINTS - Line the perimeter of fixed structures such as manholes, valves, and trench drains with strips of fiberboard or other approved isolation joint material, as noted in the plan details, prior to paving. Joint filler for isolation joints must be preformed expansion joint filler for concrete (bituminous type) in compliance with ASTM D 994.
  - F. EXPANSION JOINTS - Install expansion joints to the details, dimensions, and locations shown on the jointing plan. Include width, filler, sealing material, location and/or spacing recommendations in the expansion joint plan, considering thermal effects, regional climatic conditions, PCC coefficient of thermal expansion and expected daily temperature ranges at the time of placement.

## **8.29 CURING**

- A. GENERAL - Immediately after final consolidation and finishing use an approved curing method outlined below. Curing compound shall be applied vertically from above the pavement. Application shall not be allowed from the side of the pavement. During this work, the Contractor shall control the work such that it does not result in curing compound particulate migration. Reapply curing compound to saw cuts and disturbed areas.
- B. CURING COMPOUND MUST MEET the requirements of State Standard Specifications Section 90-1.03B and be curing compound number 1 or 2. Curing compound shall be applied at a rate of one hundred fifty (150) sf/gallon no later than one (1) hour after

completion of finishing operations on the surface and edges of PCC pavement. This application must ensure a uniform continuous (free of uncured areas) membrane across the entire pavement. If the application rate is found to be insufficient, the Contractor, with approval of the Engineer, can increase the application rate to a level which achieves a void-free surface without ponding. In case the minimum rate of application is specified otherwise by manufacturer's recommendations, the highest application rate shall govern.

### **8.30 CONCRETE PAVEMENT SMOOTHNESS**

- A. THE CITY ACCEPTS PAVEMENT surfaces for smoothness based on compliance with 36-3 and 40-1.01D(8)(c.)(iii) of the State Standard Specifications.
- B. FOR AREAS THAT REQUIRE pavement smoothness determined using a twelve (12) foot straightedge, the pavement surface must not vary from the lower edge of the straightedge by more than:
  - 1. One-hundredth (0.01) foot when the straightedge is laid parallel with the centerline.
  - 2. Two-hundredths (0.02) foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane.
  - 3. Two-hundredths (0.02) foot when the straightedge is laid within twenty-four (24) feet of a pavement conform.

The Engineer may order you to recalibrate your inertial profiler equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your inertial profiler operator.

### **8.31 ADDITIONAL PCC PAVING REQUIREMENTS**

- A. LIFT THICKNESS SHALL NOT be less than those specified in the approved plans and the minimum thickness specified in Section 3 of the City Design Standards. Multiple lifts are not allowed unless approved by the City Engineer.
- B. SEGREGATION - If segregation occurs in the PCC during paving, operations shall cease until the cause is determined and corrected.
- C. PLACEMENT - PCC placement shall be done in a pattern so that the curing water from the previous placements will not pose a runoff problem on the fresh PCC surface or on the subbase layer.
- D. RESTORATION AFTER QUALITY ASSURANCE TESTING - If coring is required by the City, the Contractor shall fill the core holes with Portland cement concrete as directed by the Engineer. Concrete shall meet the requirements of Section 90 of the State Standard Specifications and the mix design requirements in Section 8.21 of these Standard Construction Specifications. Core holes are to be filled to be flush with surrounding pavement surface.

- E. THICKNESS REQUIREMENTS SHALL be met after any required diamond grinding of the PCC pavement.
- F. REMOVAL OF TEMPORARY TRAFFIC stripes shall not cause deficiencies in pavement smoothness or thickness. If deficiencies are visible by City Inspector, the Contractor shall treat the surface to remove the deficiency.

### **8.32 EXISTING CONCRETE PAVEMENT REPAIR**

- A. SUBMIT A MIX DESIGN THAT meets the requirements of Section 8.21 of these Standard Construction Specifications.
- B. REMOVING CONCRETE PAVEMENT
  1. Sawcut using a diamond blade and make cuts perpendicular to the pavement surface. Sawcutting is not required where concrete pavement is adjacent to asphalt concrete pavement.
  2. Sawcuts must be the full pavement depth unless otherwise shown.
  3. Sawcut at longitudinal and transverse joints to remove entire slabs.
- C. AFTER REMOVING PAVEMENT TO the depth shown, grade the aggregate base to a uniform plane. Water as needed and compact the aggregate base remaining in place to a firm and stable base and to at least ninety-five (95) percent relative compaction. The finished surface of the remaining material must not extend above the grade established by the Engineer.
- D. DRILL AND BOND BARS IN accordance with State Standard Specification Section 41-10 and as required in the project improvement plans and special provisions.

### **8.33 MEASUREMENT AND PAYMENT**

- A. CONCRETE PAVEMENT SHALL BE measured by the volume determined by the dimensions shown on the approved plans. Payment shall be made at the contract price per cubic yard and shall include full compensation for furnishing all labor, materials, tools, equipment, traffic control, incidentals, and for doing all the work in placing concrete pavement, complete in place as shown on the plans, as specified in these specifications and as directed by the City Engineer.
- B. PAYMENT FOR NON-COMPLIANT work is at the sole discretion of the City.