Black text – from standard FAA spec	Blue text – additions to FAA standard spec
~~Strikeout text~~ – deletions from FAA standard spec	Red text – notes to the Engineer/won't appear in spec

I. DESCRIPTION

A. GENERAL

1. [Surface][Base] [Leveling] Course
   a) mixture of mineral aggregate and bituminous material
   b) mixed in central plant
   c) to depth, typical section and elevation shown on plans
   d) compacted, finished and approved
2. In accordance with the plans and specifications.
3. Specification also covers asphalt concrete as specified by
   a) the Standard Specifications for Public Works Construction ("Greenbook")
   b) the State of California Department of Transportation ("Caltrans") Standard Specifications
4. Use P-401 – Section 34 for:
   a) Surface course for aircraft > 12,500#
   b) Leveling course for aircraft > 12,500#
   c) Base course for aircraft > 12,500#
5. Use P-403 / Greenbook AC / Caltrans AC - Section 36 - for:
   a) Base Course for all aircraft weight categories
   b) Surface course for:
      (1) Aircraft <12.500#
      (2) Shoulder pavement
      (3) Blast Pads
      (4) Other pavement not subject to aircraft loading including
         (a) Roadways
         (b) Other as specified
6. Type of asphalt concrete required will be shown on the plans or indicated by the Engineer

II. MATERIALS

A. AGGREGATE

1. General
   a) shall be
      (1) crushed stone or
      (2) crushed gravel or
      (3) crushed slag
      (4) with or without
         (a) sand
         (b) other fine mineral aggregate
   b) Definitions:
      (1) Coarse:
         (a) Retained on No. 4 screen
      (2) Fine:
         (a) Passing No. 4 screen
         (b) Retained on No. 200 screen
      (3) Mineral Filler:
         (a) Passing No. 200 screen
2. Coarse Aggregate
   a) sound, tough, durable particles
   b) free from

(1) films
(2) organic matter
(3) other deleterious substances

c) Wear:
(1) ≤ 40% for
(a) Surface Course
(b) Leveling Course
(2) ≤ 50% for Base Course
(3) per ASTM C 131

NOTE TO ENGINEER: HIGHER % WEAR MAY BE ACCEPTABLE WITH RECORD OF SATISFACTORY PERFORMANCE UNDER SIMILAR CONDITIONS OF SERVICE AND EXPOSURE

d) Soundness
(1) Sodium Sulfate Soundness, or
(a) <10%
(2) Magnesium Sulfate Soundness
(a) <13%
(b) after 5 cycles
(3) per ASTM C88

e) Fractured Face Requirement
(1) Definition Fractured face
(a) must be 75% of smallest midsectional area
(b) angles between planes must be > 30 deg to be two faces
(c) must be obtained from crushing
(2) Two fractured faces requirement
(a) ≥ 70%
(3) Single fractured face requirement
(a) ≥ 85%

f) Flat or elongated piece requirement
(1) ≤ 8%
(a) flat
(b) elongated
(c) flat and elongated
(2) per ASTM D 4791 @ 5:1

g) Slag
(1) air-cooled, blast furnace
(2) compacted weight ≥ 70 pcf
(a) per ASTM C 29

3. Fine Aggregate
a) clean, sound, durable, angular particles
b) produced by crushing
(1) stone or
(2) gravel
(a) meeting coarse aggregate requirements for
(i) wear
(ii) soundness
(3) free from coatings
(a) clay
(b) silt
(c) other objectionable materials
c) containing no clay balls

d) Atterberg limits
(1) including added mineral filler:
(a) Plasticity Index (PI) $\leq$ 6
(b) Liquid Limit (LL) $\leq$ 25
(c) per ASTM D 4318
e) natural sand
(1) may be added to obtain gradation
(a) limit 15% by weight of total aggregates
(b) Atterberg limits
(i) Plasticity Index (PI) $\leq$ 6
(ii) Liquid Limit (LL) $\leq$ 25
(iii) per ASTM D 4318
f) Sand Equivalent (SE)
(1) > 45
(2) per ASTM D 2419

4. Sampling
a) per ASTM D 75
(1) for fine aggregate
(2) for coarse aggregate
b) per ASTM C 183
(1) for mineral filler

B. MINERAL FILLER
1. if used shall meet ASTM D 242

C. BITUMINOUS MATERIAL
1. Meet AASHTO M 320 for
a) PG 70-10 – for surface courses
b) PG 64-10 – for base courses
2. provide vendors' certified test reports for each lot of bitumen delivered
a) Engineer may request independent testing

D. PRELIMINARY MATERIAL ACCEPTANCE
1. Prior to delivery to job site, provide certified test reports for:
a) Coarse Aggregate, including:
(1) Percent of wear.
(2) Soundness.
(3) Unit weight of slag.
(4) Percent fractured faces.
b) Fine Aggregate, including:
(1) Liquid limit.
(2) Plasticity index.
(3) Sand equivalent.
c) Mineral Filler
d) Bituminous Material, including:
(1) temperature / viscosity charts for
(a) mixing and compaction temperatures
(2) ASTM test
(3) test results
(4) statement whether material meets requirements
2. Engineer may request samples for testing
a) prior to production
b) during production

E. ANTI-STRIPPING AGENT
1. Any added anti-strip agent shall:

a) be heat stable
b) not change viscosity beyond specified limits
c) contain no harmful ingredients
d) shall be approved by Caltrans

III. COMPOSITION OF MIXTURE

A. GENERAL

1. blend of:
   a) well-graded aggregates
      (1) maintain in separate size groups
   b) filler
   c) anti-stripping agent, if required

B. JOB MIX FORMULA

1. Approve mix design prior to any production
2. Use procedures in
   a) Chapter 5, MARSHALL METHOD OF MIX DESIGN
      (1) Asphalt Institute's (AI) Manual Series No. 2 (MS-2)
      (2) Mix Design Methods for Asphalt Concrete, sixth edition.
3. Use design values in Tables 1, 2, and 3:

TABLE 1. MARSHALL DESIGN CRITERIA	
TEST PROPERTY	Criteria
Number of blows	**75**
Stability, pounds minimum	**1800**
Flow, 0.01 in.	**8-16**
Air voids (percent)	**2-5**
Percent voids in mineral aggregate, minimum	**See Table 2**

NOTES TO ENGINEER: MAY USE AI MS-2, CHAPTER 5, PROCEDURES, AND ASTM D 5581 IN LIEU OF ASTM D 6926, IF AGGREGATES OF 1' MAX OF 1.5" MAX USED. MAY NEED TO MODIFY FLOW IF BINDER MODIFIERS ARE USED.

TABLE 2. MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE		
Maximum Particle Size		**Minimum Voids in Mineral Aggregate, percent**
in.	**mm**	**Percent**
½	12.5	14
c¾	19.0	13
1	25.0	12
1-½	37.5	11

NOTES TO ENGINEER: TABLE 2 REFLECTS MODIFICATIONS BASED ON SOUTHERN CALIFORNIA EXPERIENCE

1. Tensile Strength Ratio (TSR)
   a) shall be $\geq$ 75
   b) per ASTM D 4867
   c) add approved anti-stripping agent

(1) if required to raise TSR to $\geq$ 75

2. Job Mix Formula (JMF)
   a) submit at least 15 days prior to production
   b) include values and criteria for:
      (1) Percent passing each sieve size for
         (a) total combined gradation
         (b) individual gradation of all aggregate stockpiles
         (c) percent by weight of each stockpile
      (2) Percent asphalt cement
      (3) Asphalt performance
         (a) penetration grade
         (b) type of modifier, if used
      (4) Number of blows
      (5) Temperatures
         (a) mixing
         (b) compaction
         (c) discharge
      (6) Temperature-viscosity relationship of binder
      (7) FHWA 45-power gradation curve (combined gradation)
      (8) Graphical plots of:
         (a) stability
         (b) flow
         (c) air voids
         (d) voids in the mineral aggregate (VMA)
         (e) unit weight versus asphalt content
      (9) Percent natural sand
      (10) Percent fractured faces
      (11) Percent by weight of:
         (a) flat particles
         (b) elongated particles
         (c) flat and elongated particles
      (12) Tensile Strength Ratio (TSR)
      (13) Antistrip agent (if required)
      (14) Date the job mix formula was developed.
   c) based on at least three samples at optimum asphalt content
      (1) average shall indicate conformance with requirements of Tables 1, 2 and 3.
   d) JMF shall be no older than 90 days
   e) new JMF required
      (1) for each different aggregate gradation / source
      (2) when changes occur to
         (a) sources
         (b) gradations
      (3) regardless of reason for new JMF submittal
         (a) no time extensions will be granted
         (b) Contractor to reimburse for Engineer review/approval
      (4) submit new JMF at least 15 days prior to intended use.
   f) mineral aggregate added shall yield combined gradation conforming to Table 3
      (1) Contractor to select gradation from Table 3 unless otherwise specified
      (2) per ASTM C 136 and C 117
      (3) shall not vary from low limit on one screen to high limit on next, and vice versa

TABLE 3 -AGGREGATE - BITUMINOUS PAVEMENTS				
Sieve Size	**Percentage by Weight Passing Sieves**			
	1-½" max	**1" max**	**¾ " max**	**½" max**
1-½ in.	100	--	--	--
1 in.	86-98	100	--	--
¾ in.	68-93	76-98	100	--
½ in.	57-81	66-86	79-99	100
⅜ in.	49-69	57-77	68-88	79-99
No. 4	34-54	40-60	48-68	58-78
No. 8	22-42	26-46	33-53	39-59
No. 16	13-33	17-37	20-40	26-46
No. 30	8-24	11-27	14-30	19-35
No. 50	6-18	7-19	9-21	12-24
No. 100	4-12	6-16	6-16	7-17
No. 200	3-6	3-6	3-6	3-6
Asphalt percent:				
Stone or gravel	4.5-7.0	4.5-7.0	5.0-7.5	5.5-8.0
Slag	5.0-7.5	5.0-7.5	6.5-9.5	7.0-10.5

(4) apply tolerances VI.E.2 to approved JMF gradation
  (a) may be outside limits of Table 3
(5) maximum aggregate size
  (a) no more than ½ lift thickness
    (i) unless approved by the Engineer
(6) gradation based on uniform specific gravity (SG)
  (a) if SG varies
    (i) correct per AI Manual Series No. 2 (MS-2), Chapter 3

C. [OPTIONAL: RECYCLED ASPHALT CONCRETE
1. Only acceptable for:
  a) shoulders
  b) base course
  c) and only if stated on the plans
2. Shall consist of:
  a) reclaimed asphalt pavement (RAP)
  b) coarse aggregate
  c) fine aggregate
  d) mineral filler
  e) asphalt cement
3. Shall be of consistent
  a) gradation
    (1) chunk size $\leq$ 2 inches
  b) asphalt content
  c) properties
4. design using procedures in AI MS-02
5. determine percentage binder for ASTM D 2171
  a) use appropriate dust correction procedure
6. Job mix shall meet all requirements
  a) in addition include:
    (1) reclaimed asphalt pavement

(2) new asphalt:
(a) percent
(b) viscosity grade

NOTES TO ENGINEER: APPROPRIATE TEST SHOULD BE USED TO DETERMINE NEW ASPHALT GRADE. FOR PG GRADING MIX DESIGN SHOULD INCLUDE DYNAMIC SHEAR REHOMETER TEST AND BENDING BEAM TEST

(3) document that equipment capable of
(a) mixing RAP mix
(b) satisfying local and national environmental regulations

7. Amount of RAP limited to 30% by total weight of aggregate
   a) RAP mix must meet requirements for virgin mixes stated herein
   b) where appropriate, RAP may come from the job site
8. Blend of new asphalt cement and RAP binder:
   a) should meet requirements of II.C
9. New and RAP binder should not be more than two standard grades apart
10. RAP containing coal tars will not be allowed.]

NOTES TO ENGINEER: DELETE PARAGRAPH C IF RECYCLED ASPHALT CONCRETE NOT TO BE ALLOWED ON JOB. ADD SENTENCE THAT RAP WILL NOT BE ALLOWED.

D. TEST SECTION

1. prior to full production place test section per JMF
   a) shall be 300 ft long x 20 ft wide
   b) same depth as project course
   c) placed in two lanes with longitudinal cold joint
      (1) cold joint =
         (a) 4 hrs exposed or
         (b) cooled to < 160 deg F
   d) placed on underlying course conforming to project underlying course
   e) using same type and weight equipment
   f) if night construction required on project, place test section
      (1) under same night lighting proposed
      (2) under same timing restrictions which will be in effect
2. test section to be paid as single lot
   a) divide into minimum 3 equal sublots
   b) acceptance criteria per VI.A and VI.B
3. test section acceptable if :
   a) 90 percent or more within limits for:
      (1) stability
      (2) flow
      (3) mat density
      (4) air voids
      (5) joint density
   b) Following are within the action limits per VII.E, Control Charts:
      (1) gradation
      (2) asphalt content
   c) VMA conforms to Table 2
4. if test section unacceptable
   a) if 1st test section unacceptable:
      (1) make adjustments to:
         (a) JMF

(b) plant operation
(c) placing procedures
(d) rolling

b) if 2nd test section unacceptable
(1) remove both sections at Contractor's expense
(2) construct additional test sections as required

5. no production shall begin until acceptable test section constructed
6. payment for test section
a) per paragraph XI will pay for:
(1) initial test section, and
(2) acceptable test section
7. JMF Control Testing
a) performed by Contractor
(1) at start of production
(2) re: calibration of the plant for the JMF
b) if plant-produced aggregates do not meet gradation
(1) re-evaluate design using plant-produced aggregates
(2) prepare new JMF in same manner as original
8. do not construct test section before Contractor Quality Control Program approved
a) per Section VII.

E. TESTING LABORATORY
1. Lab developing JMF shall:
a) conform to ASTM D 3666
(1) including requirement to be accredited by
(a) NVLAP, or
(b) AALA, or
(c) AAP
b) lab personnel shall meet requirements of Section 12 - Contractor Quality Control Program
c) Provide certification from laboratory manager that requirements are met
(1) prior to start of construction
(2) include, as minimum.
(a) Qualifications of
(i) personnel
(ii) laboratory manager
(iii) supervising technician
(iv) testing technicians.
(b) list of equipment to be used in developing the job mix
(c) copy of the laboratory's quality control system
(d) Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program
(e) ASTM D 3666 certification of accreditation by nationally recognized accreditation program

IV. CONSTRUCTION METHODS

A. WEATHER LIMITATIONS
1. Do not place
a) on wet surface
b) when temperature of underlying course below Table 4:

TABLE 4. BASE TEMPERATURE LIMITATIONS		
Mat Thickness	**Base Temperature (Minimum)**	
	Deg. F	**Deg. C**
3 in. or greater	40	4
Greater than 1 in. but less than 3 in.	45	7
1 in. (2.5 cm) or less	50	10

c) may be waived by the Engineer:
   (1) temperature requirements
   (2) no other requirements

B. BITUMINOUS MIXING PLANT
   1. Requirements for all Plants
      a) Truck Scales
         (1) approved scales or
         (2) certified public scales
         (3) inspected and sealed as often as Engineer deems necessary
         (4) shall conform to Section 4-1.7
      b) In lieu of scales, may use electronic weighing system
         (1) equipped with automatic printer
         (2) furnish calibration certification
            (a) prior to production
            (b) as often as requested by Engineer during production
      c) Testing Facilities
         (1) Contractor to provide
            (a) for Contractor's QAQC
            (b) for Engineer's acceptance testing
         (2) Shall conform to ASTM D 3666
         (3) Engineer to have:
            (a) priority of use
            (b) unrestricted access
         (4) Laboratory shall:
            (a) have at least 150 sq ft floor space
            (b) have ceiling height not less than 7.5 ft
            (c) be weather tight
            (d) be furnished with climate control
               (i) heater
               (ii) air conditioner
               (iii) to maintain temperature at 70 deg F +/- 5 deg
            (e) be located on site with view of trucks being loaded with plant materials
         (5) Contractor shall
            (a) keep testing facility clean
            (b) maintain equipment in working order
         (6) Engineer to:
            (a) notify in writing of deficiencies in
               (i) testing facility
               (ii) equipment
               (iii) supplies
               (iv) personnel
               (v) procedures

(b) suspend work if deficiencies serious
(i) not permit operations to resume until corrections made

(7) testing facility shall have:
(a) adequate space and equipment
(i) so both parties can operate efficiently
(b) as a minimum shall have:
(i) Adequate artificial lighting
(ii) Electrical outlets sufficient
(a) in number
(b) capacity
(i) for operating testing equipment
(ii) drying samples.
(iii) Fire extinguishers
(a) at least two (2),
(b) Underwriters Laboratories approved
(iv) Work benches for testing, minimum 2-½ feet by 10 feet.
(v) Desk
(a) with 2 chairs
(vi) Sanitary facilities convenient to testing laboratory
(vii) Exhaust fan to outside air
(a) minimum 12 inch blade diameter
(viii) direct telephone line and telephone
(a) including a FAX machine
(i) operating 24 hours per day
(ii) operating seven days per week
(ix) File cabinet
(a) with lock
(b) for Engineer
(x) Sink with
(a) running water
(b) attached drain board and drain
(c) capable of handling separate material
(xi) Metal stand for holding washing sieves
(xii) Two element hot plate or
(a) other comparable heating device
(b) with dial type thermostatic controls for drying aggregates
(xiii) Mechanical shaker with
(a) appropriate sieves
(i) as listed in JMF, Table 3
(ii) meeting the requirements of ASTM E-11
(iii) for performing ASTM C 136 testing
(xiv) Marshall testing equipment
(a) meeting
(i) ASTM D 6926
(ii) ASTM D 6927
(b) with automatic compaction equipment
(i) capable of compacting three specimens at once
(c) other apparatus as specified in ASTM C 127, D

2172, D 2726, and D 2041

(xv) Oven
- (a) thermostatically controlled
- (b) minimum interior volume 1 cubic foot

(xvi) Two volumetric specific gravity flasks, 500 cc

(xvii) Other necessary hand tools required for sampling and testing

(xviii) Library containing
- (a) contract specifications
- (b) latest ASTM volumes 4.01, 4.02, 4.03 and 4.09
- (c) AASHTO standard specification parts I and II
- (d) Asphalt Institute Publication MS-2

(xix) Equipment for Theoretical Specific Gravity testing including:
- (a) 4,000 cc pycnometer
- (b) vacuum pump capable of maintaining 30 ml mercury pressure
- (c) balance
  - (i) 16-20 kilograms
  - (ii) accuracy of 0.5 grams

(xx) Extraction equipment
- (a) centrifuge type
- (b) reflux type
- (c) ROTOflex equipment

(xxi) masonry saw
- (a) with diamond blades

(8) Plant and laboratory:
- (a) must be in good working order during
  - (i) production
  - (ii) sampling
  - (iii) testing
- (b) if not approved, material produced and tested therein subject to rejection
- (c) Owner to have access to both at all times during production

d) Inspection of Plant

(1) Engineer shall have access at all times relative to:
- (a) adequacy of equipment
- (b) to verify:
  - (i) weights
  - (ii) proportions
  - (iii) material properties
  - (iv) temperatures

e) Storage Bins and Surge Bins

(1) May be used for temporary storage of bituminous mixture
- (a) for not more than 3 hours
- (b) in insulated tanks for not more than 24 hours

(2) mix retrieved from storage must meet all other spec requirements

(3) Engineer will disallow temporary storage if he determines one or more of the following exists:
- (a) excessive heat loss
- (b) segregation
- (c) oxidation

C. HAULING EQUIPMENT
  1. Shall have:
    a) tight, clean, smooth metal beds
      (1) may be lightly coated with
        (a) paraffin oil
        (b) lime solution
        (c) petroleum products not allowed for bed coating
    b) covers
      (1) use during adverse weather
    c) insulated beds required
      (1) if excessive heat loss occurs in transit

D. BITUMINOUS PAVERS
  1. Self-propelled paver
    a) with activated, heated screed
      (1) produce finished surface of required
        (a) evenness
        (b) texture
        (c) without
          (i) tearing
          (ii) shoving
          (iii) gouging
      (2) capable of spreading and finishing
        (a) to specified
          (i) thickness
          (ii) smoothness
          (iii) grade
    b) with sufficient power to propel itself and hauling equipment
      (1) without affecting finished surface
    c) with receiving hopper
      (1) of sufficient capacity to allow continuous, uniform spreading operation
      (2) with distribution system to place material
        (a) uniformly
        (b) in front of screed
        (c) without segregation
    d) with control system
      (1) to automatically control grade
      (2) automatically actuated from
        (a) reference line, or
        (b) system of mechanical sensors
          (i) to maintain paver at correct
            (a) slope: @ +/- 0.1%
            (b) elevation
      (3) able to work with any of the following:
        (a) Ski-type device
          (i) not less than 30 feet in length.
        (b) Taut stringline (wire) set to grade.
        (c) Short ski or shoe.
        (d) Laser control.
  2. discontinue operations and replace spreading/finishing equipment if it leaves
    a) tracks
    b) indented areas

c) other blemishes

E. ROLLERS
1. Type
a) vibratory, or
b) steel wheel, or
c) pneumatic-tired
2. Shall be:
a) of sufficient
(1) weight
(2) number
(3) type
b) in good condition
c) specifically designed for compaction of bituminous mixes
3. Capable of:
a) spreading mix
(1) at slow speed
(2) without displacement
4. Equipment not allowed which:
a) impairs stability of mix
b) crushes aggregate
5. Contractor shall repair at his own cost:
a) depressions caused by equipment

F. NUCLEAR DENSOMETER
1. Contractor shall provide during all paving operations
a) nuclear densometer
b) with qualified technician to
(1) calibrate
(2) obtain accurate density readings
2. Shall be provided to Engineer upon request at any time
3. No separate payment will be made for nuclear densometer

G. PREPARATION OF BITUMINOUS MATERIAL
1. Mix in manner to:
a) avoid local overheating
b) provide continuous supply of mix
c) provide uniform temperature
(1) adequate to provide suitable viscosity for coating of aggregate
(2) not more than 325 deg F
(a) unless otherwise required by manufacturer

H. PREPARATION OF MINERAL AGGREGATE
1. heat and dry prior to introduction into mixer
2. maximum temperature
a) shall not damage aggregate
(1) esp. with high calcium or magnesium content
b) shall not exceed 350 deg F
c) shall not be lower than that required for
(1) complete coating of aggregate
(2) uniform distribution on aggregates
(3) suitable mix workability

I. PREPARATION OF BITUMINOUS MIXTURE
1. Materials introduced by
a) weighing or
b) metering

c) in amounts per JMF

2. Wet mixing time:
   a) Definition:
      (1) For Batch Plant, time=:
         (a) from introduction of bituminous material
         (b) to opening of discharge gate
      (2) For Continuous Plant, time=:
         (a) in transit through drum
   b) until uniform coating is obtained
   c) shortest time to produce satisfactory mix
      (1) established based on % coated particles per ASTM D 2489
         (a) for 95% coated particles
         (b) time function of
            (i) type of plant
            (ii) type of aggregate
      (2) for batch plants
         (a) not less than 25 seconds
      (3) for continuous plants
         (a) divide
            (i) weight of contents at operating level, by
            (ii) weight of mixture delivered per second
   d) moisture content at discharge
      (1) shall not exceed 0.5%

J. PREPARATION OF THE UNDERLYING SURFACE
1. Remove by milling or grinding where specified per Section 21- Surface Preparation:
   a) rubber deposits
   b) paint
2. Clean surface of dust and debris
   immediately before placing bituminous material
3. Apply:
   a) prime coat – per Section 39 – Bituminous Prime Coat, or
   b) tack coat – per Section 40 – Bituminous Tack Coat
   c) as:
      (1) indicated on plans, or
      (2) as directed by Engineer

K. LAYDOWN PLAN, COMPACTION OF MIXTURE, TRANSPORTING, PLACING, AND FINISHING
1. Contractor to provide Laydown Plan prior to paving
   a) purpose – to minimize cold joints
   b) to be approved by the Engineer
      (1) before paving
      (2) subsequent changes made to plan
   c) include:
      (1) sequence by stations
      (2) number of width of lanes
      (3) temporary ramp location(s)
      (4) laydown temperature
      (5) estimated time of completion for each portion
2. Transport of material
   a) in trucks conforming to IV.C
   b) schedule so as to minimize paver
      (1) stopping
      (2) starting

c) do not haul over freshly placed material unless it
(1) has been compacted
(2) has been allowed to cool to atmospheric temperature

3. ~~May~~ Shall use transfer vehicle to deliver mix to paver
4. Paving During Nighttime:
a) all equipment fitted with artificial illumination
(1) adequate for safe operation
b) minimum illumination level:
(1) 20 horizontal foot candles maintained for area:
(a) 30 feet wide by 30 feet long immediately behind the paving machines
(b) 15 feet wide by 30 feet long immediately in front and back of all rolling equipment
(c) 15 feet wide by 15 feet long at any point being prime or tack coated
c) as partial fulfillment:
(1) complete light units
(a) 3,000 watts
(b) affixed to all equipment
(i) to illuminate area under construction
d) in addition provide portable floodlights:
(1) Number: [INSERT NUMBER]
(2) Equal to [PROPRIETARY: MANUFACTURER, MODEL], or equal.
e) Any out of specification material to be removed and replaced at Contractor's expense
(1) as first order of work next night shift
(2) no extended closure times will be allowed
(3) no schedule extensions will be allowed
f) See Section 11 -Construction Sequencing – for requirements relative to opening night work areas to aircraft traffic after each shift.
5. Initial placement and compaction temperature
a) suitable for obtaining
(1) density
(2) smoothness
(3) other requirements
b) not less than 250 deg F
6. When placement abuts existing pavement
a) sawcut and remove existing pavement
b) apply bituminous tack coat per Section 40 – Bituminous Tack Coat on all contact surfaces
7. Upon arrival of mix at site
a) place to full width with approved paver
b) strike off to uniform thickness such that
(1) when compacted will provide plan thickness
c) regulate speed of paver
(1) to eliminate pulling, tearing
d) begin placement at
(1) centerline, for crowned sections
(2) high edge, for one-way slope
(3) unless otherwise approved
e) joint locations
(1) longitudinal

(a) shall be at centerline for crowned pavement
(b) shall be offset from underlying layer by at least 1 ft.
(2) transverse
(a) shall be offset
(i) from underlying layer by at least 10 ft.
(b) transverse joints in adjacent lanes
(i) offset a minimum of 10 ft
f) place:
(1) in consecutive adjacent lanes
(2) minimum lane width 12.5 ft.
(a) except where edge lanes require less
(b) do not add additional screed sections to provide width
(i) unless auger sections added to match
g) irregular areas
(1) may be spread and luted with hand tools
(2) areas of segregation at the surface shall be removed and replaced at Contractor's expense
(a) remove by sawcutting and milling
(i) minimum depth
(a) 2 inches
(ii) minimum width
(a) paver width
(iii) minimum length
(a) 10 ft

L. COMPACTION OF MIXTURE
1. Compact with power rollers
a) as soon as stable enough to avoid
(1) undue displacement
(2) cracking
(3) shoving
b) sequence and type of roller
(1) at the discretion of the Contractor
c) speed of roller
(1) sufficiently slow to
(a) avoid displacement
(i) correct any displacement at once
(a) from reversing rollers
(b) from any cause
(b) provide effective compaction
2. provide sufficient rollers to
a) handle output of plant
3. continue rolling until
a) uniform texture obtained
b) grade conforms to plans
c) cross-section conforms to plans
d) required field density obtained
4. to prevent adhesion, roller should be
a) equipped with scraper
b) kept sufficiently moistened
(1) excess water not allowed
5. in inaccessible areas
a) compact with approved, power-driven tampers

(1) not less than 275 pounds gross weight
(2) tamping plate not less than 15 inches width
(3) minimum 4,200 vibrations per minute
(4) equipped with
(a) standard tamping plate
(b) plate wetting device

6. defective mixture to be replaced immediately at Contractor's expense
a) loose
b) broken
c) mixed with dirt
d) contains check-cracking
e) any other way defective

M. JOINTS
1. Form all joints to
a) ensure continuous bond between courses
b) obtain required density
c) have same texture as other sections
d) meet requirements for smoothness and grade
2. Transverse joints
a) form by
(1) bulkhead
(2) tapering course
(a) roller over unprotected edge only allowed in this manner
(b) after tapering
(i) cut back to full depth
(ii) on straight line
(iii) apply tack coat to all contact surfaces
3. Longitudinal joints
a) replace if
(1) irregular
(2) damaged
(3) have been
(a) left exposed more than 4 hours, or
(b) surface temperature < 160 deg F
(4) otherwise defective
b) sawcut back to expose clean, sound surface
(1) no more than 6 inches from edge
(2) for full depth of course
c) clean, dry and apply tack to all contact surfaces
d) replacement cost shall be considered incidental

V. MATERIAL ACCEPTANCE

A. ACCEPTANCE SAMPLING AND TESTING
1. General
a) to be performed by the Engineer
(1) at no cost to Contractor
(2) unless otherwise specified
b) testing agencies shall conform to ASTM D 3666
c) all equipment in Contractor-furnished laboratories to be certified by independent testing organization
(1) at start of operations
(2) at Contractor's expense

2. Field-Placed Material
    a) General
        (1) field-placed material tested for mat density and joint density on a lot basis
        (2) on lot basis
            (a) lot =
                (i) one day's shift if < 2,000 tons
                (ii) one-half day's shift if 2,000 to 4,000 tons
                (iii) similar subdivisions if > 4,000 tons/day
            (b) if more than one plant, lots shall apply separately for each plant
    b) Mat Density
        (1) each lot = 4 equal sublots
        (2) one core of finished, compacted material per sublot
        (3) random locations per ASTM D 3665
        (4) locations no closer than one foot from joint
    c) Joint Density
        (1) lot size = total length of longitudinal joint for lot defined in V.A.2.a.2.
        (2) each lot = 4 equal sublots
        (3) one core of finished, compacted material per sublot
        (4) random locations per ASTM D 3665
        (5) edge of cores within 6 inches from, but not on, joint
    d) Sampling
        (1) neatly cut with core drill
            (a) edges of hardened steel with diamond chips embedded
            (b) minimum diameter 5 inches
        (2) clearly defective samples will not be used for testing
        (3) Contractor to provide all tools and labor to
            (a) cut
            (b) clean
            (c) fill
                (i) use material and manner approved by the Engineer
                (ii) fill within one day of sampling
    e) Testing
        (1) determine bulk specific gravity per applicable test method:
            (a) ASTM D 2726, or
            (b) ASTM D 1188
        (2) % compaction (density) of sample =
            (a) bulk specific gravity of each sublot determined as follows:
                (i) sufficient material will be sampled
                    (a) by the Engineer
                    (b) selected on a random basis
                        (i) per ASTM D 3665
                (ii) prepare one specimen per sublot per ASTM D6926
                    (a) use # blows per Table 1
                    (b) eat set of specimens = three test portions from same sample increment
                (iii) place in covered metal tin and placed in oven:
                    (a) for 30 minutes for normal aggregates, to:
                    (b) 60 minutes for absorptive aggregates
                    (c) to stabilize to compaction temperature
                (iv) compaction temperature as specified in JMF
            (b) measure bulk SG per applicable standard
                (i) ASTM D2726, or:

(ii) ASTM D1188

(c) bulk specific gravity of joint samples

(i) use lowest of the values from the two different lots

f) Acceptance

(1) for mat and joint density

(a) per paragraph V.B.2

3. Partial Lots — Field Placed Material

a) Definition Partial Lot:

(1) when operations terminate before specified number of tests made for lot

(2) minor tonnage placements

(a) if agreed in writing Contractor/Engineer

b) Procedure

(1) last batch produced shall be considered representative of sublot, or

(2) minor tonnage placement shall be considered representative of sublot

(3) number of sublots

(a) if three (3) sublots taken

(i) = lot

(b) if one or two sublots taken

(i) shall be incorporated into next lot

(c) adjust "n" value for use in acceptance calculations

c) partial lots at the end of production shall be included in previous lot

B. ACCEPTANCE CRITERIA

1. General

a) Acceptance based on

(1) characteristics of

(a) mix

(b) completed pavement

(2) test results per criteria in VI.B for:

(a) Mat density

(b) Joint density

(c) Thickness

(d) Smoothness

(e) Grade

b) Notwithstanding plant acceptance, Engineer may reject on the basis of

(1) contamination

(2) segregation

(3) incomplete coating of aggregate

(4) improper mix temperature

(5) as based on

(a) visual inspection

(b) temperature measurements

(6) Contractor may take representative sample of rejected material

(a) in the presence of the Engineer

(b) if laboratory tests subsequently demonstrate acceptability

(i) payment will be made at contract unit price

2. Mat Density

a) lot based on average of all densities from sublots

(1) acceptable if $\geq$96%

(2) unacceptable if <96%

(a) remove and replace at Contractor's expense

3. Joint Density

a) lot based on average of all densities from sublots

(1) acceptable if ≥94%
(2) unacceptable if <94%
(a) stop and evaluate method of compacting joint
(b) may resume when appropriate measures taken to correct joint compaction

4. Thickness
a) each lift to be evaluated for thickness
b) one core per sublot, using mat density cores
c) maximum deficiency allowed:
(1) at any point:
(a) not more than ½ inch below plan thickness
(2) average thickness for lift, or combined lifts:
(a) not less than plan thickness
d) if thickness requirements not met, Contractor to repair at his expense
(1) by providing new pavement
(2) may, at his expense, take additional cores to delineate deficient area

5. Smoothness
a) final surface shall be free of roller marks
b) shall not vary more than:
(1) 3/8 inch in 16 ft for base course
(2) 1/4 inch in 16 ft for surface course
c) Lot size = 2,000 square yards
d) measure at 50-ft intervals
(1) longitudinal – measure at center of paving lane
(2) transverse – measure continuously across full width
(3) except across designed grade changes
(a) at transition areas, adjust straightedge to measure smoothness, not grade transitions
e) if more than 15% of measurements out of tolerance
(1) Contractor shall remove and replace
(a) to depth of final course
(2) skin patching not allowed
(3) high spots may be ground off
(a) providing thickness requirements met
(b) grinding areas limited to 15 sq yds
(i) if more than 15 sq yds, remove and replace

6. Grade
a) shall not vary from plan grade by more than ½ inch
b) test:
(1) longitudinally: @ 50-ft intervals
(2) transversely: at all grade breaks
c) Contractor to pay surveying costs
d) provide documentation, stamped and signed by licensed Land Surveyor
e) Lot size = 2,000 sq yds
f) Acceptance
(1) Contractor to remove and replace final course if:
(a) more than 15% outside of tolerance
(b) any one shot > ¾ inch from plan grade
(2) skin patching not allowed
(3) high spots may be ground providing
(a) thickness requirements met
(b) grooved surfaces retain grooves

(i) width: .090 and 0.130 inches
(ii) depth: 1/32 inch
(c) slurry from grinding shall be continuously removed
(i) residue cannot flow across other paving lanes
(d) grinding area limited to 15 sq yds
(i) > 15 sq yds requires removal and replacement

C. RESAMPLING PAVEMENT FOR MAT DENSITY
1. General
a) resampling only allowed for mat density
b) Contractor must request in writing within 48 hours after initial test results
c) use same procedures as initial testing
d) only one resampling per lot allowed
e) new redefined mat density shall include initial and new samples
f) Contractor to bear cost of resampling and testing
2. Payment for Resampled Lots
a) payment will be made per V.B.2.

D. [OPTIONAL: LEVELING COURSE
1. Definition: first variable thickness lift placed prior to subsequent courses
2. must meet air voids requirements
3. will not be held to mat density requirements
4. compact with same effort documented for accepted test section
5. shall not exceed 1.5 inches thickness]

VI. CONTRACTOR QUALITY CONTROL

A. GENERAL
1. Develop Quality Control Program (QCP) per Section 12 – Contractor Quality Control Program
2. Ensure that
a) work conforms to contract documents
b) at minimum test frequencies per VI.C.
3. Program shall address:
a) Mix Design
b) Aggregate Grading
c) Quality of Materials
d) Stockpile Management
e) Proportioning
f) Mixing and Transportation
g) Placing and Finishing
h) Joints
i) Compaction
j) Surface Smoothness

B. TESTING LABORATORY
1. Contractor to provide on-site asphalt testing laboratory conforming to subsections III.E and IV. B.1.c.
2. provide certification that lab equipment
a) is properly calibrated
b) will meet specifications applicable to specified test procedures

C. QUALITY CONTROL TESTING
1. Contractor shall perform all tests per approved QCP
2. Include tests for, not necessarily limited to, tests for:
a) control of asphalt content
b) aggregate gradation

c) temperatures
d) aggregate moisture
e) field compaction
f) surface smoothness

3. Develop Quality Control Testing Plan as part of QCP
4. Asphalt Content
   a) For determination of asphalt content
      (1) two tests per lot, minimum
      (2) per ASTM D 6307 or ASTM D 2172
   b) determine weight of ash portion
      (1) as part of first test
      (2) as part of every 10th test thereafter for duration of production
   c) last ash weight obtained shall be used in asphalt content calculations
   d) asphalt content used for lot will be average of test results
   e) May use nuclear gauge per Section 20 – Nuclear Gauges
      (1) in accordance with ASTM D 4125
      (2) if calibrated for specific mix being used
5. Gradation
   a) test twice per lot, minimum
   b) per ASTM D 544 and ASTM C 136
   c) if asphalt content determined by nuclear gauge, determine gradation:
      (1) based on hot bin samples at batch plant, or
      (2) cold feed from drum plant
      (3) test in accordance with ASTM C 136, dry sieve
6. Moisture Content of Aggregate
   a) test once per lot, minimum
   b) per ASTM C 566
7. Moisture Content of Mixture
   a) test once per lot, minimum
   b) per ASTM D 1461 or AASHTO T 110
8. Temperature
   a) check 4 times per lot, minimum
   b) test mix at locations to determine temperature of:
      (1) dryer
      (2) bitumen in storage tank
      (3) mixture at plant
      (4) mixture at job site.
9. In-Place Density Monitoring
   a) test as frequently as necessary to ensure that required density is being achieved
   b) may monitor with nuclear gauge per Section 20 – Nuclear Gauges
      (1) per ASTM D 2950
10. Additional Testing
    a) perform all other tests Contractor deems necessary to control process
11. Monitoring
    a) Engineer reserves right to monitor all Contractor QC testing

D. SAMPLING
   1. Contractor shall sample and test any material which the Engineer believes to be inconsistent
   2. Sampling and testing per standard procedures described herein

E. CONTROL CHARTS
   1. Contractor shall maintain linear control charts for
      a) individual measurements

b) range (difference highest to lowest)
c) post in location satisfactory to the Engineer
d) include as a minimum:
    (1) project number
    (2) contract item number
    (3) test number
    (4) test parameter
    (5) applicable Action and Suspension Limits
    (6) Contractor's test results
e) use control charts to
    (1) identify potential problems
    (2) assign causes
    (3) before they occur
f) if data indicates problem not be acted upon by Contractor, Engineer may
    (1) suspend production
    (2) reject material

2. Individual Measurements
    a) use for control of
        (1) aggregate gradation
        (2) asphalt content
        (3) use JMF target values of central tendencies, for following:

TABLE 5
CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS

Sieve	Action Limit	Suspension Limit
¾ inch	0%	0%
½ inch	+/-6%	+/-9%
⅜ inch	+/-6%	+/-9%
No. 4	+/-6%	+/-9%
No. 16	+/-5%	+/-7.5%
No. 50	+/-3%	+/-4.5%
No. 200	+/-2%	+/-3%
Asphalt Content	+/-0.45%	+/-0.70%

3. Range
    a) use to control
        (1) process variability for parameters noted in table, below
    b) range for each lot = difference two test results for each control parameter
    c) Suspension Limits in table based on n=2
        (1) if more tests performed, adjust suspension limits by multiplying Suspension Limit by:
            (a) 1.18 for n = 3
            (b) 1.27 for n = 4

TABLE 6
CONTROL CHART LIMITS BASED ON RANGE (Based on n = 2)

Sieve	Suspension Limit
½ inch	11 percent
⅜ inch	11 percent

No. 4	11 percent
No. 16	9 percent
No. 50	6 percent
No. 200	3.5 percent
Asphalt Content	0.8 percent

4. Corrective Action
   a) QCP shall indicate appropriate action to be taken if process out of tolerance:
      (1) set of rules to gauge process
      (2) actions to be taken
   b) Process will be considered out of control and production will be stopped if:
      (1) One point outside individual measurement Suspension Limit line
      (2) Two points outside individual measurement Action Limit line.

NOTES TO ENGINEER: Charts based on ¾-inch max aggregate. if 1' or 1.5" max aggregate used, amend Individual Measurement chart as follows:

1 inch or 1-½ inch	0%	0%
¾ inch	6%	11%

If 1' or 1.5" max aggregate used, amend Individual Measurement chart as follows:

1) delete 1-inch and ¾ inch Action and Suspension Limits
2) revise 1/2 –inch limits to:

½-inch	0%	0%

3) delete ½-inch sieve from Range Chart

F. QUALITY CONTROL REPORTS
   1. Submit QC reports to Engineer daily, per Section 12 – Contractor Quality Control Program

VII. GREENBOOK ASPHALT CONCRETE

A. GENERAL
   1. For locations identified on the plans, provide asphalt concrete conforming to:
   2. "Brown Book"
      a) August 03, 2009 Version
      b) City of Los Angeles Department of Public Works
      c) includes additions and amendments to:
         (1) 2006 Edition
         (2) 2008 Cumulative Supplement to the Standard Specifications for Public Work Construction, (SSPWC).

B. MATERIALS
   1. Asphalt Concrete shall conform to the following Sections, including referenced sections and subsections, of the Brown Book for the types of mixes specified:
      a) 203-1 Paving Asphalt
      b) 203-6 Asphalt Concrete
      c) 203-7 Recycled Asphalt Concrete – Hot Mixed
      d) 203-10 Latex Modified Asphalt Concrete
   2. Asphalt for this project shall be:

a) C2-PG70-10, or
b) C2-PG64-10, or
c) [OPTIONAL: STATE OTHER TYPE]

3. [OPTIONAL IF RECYCLED ASPHALT CONCRETE ALLOWED:
a) C2-PG-70-10-RAP 15%, or
b) C2-PG-64-10-RAP 15%]

C. CONSTRUCTION METHODS
1. Construction shall be in accordance with Section 302-5 of the SSPWC.
2. Tack coat, as specified in 302-5.4, shall be required between lifts and on all contact surfaces
3. Prime coat, as specified in 302-5.3, shall be required on all unbound underlying surfaces

VIII. CALTRANS ASPHALT CONCRETE

A. GENERAL
1. For locations identified on the plans, provide asphalt concrete conforming to:
2. Standard Specifications, State of California Department of Transportation (Caltrans)
a) May 2006 version of the
b) Sections 39-1 through 39-7

B. MATERIALS
1. Asphalt Concrete shall conform to Section 39-2, including referenced sections and subsections, of the Caltrans specifications for the types of mixes specified.
a) Type A: ¾-inch Max Coarse
b) Type B: ¾-inch Max Medium
c) Leveling Course: ½-inch Max Medium
d) If not otherwise specified, mix shall be Type A
e) except that
(1) the maximum aggregate size shall not be more than ½ the thickness of the compacted finished pavement
(2) If planned layer < 1/5 inches:
(a) for Type A substitute ½-inch Max Coarse
(b) for Type B substitute ½-inch Max Medium
2. Asphalt Binder shall be type PG64-10 unless otherwise specified

C. CONSTRUCTION METHODS
1. Conform to requirements of Sections 39-3 through 39-7.

IX. SUBMITTAL REQUIREMENTS

A. JOB MIX FORMULA
1. Aggregates
2. Bitumen
a) grade certifications

B. LABORATORY CERTIFICATIONS
C. TESTING FACILITY CERTIFICATIONS
D. SCALE CERTIFICATIONS

X. METHOD OF MEASUREMENT

A. PLANT MIX BITUMINOUS PAVEMENT – P-403 – SURFACE COURSE
1. per ton
2. Measured by recorded batch weights or truck scale weights

B. PLANT MIX BITUMINOUS PAVEMENT – P-403 – BASE COURSE
1. per ton
2. Measured by recorded batch weights or truck scale weights

C. PLANT MIX BITUMINOUS PAVEMENT – P-403 – LEVELING COURSE
1. per ton
2. Measured by recorded batch weights or truck scale weights]

D. GREENBOOK ASPHALT [TYPE]
   1. per ton
   2. Measured by recorded batch weights or truck scale weights

E. CALTRANS ASPHALT [TYPE]
   1. per ton
   2. Measured by recorded batch weights or truck scale weights

XI. BASIS OF PAYMENT

A. PAID AT CONTRACT UNIT PRICE UNDER ITEM NUMBER
   1. 36.1 Plant- Mix Bituminous Pavement P-403 – Surface Course – per ton
   2. 36.2 Plant- Mix Bituminous Pavement P-403 – Base Course – per ton
   3. 36.3 Plant- Mix Bituminous Pavement P-403 – Leveling Course – per ton
   4. 36.4 Greenbook Asphalt Concrete Type [ ] – per ton
   5. 36.5 Caltrans Asphalt Concrete Type [ ] - per ton
   6. Is full compensation for all preparation, mixing, placing, compaction, labor, equipment, tools, incidentals
   7. No separate payment for work in areas of night or limited-time construction area.

XII. TESTING REQUIREMENTS

A.	ASTM C 29	BULK DENSITY (“UNIT WEIGHT”) AND VOIDS IN AGGREGATE
B.	ASTM C 88	SOUNDNESS OF AGGREGATES BY USE OF SODIUM SULFATE OR MAGNESIUM SULFATE
C.	ASTM C 117	MATERIALS FINER THAN 75MM (NO.200) SIEVE IN MINERAL AGGREGATES BY WASHING
D.	ASTM C 127	SPECIFIC GRAVITY AND ABSORPTION OF COARSE AGGREGATE
E.	ASTM C 131	RESISTANCE TO DEGRADATION OF SMALL SIZE COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOS ANGELES MACHINE
F.	ASTM C 136	SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES
G.	ASTM C 183	SAMPLING AND THE AMOUNT OF TESTING OF HYDRAULIC CEMENT
H.	ASTM C 566	TOTAL EVAPORABLE MOISTURE CONTENT OF AGGREGATE BY DRYING
I.	ASTM D 75	SAMPLING AGGREGATES
J.	ASTM D 979	SAMPLING BITUMINOUS PAVING MIXTURES
K.	ASTM D 995	MIXING PLANTS FOR HOT-MIXED HOT-LAID BITUMINOUS PAVING MIXTURES
L.	ASTM D 1073	FINE AGGREGATE FOR BITUMINOUS PAVING MIXTURES
M.	ASTM D 1074	COMPRESSIVE STRENGTH OF BITUMINOUS MIXTURES
N.	ASTM D 1188	BULK SPECIFIC GRAVITY AND DENSITY OF COMPACTED BITUMINOUS MIXTURES USING PARAFFIN-COATED SPECIMENS
O.	ASTM D 1461	MOISTURE OR VOLATILE DISTILLATES IN BITUMINOUS PAVING MIXTURES

P.	ASTM D 2041	THEORETICAL MAXIMUM SPECIFIC GRAVITY AND DENSITY OF BITUMINOUS PAVING MIXTURES
Q.	ASTM D 2172	QUANTITATIVE EXTRACTION OF BITUMEN FROM BITUMINOUS PAVING MIXTURES
R.	ASTM D 2419	SAND EQUIVALENT VALUE OF SOILS AND FINE AGGREGATE
S.	ASTM D 2489	ESTIMATING DEGREE OF PARTICLE COATING OF BITUMINOUS-AGGREGATE MIXTURES
T.	ASTM D 2726	BULK SPECIFIC GRAVITY AND DENSITY OF NON-ABSORPTIVE COMPACTED BITUMINOUS MIXTURES
U.	ASTM D 2950	DENSITY OF BITUMINOUS CONCRETE IN PLACE BY NUCLEAR METHODS
V.	ASTM D 3203	PERCENT AIR VOIDS IN COMPACTED DENSE AND OPEN BITUMINOUS PAVING MIXTURES
W.	ASTM D 3665	RANDOM SAMPLING OF CONSTRUCTION MATERIALS
X.	ASTM D 3666	MINIMUM REQUIREMENTS FOR AGENCIES TESTING AND INSPECTING ROAD AND PAVING MATERIALS
Y.	ASTM D 4125	ASPHALT CONTENT OF BITUMINOUS MIXTURES BY THE NUCLEAR METHOD
Z.	ASTM D 4318	LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
AA.	ASTM D 4791	FLAT PARTICLES, ELONGATED PARTICLES, OR FLAT AND ELONGATED PARTICLES IN COARSE AGGREGATE
BB.	ASTM D 4867	EFFECT OF MOISTURE ON ASPHALT CONCRETE PAVING MIXTURES
CC.	ASTM D 5444	MECHANICAL SIZE ANALYSIS OF EXTRACTED AGGREGATE
DD.	ASTM D 5581	RESISTANCE TO PLASTIC FLOW OF BITUMINOUS MIXTURES USING MARSHALL APPARATUS (6" DIAMETER SPECIMEN)
EE.	ASTM D 6926	PREPARATION OF BITUMINOUS SPECIMENS USING MARSHALL APPARATUS
FF.	ASTM D 6927	MARSHALL STABILITY AND FLOW OF BITUMINOUS MIXTURES
GG.	ASTM E 11	WIRE-CLOTH SIEVES FOR TESTING PURPOSES
HH.	ASTM E 178	DEALING WITH OUTLYING OBSERVATIONS
II.	AASHTO T 30	MECHANICAL ANALYSIS OF EXTRACTED AGGREGATE
JJ.	[AASHTO T 110	MOISTURE OR VOLATILE DISTILLATES IN BITUMINOUS PAVING MIXTURES]
KK.	THE ASPHALT INSTITUTE'S	MIX DESIGN METHODS FOR ASPHALT CONCRETE

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XIII. MATERIAL REQUIREMENTS

A.	ASTM D 242	MINERAL FILLER FOR BITUMINOUS PAVING MIXTURES
B.	ASTM D 946	PENETRATION GRADED ASPHALT CEMENT FOR USE IN PAVEMENT CONSTRUCTION
C.	ASTM D 3381	VISCOSITY-GRADED ASPHALT CEMENT FOR USE IN PAVEMENT CONSTRUCTION
D.	ASTM D 4552	CLASSIFYING HOT-MIX RECYCLING AGENTS
E.	AASHTO MP1	PERFORMANCE GRADED BINDER DESIGNATION

XIV. END OF SECTION