

## SECTION 32 12 16

### ASPHALT PAVING

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Full depth asphaltic concrete paving over prepared subgrade.

##### **1.02 RELATED SECTIONS**

- A. Section 31 00 00 – Earthwork.
- B. Section 32 13 13 - Concrete Paving.

##### **1.03 REFERENCES**

- A. ASTM C29: Unit Weight and Voids in Aggregate.
- B. ASTM C88: Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- C. ASTM C117: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.
- D. ASTM C128: Specific Gravity Test and Absorption of Fine Aggregate.
- E. ASTM C131: Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- F. ASTM C136: Sieve or Screen Analysis of Fine and Coarse Aggregates.
- G. ASTM D70: Specific Gravity of Semi-Solid Bituminous Materials.
- H. ASTM D2726: Bulk Specific Gravity of Compacted Bituminous Mixtures.
- I. ASTM D2041: Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.
- J. ASTM D4462: Viscosity of Asphalts (Bitumens).
- K. ASTM D2172: Quantities Extraction of Bitumens from Bituminous Paving Mixtures.
- L. ASTM D2419: Sand Equivalent Value of Soils and Fine Aggregate.
- M. ASTM D290: Bituminous Mixing Plant Inspection.
- N. ASTM D6373: Performance Graded Asphalt Binder.
- O. ASTM D692: Course Aggregate for Bituminous Paving.
- P. ASTM D1073: Fine Aggregate for Bituminous Paving Mixtures.
- Q. ASTM 1241: Materials for Soil-Aggregate Subbase, Base and Surface Courses.
- R. ASTM D2026: Cutback Asphalt (Slow-Curing Type).
- S. ASTM D2027: Cutback Asphalt (Medium-Curing Type).
- T. ASTM D2028: Cutback Asphalt (Rapid-Curing Type).
- U. SP-2: Superpave Level 1 Mix Design.
- V. CABO/ANSI A117.1 for accessibility requirements related to walks, ramps, parking areas, drives, curb ramps, etc.
- W. Colorado Department of Transportation.
- X. Colorado Asphalt Pavement Association.

##### **1.04 SUBMITTALS**

- A. Submit under provisions of Division 1 Specifications.
- B. Samples: Provide samples of materials for laboratory testing and job-mix design for asphaltic concrete paving section.

- C. Record of Work: Maintain record of time and date of placement, temperature, and weather conditions, retain until completion and furnish copy to engineer.
- D. Test Reports: Submit laboratory reports for following materials tests.
  - 1. Coarse and fine aggregate from each material source and each required grading.
    - a) Sieve analysis: ASTM C136 (AASHTO T19).
    - b) Unit weight of slag: ASTM C29 (AASHTO T19).
    - c) Soundness: ASTM C88 (AASHTO T104) for surface course aggregates only.
    - d) Sand equivalent: ASTM D2419 (AASHTO T176).
    - e) Abrasion of coarse aggregate: ASTM C131 (AASHTO T96), for surface course aggregates only.
  - 2. Asphalt cement for each penetration grade.
    - a) Flash Point Temperature, °C: ASTM D92 (AASHTO T48).
    - b) Viscosity at 135° C: ASTM D24402.
    - c) Dynamic Shear, Temperature, °C: AASHTO TP5.
    - d) Specific gravity: ASTM D70 (AASHTO T43).
  - 3. Job-mix design mixtures for each material or grade.
    - a) Bulk specific gravity for fine aggregate: ASTM C128 (AASHTO T84).
  - 4. Uncompacted asphalt concrete mix: Maximum specific gravity ASTM D2041 (AASHTO T209).
  - 5. Compacted asphalt concrete mix.
    - a) Bulk density: ASTM D1188 (AASHTO T166).
  - 6. Density and void analysis.
    - a) Provide each series of asphalt concrete mixture test specimens, in accordance with SP-2.
    - b) Use SHRP Gyrotory method of mix design unless otherwise directed or acceptable to Engineer.
  - 7. Sampling and testing of asphalt concrete mixtures for quality control during paving operations.
    - a) Uncompacted asphalt concrete mix.
      - i) Asphalt cement content: ASTM D2172 (AASHTO T164).
      - ii) Maximum Specific Gravity: ASTM D2041 (AASHTO T209).
    - b) Compacted asphalt concrete mix.
      - i) Bulk density: ASTM D2726.
    - c) Perform at least one test for each day's paving but not less than one test per each 4000 sf of each lift.

**1.05 QUALITY ASSURANCE**

- A. Conform materials and installation to applicable portions of City and County of Denver and Colorado Department of Transportation construction specifications, standards and details.

**1.06 REGULATORY REQUIREMENTS**

- A. For work on public streets or rights-of-way conform to the requirements of City and County of Denver construction specifications, standards and details for the construction public right-of-way improvements.
- B. Comply with applicable requirements of CABO/ANSI A117.1 for accessibility requirements related to walks, ramps, parking areas, drives, curb ramps, etc.

**1.07 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store, protect and handle materials under provisions of Division 01 Specifications.

- B. Transport mixture from mix plant in trucks with tight, clean, non-sticking compartments. Coat hauling compartments with lime-water mixture to prevent sticking. Elevate and drain compartment of excess solution before loading mix.
- C. Cover to protect from weather and prevent loss of heat when temperature is below 50 degrees F.
- D. Provide insulated truck beds during temperature below 50 degrees F on long distance deliveries.

**1.08 ENVIRONMENTAL REQUIREMENTS**

- A. Do not apply when underlying surface is muddy, frozen or wet.
- B. Do not place by spreading and finishing machine tack coat or asphaltic cement when temperature is below 45 degrees F and falling. Place when above 40 degrees F and rising.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations, and that meet CDOT requirements.
- B. Aggregates: Clean, hard, durable particles of crushed stone, crushed slab, crushed gravel, or natural gravel.
  - 1. Construction Waste Management: Divert the entire quantity of removed asphalt to be recycled.
  - 2. Recycled Content: a minimum of 20% (1/2 post consumer + 1/2 pre-consumer) is to be used. Percentages of recycled content to conform with CDOT specifications.
  - 3. Asphalt materials to be extracted processed and manufactured regionally.
- C. Mixes:
  - 1. Plant-mix pavements: Specify job-mix formulas for each asphalt pavement type.
  - 2. Asphaltic concrete base or surface course: Mix aggregates and bituminous materials.
    - a) Base course: Grade S Hot Bituminous Pavement using Superpave Performance Grade 58-28 Binder.
    - b) Surface (wearing) course: Grade SX Hot Bituminous Pavement using Superpave Performance Grade 58-28 Binder.
  - 3. Overlay asphalt mix: Same as wearing course materials.
  - 4. Pavement patching: Grade SG Hot Bituminous Pavement using Superpave Performance Grade 58-28 Binder.
- D. Specify geotextile pavement reinforcement fabric under asphalt overlay.
  - 1. "Petro Mat" as produced by Phillips Fibers, Greenville, SC.
  - 2. Trivera Spunbond 1114 as produced by Hoechst Celanese Corp., Spartanburg, SC.
  - 3. Mirafi Mirapave 500 as produces by Ten Cate Nicolon, Pendergrass, GA.
- E. Tack coat: AC10 Asphaltic Cement or emulsion.
- F. Soil sterilant:
  - 1. Material shall be of an organic nature with minimum leaching characteristics.
  - 2. Preferred product is Simazine of the Triazine group.
- G. Reclaimed asphalt pavement (RAP) should be encouraged. If it is, it needs to have the following requirements:
  - 1. 100% of material must pas through a 50mm sieve.
  - 2. Can be used in the base, binder and/or surface courses.
  - 3. The recycled materials must have the same properties as virigin material.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. For pavements to be resurfaced:

1. Specify appropriate patching and crack filling operations and apply tack coat.
  2. Install pavement reinforcement fabric.
  3. Apply additional tack coat where needed. Apply sand to areas where excessive tack coat appears on surface.
  4. When overlaying the finished surface needs to be considered for rise of steps that the asphalt is up against.
  5. When overlaying site furnishings need to be reset to have proper finished install height. (Tetherball sleeves, basketball goals, benches, tables, trash receptacles, etc).
- B. Proof rolling:
1. Proof rolling of the sub-grade is required prior to placement of pavement and after sub-grade reconditioning has been completed.
  2. The A/E or the Owner's Testing Agency shall be present during proof rolling.
  3. The sub-grade shall be approved in writing prior to placement of pavement.
- C. Acceptable methods of subgrade stabilization:
1. Incorporation of lime, if soil plasticity is greater than 10.
  2. Cement or fly ash if soil plasticity is less than 10; this is the preferred method as it is not affected by subsequent rain.
  3. Asphalt emulsion, where soil is very sandy.
  4. Geotextiles.

### **3.02 CONSTRUCTION**

- A. Tolerances:
1. Minimum slope of 2% +/- 0.1%.
  2. The Owner reserves the right to require the Contractor to remove paved areas where the pavements thickness exceeds the maximum tolerance limits, creating birdbaths.

### **3.03 FIELD QUALITY CONTROL**

- A. Notifications: Contractor shall work with the Owner to schedule Owner's Testing Agency inspections and testing.
- B. General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by Owner's independent testing laboratory. Repair or remove and replace unacceptable paving as directed by Owner or Engineer.
- C. Testing:
1. The Owner will retain and pay for the services of an Owner's Testing Agency to perform tests and submit results to the A/E and Contractor.
  2. The Testing Agency will notify Contractor at the time of testing, prior to final report, if results do not meet specifications, so that corrective measures may be made immediately.
  3. Contractor shall repair cores taken at time of testing.
  4. A/E shall specify minimum acceptable results.
  5. A/E shall specify type of geotechnical testing.
- D. Water test by Contractor: New pavement shall be tested by flooding with water, at Contractors expense, to verify no adverse slopes or excessive birdbaths exist across pavement. Specified tolerances shall be met prior to acceptance by Owner.
- E. Additional tests or re-tests required for quality control shall be at Contractor's expense.
- F. Asphalt which fails to meet specified requirements shall be removed and replaced at the Contractor's expense. Testing of replacement asphalt shall be at the Contractor's expense.

### **3.04 CLEANING AND PROTECTION**

#### **A. Protection:**

1. Protect newly placed material from traffic by barricades or other suitable method until mixture has cooled and attained maximum degree of hardness.
2. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than six hours.
3. Traffic is not permitted on in-place pavement reinforcement geotextiles unless approved by DPS and the A/E.

#### **B. Cleaning:**

1. After completion of paving operation, clean surfaces of excess or spilled asphalt materials to the satisfaction of DPS and the A/E.
2. After completion of paving operation, clean surfaces of excess or spilled asphalt materials to the satisfaction of City inspectors for work in City rights-of-way.

### **3.05 STRIPING AND PAINTING**

- #### **A. Refer to Section 32 17 23, Pavement Markings.**

### **3.06 TRAFFIC CONTROL DEVICES**

- #### **A. Signs.** Sign faces, posts and bases shall be in conformance with the following materials specifications. All nonstandard sign faces, posts and bases must be approved by municipality. Private property or nonstandard signs will not be maintained by municipality. Contact municipality for additional details and submit shop drawings for approval prior to fabrication. All signs shall conform to current M.U.T.C.D. Standards and Colorado Supplements. All signs shall be 3M-engineer grade reflective sheeting or accepted substitute.

1. Traffic/Parking Signs: Sign blanks shall be 6061 or 5052-H38 aluminum alloy .080 inches thick. Facing shall be specified reflective sheeting with standard sign colors based on standard graphics and as shown on the plans.

#### **B. Sign Posts:**

1. For large signs greater than 12"W x 18"H and for multiple signs of any size mounted on the same post: sign posts shall be two (2) inch by two (2) inch galvanized telespar tube.
2. For regular single signs 12"W x 18"H or smaller: sign posts shall be one and one-half (1-1/2) inch by one and one-half (1-1/2) inch galvanized telespar tube.
3. Galvanized telespar tube shall have 0.120-inch wall thickness, and three-eighths (3/8) inch holes drilled on one (1) inch centers, all sides over full length, ten (10) feet in length (min).

- #### **C. Sign Post Anchor Bases (Stubs).** All sign post anchor bases shall be twist resistant square galvanized telespar tube post with thickness and hole pattern the same as sign posts. Use 2-1/4" by 2-1/4" anchor for large posts and 1-3/4" by 1-3/4" anchor for regular posts. Bases shall be embedded a minimum of 36" below finished grade and shall extend 3" above finished grade.

- #### **D. Signs Post Anchor Bases with concrete footing:** Sign, post, base and compacted soil shall be rigid and able to withstand wind loads. Where predominantly clay soils are present which will not properly compact at sign base, install a 6" diameter by 36" deep concrete footing around signs post anchor base for all signs in landscaped areas.

- #### **E. All signs and posts shall be mounted and secured with municipal-approved vandal-proof type TL-3896 drive rivets with washers, or accepted substitute.**

**END OF SECTION 32 12 16**