SECTION 32 12 00

FLEXIBLE PAVING

PART 1 GENERAL

1.1 RELATED WORK

A. Section 31 10 00: Site Preparation
B. Section 31 00 00: Earthwork
C. Section 32 17 23 01: Traffic Striping and Pavement Markings
D. Section 32 00 01: Site Restoration and Rehabilitation

1.2 REFERENCES

A. Current Caltrans Standard Specifications:
   1. Section 26 – Aggregate Base
   2. Section 39 – Asphalt Concrete
   3. Section 92 – Asphalts
   4. Section 93 – Liquid Asphalts
B. Standard Test Methods: No. 399A

1.3 SUBMITTALS

A. The Contractor shall furnish material certificates, including mill test reports on the asphalts, emulsions, crack sealers, cement, aggregates and reinforcing fabric, signed by the material producer and the Contractor, showing compliance with the respective specifications.

B. The Contractor shall furnish asphalt concrete mix designs signed by the material producer and the Contractor.

C. The Contractor shall furnish a certified weight or load slip to the Project Manager for each load of material used in the construction of the asphalt concrete pavement.

D. The Project Manager may require material samples and may make field tests as deemed necessary to determine compliance with the Specifications.
1.4 PROJECT CONDITIONS

Asphalt concrete surfaces shall be constructed only when the atmospheric temperature is above 10° C (50° F) and when base is dry.

PART 2 PRODUCTS

2.1 AGGREGATE BASE MATERIAL

A. Aggregate base shall conform to Class 2 gradation and quality requirements, as specified in Section 26-1.028 of the Caltrans Standard Specifications.

B. Pulverizing existing AC and base material may be acceptable for use as aggregate base, provided the pulverized material meets the gradation and quality requirements for Class 2 Aggregate Base, as specified in Section 26-1.02A of the Caltrans Standard Specifications, and has been approved by the Geotechnical Engineer. Where the milling process produces large pieces of asphalt, the contractor shall remove the oversize (greater than 1½") pieces prior to the compaction phase.

2.2 AGGREGATE SUBBASE MATERIAL

Pulverizing existing AC and base material may be acceptable for use as aggregate subbase, provided the pulverized material meets the gradation and quality requirements for Class 2 Aggregate Subbase, as specified in Section 25-1.02A of the Caltrans Standard Specifications, and has been approved by the Geotechnical Engineer. Where the milling process produces large pieces of asphalt, the contractor shall remove the oversize (greater than 2½") pieces prior to the compaction phase.

2.3 ASPHALT CONCRETE PAVING

A. Asphalt binder to be mixed with aggregate shall be steam-refined asphalt conforming to Sections 92 and 93 of the Caltrans Standard Specifications.

B. Mineral aggregate shall be Type B mineral aggregate as specified in Section 39 of the Caltrans Standard Specifications.

C. Maximum aggregate size shall be as follows:

<table>
<thead>
<tr>
<th>A.C. Thickness</th>
<th>Aggregate Size (Gradation)</th>
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</thead>
<tbody>
<tr>
<td>1½&quot; to 3&quot; Surface Course</td>
<td>½&quot; Maximum (medium)</td>
</tr>
<tr>
<td>Base Course</td>
<td>¾&quot; Maximum (medium)</td>
</tr>
<tr>
<td>Leveling Course</td>
<td>¼&quot; Maximum</td>
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2.4 REINFORCING FABRIC

A. Asphalt binder for fabric tack coat shall be steam refined asphalt conforming to Sections 92 and 93 of the Caltrans Standard Specifications.

B. The reinforcing fabric shall conform to Caltrans Standard Specifications Section 88-1.02.

PART 3 EXECUTION

3.1 PREPARATION

A. Subgrade: The upper 6 inches of subgrade shall be scarified, moisture conditioned and compacted to 95 percent per Section 31 00 00, Earthwork.

B. Thermoplastic striping, tape, and raised pavement markers shall be removed in conformance with Section 32 17 23 01, Traffic Striping and Pavement Markings.

C. Areas receiving overlay shall be wedge cut at all gutters, conforms, and any other area where required for drainage. Wedge cuts will not be required at vertical curbs, unless required for drainage.

D. Areas specified for surface grind shall be ground to a depth of 2 inches, and at least 6 feet wide using an approved milling machine.

3.2 PAVEMENT REPAIR

All existing pavement to receive an asphalt concrete overlay (with or without reinforcing fabric) shall be repaired as follows prior to commencing resurfacing operations:

A. For pavements to receive an AC overlay, cracks 1/8 inch to 1/2 inch in width shall be cleared of dirt, dust, and other deleterious materials and repaired with asphalt crack sealer or with slurry seal applied in accordance with the manufacturer's recommendations.

B. Cracks or holes larger than ½ inch in width shall be cleared of dirt and other deleterious materials and repaired with hot asphalt concrete mix.

C. Areas specified for dig-out shall be excavated to sub-grade, or to the depth specified. The sub-base shall be scarified to a depth of 6 inches and compacted to 95 percent density.

D. The maximum thickness of any lift of asphalt concrete in dig-outs shall be 3 inches.

E. Low areas shall be filled with a leveling course of asphalt concrete as directed by the Project Manager prior to fabric installation. High areas shall be milled to result in a
uniform plane, or excavated and patched per paragraph 3.02.C above, and rolled to match the grade of the adjacent paving.

3.3 REINFORCING FABRIC

A. Preparation:

1. Existing and recently repaired pavement to be fabric-overlaid, shall be cleaned to remove all materials such as, but not limited to, leaves, vegetation, trash and dirt.

2. An asphalt binder tack coat shall be applied to all surfaces to receive fabric. The tack coat shall be applied as follows:
   
   a. At a uniform rate of 0.25 gallons per square yard

   b. At a temperature between 250 F and 375 F

   c. For full width of the fabric plus 3 inches on each side

   d. No farther a distance in advance of the fabric application and overlay than the Contractor can maintain free of traffic.

B. Application:

1. Reinforcing fabric shall be installed per Caltrans Standard Specifications Section 39-4.03, unless otherwise directed by the Project Manager.

2. No traffic shall be allowed on the fabric before it is overlaid with asphalt concrete.

3. No more fabric shall be installed than can be overlaid in the same working day. In the event that some installed fabric is not overlaid, traffic shall be prevented from traveling on the exposed fabric.

4. Fabric joints shall overlap 2 to 4 inches, but in no case shall more than 2 layers of fabric result. Both the tack coat and the fabric shall overlap the previously placed fabric by the same amount.

5. Fabric shall be neatly cut around manhole covers, valve boxes, etc. to allow for raising to finish grade. No more than two adjacent layers of fabric are allowed.
6. If there are wrinkles and folds in the fabric, the Contractor shall lay flat all fabric after it is placed, cutting to remove such wrinkles, bubbles, and folds to increase the bond between the fabric with the existing pavement. Where the integrity of the bond is lost, the fabric shall be removed and replaced at the discretion of the Project Manager.

3.4 AGGREGATE BASE

Class 2 aggregate base shall be placed, spread and compacted to not less than 95% relative compaction in conformance with Section 26 of the Caltrans Standard Specifications.

3.5 PULVERIZED BASE

Recycling existing surfacing and base:

A. The depth of ripping shall be such that no material below the existing base will be included to contaminate the recycled asphalt concrete and base.

B. The equipment used for recycling shall leave an undisturbed plane at a uniform depth below the pavement surface shown on the typical cross sections. Precautions shall be taken to avoid forming furrows of loosened material below this plane and to obtain a uniform condition for the full width of the recycled area.

C. If the pulverized material is not sufficient to conform to the thickness, lines, or elevations shown on the plans, material conforming to Class 2 aggregate base shall be furnished, placed, and compacted to grade as required, at no additional cost.

3.6 SUBGRADE STABILIZATION

A. Description

After removal of the existing asphalt pavement to the depth specified, this work shall consist of constructing a mixture of base rock, soil, lime, fly ash and water in accordance with the specifications and in conformity with the lines, grades, thickness, and typical cross-sections shown on the plans or specified.

B. Products

1. Quicklime shall conform to the physical and chemical properties of ASTM C 977-95 with the noted exception that the available lime index shall be a minimum of 90% available calcium oxide (CaO) when tested in accordance with ASTM C 25-95. A Certificate of Compliance and a certified shipping weight slip shall be submitted to the Project Manager with each delivery. Dry hydrated, dolomitic, air slaked, by-product or waste lime shall not be used.
2. Fly ash shall be Type C from a single source with less than 7% sulfate (SO₃). All sources submitted for consideration by the contractor shall be tested for strength and expansion and will meet or exceed the test data achieved for design of this project.

3. Water used for mixing or curing shall be obtained from Stanford’s domestic or lake water system and be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water shall be tested in accordance with and shall meet the suggested requirements of AASHTO T 26. Water known to be of potable quality may be used without testing.

C. Preparation

1. Roots, sod, weeds, wood, construction debris, and stones larger than 2½ inches (60 mm) in any dimension shall be removed from the base and subgrade soil prior to the lime/fly ash stabilization treatment.

2. Prior to beginning the lime/fly ash treatment, the existing subgrade shall be shaped to conform to the typical sections, lines, and grades as specified or shown on the plans.

D. Application

1. Stabilizing agents shall be applied at the rates specified or shown on the plans based on the in-place dry unit weight of soil and for the depth of subgrade treatment shown on the plans. The stabilizing agent shall be spread uniformly over the material to be treated without recourse to drifting or subsequent blading.

2. The lime and fly ash shall vary no more than 0.6% under and not more than 1.0% over the specified spread rate (example – tolerance on a spread rate of 6.0% is 5.4% to 7.0%). However the moving average of the rate of lime/fly ash content tests/inspections shall be at least the specified lime/fly ash content. The Project Manager reserves the right to increase the rate of application of lime and/or fly ash from the specified rates during the progress on construction as necessary to maintain the desired characteristic of the stabilized section. Additional lime and/or fly ash, exceeding the tolerance limit (1% over the specified rate), and work required above and beyond the specified amount will be paid for by Stanford on a time and material basis.

E. Mixing

1. Following spreading of the stabilizing agent, it shall be covered or mixed with soil within 2 hours after application. Mixing shall be accomplished to the full depth specified using an all-wheel drive rotary mixer capable of down and up cutting the soil (CMI RS-500B or equivalent). The full depth of the treated subgrade shall be thoroughly mixed a minimum of two (2) times with the approved mixing machine. Should slurry lime be used, the initial mix shall be in the down-cut mode of the
mixer in order to keep displacing the slurry ahead of the mixer. Water shall be added to the subgrade during mixing to provide a moisture content at least 3% above the optimum moisture of the soil-lime mixture to ensure chemical action of the lime and soil. Streaks or pockets of the stabilizing agent shall be considered evidence of inadequate mixing.

2. The soil-lime mixture shall be allowed to cure or “mellow” for a minimum of 16 hours during which the moisture content of the subgrade mixture shall be maintained above the optimum moisture content. Remixing shall be done as necessary to assist the soil-lime reaction and the material sprinkled with water to maintain the moisture content.

3. After the curing period, the fly ash shall be mixed with the soil-lime mixture to the full depth specified. Water shall be added to the subgrade during mixing to provide the desired moisture content.

F. Compaction

1. Prior to initial compaction, maximum density and optimum moisture content of the soil-lime/fly ash mixture shall be determined by the Geotechnical Engineer in accordance with ASTM 1557-91, wet method. The samples shall be obtained after all mixing is completed.

2. Initial compaction shall be by means of a sheepsfoot or segmented wheel roller. Areas inaccessible to rollers shall be compacted to the required compaction by other means satisfactory to the Project Manager.

3. The moisture content of the mixture at the start of compaction shall not be below the optimum moisture content. The material shall be aerated or sprinkled as necessary to provide the required moisture content. The field wet density of the compacted mixture shall be at least 95% of the maximum wet density of laboratory specimens prepared from samples taken from the in-place material. The in-place field density shall be determined in accordance with industry standards.

G. Finishing and Curing

1. After the final layer of lime/fly ash treated base has been compacted, it shall be brought to the required lines and grades in accordance with the typical section. The completed section shall then be finished by rolling with a vibratory roller or other suitable roller approved by the Project Manager.

2. Aggregate base or asphalt concrete may be placed on the treated section immediately after final compaction as long as the grade is stable and unyielding and is able to support the paving equipment.
3. The Contractor shall maintain, at his/her own expense, the entire lime/fly ash treated subgrade in good condition from the start of the work until aggregate base or asphalt concrete has been placed.

3.7 ASPHALT CONCRETE PAVING

A. Asphalt concrete shall be proportioned, mixed, placed, spread and compacted in layers in conformance with Section 39 of the Caltrans Standard Specifications. No layer of asphalt concrete shall be less than 1½ -inches for ½ inch maximum medium aggregate and 2-inches for ¾ inch maximum medium aggregate, nor more than 3-inches in compacted thickness for one lift of any aggregate.

B. Asphalt concrete shall be placed in two separate lifts using ¾-inch aggregate for the initial lift and ½-inch aggregate for the final lift. The final lift shall not be placed until the end of the project, with the Project Manager's approval. For paths and bicycle parking pads, the asphalt may be placed in one lift.

C. Before placing asphalt concrete, an asphalt emulsion tack coat (Type SS-1h) shall be applied to all vertical surfaces of existing pavement, curbs, gutters, construction joints, and all existing pavement to be surfaced in conformance with Section 39 of the Caltrans Standard Specifications.

D. Asphalt concrete shall be compacted to a relative compaction of not less than 95% and shall be finished to the lines, grades and cross section shown on the Plans. In-place density of asphalt concrete will be determined prior to opening the pavement to traffic.

3.8 SURFACE STRUCTURES

A. The Contractor shall be responsible for referencing structures prior to paving and locating them after paving operations are complete. Access to existing valves, manholes and vaults shall be provided at all times. The location of existing valves, manholes and vaults shall be staked and referenced during construction.

B. All surface structures within the limits of proposed paving shall have traffic rated (ASSHTO H-20 loading) frames and covers as specified.

C. Grade Adjustments:

1. Frames, grates and covers of all existing surface structures (manholes, vaults, valve boxes, drain inlets, monument boxes, etc.) shall be adjusted to finish grade within 48 hours of surface paving. Grade rings shall be supplied and installed by the Contractor as needed to meet finish grade. No more than three (3) grade rings may be used.
2. Frames of new or adjusted surface structures shall be supported by concrete with minimum dimensions as follows: 6 inches wide by 6 inches deep for structures less than 18 inches in diameter and 6 inches wide by 9 inches deep for structures 18 inches or greater in diameter.

3. The highest rung of ladders in new or adjusted surface structures shall be no more than 12 inches from the top of the structure, and all rungs shall be spaced evenly (12 inches maximum). Ladder rungs shall conform to State Industrial Safety requirements.

4. Structures within paved areas:
   a. A structure located in an area paved with asphalt concrete shall not be constructed to final grade until the adjacent pavement or surfacing has been completed.
   b. After asphalt concrete paving is complete, the asphalt shall be cut out 6 inches wider than the frames of all surface structures. Each frame shall then be raised to finished grade (allowable tolerance ± 1/8-inch) and supported by concrete as noted above. The concrete shall be left 1½ inches lower than finished grade. This depressed area shall be paved to finished grade with hot-mix asphalt concrete, ½-inch maximum aggregate size within 48 hours. Cold-applied asphalt patching material will not be allowed.

5. When reconstruction or adjustment of a concrete drainage facility requires partial removal of concrete, sufficient concrete shall be removed to permit new reinforcing steel to be spliced to existing reinforcing steel as specified in Caltrans Standard Specifications Section 52-1.08, "Splicing". Existing reinforcement that is to be incorporated in new work shall be protected from damage and shall be thoroughly cleaned of all adhering material before being embedded in new concrete. Concrete removal shall be performed without damage to any portion that is to remain in place. All damage to the existing concrete which is to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of removal operations. The cost of repairing existing concrete damaged by the Contractor's operations shall be at its expense.

6. All manholes that are to be lowered shall be removed to an approximate depth of 3.5 feet below finish grade and shall then be reconstructed with the proper taper to finish grade.

7. When existing manholes or inlets are to be abandoned, all pipes entering the manhole or inlet shall be securely closed by tight fitting plug or wall of Class A or Class B concrete not less than 0.5 foot thick. The bases of manholes or inlets shall be broken in a manner to prevent entrapment of water. The manhole or inlet shall be demolished to an elevation 3 feet below finish grade and backfilled.
3.9 FIELD QUALITY CONTROL

A. The surface of finished base material shall vary by no more than 0.05 feet above or below the grade established in the plans or as directed by the Project Manager.

B. Asphalt Concrete Paving:

1. The finished asphalt pavement, where not controlled by adjacent structures or features, shall not vary more than 0.05 feet above the planned grade, and not at all below, and shall be uniform and free of sharp breaks.

2. The cross section of the finished pavement shall be free of ridges and valleys and shall not vary more than 0.03 feet above or below the theoretical section at any point on the cross section.

3. The specified thickness of the finished pavement shall be the minimum acceptable.

4. Conforms shall form a smooth, pond free, transition between existing and new pavement.

END OF SECTION