SECTION 32 16 13 01
COLORED CONCRETE HEADER

PART 1 GENERAL

1.1 RELATED WORK

A. Section 31 10 00 – Site Preparation
B. Section 31 00 00 – Earthwork
C. Section 32 14 23 - Asphalt Unit Paving

1.2 REFERENCES

A. American Concrete Institute ("ACI") Manual of Concrete Practice.
B. American Society for Testing Materials ("ASTM")
   1. A615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C. Current Caltrans Standard Specifications:
   1. Section 51 – Concrete Structures
   2. Section 52 – Reinforcement
   3. Section 73 – Concrete Curbs and Sidewalks
   4. Section 90 – Portland Cement Concrete

1.3 QUALITY ASSURANCE

A. Installer’s Qualifications: Show successful experience in creating uniform sand-blast and acid-etched concrete finishes, including not less than five years’ experience in installation of finishes similar to the work required for this project.

B. Lines and Levels: A licensed Surveyor or registered Civil Engineer shall lay out and establish all lines, levels, grades, and positions of all parts of the work.

C. Pre-saturation of Subgrade: The Contractor shall pre-saturate the subgrade of all concrete flatwork as required by the Geotechnical Soils Report and/or Civil Engineer.
1.4 SUBMITTALS

A. Product Data: Submit Manufacturer's technical data and material specifications, as applicable, for all products specified herein for review by the Project Manager prior to starting the work of this Section.

B. When so requested the Contractor shall furnish mill test reports on the cement, aggregate, admixtures and reinforcement bars, showing compliance with the respective specifications. The Project Manager may require the making of concrete test cylinders and slump tests as deemed necessary to determine compliance with the specifications.

C. Sample Submittals: Submit samples of the following materials:

1. On-site sample mock-up: One 6-foot long segment of 4-inch Flush Concrete Header with expansion and control joints.
2. Expansion joint material: 12-inch long.
3. Color samples: for sand, sealant, and expansion joint compounds.
4. Sealer: Manufacturer’s data sheet and literature.
5. Concrete Mix Design: Three copies of a written description of each type of concrete, including all information required by the batch plant for the accurate mixing of the concrete. Mix designs are to be based on the composition of the approved concrete paving samples.
6. Aggregates: Provide three samples of each aggregate size and type to be used in the mix design. Clearly identify the sieve size, name, and color of each sample on the containers. Submit samples of each of the following:
   a. Course Aggregate
   b. Fine Aggregate
   c. Sand
7. The Contractor shall select a sole source single aggregate for use in all exposed aggregate concrete finishes.
8. "Speed Dowel" or approved equal: Provide a sample of "Speed Dowel" or approved equal cardboard sleeve, including sleeve and base.

1.5 MIX DESIGN CRITERIA

A. Standards: All concrete mixes shall be proportional and designed in accordance with ACI 211.1-81 and the Uniform Building Code.
B. Transportation: All concrete mixes shall be designed for ready-mix transported concrete per ASTM C94.

C. Procedure: The Contractor shall employ an independent testing laboratory to take samples of aggregates and to prepare design mixes. Proposed design mixes shall be submitted to the Project Manager for review and approval prior to placing concrete.

D. Proportions of aggregate to cement for concrete shall be such as to produce a mixture which will work readily into the corners and angles of forms and around reinforcement without permitting segregation of materials or an excess of free water collection on the surface.

1.6 SITE CONDITIONS

A. Inspection: Examine subgrades and all related work and surfaces before starting work. Report to the Project Manager in writing any site conditions which prevent the proper provision of the work of this Section.

B. Acceptance: Starting the work of this section without reporting unsuitable site conditions to the Project Manager shall constitute acceptance of site conditions by the Contractor.

C. Repair: Any repair or replacement of work required as a result of unsuitable site conditions shall be performed by the Contractor at no additional cost to Stanford.

1.7 TOLERANCES FOR FINISHED WORK

A. General: The variations below describe the maximum permissible deviation from established lines, grades, and dimensions for all exposed concrete.

B. Variations from plumb:

1. For lines and surfaces of pavements: maximum 1/8 inch in 10-feet.

2. For control joints, expansion joints, saw-cut joints, and other conspicuous lines:
   a. In any 20 feet, 1/8 inch
   b. In any 40 feet or more, 1/4 inch

C. Variations from level or from the grades shown on the Drawings:

1. For curbs and pavements:
   a. In any 10 feet, 1/4 inch
   b. in any 20 feet, 3/8 inch
c. in any 40 feet or more, 3/4 inch

2. For exposed joints and other conspicuous lines:
   a. In any 20 feet, 1/4 inch
   b. In any 40 feet or more, 1/2 inch

D. Variations in the sizes and locations of sleeves: plus or minus 1/4 inch.

E. Variations in the cross-sectional thickness of paving:
   1. Minus 1/4 inch
   2. Plus 1/2 inch

F. Variation in radii:
   1. In radii of less than 10 feet:
      a. In any 5 feet, 1/8 inch
      b. In any 10 feet, 1/4 inch
   2. In radii of 10 to 20 feet:
      a. In any 10 feet, 1/4 inch
      b. In any 20 feet, 3/8 inch
   3. In radii of more than 20 feet:
      a. In any 20 feet, 1/2 inch
      b. In any 30 feet, 1 inch

1.8 FINAL ACCEPTANCE

A. Review Date: Submit a written request for review for Final Acceptance at least five (5) working days in advance.

B. Completion: Work will be accepted upon satisfactory completion of all site concrete work. There will be no partial acceptance of work.

1.9 TRAFFIC

During the work the Contractor shall maintain the safe flow of vehicular and pedestrian traffic as required for other construction activities and provide barricades, signs, warning lights, and flagmen as required to ensure personal safety and cause the least interruption of the flow of work.
1.10 WARRANTY

In addition to any manufacturers' guarantees or warranties, the Contractor shall warrant all work against defects in materials and workmanship for one year from date of acceptance of work. This warranty shall cover the repair of damage to any part of the premises resulting from defects in materials and workmanship to the satisfaction of the Project Manager.

PART 2 PRODUCTS

2.1 GENERAL

All materials shall be free from defects and imperfections, of recent manufacture, and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture, quality, and appearance.

2.2 FORMWORK

All forms shall be of wood or foam polystyrene and will leave clean, smooth surfaces and crisp edges on the finished concrete. Earth forms are not permitted.

2.3 REINFORCEMENT

Standards: Reinforcing shall comply with the following minimum standards:

Dowels for Expansion Joints: ASTM A615 smooth billet #4 steel rebar with cardboard sleeve at one end; or #4 rebar, with "Speed Dowel" as manufactured by Aztec Concrete Accessories, Inc., 14760 Santa Ana Avenue, Fontana, CA. 92337. tel. (800) 531-3355 or (909) 829-2765; or approved equal.

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Part Desc./Size</th>
<th>Length</th>
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<tbody>
<tr>
<td>PSD09/#4</td>
<td>Speed Dowel for #4 rebar</td>
<td>9&quot;</td>
</tr>
<tr>
<td>PSD12/#4</td>
<td>Speed Dowel for #4 rebar</td>
<td>12&quot;</td>
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2.4 CONCRETE

A. Standards: Concrete shall be Class A concrete conforming to Caltrans Standard Specifications Section 90. Materials shall comply with the following standards as minimums:

1. Portland Cement: ASTM C150, Type II, conforming to ASTM, Designation C150 as modified by Caltrans Standard Specifications Section 90, with all cement provided by the same supplier.

2. Base Course: Class II Aggregate Base as recommended by the structural soils report and civil engineer.
3. Coarse Aggregate: 1/2” x 3/8” Aggregate. ASTM C33 hard, durable, uncoated, washed, graded, cleaned, and screened crushed rock or gravel aggregate for regular weight concrete. Maximum size shall not be larger than 1/5 of the narrowest dimension between sides of the forms for the concrete or larger than 3/4 of the minimum clear distance between reinforcing elements.

4. Fine Aggregate: ASTM C33 clean, hard and durable sand free from silt, loam, clay or other deleterious materials graded as follows:

<table>
<thead>
<tr>
<th>Percent passing</th>
<th>sieve size:</th>
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<tbody>
<tr>
<td>45% — 70%</td>
<td># 16</td>
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<tr>
<td>15% — 30%</td>
<td># 50</td>
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<tr>
<td>3% — 8%</td>
<td># 100</td>
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5. Water: Clean, potable, free of salts, oils, acids, alkalis, organic material or other deleterious matter.

B. Concrete Product Characteristics:

1. Compressive Strength: 3,000 psi. minimum at 28 days
2. Slump: 6 inches maximum.
3. Cement Content: 7 sack mix.
4. Type “F” Fly ash is not acceptable.

2.5 INTEGRAL COLOR

Scofield #1266, Cool Gray @ 3 lbs./sk. Color from L.M. Scofield Company; tel. (800) 800-9900.

2.6 JOINTS AND FILLERS

A. Premolded Joint Filler: "Ethafoam" Ceramar flexible 1/4" poly-foam expansion joint as manufactured by W. R. Meadows, or approved equal.

B. Joint Sealant: Two-part, Type 1 sealant, gun-grade, polyurethane with a Shore 'A' hardness of not less than 40 after 72 hours. “Trafficak G-11” by L.M. Scofield Company, tel. (800) 800-9900, or approved equal. Custom sealant colors to match concrete finishes as approved by the Project Manager.

C. Seeded Sand on Sealant: Medium - Dark gray manufactured sand from decomposed granite fines.

1. Type: “Wilson” or “Aromas”; or accepted equal.
2. Supplier: Graniterock, Redwood City, CA. tel. (650 482-3800) or approved equal.
2.7 SCORE JOINTS OR WEAKENED PLANE JOINTS

Hand tooled joint, size per drawings. “Zip-strip joints”, “U” caps, or plastic felt cap joints are not permitted.

2.8 PORTLAND CEMENT CONCRETE SEALER

A. Type: SLX100.

B. Manufacturer: Prosoco, 3741 Greenway Circle, Lawrence, KS 66046. Tel. (800) 255-4255.

2.9 BIODEGRADABLE ACID

A. Biodegradeable acid for acid etching concrete finish.

B. Distributor: White Cap Industries; or approved equal.

**PART 3 EXECUTION**

3.1 GENERAL

A. Embedded items: Accurately locate and firmly secure all items imbedded in Portland cement concrete paving so that they will not be displaced during placement of paving. Protect all embedded items from damage during paving installation.

B. Irrigation sleeving: Verify size and location of irrigation sleeving and place sleeving so as not to reduce the strength of concrete paving.

C. Drainage: All concrete paving shall have positive drainage free of depressions or "birdbaths". Any discrepancies or omissions on the Drawings or any site conditions that would preclude or impair proper drainage shall be brought to the attention of the Project Manager in writing before commencing work.

D. Finishes: Unless noted otherwise on the Drawings, all exposed concrete surfaces shall have Class 1 surface finish.

E. Finish Grades: Finish surface of concrete paving shall be installed true to line and grade as indicated on the Drawings, and paving surface shall not vary more than 1/4 inch measured with a 10 foot metal straightedge from the grade indicated on the Drawings. Irregularities in finish grades shall be corrected to the satisfaction of the Project Manager.

F. Approval: All work shall be subject to the inspection of the Project Manager. No concrete shall be placed until the Project Manager has approved the forms and reinforcement.
3.2 SUBGRADE PREPARATION

A. Grading: Check all subgrades to ascertain that elevations are correct and that subgrade is properly shaped making allowance for the thickness of paving. Modify subgrade as required to ensure that required finish grades of paving can be achieved.

B. Preparation: Thoroughly scarify, sprinkle, and compact the subgrade by rolling to obtain a smooth, hard, even surface of approved bearing capacity to receive the paving. Remove all unsuitable subgrade material and replace with suitable material. Compact to 95%.

3.3 BASE COURSE

A. Depth: Install base course of type and thickness recommended by the geotechnical investigation report prepared by soils engineer.

B. Placement: Spread the base course aggregate to provide the recommended compacted thickness. Compact base course by rolling or other approved method to 95% of the maximum dry density per ASTM D1557 or as recommended by the geotechnical investigation report. Slope all areas uniformly and maintain proper slope during compaction.

C. Thickness Tolerance: Provide the compacted thickness’ within a tolerance of minus 0.0 inches and plus 0.5 inches at any point.

D. Smoothness Tolerance: Provide the lines and grades to within a tolerance of 0.5 inches vertically and 1 inch horizontally at any point.

E. Deviations: Correct deviations by removing materials, replacing with new materials, and reworking or recompacting as required.

F. Moisture: Use only the amount of moisture needed to achieve the specified compaction.

3.4 FORMWORK

A. Construction: Construct forms accurately to the shapes, lines, and dimensions shown on the Drawings, providing for all recesses and openings shown on the Drawings or as directed on site. Forms shall be tightly joined and properly braced and tied so as to maintain position and shape during pouring of concrete. Forms shall be carefully aligned so that joints are straight and visually continuous across the site without bends, breaks, or jogs.

B. Preparation: Prior to placing concrete, thoroughly clean all forms and apply form coatings, or thoroughly wet wood forms as required where form coatings are not used.
C. Removal: Do not remove formwork until concrete has set and reached sufficient strength to carry its own weight and the weight of other loads upon it. Remove forms without damaging concrete.

3.5 MIXING OF CONCRETE

A. All concrete shall be transit mixed in accordance with requirements of ASTM C94. All concrete shall be mixed in equipment having automatic devices for timing the operations and for metering or controlling the quantities of all materials, including water, within a tolerance of 1%. All materials shall be accurately and separately weighed, and mixing shall continue until the distribution of the ingredients is uniform and the mass of concrete is homogeneous. Integral color shall be added to the concrete as specified and recommended by the manufacturer.

B. At the batch plant withhold 2-1/2 gal. of water per cu. yd. of concrete. Upon arrival at the job site, and as directed by the testing laboratory inspector, add all or part of the withheld water before the concrete is discharged from the mixer. Mix concrete for not less than five minutes after the withheld water has been added and not less than one minute of this time immediately prior to the discharge of the concrete. Provide total mixing time of at least 15 minutes after adding original water to the batch. Concrete mixing shall continue until concrete is completely discharged. Minimum mixing time shall be 3 minutes at the job site.

C. Concrete which has not been placed within 60 minutes after the introduction of water to the mix or concrete which has not been placed within 30 minutes after leaving the mixer shall not be used and shall be removed immediately from the site.

D. All concrete shall be mixed and placed in accordance with Caltrans Standard Specifications Section 90, Parts 1 through 10.

3.6 "SPEED DOWEL" INSTALLATION

A. General:

1. Provide sufficient quantity of "Speed Dowel" sleeves to fulfill the requirements of the Drawings and Specifications.

2. Report in writing any discrepancies or omissions on Drawings and conditions on the site which would prevent proper placement.

3. No form work positioning irregularities will be permitted. Insure that forms are plum and true to line and grade. Wavy surfaces and bulged slab surfaces resulting from settlement or springing of form work will be rejected. Carefully verify and check all forms for alignment and levels as the work proceeds. Promptly make all needed adjustments or additional bracing.
4. Do not place concrete until "Speed Dowels" are in place and properly fastened or covered.

B. Prior to Placing Concrete:

1. Insure that "Speed Dowel" bases are secured in the proper locations.

2. Thoroughly wet wood forms as required where form castings are not used.

C. Provide "Speed Dowel" sleeves in locations as indicated in the drawings.

3.7 SCORE JOINTS

A. Provide score joints where indicated on the drawings.

B. Locate all joints on forms prior to placing concrete. Install score joints in fresh concrete using a jointer to cut a smooth, uniform groove to a constant depth. Restrike joints after finishing.

3.8 EXPANSION JOINTS

A. Provide expansion joints where indicated on the Drawings, between areas with different concrete finishes, and where concrete paving abuts buildings, curbs, existing paving, or other structures. In no case shall expansion joints be located at intervals greater than twenty-feet (20') without the prior approval of the Project Manager.

B. Along all expansion joints provide smooth steel dowels as indicated on the Drawings, with one side mounted in a sleeve.

C. Fill joint from full depth to 1/2 in. below surface of slab with expansion joint material, and secure material in place to prevent movement.

D. Except at saw-cut expansion joints, use an edging tool to form a smooth, consistent edge of concrete slabs adjacent to joints.

E. Except at saw-cut expansion joints, after curing of slab, carefully clean expansion joints and fill with joint compound to 1/4 in below adjacent pavement surface. Do not allow joint compound to overflow joint onto concrete surface.

3.9 CONCRETE FINISHING

A. Exposed Sand Aggregate with Medium Acid Etch Retardant Finish with Integral Color Concrete:

1. QScreed, tamp while still plastic and float integral color concrete in conformance to normal installation procedures.
2. Cool Weather: While concrete is still plastic, evenly apply concrete retardant. Protect concrete until pressure washing.

3. Hot Weather: While concrete is still plastic, evenly apply concrete retardant.

B. When concrete has cured, wash off top layer of cement to expose the aggregate. Apply an even distribution of spray over the entire concrete surface to insure an even exposure of the aggregates. Remove and replace all sections of concrete where consistency of exposed sand aggregate finish is not even.

C. Do not concentrate water spray in one spot. Spalling or popping of the aggregates will occur. Remove and replace all sections of concrete where spalling of aggregates have occurred.

3.10 PROTECTION AND CURING OF CONCRETE

A. Protection: Beginning immediately after placement, protect concrete from damage due to premature drying, excessively hot or cold temperatures or mechanical injury from construction operations until Final Acceptance.

B. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice. No pigment shall be used in curing compounds.

3.11 CLEAN-UP

A. General: Upon completion of work, immediately remove from the premises all surplus materials, tools, equipment, rubbish and debris resulting from the work.

B. Cleaning and Patching:

1. Voids: Fill holes with a 1:3 cement and sand mortar with the same color as the adjoining concrete. Mix and place the mortar as dry as possible and finish flush with the adjacent surface.

2. Corrective patching: Correct all defects in concrete work including edges of joints. Chip all voids to a depth of at least 1 inch with the edges perpendicular to the surface and parallel to form markings. Fill all voids, surface irregularities, by patching or rubbing. Insure that all concrete surfaces so repaired duplicate the appearance of the unpatched work.

3. Cleaning: Four weeks after installation, wash all Portland Cement Concrete finish surfaces with a mild acid solution of five (5) parts water to one (1) part muratic acid to remove any free-lime efflorescence. Upon review and acceptance of finish by the Project Manager, apply a steam pressure wash at 220 degrees Fahrenheit and 3000
psi. to all exposed surfaces to remove tire marks, dirt, stains, etc. This shall be done prior to review of the finish by the Project Manager.

4. Sealer Installation: Install to all concrete finish surfaces per manufacturer’s directions.

5. Defective work: Remove in its entirety and replace all defective concrete work which, after corrective patching, rubbing, etc., fails to duplicate the appearance of unpatched work and/or conform to the standards set forth in these Specifications.

END OF SECTION