SECTION 03300

CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to complete the Contract, including, but not limited to, these major items:

1. Forms for concrete.

2. Reinforcing steel.

3. Embedded items.

4. Footings.

5. Concrete and ramps.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

B. Contractor shall follow recommendations of Geotechnical Engineer, as noted in Geotechnical Investigation Report by Converse Consultants, dated October 30, 2008 (Project No. 07-81-368-01).

1.03 GENERAL REQUIREMENTS

A. Codes: Materials and work shall conform to the governing Building Code. In case of conflict between these specifications, the standard specifications, and the Building Code, the more stringent shall govern.

B. All footings shall rest on firm natural soil or approved compacted fill.

1.04 QUALITY ASSURANCE

A. All concrete shall be mixed, formed and placed according to A.C.I. Code and the latest adopted edition of the California Building Code.

B. Material quality standards and testing procedures shall be in accordance with the American Society for Testing Materials, hereinafter referred to as "ASTM". All ASTM standards and testing procedures shall be the latest requirements. All tests shall be made by a testing laboratory acceptable and approved by the Owner's Representative. The cost of sampling and testing concrete required by the specifications shall be borne by the Owner.

C. One mechanical analysis and one decantation test shall be made of the sand and coarse aggregate proposed for the work. Concrete specimens shall be taken when directed by the Owner's Representative. At least one pair of specimens shall be taken from each pour of concrete or from each one-hundred cubic yards

of concrete or major fraction thereof. One cylinder from each pair shall be tested at 7 days. One from each pair shall be tested at the age of 28 days. Concrete for specimens shall be taken from place of deposit. Specimens shall be prepared and tested in accordance with the latest ASTM specifications.

D. Additional tests shall be made when and as directed by the Owner's Representative. Cost of additional tests shall be borne by Owner.

E. Defective Concrete: Should concrete strengths not attain the minimum specified at 28 days, the area of substandard work shall be examined by the Owner's Inspector. The defective concrete shall be removed and replaced or the work shall be strengthened in a manner as directed by the Inspector. The cost of all examination and testing of defective material, as well as corrective measures, shall be borne by the Contractor.

F. Record Drawings: The Contractor shall provide record drawings that accurately locate embedded utilities and components when they are concealed from view.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete shall be machine-mixed using a maximum of 7-1/2 gallons of water per sack of cement. Readymix concrete shall be mixed and delivered in accordance with ASTM C-94. In no case shall concrete contain less than 5 sacks of cement per yard. Concrete mix shall have a low water-cement ratio (less than 0.45).

B. Concrete shall have a minimum ultimate compressive strength of 3,500 psi at 28 days.

C. Provide a standard brand of Portland cement complying with ASTM C150, type II, low alkali. Do not change the brand of cement during progress of the Work except as approved in writing by the Architect.

D. Aggregates: ASTM C33 and as follows, from an approved source with a proven history of non-reactivity, conforming to ASTM C 289. Do not use aggregates known to cause excessive shrinkage.

1. Coarse aggregate: Clean, hard, fine grained, sound crushed rock or gravel, which does not contain more than 5% by weight of flat, chip-like, thin, elongated, friable or laminated pieces. Any piece having a major dimension in excess of two and one-half (2 1/2) times the average thickness and which will adversely effect the strength of the concrete shall not be used. Size shall be between maximum of one and a half (1 1/2) inches and minimum (No. 4).

2. Fine aggregate: Clean, natural washed sand, of hard and durable particles, varying fine to particles passing 3/8" screen, of which at least 12% pass 50 mesh screen. Aggregate shall not contain more than 2% by weight of clay, loam, shale, alkali, organic matter or other deleterious substances.

E. Water: Clean from a source suitable for domestic consumption.

2.02 OTHER MATERIALS AND EMBEDDED ITEMS

A. All bolts shall have a standard bolt head at embedded end, unless noted otherwise. Anchor bolts shall be spaced 12-bolt diameters minimum. Minimum embedment of anchor bolts shall be 7" in footings, unless noted otherwise on the Structural Drawings.

B. Expansion bolts, such as "Hilti" Kwik II, etc., may be used in lieu of anchor bolts where special conditions warrant their use, provided that written approval of the Structural Engineer is obtained. Size of such anchors shall be one nominal size larger or their number shall be increased by 25% where applied to vertical surfaces.

C. Reinforcement:

1. Bars: ASTM A615, Grade 60, #5 bars and larger deformed. Grade 40 for #4 and smaller.
2. Bending: Conform to requirements of ACI 318.

D. Non-shrink additive for dry pack and patching: Upco, Five Star Grout or Master Builders Co.'s Embeco. Above grade, where exposed to weather or moisture, use dry pack without non-shrink additive.

2.03 MIXING OF CONCRETE

A. Mix concrete by transit mixers only:

1. Design mix: Concrete composed of Portland cement, coarse aggregate, fine aggregate and water in the proportions as determined by the testing laboratory.
2. Water/Cement Ratio: shall be a maximum of 0.48.
3. Mixing: In accordance with ASTM C94, unless otherwise approved. Transit-mix concrete shall not be delivered to the work site with the total specified amount of water incorporated therein. Two gallons of water per cubic yard shall be withheld, and may be incorporated in the mix before the concrete is discharged from the mixer truck.
4. Mixing time: At least 10 minutes after all water is added to mixture, not less than three minutes of which is immediately prior to discharge at job. Each transit mixer shall be equipped with automatic devices for recording the number or revolutions of the drum prior to completing the mixing, with peripheral drum speed of approximately 200 feet per minute.
5. Final position: Place transit mixed concrete in final position within 1-1/2 hours after water is first added to the batch; at the time of placing, the concrete shall be in such condition that it will flow readily into position. Transit-mix concrete shall be rejected if not placed in final position within ninety (90) minutes after water is first added to the batch.
6. Mix design shall be signed by a California Registered Civil Engineer, and design shall be submitted to the Architect for review.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Forms: Construct forms to exact shapes, sizes, lines and dimensions required to obtain accurate alignment, location, grades, level and plumb work. Provide

openings required for work of other trades. Make joints tight to prevent loss of mortar from concrete. Use metal spreaders providing accurate spreading and positive typing of forms together; wood spreaders and on-the-job hand-twisted wire ties are not permitted. Form coating shall not adversely affect bonding of paint, plaster, adhesive, or bonding agents applied to concrete surface.

B. The Contractor shall allow 48 hours minimum for the Engineer to inspect the reinforcing prior to placing concrete. At the time of inspection all reinforcing, bolts, anchors, block-outs, electrical, plumbing, etc., shall be secured in place.

C. Placing: Before placing concrete, remove wood, rubbish, vegetable matter and loose material from inside forms. Thoroughly wet down forms to close joints.

1. Clean reinforcement; remove paint, loose rust, scale and foreign matter. Bars with bends not called for will be rejected. Hold securely in place to prevent displacement. Lap bar per Structural Drawings; lap fabric one mesh minimum. Tie intersections, corners, splices with 16 gage-annealed wire or as otherwise indicated.

2. Place concrete immediately after mixing, never after it has begun to set: no tempering will be allowed. If chuting is used, avoid segregation. Concrete at time of placing shall have a slump of not more than 4". Concrete temperature shall comply with ACI-301 requirements.

3. All foreign material shall be removed from forms and excavations and wooden forms shall be thoroughly wetted.

4. Responsibility for proper placing, compacting and finishing rests with the Contractor. Finish work showing voids and separation of aggregates will not be accepted.

D. Compacting: Thoroughly compact concrete within 15 minutes after placing. Use mechanical vibrators for structural concrete.

E. Curing formed work:

1. Forms containing concrete: Wet thoroughly, including tops, and maintain in a thoroughly moist condition until forms are removed.

F. All concrete shall be mixed, formed and placed according to A.C.I. Code.

G. All reinforcing steel, anchor bolts and other inserts shall be securely fastened in the forms prior to pouring concrete.

H. All reinforcing steel, dowels, anchor bolts, etc. shall be well secured in place prior to placing concrete. Contractor shall use templates to insure accurate placement of anchor bolts, dowels, etc., and provide mechanical fasteners to hold vertical steel in proper place at top and bottom.

I. Minimum concrete cover shall be as shown on the Structural Drawings.

END OF SECTION - 03300

SECTION 03300
CAST-IN-PLACE CONCRETE– VERTICAL ELEMENTS (SITE)

PART 1 – GENERAL

1.1 The provisions of the Standard Specifications for Public Works Construction (SSWC) latest edition apply except as modified herein. Available through *Building News Publications*, Telephone #: (714) 517-0970.

1.2 Related Work Specified Elsewhere:

a. Concrete formwork.

b. Concrete reinforcement.

c. Concrete specialty - Shotcrete.

d. Miscellaneous Metals.

1.3 Quality Assurance:

a. Material quality standards and testing procedures shall be in accordance with the American Society for Testing Materials, hereinafter referred to as "ASTM". All ASTM standards and testing procedures shall be the latest requirements.

b. All tests shall be made by a testing laboratory acceptable and approved by the County Representative.

c. The cost of sampling and testing concrete required by the specifications shall be borne by the County.

d. One mechanical analysis and one decantation test shall be made of the sand and coarse aggregate proposed for the work.

e. Concrete specimens shall be taken when directed by the County Representative. At least one pair of specimens shall be taken from each pour of concrete or from each one-hundred cubic yards of concrete or major fraction thereof. One cylinder from each pair shall be tested at 7 days. One from each pair shall be tested at the age of 28 days. Concrete for specimens shall be taken from place of deposit. Specimens shall be prepared and tested in accordance with the latest ASTM specifications.

f. Additional tests shall be made when and as directed by the County Representative. Cost of additional tests shall be borne by County.

g. Defective Concrete: Should concrete strengths not attain the minimum specified at 28 days, the area of substandard work shall be examined by the County Inspector. The defective concrete shall be removed and replaced or the work shall be strengthened in a manner as directed by the County Inspector.

h. The cost of all examination and testing of defective material, as well as corrective measures, shall be borne by the Contractor.

1.4 Record Drawings:

a. The Contractor shall provide record drawings that accurately locate embedded utilities and components when they are concealed from view.

b. The cost of all examination and testing of defective material, as well as corrective measures, shall be borne by the contractor.

PART 2 – PRODUCTS

2.1 Materials:

a. All concrete for the project shall have a minimum ultimate compressive strength at 28 days of 3,500 psi.

b. Portland Cement shall be Type II, low alkali, and shall conform to ASTM C150.

c. Concrete aggregate shall conform to ASTM C33. All aggregate shall be well graded and selected from a source that has a proven history of non-reactivity and shall conform to ASTM C 289. Maximum aggregate size shall be one (1) inch.

d. Fine aggregate shall consist of washed natural sand having hard, strong and durable particles and which does not contain more than 2% by weight of clay, loam, shale, alkali, organic matter or other deleterious substances.

e. Coarse aggregate shall consist of clean, hard, fine grained, sound crushed rock or gravel, which does not contain more than 5% by weight of flat, chip-like, thin, elongated, friable or laminated pieces. Any piece having a major dimension in excess of two and one-half (2 ½) times the average thickness and which will adversely affect the strength of the concrete shall not be used.

f. Water shall be clean and free from deleterious amounts of acids, alkalis, and organic materials.

2.2 Proportions and Mixing:

a. The concrete shall be composed of cement, sand and coarse aggregate in the proportions as determined by the testing laboratory.

b. The water/cement ratio shall be a maximum of 0.48.

c. Maximum slump of concrete shall be four (4) inches. The concrete shall be mixed as directed herein:

1. Each transit mixer shall be equipped with automatic devices for recording the number of revolutions of the drum prior to completing the mixing, with peripheral drum speed of approximately 200 feet per minute.
2. Transit-mix concrete shall be mixed for a period of not less than ten minutes. At least three minutes of the mixing period shall be immediately prior to discharging at the job.
3. Transit-mix concrete shall not be delivered to the work site with the total specified amount of water incorporated therein. Two gallons of water per cubic yard shall be withheld, and may be incorporated in the mix, before the concrete is discharged from the mixer truck.
4. Transit-mix concrete shall be rejected if not placed in final position within ninety (90) minutes after water is first added to the batch. The concrete, at time of placing, shall be in such condition that it can be properly placed.
5. Concrete shall be air-entrained by use of an approved admixture to provide an air content of 5-1/2% ± 1%.

6. Submit mix design for review by County.

PART 3 – EXECUTION

3.1 Placing of Concrete:

a. Before the placing of any concrete, all forms shall be thoroughly cleaned and wet. Concrete shall be poured into forms immediately after it is mixed, and so that no separation will occur. No concrete which has stood for more than fifteen (15) minutes after leaving the mixer shall be used. Concrete shall be rejected if not placed in final position within ninety (90) minutes after water is first added to the batch.

b. All forms and reinforcement to be inspected prior to pour by County Representative.

c. Sandblast all surfaces on which concrete is to be placed. County Representative to approve a 24" square sample.

d. Maximum free drop of concrete shall not be more than 5'-0". Use tremies in deep sections.

e. The location of all stoppages shall be approved by the County Representative.

f. The flow surface of the freshly poured concrete shall be level wherever any pour is stopped and tight dams shall be built as necessary to accomplish this result. Construction joints shall be made only when unavoidable, and then only at the point determined by the County Representative. Details of such joints shall be as directed by the County Representative.

g. Before the placing of any concrete, the surface of the previously poured concrete shall be wet.

END OF SECTION - 03300

SECTION 03310
CONCRETE FLATWORK– (Site)

PART 1 – GENERAL

1.1 The provisions of the Standard Specifications for Public Works Construction (SSWC) latest edition apply except as modified herein. Available through Building News Publications, Telephone #: (714) 517-0970.

a. Work Included in This Section:

1. Exterior walks and slabs, as shown on drawings.
2. Forms.
3. Reinforcing steel.
4. Cement finish, joints and saw cuts.
5. Wall footings.
6. Curing.
7. Testing.
8. Miscellaneous concrete items.

b. Related Work Specified Elsewhere:

1. Concrete formwork.
2. Concrete finishes.
3. Subgrade preparation.
4. Miscellaneous Metals.

1.2 Standards:

Testing, materials and workmanship shall conform to the requirements of the applicable Building Code.

PART 2 – PRODUCTS

2.1 Materials

a. All concrete for the project shall have a minimum ultimate compressive strength at 28 days of 2,500 psi.

b. Portland Cement shall be Type II, low alkali, and shall conform to ASTM C150.

c. Concrete aggregate shall conform to ASTM C33. All aggregate shall be well graded and selected from a source that has a proven history of non-reactivity and shall conform to ASTM C 289. Maximum aggregate size shall be 3/4 inch.

d. Fine aggregate shall consist of washed natural sand having hard, strong and durable particles and which does not contain more than 2% by weight of clay, loam, shale, alkali, organic matter or other deleterious substances.

e. Coarse aggregate shall consist of clean, hard, fine grained, sound crushed rock or gravel, which does not contain more than 5% by weight of flat, chip-like, thin, elongated, friable or laminated pieces. Any piece having a major dimension in excess of two and one-half (2-/2) times the average thickness and which will adversely affect the strength of the concrete shall not be used.

f. Water shall be clean and free from deleterious amounts of acids, alkalis, and organic

materials.

g. Air entrainment admixture shall conform to Standard Specification Section 6.02.3(3)A and ASTM C260.

2.2 Proportions and Mixing:

a. The concrete shall be composed of cement, sand and coarse aggregate in the proportions as determined by the testing laboratory.

b. Submit mix design for review by County.

c. The water/cement ratio shall be a maximum of 0.48.

d. Maximum slump of concrete shall be four (4) inches. The concrete shall be mixed as directed herein:

1. Each transit mixer shall be equipped with automatic devices for recording the number of revolutions of the drum prior to completing the mixing, with peripheral drum speed of approximately 200 feet per minute.

2. Transmit-mix concrete shall be mixed for a period of not less than ten minutes. At least three minutes of the mixing period shall be immediately prior to discharging at the job.

A. Transit-mix concrete shall not be delivered to the work site with the total specified amount of water incorporated therein. Two gallons of water per cubic yard shall be withheld, and may be incorporated in the mix, before the concrete is discharged from the mixer truck.

B. Transit-mix concrete shall be rejected if not placed in final position within ninety (90) minutes after water is first added to the batch. The concrete, at time of placing, shall be in such condition that it can be properly placed.

3. Concrete shall be air entrained by use of an approved admixture to provide an air content of 5-1/2% ± 1%.

2.3 Crack Joint Control:

a. As shown on plans.

b. See Section 03350 - Concrete Finishes - Materials "E". Install per manufacturer's specifications.

2.4 Concrete Formwork:

a. General. Forms shall be constructed true to line and grade; shall conform to the shape and dimensions of the required concrete and shall be sufficiently tight to prevent the leakage of mortar and sufficiently rigid to prevent displacement or sagging between supports. Forms shall be so constructed that they can be removed without damage to the concrete. Forms for curved surfaces shall be so constructed and placed that the finished surface will not deviate from the arc of the curve, flat spots shall not be permitted.

b. Approval of Forms and Reinforcement. Forms and metal reinforcement shall be checked

and approved by the County Representative before concrete is placed.

PART 3 – EXECUTION

3.1 General:

a. Install concrete and cement finish work true to lines, dimensions and levels, and finish with smooth unblemished surfaces for interior work, exterior finishes specified on plans.

b. Remove and replace defective concrete or cement work with new materials. Permission to patch any defective area shall not be a waiver of the County's right to require complete removal of defective work if patching does not restore quality and appearance of work.

c. No advertising impression, stamp, or mark of any description will be permitted on surface of concrete or cement finish.

3.2 Cement finish:

a. Compact and tamp concrete as specified to bring 3/8" of mortar to surface, wood float to straight edges and screeds, and apply following finishes. Do not use steel or plastic floats of any kind for initial floating operations. Unless otherwise specified, do not apply following finishes until surface water disappears and surface is sufficiently hardened. Remove any bleed water and laitance as it appears. Finish texture to be a light sandblast finish.

3.3 Location of Expansion and Control Joints:

a. Locate expansion and control joints to least impair the strength and appearance of the structure. In no case place an intersecting construction joint in such a way that two intersecting walks are separated by a construction or control joint at the point of intersection. Transition curves shall be part of a continuous pour of the intersection slab. Expansion joints shall be a maximum of 20 feet apart, with control joints a maximum of 10 feet apart. Exception to this are specialty work joints which will be laid out as shown on the drawings. Contractor shall obtain County Representative's approval of layout showing proposed location of joints before pouring concrete.

3.4 Caulking:

a. Caulking of expansion joints where called for on drawings, shall be done with a non-tracking, multi-part flow type, self-leveling, polyurethane sealant manufactured by Chem-Seal, W.R. Grace, 3-M or approved equivalent. Color shall be medium gray or match color if concrete is colored. Caulking shall be done by an experienced applicator in a workmanlike manner, in smooth straight runs, after thoroughly cleaning and priming joints. All work shall be done in strict accordance with manufacturer's printed recommendations. Do not permit traffic to travel over sealed joints until sealer has fully cured.

PART 4 – QUALITY CONTROL

4.1 Smoothness Tolerance:

a. Exterior cement finish surfaces shall be of such smoothness and evenness that they shall contact the entire length of a 10' straight edge or template (drag form) cut to design radius or form, laid in any direction, with an allowable tolerance of 1/8 inch. Any

operations necessary to achieve this result shall be performed by the Contractor at no additional cost to the Agency.

4.2 Inspections:

a. Inspections will be provided as necessary. Call for inspection two (2) working days prior to need.

b. The Contractor shall call for inspection during specific phases of construction. They shall include:
   1. All formwork prior to pouring.
   2. All footings prior to pouring.
   3. Subgrade prior to pouring.
   4. Reinforcement.

c. Contractor shall notify the County Representative two (2) working days prior to pouring any concrete.

d. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.

4.3 Testing:

a. Tests required. Compression tests of concrete shall be made as required by the Building Code except that compression tests of any grade of concrete shall be made whenever the quantity of that grade used in the project exceeds 25 cubic yards. At least four identical cylinders of each grade of concrete for poured in place and Shotcrete shall be taken of each 100 cubic yards of concrete or fraction thereof placed in the work. The cylinders shall be tested in a testing laboratory and test reports submitted to the County.

b. Storage of test cylinders on the site and after delivery to the testing shall be in accordance with A.S.T.M. Designation C31.

c. One mechanical analysis and one decantation test shall be made of the sand and coarse aggregate proposed for the work.

d. Concrete specimens shall be taken when directed by the County Representative. At least one pair of specimens shall be taken from each pour of concrete or from each one-hundred cubic yards of concrete or major fraction thereof. One cylinder from each pair shall be tested at 7 days. One from each pair shall be tested at the age of 28 days. Concrete for specimens shall be taken from place of deposit. Specimens shall be prepared and tested in accordance with the latest ASTM specifications.

e. Additional tests shall be made when and as directed by the County Representative. Cost of additional tests shall be borne by the County.

f. Should the strength by test fail, the mix shall be adjusted so that the resulting concrete will comply with the minimum requirements, and all additional expense resulting from such adjustment shall be borne by the Contractor. Further, should the strength of any grade by test fall below minimum, concrete from the defective pours which is in place may be tested by the core method, and if such tests show the concrete to be defective, the concrete shall be removed and replaced or adequately strengthened as required under the governing Code; and all expenses involved shall be borne by the Contractor.

g. The cost of sampling and testing defective materials as well as corrective measures shall be borne by the Contractor.

END OF SECTION - 03310

SECTION 03345

CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide finishes on cast-in-place concrete as called for on the Drawings, specified herein, and needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03300: Cast-in-place concrete.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Except as may be modified herein or otherwise directed by the Architect, comply with ACI 301, "Specifications for Structural Concrete for Buildings".

1.4 MOCK-UP TEST SECTION

A. Provide minimum 4 sq. ft. area test section for each portion of color-stained work specified, to demonstrate specified performance, in a place that will be covered up by subsequent floor finishes, the application of which will not be adversely effected by the color stain.

B. Test sections shall be applied using the same workmen, materials, equipment and procedures as will be used for final applications.

C. Test sections, when approved by Architect, shall become the basis of the remaining work, and may remain as part of the work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01620.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.
2. As required for the Work, provide the following materials, or equals approved in advance by the Architect.

B. Concrete materials: Comply with pertinent provisions of Section 03300, except as may be modified herein.

C. Liquid bonding agent: "Weld-Crete", manufactured by the Larsen Products Corporation.

D. Curing and protection paper:
1. Approved products:
a. "Sisalkraft, Orange Label";
b. Equal products complying with ASTM C171.
2. Where concrete will be exposed and will be subjected to abrasion, such as floor slabs, use non-staining paper such as "Sisaldrafts, Seekure 896", or equal paper faced with polyethylene film.

E. Liquid curing agents:
1. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water only; do not use chemical cure.
2. For curing other areas, use "Hunt TLF" manufactured by Hunt Process Company, Inc.

F. Floor sealer: Acceptable products:
1. "Superkote Special Clear Sealer" manufactured by Ven-Chem Company, Inc., P.O. Box 3186, Santa Barbara, California 93105 (213) 342-1195.
2. "Supershield" manufactured by James Darcey Company, Inc., 19712 Merridy Street, Chatsworth, California 91311 (213) 349-3705.

G. Slip-resistant abrasive additive:
1. Provide aluminum oxide, 14/36 grading.
2. Acceptable manufacturers:
a. Carbonundum Company;
b. Norton Company;
c. L.M. Scofield Company.

H. Color Stain
1. Where colored concrete is called for on plans, provide "Lithochrome Chemstain Classic" by L.M. Scofield Co., (323) 720-3000, in colors as shown on the Drawings.

2.2 OTHER MATERIALS

A. Provide materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISHING OF FORMED SURFACES

A. General:
   1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings.
   2. Revise the finishes as needed to secure the approval of the Architect.

B. As-cast finish:
   1. Rough form finish:
      a. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.
      b. Remove fins exceeding 1/4" in height.
   2. Smooth form finish:
      a. coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.
      b. Patch tie holes and defects.
      c. Remove fins completely.

C. Rubbed finishes:
   1. Provide these finishes only where specifically called for, and then only on a "smooth form finish" base as described above.
   2. Smooth rubbed finish:
      a. Produce on newly hardened concrete no later than the day following form removal.
      b. Wet the surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.
      c. Do not use a cement grout other than the cement paste drawn from the concrete itself by the rubbing process.
   3. Grout cleaned finish:
      a. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
      b. Do not permit cleaning as the work progresses.
      c. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
      d. Substitute white portland cement for part of the gray portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.

e. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, and apply the grout uniformly with brushes or spray gun.
f. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.
g. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
h. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.
i. Keep the surface damp for at least 36 hours after final rubbing.

4. Cork floated finish:
   a. Remove forms at an early stage, and no later than three days after placement of concrete.
   b. Remove ties.
   c. Remove burrs and fins.
   d. Mix one part portland cement and one part fine sand with sufficient water to produce a stiff mortar.
   e. Dampen the wall surface.
   f. Apply mortar with a firm rubber float or with a trowel, filling all surface voids.
   g. compress mortar into voids using a slow-speed grinder or stone.
   h. If the mortar surface dries to rapidly to permit proper compacting and finishing, apply a small amount of water with a fog sprayer.
   i. Produce the final texture with a cork float using a swirling motion.

D. Unspecified finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.
   1. Rough form finish:
      a. for all concrete surfaces not exposed to public view.
   2. Smooth form finish:
      a. For all concrete surfaces exposed to public view.

3.3 FINISHING SLABS

A. Definition of finishing tolerances:
   1. "Class A": True plane within 1/8" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.
   2. "Class B": True plane within 1/4" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.
   3. "Class C": True plane within 1/4" in two feet as determined by a two foot straightedge placed anywhere on the slab in any direction.

B. Scratched finish: After the concrete has been placed, consolidated, struck off, and leveled to a Class C tolerance, roughen the surface with stiff brushes or rakes before the final set.

C. Floated finish:
   1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
   2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
   3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.

4. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.
5. Refloat the slab immediately to a uniform sandy texture.

D. Troweled finish:
1. Provide a floated finish as described above, followed by a power troweling and then a hand troweling.
   a. Produce initial surface relatively free from defects, but which still may show some trowel marks.
   b. Provide hand troweling when a ringing sound is produced as the trowel is moved over the surface.
   c. Thoroughly consolidate surface by hand troweling.
2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance.
   a. For concrete on metal deck, Class B plane tolerance is acceptable.
   b. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.

E. Broom finish:
1. Provide a floated finish as described above.
2. While the surface is still plastic, provide a textured finish by drawing a fiber bristle broom uniformly over the surface.
3. Unless otherwise directed by the Architect, provide the texturing in one direction only.
4. Provide "light", "medium", or "coarse" texturing as directed by the Architect or otherwise called for on the Drawings.

F. Exposed aggregate finish:
1. Provide a floated finish as described above.
2. While the surface is still plastic, embed an approved aggregate uniformly into the surface by light tamping.
3. Provide complete coverage to the depth of a single stone.
4. Float the surface until the embedded stone is fully coated with mortar and the surface has been brought to a true plane with Class B tolerance.
5. After the matrix has hardened sufficiently to prevent dislodgement of aggregate, begin exposure.
   a. Allow copious quantities of water, without force, to flow over the surface of the concrete while the matrix encasing the aggregate is removed by brushing with a fine bristle brush.
   b. Continue this operation until the aggregate is uniformly exposed but not dislodged.
6. An approved chemical retarder sprayed onto the freshly floated surface may be used to extend the working time for exposure of aggregate.

3.4 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.

B. Preservation of moisture:
1. Unless otherwise directed by the Architect, apply one of the following procedures to concrete not to contact with forms, immediately after completion of placement and finishes:
   a. Ponding or continuous sprinkling;

b. Application of absorptive mats or fabric kept continuously wet;
c. Application of sand kept continuously wet;
d. Continuous application of steam (not exceeding 150 degrees F) or mist spray;
e. Application of waterproof sheet materials specified in Part 2 of this Section;
f. Application of other moisture-retaining covering as approved by the Architect;
g. Application of the curing agent specified in Part 2 of this Section or elsewhere in the Contract Documents.

2. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
3. Cure concrete by preserving moisture as specified above for at least seven days.

C. Temperature, wind, and humidity:
1. Cold weather:
a. When the mean daily temperature outdoors is less than 40 degrees F, maintain the temperature of the concrete between 50 degrees F and 70 degrees F for the required curing period.
b. When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
c. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
2. Hot weather: When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.
3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5 degrees F in any one hour period, or 50 degrees F in any 24 hour period.

D. Protection from mechanical injury:
1. During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.
2. Protect finished concrete surfaces from damage from construction equipment, materials, and methods, by application of curing procedures, and by rain and running water.
3. Do not load self-supporting structures in such a way as to overstress the concrete.

3.5 SPECIAL PROCEDURES FOR COLOR-STAINED CONCRETE

A. In addition to the procedures noted elsewhere in this specification, slab areas designated to receive color stain shall be prepared and treated as noted in this section.

B. Preparation:
1. Concrete surfaces to receive stain application shall be free from any curing membrane, bond-breaker, debris, or construction latents directly prior to application.

2. Power-sweep entire floor area, blow out all corners. Power scrub the entire floor with an automatic rider scrubber or similar approved equipment, to a dirt-free condition.
3. Scrape floor as required to remove remaining form glue, texture overspray, paint drips, or other similar built-up material on the surface.
4. Floor shall be dry prior to commencement of finish application.
5. Saw-cut perimeters of each defined area to receive stain. Refer to plans for defined areas.

C. Application:
1. Apply stain to designated concrete slab surfaces by spray and brushing, in strict accordance with manufacturer's instructions. Avoid lap marks onto adjacent surfaces. Avoid stepping on wet surfaces.
2. Apply stain with manufacturer's approved equipment, at per-gallon coverage rate as determined by the manufacturer.
3. Apply additional applications to any absorbent areas and repeat removal of puddles, keep all areas wet without allowing puddling.
4. Allow stain to dry evenly. Do not allow standing water on surface.

D. Rinsing Application:
1. After final application of stain, and after materials have remained on surface a minimum of four hours, remove all residue by wet scrubbing with manufacturer's recommended commercial detergent and rotary floor machine.
2. When suitably dry, apply manufacturer's clear sealer to all treated surfaces.
3. After sealing application and prior to installation of movable equipment, materials, furniture and similar interior improvements, apply heavy duty protective covering to prevent damage to treated surfaces.
4. Apply specified sealant to saw-cuts. Utilize manufacturer's recommended primer. Color of sealants for each saw-cut shall be approved by Architect prior to application.

END OF SECTION - 03345

SECTION 03350
CONCRETE FINISHES (Site)

PART 1 – GENERAL

1.1 The provisions of the Standard Specifications for Public Works Construction (SSPWC) latest Edition apply except as modified herein.

a. Scope: Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified, and as necessary to complete the Contract, including, but not limited to, these major items:

1. Finish of all concrete.
2. Curing of flatwork.
3. Sealers.

1.2 Related Work Specified Elsewhere:

a. Formwork.
b. Reinforcement.
c. Curing vertical surfaces.
d. Patching and repair of formed surfaces.

1.3 General Requirements:

a. Field Conditions.

1. Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces.
2. This section supplements Concrete, Section 03310.
3. Finish all surfaces to present a uniform appearance throughout the area involved, and throughout adjacent areas with the same treatment.
4. Where finishing occurs adjacent to finished metal or other finished surfaces, particularly where serrated or indented, remove all traces of cement film before it hardens. This applies particularly to stair nosings and similar items.

1.4 Samples:

In accordance with Section 1.34, submit duplicate samples of proposed finishes requested by the Architect; sizes as directed. Finished work shall match samples as approved by Architect.

PART 2 – MATERIALS

2.1 Portland Cement:

Per Section 03300.

2.2 Aggregates:

Per Section 03300.

2.3 Water:

Per Section 03300.

2.4 Concrete Surface Retarder:

Form Grade Concrete Surface Retarder, by L.M. Scofield Co., 323/720-3000, or other approved by Architect.

2.5 Curing and Protection Paper:

Sisalkraft Orange Label or other conforming to ASTM C171, as approved by the Architect.

2.6 Color and Hardeners:

"Lithochrome" color hardener, by L.M. Scofield Co., or approved equal.

2.7 Divider Strips Embedded in Concrete Finish:

One piece extruded zinc alloy strips of the type and size required by Duggan Manufacturing Co., Los Angeles, or approved equal.

2.8 Slip Resistant Additive:

"Emerchrome" floor hardener, by L.M. Scofield Co., or approved equal.

2.9 Expansion Joint Sealer for Use Except Where Sealants Specified Under Caulking and Sealants are Required:

"Igas Joint Sealer", by Sika Chemical Corp., or other approved by the Architect.

2.10 Curing and Hardening Compound:

For use on finish indicated to be left exposed. Material shall contain a fugitive dye. Approved products include West "Concrete Floor Treatment", Upco "Polyclear", Hunt "MD7C", Tock Bros. "Cureetox", and Sonneborn "Kure-n-Seal".

2.11 Sealer:

Hunt "MD-7C", Sonneborn "Kure-n-Seal", or Upco "Polyclear". Apply in accordance with manufacturer's recommendations.

PART 3 – EXECUTION

3.1 Floating:

a. Bring slabs to proper level, using screeds and strikeoff with a straightedge. Remove excess water and laitance. Compact by rolling with weighted rollers and by tamping with grid tampers. Float with power rotary floating machine. Thoroughly hand tamp areas not accessible for rolling. Float areas not accessible for power floating by hand, using a wood float. Test surface with a 10' straightedge, and eliminate high and low spots of 1/8" or more. Cumulative tolerances are not allowed.

3.2 Screeds.

Of such type and construction, and so spaced and located as to provide surface

tolerances specified. Use continuous screeds to provide surface over which to drag straightedges. Refer to requirements under Concrete Section which apply to this work.

3.3 Metal Divider Strips:

Where concrete floors finish against other materials, set combination screed and divider strip, secured in place and protected by shores until concrete on opposite side is installed. Insure that top of screed is at the exact required relationship with the top of the two finished surfaces to finish flush.

3.4 Embedded Items:

Set items as exact required elevations, level and in proper relationship to other work. Where items have a drainage function, insure that slabs slope to them properly. Adjust finish work to properly connect and fit to other work.

3.5 Defective Finishing:

Finish which is not true to line and plane, which is not thoroughly troweled and properly surfaced as required, which varies in excess of requirements along a 10' straightedge, which scuffs or has a rough top surface (except where required), which does not connect properly to adjoining work, which does not slope to drains, which does not match approved samples, or is not properly cured, will be deemed defective. Remove and replace with proper work and material conforming with contract requirements, and to limits directed by the Architect.

3.6 Protection:

Protect all finished work from damage by impact or from building rubbish. Protect work of others from damage by this work. Protect exposed slabs and slabs which receive applied coatings from soiling from foot traffic and subsequent work performed after finishing; use protective paper cover hereinbefore specified. Maintain protection in effective condition as long as the need exists. Control the use of water within the building so that no damage to previously installed work or existing structure and finish occurs.

3.7 Markings:

a. At expansion joints and elsewhere as indicated on the drawings, provide markings with a rounded edging or marking tool to a 1/4" radius.

b. In textured work, edge and mark with a combination edging and smoothing tool approximately 1 ½" wide.

c. Where so indicated, or where required tooled markings may have been inadvertently omitted, provide markings cut into surface of cured concrete with a diamond abrasive saw. Properly coordinate this work with the work of other trades in order to avoid damage to adjacent surfaces. Unless detailed otherwise, cut sawed markings 1/8" wide by 3/4" deep.

d. Make marking lines straight or curved where required by the drawings, equally spaced and parallel to adjacent lines or walls, edges and other construction, and of uniform depth and cross section, with intersections accurately formed.

3.8 Bases:

Provide cement base where indicated. Mix: Two parts fine aggregate to one part Portland cement with a minimum amount of water to make a relatively dry mixture. Shape all work true to detail.

3.9 Schedule of Finishes:

a. The applicator of process concrete finishes must examine the substrate and the conditions under which work is to be performed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to the applicator.

b. Comply with air pollution and safety regulations of governing authorities.

c. Protect adjacent materials and finishes from dust, dirt, and other surface or physical damage during finishing operations. Provide all protection as may be required and remove from site at completion of the work.

d. Float finish all slab surfaces which are to receive trowel finishes and other surface or physical damage during finishing operations. Provide all protection as may be required and remove from site at completion of the work.

e. Float finish all slab surfaces which are to receive trowel finishes and other finishes as specified and noted on drawings. After screeding and consolidating slabs, begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Hand-float in areas inaccessible to power units. Check and level surface plane to a tolerance not exceeding 1/8" in 10' when tested with a 10' straight edge. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

3.10 Slab Finishes:

a. Steel Trowel Finish:
Same as monolithic trowel finish, except omit burnish troweling. Apply on garage floor surfaces.

b. Wood Float Finish:
Float to screeds. When ready, finish with wood floats to a uniformly textured surface. Apply on surfaces to receive waterproofing membrances, resilient floorings, carpet and wood flooring.

c. Sweat Trowel Finish:
Same as steel float finish, except perform last troweling with circular motion and slight lifting of trowel to produce uniformly swirling nonslip finish. Apply on exposed floors in mechanical equipment rooms and spaces.

d. Rough Finish:
Float to screeds. When surface water disappears, roughen surface in two directions with stiff wire brooms or garden rakes. Apply on slabs to receive mortar underbeds.

e. Abrasive Finish:
Same as steel trowel finish. Just before final troweling, uniformly apply abrasive aggregate at minimum rate of 1/4 pound per square foot, and lock into cement matrix with last troweling. Lightly brush green, set concrete surface to expose grains and remove

cement film. Apply on all concrete stair treads and landings. A medium broom finish to all paving unless otherwise specified.

f. Broom Finish:
Provide a rough broom finish on all slabs scheduled to receive a ceramic tile floor on setting bed.

g. Steel Trowel Finish:
Provide steel trowel finish to all concrete surfaces as noted on drawings and hereinafter specified.

1. After concrete is sufficiently hardened to prevent drawing moisture and fines to the surface, finish trowel in two operations. Perform first operation with a power rotary trowel until matrix no longer accumulates on the trowel. Do not use cement, sand, or a mixture thereof to absorb excess moisture and do not add water to facilitate troweling. Perform second troweling until there is a distinct ringing sound under the trowel and a smooth, hard-burnished surface is obtained. Use liquid curing membrane.

h. Location: Under resilient flooring, wood floor, carpet, thin set tile and at all interior exposed floors not otherwise indicated.

i. Sealing: Just prior to final inspection, those floors which will be left exposed shall be scrubbed with detergent and water using a mechanical scrubber. Apply Sonneborn "Son-No'Mar" or equal product approved by the Architect, in accordance with manufacturer's recommendations. Provide manufacturer's 5 year guarantee against dusting.

j. Colored Concrete:
1. Where indicated on drawings, exposed concrete floors shall receive a colored and slip resistant finish. Color shall be of the dry-shake type, applied in strict conformance to manufacturer's instructions. A non-slip aggregate (natural aluminum oxide) shall be applied to the colored concrete surface while still in its plastic state. Application shall be compatible with coloring material and be applied per manufacturer's instructions. Color to be selected by Architect from manufacturer's standard palette.

k. Exposed Aggregate Concrete, Rock Salt Finish Concrete:

1. Aggregate or rock salt finish concrete shall refer to paving as indicated on the drawings.
2. Sample: Contractor shall provide one (1) foot square samples of the specified paving for approval by the Agency Representative. An approved sample shall be maintained by the Agency Representative and used as a comparison to installed work. Work which does not conform to the samples shall be removed and replaced at no additional cost to the Agency.
3. Slab Thickness: 4" minimum.
4. Aggregate shall be 1/4" to 3/8" size pea gravel. Submit samples for approval to Landscape Architect before construction.

l. Aggregate Paving Installation:

1. Finish surface to grade and cross-section with steel trowel to produce an even surface.
2. Score lines shall be made with a 1/8" radius jointing tool. See drawings for locations of score lines. Edge lines at existing sidewalk, paving edges, and at

expansion joints shall be made with a 1/4" radius jointing tool.

3. Allow to set up 2-4 hours, depending on weather conditions.
4. Brush surface with a stiff broom and water, to wash all cement off the surface aggregate and expose it without dislodging the aggregate.
5. Surface to present an even appearance with only top of aggregate exposed and interstices free of pits and washouts.
6. In approximately one week, clean surfaces with diluted muriatic acid wash and then rinse.
7. Vertical exposure of aggregate shall exceed 1/16".
8. Aggregate coverage of the finished surface shall be 90%.

m. Rock Salt Finish Installation:

1. Salt:
   Coarse and/or extra coarse rock salt, not pellet form.
2. Application:
   100 pounds per 600 square feet. Spread coarse rock salt first and tamp into concrete, then apply extra coarse rock salt and tamp into the concrete. Do not spread both sizes of rock salt in one application. (Indicate percentage of each size of rock salt to be used.) Concrete finish shall be sweat-trowel finish before applying salt.

Curing:

n. On plain concrete use Hunt's TLF. On colored concrete use color wax recommended by manufacturer of color additive used in the concrete.

o. Non-Slip Aggregate Finish:
All handicapped ramps shall be given a medium rough rotary trowel finish.

END OF SECTION - 03350