SECTION 03 35 00
CONCRETE FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Finishing interior and exterior concrete surfaces.

1.2 REFERENCES
A. ACI 303: Guide to Cast-in-Place Architectural Concrete Practice.

1.3 SUBMITTALS
A. Name, type, chemical analysis and manufacturer's recommended rate of application for liquid chemical hardener.

1.4 PROJECT CONDITIONS
A. Protect adjacent materials and finishes from dust, dirt and other surface or physical damage during finishing operations. Provide protection as required and remove from site at completion of Work.

PART 2 PRODUCTS

2.1 MATERIALS
A. Masonry Mortar and Grout: Section 04 05 16.
B. Dry Shake: Blend of metallic or mineral aggregate with Portland cement concrete in proportions recommended by manufacture.
C. Proprietary Materials: If permitted or required, proprietary compounds may be used in lieu of or in addition to foregoing materials. Use such compounds per manufacturer's recommendations.
D. Liquid-Chemical Hardener: Colorless, aqueous solution containing a blend of magnesium fluosilicate, zinc fluosilicate and a wetting agent. Mixture contains not less than 2 pounds fluosilicate per gallon and does not interfere with adhesives and bonding.

PART 3 EXECUTION

3.1 PREPARATION
A. Examine the areas and conditions under which work of this section will be performed.
B. Correct conditions detrimental to timely and proper finishing.
C. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISHING HORIZONTAL SLABS
A. **Do not apply water (i.e. sprinkle) to any surface of concrete when finishing slabs.**
B. Edges and Joints: Tools may be made out of steel. Preferred is wood, aluminum or magnesium.

C. Tolerances:
   1. Class A: 1 in 1000.
   2. Class B: 1 in 500.
   3. Class C: 1 in 250.

D. Float Finish: After concrete has been placed, consolidated, struck-off, and leveled, do not work further until ready for floating.
   1. Begin floating when water sheen has disappeared and surface has sufficient stiffness.
   2. During or after first floating, check planeness of entire surface with a 10 feet long straightedge applied at 2 or more different angles.
   3. Cut down high spots and fill low spots to the required tolerance.
   4. Refloat slab immediately to a uniform sandy texture.

E. Trowel Finish:
   1. Do not use steel trowel or a power trowel on exterior concrete or on concrete that contains more than 3 percent air.
   2. First troweling shall produce smooth surface relatively free of defects but which may still show some trowel marks.
   3. Second troweling after surface has stiffened shall make finished surface essentially free of trowel marks, uniform in texture and appearance.
   4. On surfaces intended to support floor coverings, grind off defects that would show through floor covering.

F. Broom or Belt Finish: Sweep surface with brushes, rakes, tines or burlap belt before final set.

G. "Dry Shake" Finish: Give the surface a floated finish. Evenly apply approximately 2/3 of a blended unsegregated material.
   1. Begin floating immediately after application of first "dry shake".
   2. After material has been embedded by floating, apply remainder of blended material to surface at right angles to previous application.
   3. Make second application heavier in any areas not sufficiently covered by first application.
   4. Immediately follow with second floating.
   5. After selected material has been embedded by second floating, complete operation with a broomed, floated, or troweled finish, as indicated.

H. Non-slip Finish: Give surface a "dry shake" application, using crushed ceramically bonded aluminum oxide particles. Apply at 25 pounds per 100 square feet.

I. Exposed Aggregate Finish: Immediately after surface of concrete has been leveled to tolerance and surface water has dissipated, spread aggregate uniformly over surface to provide complete coverage to the depth of a single stone.
   1. Embed aggregate into surface by light tamping.
   2. Float surface until embedded aggregate is fully coated with mortar and surface has been brought to tolerance.
   3. Start exposure of aggregate after matrix has hardened sufficiently to prevent dislodgment.
   4. Flow ample quantities of water, without force, over surface of concrete while matrix encasing aggregate is removed by brushing with a fine bristle brush.
   5. Continue until aggregate is uniformly exposed.

6. An approved chemical retarder sprayed onto freshly floated surface may be used to extend working time.

J. Chemical-Hardener Finish: Apply liquid chemical-hardener finish to interior concrete floors where indicated. Do not apply liquid chemical hardener on floor areas scheduled to receive synthetic matrices terrazzo, setting beds for tile, terrazzo, vinyl flooring, or like items. Apply hardener after complete curing and drying of concrete surface per manufacturer's recommendations. Evenly apply each coat, and allow 24 hours for drying between coats. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.3 FINISHING FORMED SURFACES

A. General:

1. Allow concrete to cure not more than 72 hours before commencing surface finish operations, unless approved otherwise.
2. Revise the finishes as needed to secure approval.

B. As-Cast Form Finish:

1. Rough: Patch defects, chip or rub off fins exceeding 1/4 inch height.
2. Smooth: Patch tie holes and defects and remove fins completely.
   a. When surface texture is impaired and form joints misaligned, grind, bush-hammer, or correct affected concrete.
   b. Slurry grout areas evidencing minor mortar Leakage to match adjacent concrete.
   c. Repair major mortar Leakage as a defective area.
   d. When workmanship is less than acceptable standard, provide one of rubbed finishes at no additional cost to OWNER.

C. Rubbed Finish:

1. Smooth Rubbed: Remove forms and perform necessary patching as soon after placement as possible.
   a. Finish newly hardened concrete no later than 24 hours following form removal.
   b. Wet surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced.
2. Grout Cleaned: Undertake no cleaning operations until all contiguous surfaces are completed and accessible.
   a. Wet surface of concrete sufficiently to prevent absorption of water from grout.
   b. Apply grout uniformly.
   c. Immediately after grouting, scrub surface with cork float or stone to coat surface and fill voids.
   d. While grout is still plastic, remove excess grout by working surface with rubber float or sack.
   e. After surface whitens from drying, rub vigorously with clean burlap.
   f. Keep damp for at least 36 hours after final rubbing.
3. Cork Floated: Remove forms within 2 to 3 days of placement where possible.
   a. Remove ties.
   b. Remove all burrs and fins.
   c. Dampen wall surface.

d. Apply mortar with firm rubber float or with trowel, filling all surface voids.
e. Compress mortar into voids.
f. If mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with fog sprayer.
g. Produce final texture with cork float using a swirling motion.

D. Unformed Finish:
1. After concrete is placed, strike smooth, tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces.
2. Float to texture that is reasonably consistent with formed surfaces.
3. Continue final treatment on formed surfaces uniformly across uniformed surfaces.

E. Blasted Finish:
1. Perform abrasive blasting within 24 to 72 hours after casting.
2. Coordinate with form work construction, concrete placement schedule, and formwork removal to ensure that surfaces are blasted at the same age for uniform results.
3. Reapply curing protection after blast finishing

F. Architectural Finish: Refer to ACI 303.
1. Tooled Finish:
a. Dress thoroughly cured concrete surface with electric, air, or hand tools to uniform texture, and give a bush hammered surface texture.
b. Remove sufficient mortar to exposed coarse aggregate in relief and to fracture coarse aggregate for tooled finish.

G. Patched Finish:
1. Repair defective areas.
a. Remove honeycomb and defective concrete to sound concrete.
b. Make edges perpendicular to surface or slightly undercut.
c. Featheredges are not permitted.
d. Dampen area to be patched and at least 6 inches surrounding it to prevent absorption of patching mortar water.
e. Prepare bonding grout.
f. Mix to consistency of thick cream.
g. Brush into surface.
2. Tie Holes: Unless indicated otherwise, after being cleaned and thoroughly dampened, fill tie hole solid with patching mortar.
3. Make any patches in concrete to closely match color and texture of surrounding surfaces. Determine mix formula for patching mortar by trial and obtain a good color match with concrete when both patch and concrete are cured and dry.
a. Mix white and gray Portland cement as required to match surrounding concrete to produce grout having consistency of thick paint.
b. Use a minimum amount of mixing water.
c. Mix patching mortar in advance and allow to stand without frequent manipulation, without addition of water, until it has reached stiffest placeable consistency.
d. After initial set, dress surfaces of patches manually to obtain same texture as surrounding surfaces.
4. After surface water has evaporated from patch area, brush bond coat into surface.

a. When bond coat begins to lose water sheen, apply patching mortar.
b. Thoroughly consolidate mortar into place and strike-off to leave patch slightly higher than surrounding surface.
c. Leave undisturbed for at least 1 hour before final finish.
d. Keep patched area damp for 72 hours or apply curing compound.
e. Do not use metal tools in finishing an exposed patch.

5. Whereas-cast finishes are indicated, total patched area may not exceed 1 in 500 of as-cast surface. This is in addition to form tie patches, if ties are permitted to fall within as-cast areas.
6. In any finishing process which is intended to expose aggregate on surface, patched areas must show aggregate.
   a. Outer 1 inch of patch shall contain same aggregates as surrounding concrete.
   b. For aggregate transfer finish, patching mixture shall contain same selected color aggregates.
   c. After curing, expose aggregates together with aggregates of adjoining surfaces by same process.

END OF SECTION