

SECTION 02775

COLORED CONCRETE SIDEWALKS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Colored portland cement concrete sidewalks.

1.02 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings
- B. ACI 308 - Standard Practice for Curing Concrete
- C. ASTM C-309 - Liquid Membrane-Forming Curing Compounds.

1.03 SUBMITTALS

- A. Mockup: Cast mockup of size equal to a ____ [1] [3] cubic yard pour to demonstrate proposed surface finish, texture, and color. Use the same cement brand, aggregate type and construction methods that will be used on the job. Maintain sample panel exposed to view for duration of Project, after Architect's acceptance of visual qualities.

1. Pour mock-up under weather conditions that will approximate actual conditions, including shading, weather conditions, temperature, time of day, finishers, tools, curing practices, etc. Check and verify air content and slump after addition of color pigments. If adjustments are made to mix design, pour new mock-up.

- B. Video Records: Submit video recording on VHS format.

1.04 QUALITY ASSURANCE

- A. Finisher Qualifications: Company specializing in performing the work of this Section with a minimum of 5-years documented experience or not less than 10 projects with similar quantity of surface area for colored or imprinted concrete.

- B. Acceptable Manufacturers: Products of manufacturers approved not less than 10 days prior to opening of bids. Submit requests for approval in accordance with procedures identified for substitutions specified in Division 1 including any Substitution Request forms and other documentation. Equivalent products of competing manufacturers are acceptable provided they match color and finish characteristics of job-site mock-up.

1. Construction Schedule Compliance: Provide evidence from ready-mix producer that indicates producer has or can procure sufficient quantities of specified materials so as not to delay the construction schedule.

- C. Video Records: For pours in excess of [] [10] cubic yards, video record conditions, procedures and resulting finishes. Record conditions after substrate and formwork is completed and dampened, just prior to placement of colored concrete. Record placement operations, including point-of-placement for each load, and finishing conditions. Record appearance and uniformity conditions prior to application of curing compounds.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS:

- A. Portland Cement

Note: When colored concrete is required, insert the paragraphs below as subordinate paragraphs under requirements for Portland Cement. SPECIAL NOTE: Cure colored concrete using membrane curing. Other methods of curing can cause discoloration; coordinate with mfr. of color pigments.

- B. Integral Color Pigments: ASTM C-979; natural and synthetic iron oxides and chromium oxides. Use only pure pigments (without additives) with record of satisfactory performance in concrete mixes. **Lambco Color; Lambert Corporation.**

- C. Normal-Weight Aggregates

- D. Water

2.02 CONCRETE FINISHING PRODUCTS:

- A. Dissipating Curing Compound: ASTM C-309, Type 1, Class B, water-based-resin curing compound; maximum volatile organic compound (VOC) rating of 350 mg per liter. **Aqua Kure-Clear; Lambert Corporation.**

Note: Pick only one of the two "wear-resistant" finishes specified below. The first product contains quartz aggregate; the second contains a "non-slip" emery aggregate. Emery aggregate is about twice the hardness of quartz aggregate. Products containing emery aggregates could cost 50% more than quartz aggregate products. Quartz aggregates wear smooth and will shear under heavy dragged objects; emery aggregate remains angular and slip-resistant, but has a tendency to shred items that are dragged over it, such as plastic-tipped table legs.

- B. Colored Wear-Resistant Finish: Specially blended and packaged dry-shake finish containing quartz aggregate, portland cement, pure color pigments, and plasticizers. **Colorhard; Lambert Corp.**

Editorial Note: Choose paragraph above or below.

- B. Colored Wear-Resistant Finish with Slip-Resistant Aggregate: Specially blended and packaged dry-shake product containing portland cement, aluminum oxide particles, color

pigment, and plasticizers. **Colorbrite; Lambert Corporation.**

1. Provide color as selected by Architect from manufacturers' standard color chart.

Note: ASTM C-1059 classifies latex bonding agents as Type I (redispersible) and Type II (non-redispersible). Under the ASTM standard for physical properties, minimum bond strengths are 400-psi for Type I, and 1,200-psi for Type II. The ASTM standard also restricts Type I Redispersible (rewettable) adhesives to use in interior work. Lambert Corporation suggests specifying bonding agents by reference to ASTM C-1059, with a restriction to only Type II non-redispersible (or non-rewettable) acrylic type bonding agents.

- C. Latex Bonding Agent: ASTM C-1059, Type II (non-redispersible type), acrylic base with minimum bond strength of 1,200-psi. **Acrylbond; Lambert Corporation.**

2.03 MIX DESIGN

- A. Design mix to provide normal weight concrete with properties as indicated on drawings and schedules:
- B. Slump Limits: 4-inch concrete slump at point of placement before adding water reducing admixture.

Note: Modify sample text by inserting color name and dosage rate; ie, 1%, 3%, 5% of portland cement content (1-lb, 3-lbs, 5-lbs. per 94-lb. sack of cement).

- C. Integral Color Dosage/Mix Ratio: Provide " _____ " color at _____ % of portland cement content by weight (_____ -lbs. per 94-lb. bag of portland cement in the concrete mix).

PART 3 - EXECUTION

3.01 FORMS

- A. Subgrade Adjustments: Uniformly compact and thoroughly moisten subgrade. Use a 2-to-3 inch sand bed on subgrades with visibly uneven density and water absorption rates. Construct formwork to provide a uniform slab thickness. Eliminate or minimize variations in slab thickness to minimize variations in the rate of evaporation and drying.

1. For pours in excess of [_____] [10] cubic yards, video record conditions after substrate and formwork is completed and dampened, just prior to placement of colored concrete.

3.02 CONCRETE MIXING

- A. Mix concrete according to standard ACI practices and ready-mix producer experience.
- B. Colored Concrete: Batch a portion (1/2 of required quantities) of coarse and fine aggregate and water. With mixer running, add color pigment and mix at least one minute prior to adding the balance of materials. Turn drum at mixing speed for additional 3 to 5 minutes prior

to dispatching mixer to job-site.

1. Use whole units of color pigment only, do not allow partial bags to be used.
2. On projects that require more than [_____] [one] truckload of colored concrete, use the same size truck for each load. Maintain consistency of batched materials and additives from first truckload to last truckload for each area of colored concrete.
3. Closely monitor and document water content to maintain consistency in each batch. Work with ready-mix producer to verify consistency from batch to batch. To the extent practical, maintain delivery conditions throughout the project, including delivery time (from plant to placement), mixing time, and weather conditions.
4. On projects that exceed 3 truckloads, do not pour colored concrete unless all concrete can be placed under the same weather conditions; do not pour on marginal weather days.

3.03 CONCRETE PLACEMENT

- A. Protect adjacent non-colored concrete surfaces. Place colored concrete with consistent 3-to-4 inch slump. Note points of placement and longest distance from end of ready-mix chute to farthest point of pour in each formed area. Avoid multiple pours in a single area.

1. For pours in excess of [_____] [10] cubic yards, video record placement operations to show point-of-placement and distances moved.
2. On pours of less than 10 cubic yards, add no water once placement has started. On contiguous pours that require multiple loads, maintain water content and water-cement ratios. Avoid the use of hand tamps and jitterbug equipment.

- B. Time of Pour: Wherever possible, schedule pouring of integrally colored concrete to occur under similar conditions for each load poured. Avoid pouring and finishing in areas that are partially shaded.

3.04 SLAB FINISHES

- A. Floating Operation: Float all slab surfaces to receive trowel finish and dust-on finishes as specified.
- B. Nonslip Broom Finish: Slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route.
- C. Deep-Broom Finish: Roughen concrete surface by brooming with stiff-bristle broom perpendicular to main traffic route.
- D. Nonslip Aggregate Finish: Uniformly spread ¼-lb. of dampened nonslip aggregate per sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below

surface. After broadcasting and tamping, apply trowel finishing as specified.

1. Apply to ramps, sloped walks, and where indicated.
 2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- E. Colored Concrete Finish: Minimize floating operations and maintain consistent working time. On multiple pours adjacent to previously placed colored concrete, use extra care to maintain consistent time finishing each area.
1. Apply a float finish to slab surfaces. Delay finishing of colored concrete work until bleed water has evaporated. Use mechanical floats or trowels. Finish in one direction; using one-way motion of blades to create a uniform colored surface.
 2. Do not sprinkle, fog or otherwise add water to the surface of colored concrete pours during finishing operations.
 3. For pours in excess of [] [10] cubic yards, video record finishing operations to document Arepresentative@ operations, methods of finishing, and curing compound application.

Note: The following paragraph for "rock salt finish" can be used separately or in conjunction with colored concrete. The paragraph should be indented as a subordinate requirement if used in conjunction with colored concrete.

- F. Rock Salt Finish: Uniformly spread 1/4-inch rock salt onto slab surface. Tamp or Apush@ rock salt flush with surface of concrete using steel trowel, but do not force below the surface. After broadcasting and tamping, apply trowel finish.

Note: Modify the following Wear Resistant Finish to include "with nonslip aggregate" terminology coordinated with products specified in Part 2.

- G. Colored Wear-Resistant Finish: Apply a colored wear-resistant finish to slab surface indicated.

Note: Modify the application rate in the next paragraph from about 1/2-lb. per sf. up to 1-lb. and is frequently expressed in terms of lbs per 100 sf. Applications range from 50-lb. for residential and light traffic areas, 60-75 lbs. for light commercial applications and heavy foot traffic; and 100-lbs. per 100 sf. for maximum strength and depth of color and where lighter colors are desired.

1. Apply dry shake materials for the colored wear-resistant finish at a rate of ____ [50] [60] [75] [100] lbs. per 100 sq. ft.
2. Immediately after floating, uniformly distribute approximately two-thirds of the required weight of the dry shake material over the concrete surface, and embed by power floating. Follow up with a second shake-on application, uniformly distributing remainder of dry shake material to ensure uniform color, and embed by power floating.
3. After broadcasting and floating, apply the trowel finish specified. Cure slab surface with the specified curing compound

3.06 CONCRETE CURING AND PROTECTION

- A. Protect fresh concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material.
- B. Compound Curing: Apply curing compound at rates recommended by manufacturer. Apply to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Do not apply in excess of specified application rate or allow to puddle. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
- C. Colored Concrete Curing: Cure slabs using the specified curing compound. Do not use paper, burlap, poly sheeting or fog curing methods.
 1. Where slab color variations do not correspond to approved sample panel or are determined by the project Architect to be excessive or unacceptable after a minimum of 28-days of curing, apply pigment manufacturer's standard clear or pigmented cure-and-seal product.

END OF SECTION