



SPECIAL PROVISIONS

FOR

INTEGRALLY COLOR CONCRETE
STAMPED/IMPRINTED COLOR PAVEMENT

Linn County

ESL-4775(621)--7S-57

Effective Date:

November 17, 2009

THE IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS,
SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND
ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER
THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 - GENERAL

1.1 DESCRIPTION

The work includes furnishing and constructing color concrete paving (flatwork) including layout, subgrade preparation, forming, steel reinforcement, color concrete with pattern finish, color curing and sealing agents, expansion joint material, color joint sealer, curb ramps with detectable warning strips, and all other incidental materials and labor required for color paving at the locations and grades on the construction drawings and as specified herein.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 1. ACI 301 "Specification for Structural Concrete for Buildings."
 2. ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."
 3. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
 4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
 5. ACI 305R "Recommended Practice for Hot Weather Concreting."
 6. ACI 306R "Recommended Practice for Cold Weather Concreting."

- B. American Society for Testing and Materials (ASTM):
 1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
 2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
 3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

- C. American Association of State Highway and Transportation Officials (AASHTO):
 1. AASHTO M194 "Chemical Admixtures."

- D. Iowa DOT Standard Specifications for Highway and Bridge Construction (current edition):
 1. Section 2301.04 "PORTLAND CEMENT CONCRETE PAVEMENT".
 2. Section 2511. "Removal and Construction of Portland Cement Concrete Sidewalks".

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's complete technical data sheets for the following:
 1. Colored admixture.
 2. Powder antiquing release agent.

3. Imprinting/Texturing tools.
 4. Curing & sealing compound.
 5. Slip resistant additive.
- B. Design Mixes: For each type of integrally colored concrete.
- C. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.
- D. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with 10-years experience in production of specified products.
- B. Installer Qualifications: An installer with 5 years experience with work of similar scope and quality.
- C. Comply with the requirements of ACI 301.
- D. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.
- E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.
- F. Integrally Colored Concrete Field Samples:
1. At location on Project selected by Landscape Architect, place and finish 10 feet by 10 feet (3 by 3 m) area.
 2. For accurate color, the quantity of concrete mixed to produce the sample should not be less than 3 cubic yards (or not less than 1/3 the capacity of the mixing drum on the ready-mix truck) and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.
 3. Construct sample panel using processes and techniques intended for use on permanent work, including curing procedures. 30 days will be needed for determination of final color of field sample. Include samples of control, construction, and expansion joints in sample panels. Field sample shall be produced by the individual workers who will perform the work for the Project.
 4. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
 5. Accepted field sample provides visual standard for work of Section.
 6. Field sample shall remain through completion of the work for use as a quality standard for finished work.
 7. Remove field sample when directed.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

1.6 PROJECT CONDITIONS

- A. Integrally Colored Concrete Environmental Requirements:
 - 1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
 - 2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
 - 3. Comply with professional practices described in ACI 305R and ACI 306R.
- B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

1.7 PRE-JOB CONFERENCE

- A. One week prior to placement of integrally colored concrete, a meeting shall be held to discuss the Project and application methods.
- B. It is suggested that the Landscape Architect, Engineer, General Contractor, Construction Manager, Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative be present.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. L.M. SCOFIELD COMPANY, Douglasville, Georgia and Los Angeles, California (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9050; Western Division – 714-568-1870; Central Division Office – 630-377-5959.
- B. SOLOMON COLORS, INC., P.O. Box 8288 Springfield, IL 62791, phone: 800-624-0261.
- C. BUTTERFIELD COLOR, 625 W. Illinois Ave., Aurora, IL, phone: 800-282-3388.

2.2 MATERIALS

- A. Colored Admixture for Integrally Colored Concrete:
 - 1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are lime proof and UV resistant.
 - 2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494, and AASHTO M194.
 - 3. Admixture shall be non-fading finely-ground synthetic mineral-oxide coloring pigment and water reducing wetting agent.
- B. Imprinting Tools: Pattern skins or stamp mats to be semi-rigid polyurethane with projected texture and ridged underside capable of imprinting texture and joint patterns to plastic concrete.
- C. Powder Antiquing Release Agent:
 - 1. Release agent to be non-fading finely ground, streak free, colored powder that facilitates release of stamps and imparts an accent color.
 - 2. Powder antiquing release agent shall be compatible with integral color additives.
- D. Curing and Sealing Compound for Integrally Colored Concrete: Compound shall comply with ASTM C309 and ASTM 3315 for use with integrally colored concrete.
 - 1. Exterior Integrally Colored Concrete: Use to cure and seal exterior flatwork that will be allowed to cure naturally with only occasional maintenance.
 - 2. Clear, solvent-borne, non-yellowing and VOC-compliant.
- E. Non-Skid / Slip Resistant Additive: Shall be a micronized polymer with finely graded aggregate designed to add to sealer for slip resistance. It shall be compatible with curing and sealing compounds.

- F. **SUBSTITUTIONS:** The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:
1. A certificate of compliance from the material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
 2. Documented proof that proposed materials have a 10-year proven record of performance for staining concrete substrates, confirmed by at least 5 local projects that Engineer can examine.

2.3 COLORS and PATTERNS

- A. **Concrete Colors & Patterns:**
1. **Cement:** Color shall be light gray.
 2. **Sand:** Color shall be locally available natural sand.
 3. **Aggregate:** Concrete producer's standard aggregate complying with specifications.
 4. **Colored Admixture:** As shown on the plans, from Color Chart provided by acceptable manufacturer.
 5. **Stamp/Imprinting Pattern:** As shown on the plans, from patterns available at acceptable manufacturers.
 6. **Powder Antiquing Release Agent:** As shown on the plans and provided from acceptable manufacturer's standard colors.

2.4 CONCRETE MIX DESIGN

- A. **Minimum Cement Content:** 6 sacks per cubic yard of concrete.
- B. **Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches. Do not add calcium chloride to mix as it causes mottling and surface discoloration.**
- C. **Air Content:** 6 percent plus or minus 1 percent.
- D. **Supplemental admixtures shall not be used unless approved by manufacturer.**
- E. **Do not add water to the mix in the field.**
- F. **Add colored admixture to the mix according to manufacturer's written instructions in premeasured bags, not by weight of cement content.**

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine subgrade and sub base for compliance. Notify Owner's representative if conditions are non-compliant.
- B. Do not add water to the mix in the field.
- C. Formwork shall be laid in straight sections except for curved paving areas, which will be smooth curves as shown on the plans.
- D. Steel Reinforcement: install in locations shown on the plans. Elevate bar to achieve placement in middle (top to bottom) of concrete paving.
- E. Surfaces shall be finished uniformly with the following finish:
 - 1. Apply color release agent in accordance with manufacturer's recommendations.
 - 2. Stamped/Imprinted: Apply pattern according to tool manufacturer's instructions. While concrete is plastic, accurately align mats in sequence and uniformly press into concrete to produce imprint pattern, texture, and depth of imprint as recommended by manufacturer. Touch-up pattern and finish edges with hand tools as necessary.
 - 3. Remove excess/un-embedded color release agent in accordance with manufacturer's recommendations.
 - 4. Saw-cut joints (within 12 hours of placement) and install expansion joints where shown on the plans. Remove irregularities from outer edges of concrete (adjacent to forms), but do not round.

3.2 CURING AND SEALING

- A. Protect concrete from prematurely drying and from excessive cold or hot temperatures that would alter normal curing process.
- B. Integrally Colored Concrete: Apply clear curing and sealing compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply curing and sealing compound at consistent time for each pour to maintain close color consistency.
- C. Thoroughly mix slip-resistant additive in sealing compound according to manufacturer's instructions. Stir regularly to maintain uniform distribution of additive. Verify adequacy of slip resistance before opening up surfaces to pedestrian traffic.
- D. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.

- E. Do not cover concrete with plastic sheeting.

3.3 TOLERANCES

- A. Minor variations in appearance of colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.
- B. Unless otherwise shown, finished surface of color concrete shall have a ¼” per foot cross slope for drainage. Any areas not draining surface water shall be removed and replaced at no additional cost.
- C. Finish surface of color concrete will be as shown on the plans within 1/8”.

3.4 REPAIRS AND PROTECTION

- A. Protect color concrete from damage until date of Substantial Completion.
- B. Repair damaged color concrete in accordance with manufacturer’s instructions.

END OF SECTION