

**SECTION 03 3053****MISCELLANEOUS EXTERIOR CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Compact sub-base for miscellaneous cast-in-place concrete as described in Contract Documents.
  - 2. Furnish and install miscellaneous cast-in-place concrete and equipment pads as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
- C. Related Requirements:
  - 1. Section 01 0000: 'General Requirements':
    - a. Section 01 1200: Multiple contracts.
    - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
    - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
    - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
    - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
    - f. Section 01 7800: 'Closeout Submittals'.
  - 2. Section 03 1113: 'Structural Cast-In-Place Concrete Forms'.
  - 3. Section 03 3111: 'Normal Weight Structural Concrete':
    - a. Concrete mix information and use admixtures.
    - b. Field Quality Control Testing and Inspection requirements for concrete.
    - c. Pre-installation conference held jointly with other concrete related sections.
  - 4. Section 03 3923: Membrane concrete curing application.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. American Concrete Institute, Farmington Hills, MI [www.concrete.org](http://www.concrete.org). Abstracts of ACI Periodicals and Publications.
    - a. ACI 224R-01, '*Control of Cracking in Concrete Structures*' (Reapproved 2008).
    - b. ACI 224.1R-07, '*Causes, Evaluation, and Repair of Cracks in Concrete Structures*' (March 1, 2007).
    - c. ACI 224.2R-92: '*Cracking of Concrete Members in Direct Tension*' (Reapproved 2004).
    - d. ACI 224.3R-95, '*Joints in Concrete Construction*' (Reapproved 2008).
    - e. ACI 302.1R-04: '*Guide for Concrete Floor and Slab Construction*' (March 23, 2004).
    - f. ACI 305R-10, 'Guide to Hot Weather Concreting'.
    - g. ACI 306R-10, 'Guide to Cold Weather Concreting'.
  - 2. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15<sup>th</sup> St., NW, Washington, DC 20005; 202-347-7474; [www.acec.org](http://www.acec.org)).
- B. Definitions:
  - 1. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
- C. Reference Standards:

1. American Concrete Institute:
  - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
  - b. ACI 117M-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary (Metric)'.
  - c. ACI 301-10, 'Specification for Structural Concrete'.
  - d. ACI 305.1-06, 'Specification for Hot Weather Concreting'.
  - e. ACI 306.1-90(R2002), 'Standard Specification for Cold Weather Concreting'.
  - f. ACI 318-11, 'Building Code Requirements for Structural Concrete and Commentary'.
2. ASTM International:
  - a. ASTM D1751-04(2008), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
  - b. ASTM E329-11c: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
3. International Code Council (IBC):
  - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

### 1.4 FIELD CONDITIONS

- A. Ambient Conditions:
  1. Cold Weather Limitations:
    - a. Follow requirements of ACI 306 for cold weather concreting.
  2. Hot Weather Limitations:
    - a. Follow requirements of ACI 305 for hot weather concreting.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Materials:
  1. Concrete:
    - a. Meet requirements specified in Section 03 3111 for exterior concrete.

### 2.2 ACCESSORIES

- A. Formwork:
  1. Meet requirements specified in Section 03 1113.
- B. Expansion Joint Material:
  1. 1/2 inch (12.7 mm) thick.
  2. Manufactured commercial fiber type:
    - a. Meet requirements of ASTM D1751.
    - b. Type Two Acceptable Products:
      - 1) Conflex by Knight-Celotex, Northfield, IL [www.aknightcompany.com](http://www.aknightcompany.com).
      - 2) Sealtight by W R Meadows Inc, Hampshire, IL [www.wrmeadows.com](http://www.wrmeadows.com).
      - 3) Equal as approved by Architect before installation. See Section 01 6200.
  3. Recycled Vinyl:
    - a. Light gray color.
    - b. Type Two Acceptable Products:
      - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI [www.oscodaplastics.com](http://www.oscodaplastics.com).
      - 2) Equal as approved by Architect before installation. See Section 01 6200.

- C. Finishing Material:
  - 1. Finishing Material available in multiple concrete shades to closely match concrete surface.
  - 2. Type Two Acceptable Products:
    - a. Mixture of 1 part cement (using same cement as used in concrete foundations), 1 part sand with 95% passing #50 sieve.
    - b. RapidSet WunderFixx by CTS Cement Manufacturing Corporation, Cypress, CA [www.rapidset.com](http://www.rapidset.com).
    - c. Equal as approved by Architect before installation. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification Of Conditions:
  - 1. Concrete Forms:
    - a. Verify dimensions and spot elevations for locations of forms for concrete footings, stem walls, building slabs, curbs, gutters, walkways, and drainage systems are correct before concrete is placed.
      - 1) Notify Architect of incorrect dimensions or spot elevations in writing.
      - 2) Do not place concrete until corrections are made and verified.

### **3.2 INSTALLATION**

- A. General:
  - 1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
- B. Sidewalks:
  - 1. Slope with cross slope of 1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm) (one to two percent) in direction of intended drainage.
  - 2. Slope away from building 1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm) (one to two percent) minimum.
  - 3. Do not dust with cement.
- C. Mow Strips and Aprons:
  - 1. Aggregate base not necessary under mow strips and aprons.
  - 2. Form and cast mow strips in place.
  - 3. Set top of mow strip above finish grade as follows:
    - a. Sodded Areas: 2 inches (50 mm) below.
    - b. Seeded Areas: One inch (25 mm) below.
    - c. Ground Cover Areas: 2 inches (50 mm) below.
    - d. Trees and Shrub Areas (not individual trees): 4 inches (100 mm) below.
  - 4. Compact topsoil underneath mow strips and aprons to density of undisturbed earth.
- D. Joints:
  - 1. Expansion Joints:
    - a. Install so top of expansion joint material is 1/4 inch (6 mm) below finished surface of concrete.
    - b. No expansion joint required between curbs and sidewalks parallel to curb.
    - c. Provide expansion joints at ends of exterior site concrete elements that are perpendicular to and terminate at curbs, building foundations or other concrete elements (i.e. sidewalks, mow strips, aprons).
    - d. Provide expansion joints between sidewalks that are parallel, and adjacent, to the storage building or main building.

- e. Provide expansion joints around perimeter of concrete slab on grade at mechanical enclosure, around perimeter of slab on grade at dumpster enclosure and at top and bottom of exterior stairs.
- f. Spacing On Center (+/-):

Sidewalks, Curbs and Gutters	40 feet to 100 feet	12 meters to 30 meters
Mow Strips and Aprons	20 feet to 40 feet	6 meters to 12 meters

- g. Seal expansion joints as specified in Section 07 9213 for following areas:
  - 1) Between entryway slabs and building foundations.
  - 2) Between sidewalks and building foundations.
  - 3) Within curbs and gutters.
  - 4) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.

2. Scored Control Joints:

- a. Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than one inch (25 mm).
- b. Control joints may be sawcut in concrete paving but are to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
- c. Spacing On Center (+/-):

Sidewalks	4 feet to 6 feet	12 meters to 18 meters
Curbs and Gutters	10 feet	3.0 meters

E. Finish:

1. Flatwork:

- a. Curb, Gutter Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous:
  - 1) After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
    - a) Provide fine hair finish where grades are less than 6 percent 1-1/4 inch (32 mm).
    - b) Provide rough hair finish where grades exceed 6 percent 1-1/4 inch (32 mm).
    - c) Broom finish, by drawing broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide fine line texture acceptable to Architect. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
    - d) On inclined slab surfaces, provide coarse, non-slip finish by scoring surface with stiff-bristled broom, perpendicular to line of traffic. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
    - e) Do not remove forms for twenty four (24) hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.
    - f) Round edges exposed to public view to 1/2 inch (13 mm) radius, including edges formed by expansion joints.
    - g) Remove edger marks.

**3.3 PROTECTION**

A. General:

- 1. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.

**END OF SECTION**

**SECTION 03 3111****NORMAL WEIGHT STRUCTURAL CONCRETE****PART 4 - GENERAL****4.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install Project concrete work as described in Contract Documents.
  - 2. Quality of concrete used on Project but furnished under other Sections.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Section 31 1123: Aggregate base under miscellaneous cast-in-place concrete and exterior slabs, and asphalt paving.
  - 2. Section 31 2323: Compaction procedures and tolerances.

**4.2 REFERENCES**

- A. Association Publications
  - 1. American Concrete Institute, Farmington Hills, MI [www.concrete.org](http://www.concrete.org). Abstracts of ACI Periodicals and Publications.
    - a. ACI 224R-01, *Control of Cracking in Concrete Structures*' (Reapproved 2008).
    - b. ACI 224.1R-07, *Causes, Evaluation, and Repair of Cracks in Concrete Structures*' (March 1, 2007).
    - c. ACI 224.2R-92: *Cracking of Concrete Members in Direct Tension*' (Reapproved 2004).
    - d. ACI 224.3R-95, *Joints in Concrete Construction*' (Reapproved 2008).
    - e. ACI 302.1R-04: *Guide for Concrete Floor and Slab Construction*' (March 23, 2004).
    - f. ACI 302.2R-06, *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials*' (August 15, 2006).
    - g. ACI CP-1-12, 'Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1'.
    - h. ACI Flatwork Finisher Certification Program.
    - i. ACI Field Technician Certification Program.
    - j. SP-204-01, 'Design and Construction Practices to Mitigate Cracking'.
    - k. SP-231R-10, 'Report on Early-Age Cracking: Causes, Measurement and Mitigation'.
  - 2. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15<sup>th</sup> St., NW, Washington, DC 20005; 202-347-7474; [www.acec.org](http://www.acec.org)).
  - 3. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15<sup>th</sup> St., NW, Washington, DC 20005; 202-347-7474; [www.acec.org](http://www.acec.org)).
- B. Definitions (Following are specifically referenced for testing):
  - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
  - 2. Approved: To authorize, endorse, validate, confirm, or agree to.
  - 3. Cementitious Materials: Portland cement alone or in combination with one or more of following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
  - 4. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
  - 5. Floor Flatness (FF): Rate of change in elevation of floor over a 12 inches (305 mm) section.

6. Floor Levelness (FL): Measures difference in elevation between two points which are 10 feet (3.05 m) apart.
  7. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
    - a. Inspection: Not required by code provisions but may be required by Contract Documents.
    - b. Special Inspection: Required by code provisions and by Contract Documents.
    - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
    - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
  8. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
  9. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. They are not samples. Approved mockups establish standard by which the Work will be judged.
  10. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
  11. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
  12. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
  13. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
  14. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
  15. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
  16. Service Provider: Agency or firm qualified to perform required tests and inspections.
  17. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
  18. Special Inspection: See Inspection.
  19. Special Inspector: Certified individual or firm that implements special inspection program for project.
  20. Special Test: See Test.
  21. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
    - a. Test: Not required by code provisions but may be required by Contract Documents.
    - b. Special Test: Required by code provisions and by Contract Documents.
  22. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
  23. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
  24. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. American Association of State and Highway Transportation Officials:
    - a. AASHTO M 213-01 (2010), 'Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)'.

- b. AASHTO T 318-02, 'Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying'.
- 2. American Concrete Institute:
  - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
  - b. ACI 301-10, 'Specification for Structural Concrete'.
  - c. ACI 318-08, 'Building Code Requirements for Structural Concrete and Commentary'.
- 3. ASTM International:
  - a. ASTM A615/A615M-12, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.
  - b. ASTM C31/C31M-10, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
  - c. ASTM C33/C33M-11a, 'Standard Specification for Concrete Aggregates'.
  - d. ASTM C39/C39M-12, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
  - e. ASTM C42/C42M-12, 'Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete'.
  - f. ASTM C94/C94M-12, 'Standard Specification for Ready-Mixed Concrete'.
  - g. ASTM C140-12, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.
  - h. ASTM C143/C143M-10a, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
  - i. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
  - j. ASTM C171-07, 'Standard Specification for Sheet Materials for Curing Concrete'.
  - k. ASTM C172/C172M-10, 'Standard Practice for Sampling Freshly Mixed Concrete'.
  - l. ASTM C173/C173M-10b, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
  - m. ASTM C192/C192M-07, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
  - n. ASTM C231/C231M-10, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
  - o. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
  - p. ASTM C494/C494M-11, 'Standard Specification for Chemical Admixtures for Concrete'.
  - q. ASTM C567/C567M-11, 'Standard Test Method for Determining Density of Structural Lightweight Concrete'.
  - r. ASTM C595/C595M-12, 'Standard Specification for Blended Hydraulic Cements'.
  - s. ASTM C597-09, 'Standard Test Method for Pulse Velocity Through Concrete'.
  - t. ASTM C618-12, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.
  - u. ASTM C803/C803M-03(2010), 'Standard Test Method for Penetration Resistance of Hardened Concrete'.
  - v. ASTM C805/C805M-08, 'Standard Test Method for Rebound Number of Hardened Concrete'.
  - w. ASTM C989/C989M-11, 'Standard Specification for Slag Cement for use in Concrete and Mortars'.
  - x. ASTM C1077-11c, 'Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation'.
  - y. ASTM C1157/C1157M-11, 'Standard Performance Specification for Hydraulic Cement'.
  - z. ASTM C1688/C1688M-12, 'Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete'.
- 4. International Code Council (IBC):
  - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

#### 4.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling:
  - 1. Engineer twenty four (24) hours minimum before placing concrete.

#### 4.4 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
    - a. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
- B. Informational Submittals:
1. Certificates:
    - a. Installers:
      - 1) Certification for National Ready Mixed Concrete Association (NRMCA).
      - 2) Certification for ACI-certified Flatwork Finishers and Technicians.
  2. Design Data:
    - a. Mix Design:
      - 1) Furnish proposed mix design to Architect for review prior to commencement of Work.
        - a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140 for hardened concrete properties.
        - b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.
    - b. Ready-Mix Supplier:
      - 1) Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
        - a) Name of ready-mix batch plant.
        - b) Serial number of ticket.
        - c) Date and truck number.
        - d) Name of Contractor.
        - e) Name and location of Project.
        - f) Specific class or designation of concrete conforming to that used in Contract Documents.
        - g) Amount of concrete.
        - h) Amount and type of cement.
        - i) Total water content allowed by mix design.
        - j) Amount of water added at plant.
        - k) Sizes and weights of sand and aggregate.
        - l) Time loaded.
        - m) Type, name, manufacturer, and amount of admixtures used.
        - n) Design Data.
      - 2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
        - a) Cement.
        - b) Aggregate.
        - c) Fly Ash.
  3. Source Quality Control Submittals:
    - a. Concrete mix design: Submit mix designs to meet following requirements:
      - 1) Proportions:
        - a) Mix Type D (also to be used for exterior concrete subject to freeze thaw conditions):
          - (1) 4500 psi (31.03 MPa) minimum at twenty eight (28) days.
          - (2) Water / Cement Ratio: 0.45 maximum by weight (water/cement ratio shall not exceed 0.45 for exterior concrete flatwork (sidewalks, curb and gutter, concrete paving, etc.)).
          - (2) Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for Exterior Concrete and foundation walls exposed to freeze thaw conditions.
        - b) Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in amount of cementitious material is allowed.
      - 2) Slump:
        - a) 4 inch (100 mm) slump maximum before addition of high range water reducer.
        - b) 8 inch (200 mm) slump maximum with use of high range water reducer.



- c) Slump not required for Mix Type F.
- 3) Admixtures:
  - a) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
  - b) Mineral: An amount of specified fly ash not to exceed twenty (20) percent of weight of cement may be substituted for cement. If substituted, consider fly ash with cement in determining amount of water necessary to provide specified water / cement ratio.
  - c) Chemical: Specified accelerator or retarder may be used if necessary to meet environmental conditions.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Pour Reports:
        - a) Provide report that records following information:
        - b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
        - c) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
        - d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
        - e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
        - f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
        - g) Screeding method and equipment used.
        - h) Saw cut method and equipment used.
      - 2) Testing and Inspection Reports:
        - a) Testing Agency Testing and Inspecting Reports of concrete.

#### 4.5 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
  - 1. Installers and Installation Supervisor:
    - a. ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
  - 2. Ready-Mix Supplier:
    - a. Comply with ASTM C94/C94M requirements and be certified according to NRMCA's 'Certification of Ready Mixed Concrete Production Facilities'.
  - 3. Testing Agencies:
    - a. Independent agency qualified according to ASTM C1077 and ASTM E329.
      - 1) Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technicians, Grade I according to ACI CP-1 or equivalent certification program.
      - 2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician - Grade II.

#### 4.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Expansion Filler Material:
    - a. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

**B. Storage And Handling Requirements:**

1. Expansion Filler Material:
  - a. Store materials in a clean, dry area in accordance with manufacturer's instructions.
  - b. Protect materials during handling and application to prevent damage.

**PART 5 - PRODUCTS****5.1 SYSTEM****A. Manufacturers:**

1. Manufacturer Contact List:
  - a. BASF Admixtures, Cleveland, OH [www.basf-admixtures.com](http://www.basf-admixtures.com).
  - b. Bonsal American, Charlotte, NC [www.bonsal.com](http://www.bonsal.com).
  - c. Dayton Superior Specialty Chemicals, Kansas City, KS [www.daytonsuperiorchemical.com](http://www.daytonsuperiorchemical.com).
  - d. Euclid Chemical Company, Cleveland, OH [www.euclidchemical.com](http://www.euclidchemical.com).
  - e. Fritz-Pak Concrete Admixtures, Dallas, TX [www.fritzpak.com](http://www.fritzpak.com).
  - f. Grace Construction Products, Cambridge, MA [www.graceconstruction.com](http://www.graceconstruction.com) and Grace Canada Inc, Ajax, ON (905) 683-8561.
  - g. L & M Construction Chemicals, Omaha, NE [www.lmcc.com](http://www.lmcc.com).
  - h. Larsen Weldcrete by Larsen Products Corp, Rockville, MD [www.larsenproducts.com](http://www.larsenproducts.com).
  - i. Sika Corporation, Lyndhurst, NJ [www.sikaconstruction.com](http://www.sikaconstruction.com) and Sika Canada, Pointe Claire, QC [www.sika.ca](http://www.sika.ca).
  - j. Sonneborn / BASF Building Systems, Shakopee, MN [www.chemrex.com](http://www.chemrex.com).
  - k. Unitex, Kansas City, MO [www.unitex-chemicals.com](http://www.unitex-chemicals.com).
  - l. U S Mix Products Co, Denver, CO [www.usspec.com](http://www.usspec.com).
  - m. W R Meadows, Hampshire, IL [www.wrmeadows.com](http://www.wrmeadows.com).

**B. Performance:**

1. Design Criteria: Conform to requirements of ASTM C94/C94M unless specified otherwise.
  - a. Floor Slab for interior concrete slabs:
    - 1) Class 1 Floor:
      - a) Anticipated type of traffic: exposed surface – foot traffic.
      - b) Special considerations: Uniform finish, nonslip aggregated in specific areas, curing.
      - c) Final finish: Normal steel-troweled finish, nonslip finish where required.
2. Capacities:
  - a. For testing purposes, following concrete strengths are required:
    - 1) At 7 days: 60 percent minimum of 28 day strengths.
    - 2) At 28 days: 100 percent minimum of 28 day strengths.
    - 3) At 28 days:
      - a) Mix Type D: 4500 psi (31 MPa).

**C. Materials:**

1. Hydraulic Cement: Meet requirements of ASTM C150/C150M, Type <II>.
2. Aggregates:
  - a. General:
    - 1) Submit a letter on quarry's letterhead that certifies all aggregate for concrete complies with the requirements of this section. Material certificates which are submitted shall be signed by both the materials producer and the contractor, certifying that materials comply with or exceed requirements specified herein to the Architect, Civil and Structural Engineering Consultant and the Independent Testing Laboratory for review and approval.
    - 2) Aggregates for all concrete shall come from a quarry that is DOT approved and meets or exceeds durability Class I aggregate. The quarry shall submit a letter to Engineer that certifies that all aggregate complies with DOT requirements for durability. Aggregate not meeting DOT durability requirements shall not be used.

- b. Coarse:
- 1) Meet requirements of ASTM C33/C33M or nonconforming aggregate that by test or actual service produces concrete of required strength and conforms to local governing codes.
  - 2) Aggregate shall be uniformly graded by weight as follows:

- a) Table Two: Flat Work, Size No. 67.

Sieve	Percent Passing	Sieve	Percent Passing
One Inch	100	25 mm	100
3/4 Inch	90 - 100	19 mm	90 - 100
3/8 Inch	20 - 55	9 mm	20 - 55
No. 4	0 - 10	4.75 mm	0 - 10
No. 8	0 - 5	2.36 mm	0 - 5

- c. Fine:
- 1) Meet requirements of ASTM C33/C33M.
  - 2) Aggregate shall be uniformly graded by weight as follows:

- a) Table Four:

Sieve	Percent Passing	Sieve	Percent Passing
3/8 Inch	100	9 mm	100
No. 4	95 - 100	4.75 mm	95 - 100
No. 8	80 - 100	2.36 mm	80 - 100
No. 16	50 - 85	1.18 mm	50 - 85
No. 30	25 - 60	0.60 mm	25 - 60
No. 50	10 - 30	0.30 mm	10 - 30
No. 100	2 - 10	0.15 mm	2 - 10

3. Water: Clear, apparently clean, and potable.
4. Admixtures And Miscellaneous:
  - a. Mineral:
    - 1) Fly Ash Pozzolan: Meet requirements of ASTM C618, Class F or C and with loss on ignition (LOI) of three (3) percent maximum.
  - b. Chemical:
    - 1) No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
    - 2) Air Entraining Admixture:
      - a) Meet requirements of ASTM C260/C260M.
      - b) Type Two Acceptable Products:
        - (1) MB-VR, MB-AE or Micro Air by BASF.
        - (2) Air Mix 200 Series or AEA-92 Series by Euclid.
        - (3) Air Plus or Super Air Plus by Fritz-Pak.
        - (4) Sika Air by Sika.
        - (5) Daravair or Darex Series AEA by W R Grace.
        - (6) Equal as approved by Architect before use. See Section 01 6200.
    - 3) Water Reducing Admixture:
      - a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.
      - b) Type Two Acceptable Products:
        - (1) Pozzolith Series by BASF.
        - (2) Eucon WR 75 or Eucon 91 by Euclid.
        - (3) FR-2 or FR-3 by Fritz-Pak.
        - (4) Plastocrete 160 by Sika.
        - (5) Daracem, WRDA, or MIRA Series by W R Grace.
        - (6) Equal as approved by Architect before use. See Section 01 6200.
    - 4) Water Reducing, Retarding Admixture:
      - a) Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.

- b) Type Two Acceptable Products:
  - (1) Pozzolith Series by BASF.
  - (2) Eucon Retarder 75 by Euclid.
  - (3) FR-1 or Modified FR-1 by Fritz-Pak.
  - (4) Plastiment by Sika.
  - (5) Daratard Series or Recover by W R Grace.
  - (6) Equal as approved by Architect before use. See Section 01 6200.
- 5) High Range Water Reducing Admixture (Superplasticizer):
  - a) Meet requirements of ASTM C494/C494M, Type F or G and containing not more than 0.05 percent chloride ions.
  - b) Type Two Acceptable Products:
    - (1) Rheobuild 1000 or Glenium Series by BASF.
    - (2) Eucon 37 or Eucon 537 by Euclid.
    - (3) Supercizer 1 through 7 by Fritz-Pak.
    - (4) Sikament 300 by Sika.
    - (5) Daracem or ADVA Series by W R Grace.
    - (6) Equal as approved by Architect before use. See Section 01 6200.
- 6) Non-Chloride, Non-Corrosive Accelerating Admixture:
  - a) Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
  - b) Type Two Acceptable Products:
    - (1) Accelguard 80 by Euclid.
    - (2) Pozzolith NC 534 or 122HE or Pozzutec 20+.
    - (3) Daraset, Polarset or Lubricon by W R Grace.
    - (4) Equal as approved by Architect before use. See Section 01 6200.
- 7) Corrosion Inhibiting Admixture:
  - a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
  - b) Type Two Acceptable Products:
    - (1) Eucon CIA by Euclid.
    - (2) DCI or DCI-S by W R Grace.
    - (3) Equal as approved by Architect before use. See Section 01 6200.
- 8) Alkali-Silica Reactivity Inhibiting Admixture:
  - a) Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
  - b) Type Two Acceptable Products:
    - (1) Eucon Integral ARC by Euclid.
    - (2) RASIR by W R Grace.
    - (3) Equal as approved by Architect before use. See Section 01 6200.
- 9) Viscosity Modifying Admixture (VMA):
  - a) Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
  - b) Type Two Acceptable Products:
    - (1) Viscrol by Euclid.
    - (2) VMAR3 by W R Grace.
    - (3) Equal as approved by Architect before use. See Section 01 6200.
- 10) Shrinkage Reducing Admixture (SRA):
  - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
  - b) Type Two Acceptable Products:
    - (1) Eucon SRA by Euclid.
    - (2) Eclipse 4500 (exterior concrete) by W R Grace.
    - (3) Eclipse Floor 200 (interior concrete) by W R Grace.
    - (4) Equal as approved by Architect before use. See Section 01 6200.

## 5.2 ACCESSORIES

### A. Bonding Agents:

1. Type Two Acceptable Products:
  - a. Acrylic Additive by Bonsal American.
  - b. Day Chem Ad Bond (J-40) by Dayton Superior.
  - c. Flex-Con by Euclid Chemical Co.
  - d. Larsen Weldcrete by Larsen Products Corp.
  - e. Everbond by L & M Construction Chemicals.
  - f. Acryl Set by BASF.
  - g. Sonocrete by Sonneborn.
  - h. U S Spec Multicoat by U S Mix Products.
  - i. Intralok by W R Meadows.
  - j. Equal as approved by Architect before use. See Section 01 6200.

### B. Evaporation Retardant:

1. Type Two Acceptable Products:
  - a. Confilm by BASF.
  - b. Sure Film J-74 by Dayton Superior.
  - c. Eucobar By Euclid Chemical Co.
  - d. E-Con by L & M Construction Chemicals.
  - e. Pro Film by Unitex.
  - f. U S Spec Monofilm ER by U S Mix Products.
  - g. Equal as approved by Architect before use. See Section 01 6200.

## PART 6 - EXECUTION

### 6.1 PREPARATION

#### A. Surface Preparation:

1. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
2. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section.
  - a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

#### B. Removal:

1. Remove water and debris from space to be placed.

### 6.2 INSTALLATION

#### A. Special Techniques:

1. Cold Weather Concreting Procedures:
  - a. General Requirements:
    - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
    - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be 35 deg F (2 deg C) minimum at time of concrete placement.
    - 3) Thaw sub-grade 6 inches (150 mm) deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
    - 4) Use no frozen materials or materials containing ice.
  - b. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Below 40 deg F (4 deg C):
    - 1) Temperature of concrete as placed and maintained shall be 55 deg F (13 deg C) minimum and 75 deg F (27 deg C) maximum.

- 2) Heat concrete for seventy two (72) hours minimum after placing if regular cement is used; for 48 hours if high early strength cement is used; or longer if determined necessary by Architect.
  - a) During this period, maintain concrete surface temperature between 55 and 75 deg F (13 and 27 deg C).
- 3) Vent flue gases from combustion heating units to outside of enclosure to prevent carbonation of concrete surface.
- 4) Prevent concrete from drying during heating period. Maintain housing, insulation, covering, and other protection twenty four (24) hours after heat is discontinued.
- 5) After heating period, if temperature falls below 32 deg F (0 deg C), protect concrete from freezing until strength of 2000 psi (13.79 MPa) minimum is achieved.
  - a) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi (24.13 MPa) minimum is achieved.
- c. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Above 40 deg F (4 deg C), but when temperature falls below 32 deg F (0 deg C):
  - 1) Protect concrete from freezing for seventy two (72) hours after placing, or until strength of 2000 psi (13.79 MPa) is achieved, whichever is longer.
  - 2) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi (24.13 MPa) minimum is achieved.
- d. Protect soil supporting concrete footings from freezing under any circumstances.
- 2. Hot Weather Concreting Procedures:
  - a. Maximum concrete temperature allowed is 90 deg F (32 deg C) in hot weather.
  - b. Cool aggregate and subgrades by sprinkling.
  - c. Avoid cement over 140 deg F (60 deg C).
  - d. Use cold mixing water or ice.
  - e. Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.

B. Tolerances:

- 1. Tolerances shall conform to requirements of ACI 117 or CSA A23.1, except where specified differently:
  - 1) Remove and replace sections of slabs measuring outside specified correctable tolerances.

C. Placing:

- 1. General:
  - a. Place as soon after mixing as possible.
  - b. Deposit as nearly as possible in final position.
  - c. Placing of concrete shall be continuous until panel or section is complete.
  - d. In order to avoid overloading of forms and ties, observe following rate of filling for various air temperatures:
    - 1) Table Six: Placing Rate.

Temperature	Rate of Fill per Hour	Temperature	Rate of Fill per Hour
40 deg F	2 feet	4 deg C	600 mm
50 deg F	3 feet	10 deg C	900 mm
60 deg F	4 feet	16 deg C	1 200 mm
70 deg F	5 feet	21 deg C	1 500 mm

- e. Compact concrete in forms by vibrating and other means where required.
  - 1) Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type F).
- f. Consolidate concrete thoroughly.
- g. Do not embed aluminum in concrete.
- h. Do not use contaminated, deteriorated, or re-tempered concrete.
- i. Avoid accumulation of hardened concrete.
- 2. Exterior Slabs:
  - a. Dusting with cement not permitted.
  - b. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs (2 inches at 6 inches slabs) (50 mm at 150 mm slabs).

3. Equipment Bases: Coordinate with appropriate Sections for locations and dimensions.
  4. Joints:
    - a. Where possible, locate joints under partitions or where joints will cause least disruption to floor coverings.
    - b. Construction Joints: Locate where shown on Drawings to least impair strength of completed structure. Construction joints in foundation walls shall not occur within 6 feet (1.80 meters) of corner and be keyed.
  5. Bonding Fresh And Hardened Concrete:
    - a. Re-tighten forms.
    - b. Roughen surfaces.
    - c. Clean off foreign matter and laitance.
    - d. Wet but do not saturate.
    - e. Slush with neat cement grout or apply bonding agent.
    - f. Proceed with placing new concrete.
  6. Anchor Bolts:
    - a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt.
    - b. Do not disturb bolts during finishing process.
- D. Finishing:
1. Rubbed Finish, Exposed Vertical Surfaces:
    - a. Smooth Rubbed Finish shall be as specified in Section 03 3053.
  2. Steel Trowel Finishes, Interior Flatwork:
    - a. Float and steel trowel interior slabs after concrete has set enough to avoid bringing water and fines to surface.
    - b. If power troweling is used, get approval of finish from Architect.
  3. Broom Finishes, Exterior Flatwork Not Specified in Section 03 3053:
    - a. Broom finish exterior slabs.
    - b. Round edges including edges formed by expansion joints.
    - c. Remove edger marks.
  4. All Other Concrete Flatwork And Curbs: Membrane cure as specified in Section 03 3923.

### 6.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
1. Concrete:
    - a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
    - b. Testing Agency will sample and test for quality control during placement of concrete as directed by Architect.
    - c. Testing and inspections, if performed, will include following:
      - 1) Periodic inspection verifying use of required design mix.
      - 2) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
      - 3) Inspection of concrete and shotcrete placement for proper application techniques.
      - 4) Periodic inspection for maintenance of specified curing temperature and techniques.
      - 5) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
        - a) Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
      - 6) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
    - d. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
      - 1) Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
        - a) Slump: ASTM C143/C143M, Test each time set of compressive specimens are made.

- b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
- c) Concrete Temperature: Test each time set of compressive specimens are made.
- d) Unit Weight: ASTM C567/C567M, Test each time set of compressive specimens are made.
- e. Compression Test Specimen: ASTM C31/C31M, one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
- f. Compressive Strength Tests: ASTM C39/C39M:
  - 1) Obtain one (1) composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd (4 cu m), but less than 50 cu. yd (38 cu m), plus one (1) set for each additional 50 cu. yd (38 cu m) or fraction thereof.
  - 2) One (1) specimen tested at at seven (7) days, two (2) specimens tested at twenty eight (28) days, and one (1) specimen retained in reserve for later testing if required.
  - 3) If strength of field-cured cylinders is less than eighty five (85) percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
  - 4) Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi (3.45 MPa).

#### 6.4 FIELD QUALITY CONTROL

##### A. Field Tests And Inspections:

1. Concrete:
  - a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
  - b. Testing Agency will sample and test for quality control during placement of concrete as directed by Architect.
  - c. Testing and inspections, if performed, will include following:
    - 1) Periodic inspection verifying use of required design mix.
    - 2) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
    - 3) Inspection of concrete and shotcrete placement for proper application techniques.
    - 4) Periodic inspection for maintenance of specified curing temperature and techniques.
    - 5) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
      - a) Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
    - 6) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
  - d. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
    - 1) Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
      - a) Slump: ASTM C143/C143M, test each time set of compressive specimens are made.
      - b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
      - c) Concrete Temperature: Test each time set of compressive specimens are made.
      - d) Unit Weight: ASTM C567/C567M, Test each time set of compressive specimens are made.
  - e. Compression Test Specimen: ASTM C31/C31M; one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.



**6.5 PROTECTION**

- A. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.
- B. Do not allow materials resulting from construction activities, which will affect concrete or application of finish floor systems adversely, to come in contact with interior concrete slabs.
- C. Protect interior concrete floors from stains, paint, mortar and other construction activities.

**END OF SECTION**

**SECTION 03 3923****MEMBRANE CONCRETE CURING****PART 7 - GENERAL****7.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of membrane concrete curing as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 03 3053: 'Miscellaneous Cast-In-Place Concrete'.
  - 2. Section 03 3111: 'Normal-Weight Structural Concrete'.

**7.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C309-11, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete'.

**7.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's product data.
- B. Informational Submittals:
  - 1. Manufacturer Instructions:
    - a. Printed installation instructions.

**PART 8 - PRODUCTS****8.1 MATERIALS**

- A. Exterior:
  - 1. Low VOC (less than 350 grams per liter), water-borne, membrane forming curing compound meeting requirements of ASTM C309, Type 2.
  - 2. Horizontal Miscellaneous Cast-In-Place Concrete:
    - a. Class Two Quality Standard. See Section 01 6200 for definition of Classes.
      - 1) Vocomp 20 Cure and Seal by W. R. Meadows.

**PART 9 - EXECUTION****9.1 PREPARATION**

- A. Protection of In-Place Conditions:
  - 1. Protect surfaces that will be receiving products or systems incompatible with curing compounds.

2. Where such surfaces do receive curing compound, remove to extent required by installer of products and systems to be subsequently installed and at no additional cost to Owner.

**END OF SECTION**