

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, joint fillers, placement procedures, finishes, and curing for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Walks and curbs
 - 5. Miscellaneous Concrete

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, and supports for concrete reinforcement.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs ACI-certified Flatwork Technicians and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction and to Owner, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technicians and Concrete Laboratory Testing Technicians - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"
 - 2. ACI 301, "Specifications for Structural Concrete"
 - 3. ACI 302.1R, "Guide for Concrete Floor and Slab Construction"
 - 4. ACI 302.2R, "Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials"
 - 5. ACI 308.1, "Standard Specification for Curing Concrete"
 - 6. ACI 318, "Building Code Requirements for Structural Concrete."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated into flat sheets from as-drawn steel wire.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

Load Transfer Dowels: For new Slab construction joints shall contain PNA diamond dowels 24" on center per the drawings. For a new slab cast adjacent to an existing slab, use PNA square dowels 18" on center anchored into the existing slab. The portion of the dowel that will be cast into the newly placed concrete shall receive PNA Square Dowel clips per the drawings.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I or II, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F or Class C
 - 1) Not permitted at polished concrete finish floor.

- b. Ground Granulated Blast Furnace Slag: ASTM 989 Grade 100 or Grade 120.
 - 1) Prohibited in slabs on grade.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S crushed coarse aggregate or better, graded. Provide aggregates from a single source. All aggregates shall be non reactive.

- 1. Crush Coarse-Aggregate Size: Coarse aggregate shall be as large as possible while complying to ACI standards.

C. For slab on grade. ASTM C 33, Class 3S crushed coarse aggregate or better, graded. Provide aggregates from a single source.

- 1. Crushed Coarse-Aggregate Size:

- a. Slab on grade concrete:

- 1) 5" slabs: 1 ½ inch nominal, similar to ASTM C 33 #467 with 100% passing the 1 ½" sieve.
- 2) 4" slabs: 1 inch nominal, similar to ASTM C 33 #57 with 100% passing the 1" sieve

D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

- 1. Water-Reducing Admixture: ASTM C 494/C 494M, Types A, F or G

2.6 VAPOR RETARDER (AT SLAB)

A. **When required by project building code or site specific conditions:** Refer to Section 076200

2.7 SUBSLAB FILL MATERIAL:

A. Material and material preparation shall be in accordance with the site specific geotechnical report. Material shall be a well graded crush and run material capable of being compacted to 95% of its modified proctor. The subbase fill material shall adequately support all construction equipment such as ready mix trucks and placing buggies. Materials that excessively rut such as natural sands and gravels shall not be permitted.

2.8 CURING MATERIALS

A. Exterior Concrete & the Freezer Slab: Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class B.

- 1. Products:

- a. Master Builders Solutions Admixtures US, LLC: MasterKure CC 300 SB (formerly Kure-N-Seal 30 by Sonneborn, Div. of ChemRex;).

B. Exposed slab on grade (Back rooms and Coolers): Penetrating Concrete Densifier/Sealer

- 1. Penetrating, chemically reactive, concrete hardener.
- 2. Acceptable products:
 - a. Cosolideck LS by Prosoco
 - b. Pentrasil NL by Convergent
 - c. Lion Hard by L&M Construction Materials
 - d. Retroplate by Advanced Floor Products

- e. 3DHS by Ameripolish

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler: ASTM D 4819 Type II ½" thick closed cell non crosslinked polyethylene foam.
- B. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- C. Bond breaker: At the construction joint between the back room and the sales floor slab, install a roofing paper bond breaker
- D. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

- A. Repair Underlayment for slab areas beneath floor coverings: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to ¼ inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment for slab areas remaining exposed: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to ¼ inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 20%. (Not permitted at polished concrete finish floor.)
 - 2. Ground Granulated Blast Furnace Slag: 25%. (prohibited in slabs on grade)
- C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.

2. Only non-chloride admixtures are permitted.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS -See project specific requirements on Structural drawings.

2.13 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, Class C, 1/2 inch for rough-formed finished surfaces.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. **When required by project building code or site specific conditions**
- B. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
- C. Extend vapor barrier to the perimeter of the slab. Terminate at the top of the slab. At the point of termination, seal vapor barrier to the foundation wall or grade beam.
- D. Overlap joints 6 inches and seal with manufacturers tape. Seal all penetrations per manufacturer's instructions.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not weld reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire. Welded wire reinforcement to be installed concurrently with the slab placement so that subbase integrity can be monitored and maintained.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of slabs.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of concrete thickness as follows:
 - 1. Early Entry Sawed Joints: Contraction joints shall be installed with early entry power saws equipped with shatterproof abrasive blades. Cut 1/8-inch-wide joints into concrete as soon as cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Location of control joints shall be reviewed by the floor slab subcontractor. Joint saver must be used where one sawcut crosses another. The dust created by the sawing must be collected and removed from the floor's surface as soon as possible and shall not be permitted to lay on the slab overnight

2. Joint spacing for a 5" slab shall be approximately 12'-6" on center. Spacing for a 4" slab shall be approximately 10'-0".
3. Joint savers shall be used when a sawcut crosses a previous cut.
4. Sawing speed shall be such that excessive raveling does not occur.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Water addition at the site shall be in accordance with ASTM C-94. Person(s) responsible for jobsite water additions shall be determined at the pre slab coordination meeting. All additions of water at the site shall be noted on batch ticket and the concrete inspector's ticket.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

D. Deposit and consolidate concrete for in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete with external vibrators during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position using chairs or spacers during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to where required.
5. Begin initial floating of flatwork using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
4. Use indirect heat to maintain a minimum of 50 °F two days prior and 5 days following slab on grade placement.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Unless approved by the Owner of his Agents, maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces indicated to be covered with fluid-applied or sheet waterproofing.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces exposed to view or to be covered with thin-film-finish coating system.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or porcelain tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
- E. Broom Finish: Apply a broom finish to concrete platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
 2. Verify medium broom finish for freezer slab with ALDI Representative.

3.9 EXTERIOR CONCRETE PAVEMENT

- A. Broom Finish: Apply a broom finish to concrete walks, platforms, steps, stoops, ramps, and pavement, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
 2. Troweling of exterior concrete in freeze thaw zones prior to booming is prohibited.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor rods for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure all unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods.
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING – see section 079200.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when required by Owner. Remove and replace concrete that cannot be repaired and patched to Owner's satisfaction.

- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner may engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Verification of use of required design mixture.
 - 3. Concrete placement, including conveying and depositing.
 - 4. Curing procedures and maintenance of curing temperature.
 - 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. All testing shall be performed by an ACI Concrete Technician, Grade I.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - 7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two (or three for 4"x8" molds) specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two (or three for 4"x8" cylinders) specimens obtained from same composite sample and tested at age indicated.
 - 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Owner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

ALDI Retail Facility

END OF SECTION 033000

SECTION 033170 –INTERIOR CONCRETE SLAB ON GRADE JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Joint sealing and filling for all interior slab on grade concrete including the back room and sales floor joints.

1.2 SUBMITTALS

- A. Product Data
 - 1. Submit brand name, chemical composition, installation procedures and certificate of compliance with required standards for the following products:
 - a. Elastomeric joint materials (sealant and back up materials)
 - b. Polyurea joint placement
 - 2. Submit product data one month prior to slab on grade placements.
- B. Installation contractor qualifications
 - 1. Provide letter of certification from the installer of semi rigid poly urea joint filler.
 - 2. Letter shall be from the manufacturer of the semi rigid poly urea joint filler and shall state that the proposed contractor is qualified to install material on this specific project.
- C. The joint sealant contractor shall submit a project specific Letter of Qualification and/or Certification from the joint sealant manufacturer.

1.3 QUALITY ASSURANCE

- A. Interior sealants in food preparation areas shall meet the compositional requirements for use in USDA regulated facilities, as required by FDA according to 21 CFR 177.2600, and local authorities having jurisdiction.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Follow the Manufacturer's written recommendations.

PART 2 - PRODUCTS

2.1 Elastomeric sealants for use in isolation joints

- A. Color shall be Standard Gray.
- B. Approved Polyurethane Sealants.
 - 1. Sikaflex -2C NS, by Sika Corporation
 - 2. Sonolastic NP-1, by BASF (Sonneborn)
 - 3. Eucolastic Series, by Euclid Chemical Corporation
 - 4. Dymeric 240, by Tremco

2.2 Semi-rigid joint filler to be used at all sawn contraction joints and joints that will receive pallet truck traffic.

- A. Approved Interior Joint Fillers.
 - 1. Newly Placed Concrete
 - a. Polished Concrete (This will be provided (furnished and installed by the Aldi Polished Concrete finishing contractor.)
 - 1) Spal Pro RS 65 by Metzger McGuire (color shall be Standard Gray). or SL 60 by VersaFlex (color shall be VF 1221)
 - 2) Install during the polishing process.
 - b. All other interior slab on grade work (back of house)
 - 1) Spall Pro RS 88 by Metzger McGuire (color shall be Standard Gray) or
 - 2) SL 90 by VersaFlex (color shall be VF 1221)

- 3) Installation shall be delayed as long as possible to permit slab shrinkage.
 - 4) To be installed the full depth of the sawn joint.
2. Existing Concrete
 - a. Polished Concrete (This will be provided (furnished and installed by the Aldi Polished Concrete finishing contractor.)
 - 1) Spal Pro RS 65 or MM80 by Metzger McGuire (color shall be Standard Gray). Or
 - 2) SL 60 by VersaFlex (color shall be VF 1221)
 - b. All other interior slab on grade work (back of house)
 - 1) Spall Pro RS 88 by Metzger McGuire (color shall be Standard Gray) or
 - 2) SL 90 by VersaFlex (color shall be VF 1221)
 - 3) To be installed the full depth of the sawn joint.

2.3 Freezer slab

- A. Metzger McGuire's Spal-Pro Rapid Set Freezer Polyuria Joint Filler
 1. Color shall be Standard Gray.

2.4 MISCELLANEOUS

- A. Stain Preventing Film
 1. SPF, by Metzger McGuire
 2. CleanCut, by Euclid Chemical Corporation
- B. Equipment
 1. Dust Free Saw
 - a. Saw Tec Crack Vac by Blasttrac
 - b. Joe Due Saw by Joe Due
 2. Polyurea Pumps
 - a. PCH GMP Series by AST
 - b. JointMaster Pro 2 Series by Webac
 - c. SB 2005 by Hi-Tech

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect joints indicated to receive joint sealers, joint fillers, and/or caulking compound for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not allow joint sealer work to proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cleaning of Floor Joints
 1. Immediately prior to application of joint materials re-saw, with a dust free saw, all floor joints to full depth of initial saw cut. No other method shall be employed in cleaning out the floor joints prior to the installation of the filler. Remove loose particles remaining from above cleaning operations by vacuuming. Ensure dirt, debris, saw laitance, release agent, curing compound, and other foreign material are removed from full depth of joint.
- B. Stain Preventing Film
 1. If joint filling is occurring after grinding and polishing, use a stain preventing film to protect slab surfaces from contact with semi-rigid polyurea joint filler. Follow manufacturer's application instructions. Do not use tape to protect slab surfaces from contact with semi-rigid polyurea joint filler.

3.3 INSTALLATION

- A. General
 1. Comply with joint sealer, filler, and caulking manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply
 2. Install joint sealer/filler just prior to substantial completion (shelving & racking), unless noted otherwise.
 3. Immediately prior to sealing/filing, clean joints to full depth of sealant/filler in accordance with manufacturer's recommendations. Remove form release agent, curing compound or other contaminants.

- B. Fill contraction, isolation and construction joints in floor slabs unless otherwise indicated on the drawings or specified herein.
- C. For interior slabs, use semi-rigid joint filler in contraction and construction joints, and use elastomeric sealant in isolation joints, unless noted otherwise.
- D. Elastomeric Joint Sealant Installation
 - 1. General, unless noted otherwise herein or on the drawings
 - a. Install over soft preformed joint filler material.
 - b. Tool surface to provide smooth, attractive appearance and geometry recommended by the sealant manufacturer.
- E. Semi-rigid Joint Filler Installation:
 - 1. Install products per manufacture's recommendations.
 - 2. Discontinue scrubbing of slab surface for 72-HRS prior to intended joint filler and sealant installation.
 - 3. Apply narrow line of joint filler stain preventing film on both sides of joints.
 - 4. Initially fill joints with semi-rigid polyurea epoxy joint filler at the earliest point in time permitted by the manufacturer. Completely fill joints in one or two passes, if needed, to produce a slight crown.
 - 5. Remove excess filler from exposed concrete surface prior to it setting.
 - 6. Add extra filler prior to setting, if needed, to prevent depressed areas.
 - 7. After curing, razor off crown so filler is flush with the adjacent concrete surfaces.
 - 8. Immediately remove stain preventing film after shaving joint filler. Follow the manufacturer's instructions for removal.
 - 9. Repair joints one week prior to store opening with semi-rigid polyurea joint filler as defined below.
 - 10. One month before end of warranty period, repair exposed joints.
 - 11. Staining of the slab due to joint filling will not be accepted.

3.4 PROTECTION AND CLEANING

- A. Install caution tape around work area to protect joint materials during and after curing period from contact with contaminating substances or from damage resulting from construction traffic and operations.
- B. If despite protection; damage, splits or deterioration occurs; cut out and remove damaged or deteriorated joint materials immediately. Refill joints with new materials in required areas that are indistinguishable from original work.
- C. Clean off excess joint materials or smears adjacent to joints as work progresses by approved methods and with cleaning materials approved by manufacturers of joint material and of products in which joints occur.

END OF SECTION 033170