

Project: Timpanogos Regional Hospital – MRI Retrofit
Addendum #5

Date: September 1, 2020

To: Contractors/Subcontractors

From: HKS Architects, Inc
90 South 400 West, Suite 110
Salt Lake City, Utah 84101
(801) 532-2393

The Pricing Documents shall be amended and/or revised by Addendum hereinafter specified and all Work affected by this Addendum shall be included.

Except as may otherwise be described, labor and materials for the Work hereinafter shall conform to all requirements of the original Contract Documents.

Pages of Addendum: 17 each pages

Specification Clarifications:

Add: Specification section 03 3500 Concrete Finishing, attached, shall be added to the contract documents. It includes the finish for the MRI equipment room, and information for concrete repair, if it should be required. It also includes concrete floor and slab finishing requirements.

Architectural Clarifications:

Sheet A2.02:
Clarification: MRI Equip 1010 shall indicate RB-01 as a base finish in this room. IPT-01 shall be indicated in this room as the wall paint. The new concrete floor shall be finished with the penetrating liquid floor hardener and sealer indicated in the attached concrete finishing specification.

End of Addendum

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SECTION 033500

CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work required for this Section includes concrete finishing of cast-in-place concrete including supplementary products necessary to complete the concrete installation.

1.2 DEFINITIONS

- A. Curing: Action taken by which hydraulic-cement concrete matures and develops hardened properties over time as result of continued hydration of cement in presence of sufficient water and heat.
- B. Envelope: Vertical distance between two level lines or planes.
- C. Flatness: Degree to which surface approximates plane.
- D. Levelness: Degree to which line or surface parallels horizontal. Horizontal is normal to direction of gravity.
- E. Minimum Local Value: Minimum local F(F) or F(L) value at given floor level, taken within one floor test area defined as Minimum Local Area.
 - 1. Boundaries of Minimum Local Areas may not cross construction joints.
 - 2. Slabs-on-Grade: Minimum Local Area will be bounded by construction and/or control joints, or by column lines and half-column lines, whichever is smaller.
- F. Specified Overall Value: Composite value of samples taken at given level, regardless of number of concrete placements required to complete level. Specified overall F-numbers represent minimum values allowed for entire floor, looked at as whole.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit copies of manufacturers' technical literature for specified products.
 - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
 - 2. Submittal(s) shall identify location(s) of Contractor's intended application of product(s).

1.4 INFORMATIONAL SUBMITTALS

- A. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

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- B. Repair Records: At conclusion of project, submit record of repairs as part of job close-out information. Record shall be complete in detail and will serve as Owner's documentation of repairs made to concrete work. Include following information.
 - 1. Location and size of repair. Include individual identification number for each repair and provide dimension(s) from established grids, elevations, and approximate repair size.
 - 2. Statement of reason(s) for repair.
 - 3. Repair material(s) applied.
 - 4. Date of repair application.
 - 5. Name(s) of trained installer used for each repair.

1.5 QUALITY ASSURANCE

- A. Finisher Qualifications: Finisher with not less than 5 years experience with successful concrete finishing and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 5 years, and with sufficient production capability, facilities, and personnel to produce required Work.
- B. Work Plan for Out-of-Tolerance Floor Surfaces:
 - 1. Detailed work plan for areas where remedial measures are necessary to correct unsatisfactory as-built floor flatness/levelness conditions. Include following information:
 - 2. Specific boundaries of area to receive remedial work
 - 3. Methods and products proposed.
 - 4. Grout/topping/underlayment product literature.

1.6 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1.7 COORDINATION

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation
- C. Coordinate openings, penetrations, and sleeve requirements with final equipment selections and locations by MEP sub-contractors. Verify any changes with Engineer of Record prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

- A. Acceptable Manufacturers/Fabricators and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers/fabricators listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

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- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers/fabricators offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 CURING MATERIALS

- A. Liquid Membrane-Forming Curing Compound:

1. Description: ASTM C 1315, Type 1, Class A, clear water-based acrylic blend curing compound with 25 percent solid content (minimum); non-yellowing under ultraviolet light after 500 hours of test in accordance with ASTM D 4587; water based, VOC/AIM compliant. Sodium silicate compounds are not acceptable.
2. Manufacturers and Products:
 - a. Euclid Chemical Co.; Super Diamond Clear VOX.
 - b. Lambert Corp.; UV Safe Seal.
 - c. L & M Const. Chemicals; Lumiseal WB Plus.
 - d. W.R. Meadows, Inc.; Vocomp-25 or Vocomp-30.
3. Alternate Products: Products listed above are non-yellowing. Other products of same manufacturers which exhibit moderate yellowing in accordance with ASTM C 1315, Type 1, Class B, and comply with other specified requirements and limitations herein may be acceptable pending Architect/Engineer review and approval.

Note: Fugitive dye is beneficial to confirm both initial compound coverage and product dissipation. DO NOT specify or allow clear dissipating resin curing compounds.

- B. Dissipating Resin Membrane-Forming Curing Compound with Fugitive Dye:

1. Description: ASTM C 309, Type 1-D, Class B, water-based and formulated with hydrocarbon resins, which begins chemical break-down after approximately 4 weeks.
2. Manufacturers and Products:
 - a. Euclid Chemical Co.; Kurez DR VOX.
 - b. L & M Const. Chemicals; L&M Cure R.
 - c. Lambert Corp.; Aqua Kure.
 - d. W.R. Meadows; 1100-Clear Series.

- C. Evaporation Retarder:

1. Description: Waterborne monomolecular film-forming compound manufactured for application to plastic concrete, preferably leaving no residue after concrete hardens. Residue remaining after concrete hardens shall be removed in accordance with manufacturer's recommendations.
2. Manufacturers and Products:

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- a. BASF; MasterKure ER 50 (Formerly Confilm).
- b. Euclid Chemical Co.; Eucobar.
- c. Lambert Corp.; Lambco Skin.
- d. L&M Construction Chemicals, Inc.; E-Con.
- e. W.R. Meadows; EVAPRE.
- f. Sika Corporation; SikaFilm.

D. Moisture-Retaining Cover:

1. Description: ASTM C 171, curing paper, white opaque polyethylene film, and polypropylene nonwoven fabric with white coating applied to one side, or white burlap-polyethylene sheeting. Polyethylene film not permitted at unformed surfaces. Clear or black polyethylene film permitted at interior formed surfaces with no exposure to sunlight during curing period.
2. Manufacturer and Product:
 - a. Curing Paper: Fortifiber Corp.; Orange Label, Sisaldraft curing paper.
 - b. Polyethylene Film: As recommended by Contractor; submit for Architect's review.
 - c. Polypropylene Nonwoven Fabric:
 - 1) Reef Industries/Armorlon; Transguard 4000.
 - 2) PNA Construction Technologies; Hydracure.
 - 3) Sika Corporation; Ultracure NCF.
 - d. White Burlap-Polyethylene Sheeting: As recommended by Contractor; submit for Architect's review.

- E. Absorptive Cover: AASHTO M 182, Class 2, Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd.

2.4 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Hardener and Sealer: Chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, densifies, and seals concrete surfaces. Minimum manufacturer's written warranty of 10 years to effectively harden, densify, and dustproof concrete surfaces.

1. Manufacturer Products, subject to specified written warranty:
 - a. ARDEX Engineered Cements; PC50.
 - b. Curecrete Chemical Co., Inc.; Ashford Formula.
 - c. Euclid Chemical Co.; Euco Diamond Hard.
 - d. L&M Construction Chemicals, Inc.; Seal Hard.

2.5 REPAIR MATERIALS

- A. Self-Leveling Concrete Topping (Wear surface):

1. Description: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/2 in (12 mm) to 2 in (50 mm). Consult manufacturer for thickness exceeding 2 in (50 mm). Interior use only, unless exterior application recommended by manufacturer within written literature.

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2. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 3. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 4. Aggregate: Well-graded, washed gravel, 1/8 in (3 mm) to 3/8 in (10 mm) or coarse sand as recommended by topping manufacturer for specific application thickness. No coarse aggregate permitted for thicknesses of 1 in (25 mm) or less.
 5. Compressive Strength: 5,000 psi minimum at 28 days when tested according to ASTM C 109.
 6. Substrate Preparation: As recommended by product manufacturer.
 7. Basis of Design (Product Standard): ARDEX Engineered Cements; "Ardex SD-T".
 8. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Architect's and Engineer's review and approval.)
 - a. ARDEX Engineered Cements.
 - b. BASF
 - c. Custom building Products.
 - d. Euclid Chemical Co.
 - e. Sika Corp.
- B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.
- C. Overlay and Repair Mortar:
1. General: Use of overlay and repair mortar shall be in accordance with manufacturer's application limitations, precautions, and directions for use, including but not limited to surface preparation, mixing, placing, curing, and compatibility with substrate conditions.
 2. Product types listed below are basis of design, however, it is recognized by Architect/Engineer that high performance cement based overlay/repair mortars are available which may be satisfactory to specific application. Intent is not to omit such products from consideration. Subject to Architect and Engineer's approval prior to use.
 3. Epoxy Mortar:
 - a. Description: ASTM C 881, acceptable at interior applications only, unless otherwise directed by Engineer; appropriate applications include locations susceptible to high wear or high corrosion.
 - 1) Type I: Acceptable at non-structural applications.
 - 2) Type IV: Acceptable at structural applications.
 - b. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval.)
 - 1) ARDEX Engineered Cements.
 - 2) BASF
 - 3) Euclid Chemical Company.
 - 4) Sika Corporation.
 4. Polymer Modified Cementitious Mortar:
 - a. Description: ASTM C 1059, Type II, acceptable at structural and non-structural applications, interior or exterior.

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- b. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval.)
 - 1) ARDEX Engineered Cements.
 - 2) BASF
 - 3) Euclid Chemical Company.
 - 4) Sika Corporation.

D. Epoxy Grout Fill:

- 1. General: Use epoxy grout fill in accordance with manufacturer's application limitations, precautions, and directions for use, including but not limited to surface preparation, mixing, placing, curing, and compatibility with substrate conditions.
- 2. Description: Multi-component, high strength epoxy grout.
- 3. Manufacturers and Products:
 - a. BASF Construction Chemicals; MasterFlow 648.
 - b. Laticrete; L&M EpoGrout 758 Epoxy Structural Grout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive concrete finishing, products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 INSTALLATION, GENERAL

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
 - 1. Respective manufacturer/fabricator's written installation instructions.
 - 2. Accepted submittals.
 - 3. Contract Documents.

3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

3.4 FINISHING FORMED SURFACES (ACI 347)

- A. Rough-Formed Finish: Class D and C Surfaces.
 - 1. Definition: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched.

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2. Procedure: Remove irregularities including but not limited to fins, ravelings, loose material, and other projections exceeding specified limits as measured within 5 foot length of straightedge by rubbing down, chipping off, filling in with approved repair mortar, or combination thereof to satisfactorily complete Work.
3. Locations and Irregularity Limits:
 - a. Class D: Maximum abrupt or gradual irregularity limited to 1 in (25 mm).
 - 1) Concrete surfaces not exposed to view; such as foundations and crawl spaces.
 - b. Class C: Maximum abrupt or gradual irregularity limited to 1/2 in (12 mm).
 - 1) Concrete surfaces not exposed to public view or concrete surfaces concealed by other construction.

B. Smooth-Formed Finish: Class B and A Surfaces.

1. Definition: As-cast concrete texture obtained with selected form-facing material, arranged in orderly and symmetrical manner with minimum of seams.
2. Procedure: Repair and patch tie holes and defective areas. Remove irregularities including but not limited to fins, ravelings, loose material, and other projections exceeding specified limits as measured with 5 foot length straightedge by rubbing down, chipping, off, filling in with approved repair mortar, or combination thereof to satisfactorily complete Work.
3. Locations and Irregularity Limits:
 - a. Class B: Maximum abrupt or gradual irregularity limited to 1/4 in (6 mm)
 - 1) Concrete surfaces to receive coating or covering material applied directly to concrete, such as waterproofing, dampproofing, or plastering.
 - b. Class A: Maximum abrupt or gradual irregularity limited to 1/8 in (3 mm).
 - 1) Concrete surfaces to receive coating or covering material applied directly to concrete, such as textured acrylic coating, concrete surfacing compound or other similar systems.

3.5 FINISHING FLOORS AND SLABS (UNFORMED SURFACES)

- A. General: Prior to proceeding with any finishing operation, complete initial placement procedures consisting of deposit in form(s), consolidation, screeding, leveling, bull-floating, and initial re-straightening. Do not commence finishing operation when excess moisture or bleed water remains on surface. Do not wet concrete surfaces during finishing operations.
- B. Screeding Concrete:
 1. Act of striking off surface of concrete to pre-determined grade conforming to elevations shown on Drawings shall be accomplished with use of rigid screed guides. Use of wet screed guides is to be avoided on elevated surfaces.
 2. Contractor shall include in his bid any additional concrete required to achieve specified slab surface finish tolerance. Finish floor tolerances shall be as specified elsewhere in this Section.

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C. Float Finish:

1. Procedures:

- a. After concrete has been placed, consolidated, screeded, and restraightened, concrete shall not be worked further until ready for floating. Begin floating operations when water sheen has disappeared, and/or when mix has stiffened sufficiently to permit proper operation of float.
- b. Floating with power machine equipped with normal trowel blades is not permitted.
- c. Floating with power machine equipped with water attachment for wetting concrete surface during finishing is not permitted.
- d. Consolidate surface with power-driven machine initially equipped with float-shoe blades. Hand float with wood or cork faced floats in locations inaccessible to power-driven machine. Restraighten surface with ten-foot highway straightedge applied at not less than two different angles approximately perpendicular.
- e. Finish surfaces to following tolerances when measured according to ASTM E 1155.
 - 1) Specified Overall Values: F(F) 18 ; F(L) 15
 - 2) Minimum Local Values: F(F) 15 ; F(L) 10
- f. Cut down high spots and fill low spots during this procedure to produce planes checking true under straightedge in any direction. Uniformly slope surfaces to drains.
- g. Follow restraightening operation by final float pass with power machine equipped with "pizza type" metal pan clipped to float blades to uniform, smooth, granular texture.
- h. Pre-plan floating operations sufficiently in advance to avoid over-finishing and incorporating additional water into surface.

2. Locations to receive Float Finish:

- a. Surfaces to receive trowel finish.
- b. Surfaces composed of air-entrained concrete.

D. Trowel Finish:

1. Procedures: Perform after applying float finish. Intent is to perform minimum troweling effort necessary to achieve satisfactory surfaces. Avoid over-troweling of surfaces and working of water into surfaces. Where bleedwater is present prior to troweling, excess water shall be dragged off or removed by absorption with porous material such as burlap. Incorporate steps to prevent "blistering". If blistering occurs during finishing or otherwise becomes evident after placement, re-evaluate and correct finishing operations immediately.
 - a. Perform first trowel finish operation with power-driven trowel, fitted with blades as flat to surface as possible and driven at slow speed, to produce smooth surface which is relatively free of defects but may still contain some trowel marks.
 - b. Additional trowelings with power-driven trowel or by hand troweling may be necessary, with waiting period between each successive troweling effort.
 - c. Perform final troweling with hand trowels after surface has hardened sufficiently to permit final consolidation of surface, free of trowel marks, and uniform in texture and appearance.

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- d. Avoid degree of troweling effort(s) resulting in surfaces which exhibit a sheen or glossy appearance.
- e. Avoid trowel patterns at surfaces exposed to view. Resulting trowel patterns at exposed surfaces are subject to Architect's approval.
- f. Finish surfaces to following F(F) and F(L) tolerances when measured according to ASTM E 1155:
 - 1) Floor levelness does not apply to slabs placed on unsupported form surfaces, such as slabs over unshored metal deck, and to inclined slabs.
 - 2) Slabs-on-Grade:
 - a) Specified Overall Value: F(F)-25/F(L)-20
 - b) Minimum Local Value: F(F)-17/F(L)-14
- g. Repair defects of sufficient magnitude to telegraph through floor covering by grinding or by application of topping. Refer to Remedy for Out-of-Tolerance Floor Surfaces article below for additional remedial measures.

2. Locations to receive Trowel Finish:

- a. Monolithic slab surfaces exposed to view in finished Work, unless noted otherwise.
- b. Slab surfaces to be covered with resilient flooring, carpet, paint, or other thin film-finish coating system.

E. Broom Finish:

- 1. Procedures: Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- 2. Locations for Broom Finish:
 - a. Exterior concrete pads.

3.6 FLOOR AND SLAB TREATMENTS

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete for minimum period indicated below from premature drying and excessive cold or hot temperatures.

Cement Type	Minimum Curing Period
Type I Portland Cement	7 days
Type II Portland Cement	10 days
Type III Portland Cement	3 days (when ambient temp. is 73 deg F or higher)
Type IV or V Portland Cement	14 days
Blended Cements	Variable, but, not less than period above for Type of Portland Cement in blended mix.

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- B. Curing Time Reduction: Curing times may be reduced from periods noted above at concrete which will have permanent in-service interior exposure to conditioned air if either of following provisions is complied with.
1. When tests are made of field cured cylinders cured by same methods as structure, curing period may be terminated when average compressive strength has attained 75% of specified 28-day compressive strength. Minimum curing period not less than 72 hours.
 2. When temperature of structure concrete is maintained at minimum of 50 deg F (10 deg C) for same length of time required for laboratory cured cylinders of same concrete to reach 85% of specified 28-day compressive strength, curing period may be terminated. Minimum curing period not less than 72 hours.
- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions result in rate of evaporation (estimated by ACI 305R, Fig. 2.1.5) approaching 0.2 lb/sq. ft. x h (1 kg/sq/ m 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.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of specified curing methods as applicable. Contractor shall select method which is compatible with requirements for subsequent material application on surface.
- E. Curing Methods: Cure formed and unformed surfaces by one or a combination of following methods as applicable.
1. Curing Compounds:
 - a. Procedures: Apply curing compound to concrete surfaces as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Do not use curing compounds which exhibit yellowing or moderate yellowing at surfaces to be permanently exposed in finished Work.
 - c. Removal: If curing compounds are used on surfaces (exterior or interior, formed or unformed) that are scheduled or specified to receive surface-adhered treatment (including but not limited to cementitious toppings/overlays, adhesive applied carpet, resilient flooring, terrazzo, thin-set ceramic tile/stone, wood, coatings, paint, waterproofing, membranes, athletic flooring, epoxy overlay/adhesive, hardeners, sealers, water repellents, or other covering system adhered with water-based adhesive), then the following requirements apply:
 - 1) Remove curing compound no later than 7 days after end of curing period by mechanical bead blast process acceptable to Architect.
 - 2) Allow sufficient additional time after curing compound removal to achieve proper concrete moisture and/or water vapor limitation for successful application of subsequent surface treatment as specified in appropriate surface treatment specification Section.

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- d. Do not use curing compounds at concrete surfaces that are to receive the following finishes:
 - 1) Penetrating liquid floor hardener and sealer.
- e. Incorrect Use: If curing compound is incorrectly used on concrete surfaces specified to receive other curing method(s), then mechanically or chemically remove curing compound in its entirety not later than 7 days after end of curing period by pre-approved method(s). Acid etching is not permitted. Method of curing and sealing compound removal shall not result in damaged or otherwise unsuitable surface to receive specified finish material, coating, membrane, or covering and shall be at Contractor's expense. Consult with appropriate surface finish vendor and installer for suitability of curing compound removal method prior to the Work.

F. Control of Water after Curing: Control water at all times after curing period. Rewetting after curing period affects drying of hardened concrete with direct effect on application of finish materials applied with adhesives sensitive to moisture and/or water vapor. Control of water includes water at jobsite, and moisture due to rain, ice, or snow. Contractor is responsible for control of water and affects on concrete and material(s) to be applied to hardened concrete.

3.8 FLOOR SURFACE TOLERANCES

A. Specified Overall Value(s) and Minimum Local Value(s) herein represent minimum floor flatness/levelness criteria for project.

- 1. Where normal data collection under provisions of ASTM E 1155 indicate possibility of work below these values, additional data collection may be required to confirm extent, or boundary, of defective work at Contractor's expense.
- 2. When areas are identified as not meeting specified Minimum Local Value(s), such areas are deemed as out-of-tolerance floor surfaces and shall be replaced or repaired in accordance with "Remedy for Out-of-Tolerance Floor Surfaces" below.

B. Floor Elevation Tolerances:

- 1. Permissible Vertical Envelope: When tested in accordance with requirements of ASTM E 1155, following percentages of elevation samples on floor slabs at single elevation shall fall within level $3/4$ in (19 mm) envelope centered about mean elevation of readings.
 - a. Slabs-on-Grade: 85 percent.
- 2. Permissible Arithmetic Mean Deviation of Floor Samples: Arithmetic mean of these elevation samples shall not deviate from design grade more than following amounts:
 - a. Slabs-on-Grade: $1/4$ in (6 mm), plus or minus.

C. Contractor shall take immediate action to correct work that does not meet specified tolerances.

3.9 REMEDY FOR OUT-OF-TOLERANCE FLOOR SURFACES

A. General:

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1. Remedial work, testing, retesting, and consulting services necessary to correct out-of-tolerance floor surfaces shall be at Contractor's expense with no extension to construction schedule.
2. Repair and/or replacement procedures, limits, and products shall be in manner that does not diminish desired appearance or serviceability of structure, and acceptable to Architect/Engineer and Owner. Contractor shall submit detailed work plan for areas where remedial measures are necessary, prior to work, and in accordance with Contractor's submittal "Work Plan for Out of Tolerance Floor Surfaces".

B. Remedial Measures:

1. Minimum local areas measuring below specified minimum local value(s) shall be repaired by grinding or by application of topping or underlayment to entire surface of minimum local area, and retested, unless following conditions occur:
 - a. Such area is acceptable to Architect/Engineer and Owner, and written acceptance is provided.
 - b. Repair of such area would diminish desired appearance and/or serviceability of structure, or is in general considered unacceptable to Architect/Engineer and Owner for other reasons, in which case minimum local area(s) shall be replaced and retested.
2. Application of topping or underlayment:
 - a. Prime floor surface as recommended by topping or underlayment manufacturer.
 - b. Add aggregate for thicker areas as recommended by topping or underlayment manufacturer.
 - c. Install in accordance with manufacturer's directions.
 - d. For interior areas which are to have finish flooring, use self-leveling concrete underlayment.
 - e. For areas which will be exposed as wearing surface, use self-leveling concrete topping.

3.10 CONCRETE SURFACE REPAIRS

A. General:

1. Locate surface defects where repair is required by visual inspection of formed and unformed surfaces. Mark location in manner that does not cause further defect. Record and maintain record of such defects for Repair Records Submittal.
2. Remove and replace concrete with surface defects if defects cannot be repaired to satisfaction of Architect/Engineer or Owner.
3. Concrete removal shall be with equipment and procedures which will prevent cracking, micro-cracking, and bruising of sound concrete to remain. Follow initial concrete removal process with sandblasting to remove any remaining deleterious effects.
4. Repairs shall be performed by trained installer, experienced with type repair and repair products required.
5. Avoid cutting reinforcement during repairs, but, where reinforcement is encountered, remove concrete so as to expose reinforcement within repair area for 1 in (25 mm) minimum on all sides.
6. Protect freshly applied repair mortars from exposure to direct sunlight, wind, rain, and frost.

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7. Repair procedures outlined below are general in nature and not intended as complete repair preparation or installation instructions. Intent is to provide minimum basic repair criteria allowing for flexibility of means/methods based on experience of trained installers.
- B. Surface Defects: Repair and patch surface defects which become evident during construction and warranty periods, when such conditions are exposed to view, or when durability, serviceability, and/or structural integrity of structure is affected by defect. Surface defects requiring attention include, but are not limited to, following.
1. Honeycombs, rock pockets, and voids over **1/4 in (6 mm)** in any dimension.
 2. Holes left by tie rods, bolts, or other.
 3. Exposed reinforcing.
 4. Cracks **0.02 in (0.50 mm)** wide or wider at interior exposed or non-exposed conditions.
 5. Cracks in excess of **0.01 in (0.25 mm)** wide at exterior exposed conditions and/or where water tightness is critical as determined by Architect/Engineer.
 6. Cracks which penetrate completely through member, regardless of width.
 7. Spalls which affect durability, structural integrity, or finish appearance at surfaces exposed to view.
 8. Surface crazing which affects durability, structural integrity, or finish appearance at surfaces exposed to view.
 9. Stains, discolorations, and texture irregularities at surfaces exposed to view which cannot be corrected by cleaning or rubbing processes.
 10. High or low irregularities in unformed surfaces other than as specified for Out-of-Tolerance Floor Surfaces.
- C. Repairing Formed Surfaces:
1. After form removal, cut out honeycombs, rock pockets, and voids more than **1/2 in (12 mm)** in any dimension in solid concrete.
 - a. Mark perimeter of area to be removed with straight-line segments forming rectangular or square repair area on formed surface. Intent is for repair area edges to be linear and repair area shape to be parallelogram.
 - b. Saw cut perimeter of repair area to pre-determined repair depth, but not less than **1/2 in (12 mm)**. Make edges of cuts perpendicular to concrete surface.
 - c. Remove concrete within repair area by appropriate method to obtain exposed aggregate surface with minimum surface profile of **1/8 in (3 mm)**.
 - d. Clean substrate of dust, dirt, loose concrete, or other bond inhibiting material.
 - e. Dampen prepared substrate with water to saturated surface dry condition, and brush-coat surface with bonding agent. Pre-dampening may be omitted if not required by repair mortar manufacturer.
 - f. Fill and compact with repair mortar before bonding agent has available exceeded pot life.
 - g. Finish repair surface to match plane and texture of adjacent concrete.
 - h. Cure repair surface by moisture retaining cover for minimum period of 72 hours, but not less than period recommended by repair mortar manufacturer.
 2. Repair defects on surfaces exposed to view with patching mortar consisting of blend of white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.

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- b. Prepare substrate to receive patching mortar same as described above, except, repair depth not less than 1 in (25 mm).
 - c. Compact mortar in place and strike off slightly higher than surrounding surface.
 - d. Cure repair surface with moisture retaining cover for 7 days minimum.
3. Repair cracks exceeding limitations noted above by high or low pressure epoxy injection procedure acceptable to Architect/Engineer. Gravity flow techniques for epoxy resin repair of cracks not permitted.
- 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.
1. After concrete has cured at least 14 days, correct high areas by removal with mechanical equipment and procedures which will not cause cracking, micro-cracking, or bruising of sound concrete.
 2. Correct localized non-exposed low areas by cutting out low areas to minimum depth of 1/2 in (12 mm) and 1/8 in (3 mm) surface profile. Apply bonding agent and replace with repair mortar. Finish repaired areas to blend into adjacent concrete.
 3. Correct low interior areas scheduled to receive floor coverings with self-leveling concrete underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 4. Correct low interior areas scheduled to remain exposed with self-leveling concrete topping. Cut out low areas to ensure a minimum repair topping depth of 1/2 in (12 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Correct low exterior areas to remain exposed with overlay or repair mortar suitable for application. Cut out defective areas to ensure minimum repair mortar depth of 1/2 in (12 mm) and 1/8 in (3 mm) surface profile. Prepare, mix, apply, and cure repair mortar and primer according to manufacturer's written instructions
 6. Repair defective areas which cannot be satisfactorily repaired, by cutting out defective area in its entirety and replacing with fresh concrete. Remove defective areas with clean, square cuts. Preserve and expose steel reinforcement with at least 1 in (25 mm) clearance all around. Dampen concrete surfaces in contact with fresh concrete and apply bonding agent. Mix fresh concrete of same materials and mix as original concrete unless smaller coarse aggregate necessary for application. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair single holes 1 in (25 mm) or less in diameter with patching mortar. Cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
 8. Repair cracks exceeding limitations noted above by high or low pressure epoxy injection procedure acceptable to Architect/Engineer. Gravity flow techniques for epoxy resin repair of cracks not permitted.
- E. Repair methods not specified above may be considered, subject to approval of Architect/Engineer prior to work.

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3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid epoxy joint filler full depth in saw-cut joints and in tooled joints. Overfill joint and trim joint filler flush with top of joint after hardening.

PART 4 - QUALITY CONTROL

4.1 INSPECTION STANDARDS

- A. Quality control, testing, and inspections shall meet the special inspection requirements of the building code and any local or state provisions.

4.2 CONTRACTOR

- A. Owner may employ a qualified independent testing agency to perform the testing/inspection services, if required. Owner's employment of a testing agency shall not operate to relieve Contractor of responsibility to furnish materials and workmanship in accordance with Contract Documents.
- B. Owner's employment of a qualified independent testing agency to perform testing/inspection services is for verification and does not prevent Contractor from providing supplemental testing/inspection at Contractor's discretion and expense.
- C. Qualifications of Contractor's Testing/Inspection Personnel: Contractor's personnel performing testing/inspection services are subject to same qualifications as Owner's Testing Agency.
- D. Re-testing of conditions failing to meet specified requirements shall be provided at Contractor's expense.
 - 1. In the event of differences between Owner's testing agency and Contractor's inspector regarding conformance, such differences shall be brought to the attention of the Architect, Engineer of Record and enforcement agency as part of the resolution.
 - 2. Where there is no resolution of differences, joint supplemental testing between Owner's testing agency and Contractor's inspector may be required and provided at Contractor's expense.
 - 3. Additional fees for Architect and Engineer of Record participation in resolution of non-conforming work may be required and provided at Contractor's expense.
- E. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

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1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
 - a. Concrete underlayments, self-leveling concrete toppings, and overlay/repair mortars
 - b. Crack repair/injection.

END OF SECTION