DIVISION 3 - CONCRETE

SECTION 03 30 00 - CAST-IN PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish all material, labor and equipment necessary for the completion of all cast-in-place concrete work. This includes:

1. Formwork and form accessories; including all shoring, bracing and anchorage.
2. Reinforcing steel bars, wire fabric and accessories.
3. Setting all sleeves, block-outs, anchor bolts and other items to be embedded into this work.

1.2 SPECIAL REQUIREMENTS

A. Foundations: Foundation subcontractor is responsible for foundation excavation and backfill in accordance with Geotechnical Report. This includes furnishing and installing foundation drains when called for in Geotechnical Report.

B. Flatwork: This specification applies to office area floor slabs only. For industrial area floor slabs refer to Specification 03 31 00.

1.3 REFERENCES

A. ACI 117 – Tolerances

B. ACI 301 – Structural Concrete for Buildings

C. ACI 302 – Guide for Concrete Floor and Slab Construction

D. ACI 304 – Guide for Measuring, Mixing, Transporting and Placing Concrete

E. ACI 305 – Hot-Weather Concreting

F. ACI 306 – Cold-Weather Concreting

G. ACI 308 – Standard Practice for Curing Concrete

H. ACI 309 – Standard Practice for Consolidation of Concrete

I. ACI 318 – Building Code Requirements for Reinforced Concrete

J. ACI 347 – Recommended Practice for Concrete Formwork

K. ACI 360 – Design of Slabs-on-Grade

L. ACI SP-66 – ACI Detailing Manual

M. ASTM A185 – Welded Steel Wire Fabric for Concrete Reinforcement

N. ASTM A615 – Deformed and Plain Billet Steel Bars for Concrete Reinforcement

O. ASTM C33 and C131 – Concrete Aggregates

P. ASTM C94 – Ready-Mixed Concrete

Q. ASTM C143 – Test for Slump of Portland Cement Concrete

R. ASTM C150 – Portland Cement

S. ASTM C260 – Air-Entraining Admixtures for Concrete

T. ASTM C494 – Chemical Admixtures for Concrete

1.4 SUBMITTALS

A. Foundation Submittals

1. Concrete Mix Design
2. Reinforcing Steel Shop Drawings
3. Embed Fabrication/Layout Drawings
4. Curing Compound Data Sheets
5. Perimeter Foundation Insulation Data Sheets
6. Column Grout Mix Design

B. Floor Slab Submittals

1. Concrete Mix Design
2. Reinforcing Steel Shop Drawings
3. Vapor Barrier Data Sheet
4. Joint Layout Drawing
5. Joint Caulk Data Sheets
6. Curing Compound Data Sheets

C. Curb Submittals

1. Concrete Mix Design
2. Reinforcing Steel Shop Drawings
3. Curb Top Embedded Form Fabrication Drawing
4. Expansion Joint Material Data Sheet
5. Curing Compound Data Sheets
6. Curb-to-Wall Caulk Data Sheet

PART 2 PRODUCTS

2.1 FORMING MATERIALS

A. General: Forms shall conform to ACI requirements.

B. Formwork: Plywood or prefabricated forms with contact faces free of defects; sound undamaged surfaces with clean, true edges.

C. Form Ties: Plastic cone type removable ties with snap-off galvanized metal having 1” back-break dimension.

D. Form Release Agent: Non-staining mineral oil that will not absorb moisture or impair normal bonding or color characteristics of coating(s) intended for use on concrete.

E. Corners: Wood or plastic rigid strips for 3/4” fillets and chamfers at all exposed corners, unless specifically detailed otherwise.

F. Nails, Spikes, Lag Bolts, Through Bolts and Metal Accessories (Inserts): Size as required,

of sufficient strength and proper type to maintain formwork in place while placing concrete.

G. Water Stop: Non-structural, bentonite clay material in a water activated package.

2.2 REINFORCING STEEL

A. All reinforcing shall be free of loose rust or scale, grease or other coating that would prevent a concrete bond.

B. Reinforcing Bars: ASTM A615, Grade 60 or ASTM A706; intermediate grade, new, unfinished, deformed billet steel.

C. Bent Ties, Stirrups, Etc: ASTM A615, Grade 40, unfinished.

D. Tie Wire: Soft annealed black steel wire, minimum 16 BWG, single-stranded.

E. For Slab-on-Grade: Welded Steel Wire Mesh Fabric: ASTM A185 plain type reinforcing, unfinished. Shall be flat sheets (not coiled), have 6” overlap and be supported on chairs.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II gray Portland cement. **NOTE: No fly-ash, slag or pozzolans shall be used.**

B. Coarse and Fine Aggregates: ASTM C33 and ASTM C131, unless otherwise noted.

C. Coarse aggregate for cast-in-place concrete shall be clean, washed material, 1-1/2" minus in size; unless otherwise noted.

1. Foundation members with minimum dimension(s) of 16": coarse aggregate shall have maximum 2-1/2" aggregate.

2. Topping on Metal Deck: coarse aggregate shall be 3/4” minus.

3. Topping on Pre-Cast Plank: coarse aggregate shall be 3/4” minus.

4. Metal Pan Stairs: coarse aggregate shall be pea-gravel.

D. Fine aggregate (sand) shall be natural sand.

E. Water: Clean and potable.

2.4 ADMIXTURES

A. Air Entrainment: ASTM C260; for concrete exposed to weather (except foundations).

B. Admixtures for modifying concrete setting time, and/or for increasing workability, may be used at the discretion of the Concrete subcontractor at no additional cost. The subcontractor assumes full responsibility.

1. Accelerators: ASTM C494, Type C or E (containing no more chloride ions than potable water).

2. Water-Reducing Admixtures: ASTM C494, Type A (containing no more than 0.05% chloride ions).

C. The use of admixtures shall be in strict accordance with the manufacturer's printed instructions.

2.5 CONCRETE MIX DESIGNS

A. The concrete mix designs shall be proportioned in accordance with Section 5.3 of ACI 318, “Proportioning on the Basis of Field Experience and/or Trial Mixture”. The proportions of ingredients shall produce a mixture that is compatible with the placing, consolidating and finishing methods to be used on the project, but without segregation or excessive free water.

B. Unless shown otherwise on drawings, concrete shall be batched and mixed to achieve the following:

Description	Min. f'c
Footings & Foundation Walls	4,500 psi
Interior Slabs-on-Grade	3,500 psi
Elev. Slabs-on-Deck or Metal Stair Pan Fill	3,500 psi
Above Grade Construction	3,000 psi
Exterior Slab-on-Grade, Sidewalks, etc. (not exterior paving)	4,500 psi

C. The maximum ratios of water to cementitious materials (w/c ratio) are as follows:

1. 3,000 psi concrete: max. w/c = 0.55
2. 3,500 psi concrete: max. w/c = 0.50
3. 4,000 psi concrete: max. w/c = 0.45
4. 4,500 psi concrete: max. w/c = 0.45

D. Non-Shrink, Non-Metallic Grout: ASTM C1107, Type C factory premixed grout with minimum 1,000 psi compressive strength at 1 day and minimum 5,000 psi compressive strength at 28 days.

2.6 CURING COMPOUND

A. Curing compound shall be a high-solids (high-moisture retention), transparent, non-yellowing, USDA approved, membrane-forming, dissipating resin conforming to ASTM C309. Application shall be spray-applied, at a rate of 200 SF/gal per coat.

B. Curing compound to be used on foundations, office area floor slabs, wall protection curbs, and miscellaneous concrete.

1. When used on floor slabs, Concrete subcontractor to confirm curing compound is compatible with slab finish materials (carpet, VCT, urethane, etc.) prior to application.

C. Curing compound shall be used in strict accordance with the manufacturer's printed instructions.

2.7 JOINT FILLER MATERIAL

A. Isolation Joint Filler (Interior Slabs): Pre-molded ½" thick sponge rubber, fully-compressible, with minimum recovery rate of 95%.

B. Construction, Expansion or Isolation Joint Filler (Exterior Slabs): Pre-molded, non-asphaltic, non-staining, non-extruding, fuel-resistant material.

2.8 SLAB ACCESSORIES

A. Edge Forms: 2" thick Douglas Fir planks, surfaced one side and two edges.

B. Dowels: Plain (smooth) steel bars conforming to ASTM A675, Grade 60, or A499. Ends of dowels shall be sawcut, not sheared. Dowels at sawcuts shall be chair supported and at construction joints supported in accurately bored holes in bulkheads.

C. Chairs, Bolsters, Bar Supports and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement, including load bearing bottom pad or runners where necessary (over insulation and/or vapor barrier).

D. Interior:

1. Stay-in-Place Forms: Provide at all perimeter wall columns. Forms shall be 24 ga. metal, 2” less than the floor slab thickness. Bend around column bases and firmly stake in place with the top 2” below the top surface of the concrete.

2. Flexible Foam Expansion Joint Filler: For use where slabs abut all walls and columns. Shall be pre-formed, closed-well, non-extruding resilient type, ½” thick flexible polyethylene or polyurethane. Material shall have a maximum compression of 10 psi at 50% deformation according to ASTM D1621 or D3575. Material shall be full slab depth.

3. Joint Filler (at sawcuts and construction joints): Semi-rigid, two-part, self-leveling, flexible epoxy. Cut flush with top of slab. MM-80 by Metzger-McGuire or approved equal.

4. Joint Sealant (over expansion joint material): One-part moisture curing, gun grade polyurethane sealant. Vulkem 921 or approved equal.

E. Exterior:

1. Expansion Joint Filler: Installed at all construction joints between slab and against building foundation walls. Shall be 1/2” thick and full thickness of slab. Shall be asphalt type control joint. Install pre-punched for dowel bars and recessed 1/4” below the top-of-slab.

2.9 PERIMETER FOUNDATION WALL INSULATION

A. Foamular 250XPS by Owens-Corning or equal. Extruded Polystyrene: 2” thick, minimum 1.6 pcf density, minimum 25 psi compressive value, "K" factor of 0.18 and flame spread of 25 or less. Minimum R=10.

2.10 VAPOR BARRIER

A. Provide an underfloor vapor barrier where recommended by the Geotechnical Report and in all areas receiving a flooring finish (carpet, VCT, urethane, etc.).

B. Material shall be Moistop Ultra 15 or Stego Wrap Class A (10-mil).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify line, level and centers before proceeding with work. Confirm that dimensions agree with drawings.

3.2 FORMWORK

A. Construct formwork that is sufficiently strong to carry the weight of concrete in a liquid state with no appreciable deflection, sufficiently tight to prevent leakage of concrete, and braced or tied together to maintain correct alignment and dimensions.

B. Forms shall be clean prior to concrete placement, free of all foreign matter. During cold weather, remove ice and snow from form surfaces prior to setting. The use of de-icing salts is prohibited.

C. Form and place openings, slots, reglets, recesses, sleeves, bolts, anchors, nosings, dowels, other inserts and components required by other trades; including embedded angles, channels and plates. Install accessories straight, level and plumb. Ensure items are not disturbed during concrete placement. Obtain approval from the Design-Builder prior to framing any openings in structural members not shown on the Drawings.

1. Coordinate locations with Site, Architectural, Mechanical, Plumbing and Electrical Drawings, and other trade subcontractors. This subcontractor will be responsible

for core drilling or saw cutting completed work, if block-outs or sleeves shown on the drawings are omitted.

D. Provide fillets and/or chamfers at all exposed corners, unless detailed otherwise.

E. Apply form release agent prior to placement of reinforcing steel, anchoring devices and/or embedded items. Coat cone type removable ties at exposed surfaces to facilitate removal. Keep all surfaces coated prior to placement of concrete.

F. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads. Loosen forms carefully, do not wedge pry bars, hammers or other tools against finished concrete. Store removed forms to protect contact faces from damage, discard damaged forms.

G. Flatwork: After stripping edge forms, stone the edges and remove any excess concrete or latency.

H. NOTE: Unless specifically noted or detailed otherwise, earth forms will be allowed if approved by the Geotechnical subcontractor. If allowed, hand trim sides and bottom, removing loose soil prior to placing concrete.

3.3 REINFORCING STEEL

A. Fabrication and placing of reinforcing steel shall be in accordance with ACI 315.

B. Place, support and secure reinforcement against displacement. Do not deviate from required position. Maintain minimum cover around reinforcing as follows (see structural notes for additional information):

1.	Concrete poured against earth	3”
2.	Formed concrete with earth backfill	2”
3.	Beams, columns, walls exposed to weather, etc	1½”
4.	Interior wall faces	1”
5.	Slabs on grade (from top)	1½”

C. NOTE: In general, slab on grade reinforcement shall be placed in the top third of the slab depth.

D. Reinforcing steel shall accommodate placement of formed openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts and components. If present, do not displace or damage vapor/moisture barrier.

E. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Review such splice locations with Design-Builder.

3.4 PREPARATION OF PLACE OF DEPOSIT

A. Before placing concrete, all debris shall be removed from the place of deposit.

B. For interior slabs:

1. Preparation by Site subcontractor will leave sub-grade between +0’ and -0.1’ of bottom of slab. This subcontractor shall provide final grading to finish sub-grade surface between +0” and –1/2” of bottom of slab. The site subcontractor is responsible for providing any material needed by this subcontractor to accomplish final grades. All slabs must be full design thickness. Sub-grade must be approved by Testing Agency prior to slab placement.

2. Wrap expansion joint material around steel columns and bollards and set against abutting wall surfaces. Install stay in place forms at perimeter wall columns. Install all embedded angles, sleeves or other inserts.

3. Install under slab vapor barrier if recommended by the Geotechnical Report or if the slab will receive a subsequent finish. Tape or seal all joints per recommendations of the vapor barrier material manufacturer.

4. Provide poly protection on walls and columns to minimize concrete splatter on those surfaces.

5. Place reinforcing steel, support rebar on metal chairs with full sand plates. At construction and saw cut control joints, all reinforcing shall be held back a minimum of 2" on both sides of the joint.

6. Install dowels at all construction joints and saw cuts, or as otherwise noted on the drawings. Grease one end of all dowels. Pre-position dowels at saw cuts on basket type chairs. Hold dowel baskets back from construction joint corners 3'-0".

   a. Install dowels at all locations where new slabs abut existing slabs.

7. Provide water for sub-grade preparation, curing, concrete saw-cutting, and equipment clean-up.

8. Provide temporary ventilation during slab placement. If temporary lighting (20 fc) provided by the electrical subcontractor is not sufficient, provide additional task lighting.

C. The Design-Builder and Testing Agency shall be notified for readiness of observation in time to complete inspection prior to concrete placement. Notify local building department officials as required.

3.5 CONCRETE PLACEMENT

A. All pours shall be scheduled with the Design-Builder a minimum of 24 hours prior to placement.

B. Concrete shall be mixed, conveyed and deposited in accordance with ACI 318 and ACI 614.

C. Delivery slips shall be presented to the Testing Agency upon delivery of concrete to the job site. Delivery slip shall note the mix and slump, and be signed by an authorized employee of the "Ready Mix" Company. Testing Agency shall provide copies of all delivery slips to Design-Builder within 24 hours of concrete delivery.

D. After the ready-mix truck has been dispatched from the batch plant, water may only be added with the approval of the Testing Agency.

E. Concrete shall be delivered between +40F and +90F. The ready-mix supplier shall take all measures necessary to ensure these temperature limits are not exceeded.

F. Place concrete continuously between predetermined construction joints. Do not interrupt successive placements; allowing cold joints to occur. When absolutely necessary, an unplanned construction joint may be placed at a location approved by the Design-Builder.

G. Consolidate concrete by careful, thorough mechanical vibration. Ensure that reinforcement, and other embedded items, are not disturbed during concrete placement.

H. Following placement and/or form removal, concrete shall be protected from premature drying, excessive temperatures, rain, flowing water, frost or mechanical injury. Forms exposed to sun shall be kept wet until removal. The temperature of the air next to the concrete shall be maintained at not less than +50F.

I. Exterior Slabs: Joints and edges shall be radius tooled. Surfaces shall be lightly broom finished for slip resistance, transverse to the direction of travel.

J. Interior Slabs (Vapor Barrier): Whether shown on drawings or not, all concrete to receive floor covering such as tile, carpet, seamless composition flooring, etc., shall have a vapor

barrier installed under the slab.

K. Interior Slabs: Shall be troweled to a fine, hard, dense, non-dusting, non-slip burnished finish (hard trowel finish), unless otherwise required by a floor covering material. All concrete to receive floor covering such as tile, carpet, seamless composition flooring, etc., shall be finished to achieve a proper bond to the finish work. Additionally, verify compatibility of curing compound with finish work in these areas.

L. Foundation Walls and General Concrete: All concrete surface treatments and finishing shall conform to ACI 302, unless otherwise specified herein:

1. Plastic snap tie inserts shall be removed at all exposed locations.

2. All concrete exposed to view shall have a smooth rubbed finish of uniform color and texture. Form tie holes, bung holes greater than ½" deep or in diameter shall be filled with sand grout and the surfaces rubbed, within 24 hours of form removal, to remove fin marks and similar defects. **The application of parging material to cover a honeycombed wall surface is not acceptable.** Concrete not exposed to view shall have all tie holes patched and all honeycombed surfaces filled with cement mortar if the size of the defect exceeds ½" in depth.

3. Concrete wall top surfaces shall have grade controlled by setting screed strips inside the form work. Steel trowel the concrete surface to a flat and true plane.

4. Interior curbs shall have trowel finish on top surface and smooth finish on vertical surface.

M. Curing Compound: Apply one coat of spray-on curing compound to formed concrete surfaces immediately after stripping forms. Apply two coats of spray-on curing compound, with the manufacturer's recommended drying time between coats, to flatwork immediately following troweling (when visible surface water has disappeared and slab can be walked on without scarring the surface), but prior to saw-cutting. Curing compound shall be applied in a smooth, neat manner to avoid smearing or ponding marks; puddles or excessive materials shall be carefully blotted up. When interior slabs are poured prior to the building being enclosed, a protective white polyethylene sheet shall be placed over the slab, following drying of the curing compound, until the building is closed in.

N. Immediately after completing finishing, snap chalk lines to locate saw cuts and apply curing compound. Saw cuts shall be made with a soff-cut concrete saw as soon as surface can be sawn without raveling. All joints shall be sawn for sealant; 1/8" to 1/4" wide, depth as noted on the drawings. Complete saw cutting within 2 hours of concrete finishing, remove cutting dust. Joints shall not be sealed until slabs have cured a minimum of 30 days.

O. Patching: Concrete which is not formed as shown on the drawings or for any reason is out of alignment or level, or shows a defective surface, shall be considered as not conforming, and be removed by the subcontractor at his expense, unless the Design-Builder grants permission to patch the defective area. Permission to patch in any such area shall not be considered a waiver of the Design-Builder's right to require complete removal of the defective work, if the patching does not, in his opinion, satisfactorily restore the quality and appearance of the surface.

P. Minimum finish tolerance numbers are Overall F_F30/F_L20 and Local F_F20/F_L15. Elevation tolerance is the finish floor elevation shown on the drawings, plus or minus 3/4", non-cumulative. Out-of-tolerance work shall be immediately brought to the attention of the Design-Builder. Repair or replacement will be the responsibility of this subcontractor, at no additional cost.

1. Out-of-tolerance correction of any individual random traffic test section which measures less than either of the specified local numbers will be rejected. When all test section results have been combined, any entire random traffic floor area (as bounded by construction joints) which measures less than either of the specified

overall numbers will be rejected. NOTE: Repair may be by either removal and/or replacement of the entire slab area, by grinding (a maximum of 1/8" may be removed from any high area, filling will not be allowed), or by chipping out a 3/4" to 1" depth and topping.

3.6 COLD WEATHER REQUIREMENTS

A. Concrete placed in cold weather shall be placed in accordance with ACI 306 and ACI 318. No concrete shall be placed unless the air temperature is at least +40F and rising, unless pour location is properly enclosed and/or heated to the Design-Builder's satisfaction.

B. Before concrete placement; all ice, snow, and frost shall be completely removed and the temperature of all surfaces to be in contact with concrete raised above the freezing point. No concrete shall be placed on a frozen sub-grade or one that contains frozen materials.

C. Placing and Curing: All concrete placed in forms shall have a temperature between +50F and +70F. Maintain the concrete at a temperature of not less than +70F for 3 days or +50F for 5 days. The housing, covering or other protection shall remain in place and intact at least 24 hours after the artificial heating is discontinued.

D. Form removal shall be as specified, except that removal shall be delayed when the air temperature falls below +50F. Otherwise, walls shall be protected by insulated blankets or enclosures until the temperature and duration requirements above are met.

3.7 HOT WEATHER REQUIREMENTS

A. Concrete placed in hot weather shall conform to ACI 305R. Concrete shall be delivered to the job site with a temperature of +90F or less. Concrete temperatures in excess of +90F shall be rejected and ice or liquid nitrogen added at the batch plant to chill the concrete.

B. If concrete temperatures are in excess of +80F, mix time limits shall be reduced from 1-1/2 hours to 1 hour.

3.8 SPECIFIC WORK

A. Grout: All column base plates, equipment bases, pre-cast wall panel erection pads and other locations noted on the structural drawings shall be grouted. Grout shall be well puddled and tamped during pouring to obtain a tight seal between members.

1. Leveling Plates and Bearing Plates: Leveling plates for steel columns and bearing plates for steel beams shall be set true to grade and elevation on mortar pads. Wedge or shim in place in accordance with setting plans and templates. The concrete surface receiving mortar shall be thoroughly wetted down and enough mortar placed to allow shaping and compaction by light troweling. Leveling plates and bearing plates shall be set to final position by light tamping to insure full bearing of the plate on the mortar.

2. Base Plates: Where base plates are shop welded to columns and leveling plates are not required by details, erect columns using double nuts on anchor bolt. Back up one side of plate with blocking and place all grout from other side. Pack with paddles of suitable size, shape and length.

B. Sidewalks: May be slip formed or formed at this subcontractor's option. The finish shall be steel floated, with a light broom finish. Provide 1/4" tooled radius edges with a 3" edging tool. Provide tooled control joints at 5ft. on center. Provide construction/expansion joints at 30ft. on center. Provide control joints at all changes in shape. Provide WWF 6/6 x 10/10 in sidewalks, walk mesh in from the top, stop at construction joint locations.

C. Housekeeping Pads: Provide formed housekeeping pads where shown on the drawings. Bases shall be 4" thick and located under electrical, mechanical and refrigeration equipment as detailed. Dowel all rotating machinery bases (refrigeration compressors, air compressors, etc) to the floor slab with drilled and grouted #4 rebar hooks spaced 12" on center each way. Size and location of all pads shall be determined and laid out by the

trade providing the equipment.

3.9 INSPECTION AND TESTING

A. Field Inspection shall be performed in accordance with ACI 301, ACI 318 and requirements outlined on Structural Drawings.

B. Slump test, in accordance with ASTM C143, shall be taken before each placement. The Testing Agency has the authority (and responsibility) to refuse acceptance of concrete when excess water has been added.

C. Four concrete test cylinders (one set) shall be taken for each class of concrete, for each day's pour. However, in no case shall there be less than one set taken for each 100 cubic yards of concrete poured or 4000 square face feet of wall or slab concrete poured.

D. One cylinder shall be tested at 7 days, two at 28 days, and one retained for further testing if necessary. If the 28 day test is satisfactory, the reserve cylinder can be discarded.

1. To be satisfactory, none of the 28-day strength tests (average of 2 cylinders) shall have values less than 500 psi below the specified strength. Also, the average of three consecutive tests shall not fall below the specified strength.

2. If the tests do not meet these requirements, test the reserve cylinder at 56 days and the Design-Builder reserves the right to require samples of hardened concrete in the structure to be taken and tested (ASTM C42) at the expense of this subcontractor.

E. Where a substantial volume of concrete is not sampled and tested accordingly, the Design-Builder reserves the right to have samples taken from the structure and tested (ASTM C42) at the expense of this subcontractor.

F. Complete records shall be kept by the Testing Agency that report test results and describe location of where sampled concrete was placed in construction.

G. Any necessary corrective measures, removal and replacement, and/or re-testing will be at this subcontractor’s expense.

3.10 DEFECTIVE CONCRETE

A. Work that is visually objectionable, in the opinion of the Design-Builder, may require additional corrective measures (i.e. rubbing with a carborundum brick, sacking, light sandblasting, etc) at no additional cost.

B. Work that is structurally impaired (i.e. excessive honeycombing, exposed reinforcement, bulges, misalignment, cracking, etc) shall be removed and replaced at no additional cost.

C. When a significant portion of a slab segment (defined by joints), is deemed defective, remedial work shall be performed to the entire segment. Remedial work may be epoxy grouting, chipping out and re-topping, or total replacement.

D. NOTE: The foregoing is independent of any out-of-tolerance repair called for elsewhere.

PART 4 COMPLETION

4.1 CLEANUP

A. All work shall be left clean and undamaged, ready for finish, sealing of joints, etc., as appropriate, under Separate Sections.

END OF SECTION