



Cherry Creek School District Technical Guidelines - 2020

DIVISION 03 - CONCRETE

03 05 10 – MOISTURE VAPOR REDUCTION ADMIXTURE

PART 1 - GENERAL

- A. Summary - Section includes:
 - 1. Application of Moisture Vapor Reduction Admixture (MRVA) at all new interior concrete slab areas except in the crawl space and the main level slabs in rooms with pigmented concrete.
- B. Referenced Standards/Minimum Criteria:
 - 1. Certification of compliance with ASTM C494 /C494M testing protocols from an independent AASHTO approved laboratory.
- C. Submittals Required:
 - 1. Product data.
- D. Restrictions/Critical Criteria:
 - 1. Ready Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
 - 2. Moisture Vapor Reduction Admixture Collection Agent / Representative Qualifications
 - a. Personnel conducting field sampling on behalf of the MVRA manufacturer shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 3. Slab Moisture Testing and Evaluation: Personnel performing laboratory tests shall be certified in the conduct of ASTM D5084 under the supervision of a licensed geotechnical engineer. The determination as to whether the concrete slab is prepared to receive flooring, coatings, roofing, etc. rests with the MVRA manufacturer.
 - 4. Source Limitations: Obtain each type of concrete moisture vapor reducing
 - 5. ACI Publications: For slabs to receive moisture sensitive coatings or material, comply with the following unless modified by requirements in the Contract Documents:
 - a. ACI 302.2R-06, "Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring".

PART 2 - PRODUCTS

- A. Acceptable Manufacturers/Products:
 - 1. "Barrier One High Performance Moisture Vapor Reduction Admixture" by Barrier One, Inc. www.barrierone.com.
 - 2. "MVRA 900" by ISE Logik Industries: www.iselogik.com.
 - 3. Approved substitute.



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03 10 00 – CONCRETE FORMWORK

PART 1 - GENERAL

- A. Summary - Section includes:
 - 1. Concrete formwork materials.
 - 2. Formwork accessories.
 - 3. Underslab gravel bed.
 - 4. Miscellaneous materials.

- B. References Standards/Minimum Criteria:
 - 1. Design and construction shall follow recommendations of ACI 301-16 "Specifications for Structural Concrete" and ACI 117-10 "Specifications for Tolerances for Concrete Construction".
 - 2. Camber: Design formwork to have sufficient camber to maintain the tolerances specified. Camber shall be sufficient to compensate for the weight of the fresh concrete and a construction liveload of 20 psf.
 - 3. Safety: Contractor shall assume all responsibility for the safety of the formwork and shall provide necessary design, construction, materials, and maintenance to produce the required concrete work safely.
 - 4. Shoring: Design shoring for elevated structural slabs to support total wet weight of concrete, reinforcement, and construction liveload of 20 psf.

- C. Restrictions/Critical Criteria:
 - 1. The use of earth as a form will not be allowed. Lap forming with dressed lumber or plywood will not be allowed. Forms shall conform to shape, lines and dimensions of the members shown on the drawings and shall be substantial and sufficiently tight to prevent leakage of concrete. Properly brace or tie to maintain position, shape, and lateral stability, and provide sufficient strength to carry construction operations and material dead loads without deflection or vibration. Forms shall be designed to be capable of needed adjustments. Where finished concrete is to remain exposed, joints shall be regularly spaced and held to a minimum both horizontally and vertically. Provide access panels in formwork for cleanout or pouring as required. Install voids where required.
 - 2. Include underslab vapor barrier and underslab gravel bed when recommended by the Geotechnical Engineer. Design according to Geotechnical Engineer's recommendations.
 - 3. Control joints in concrete slabs on grade shall be per the layout on the drawings or maximum spacing per ACI 301. Reinforcing shall extend through joints unless noted otherwise. Sawed joints may be substituted for joint forms at control joints. Sawed joints shall be 1/4 of the slab thickness. Saw cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw, and shall be completed before shrinkage stresses have developed sufficiently to induce cracking.
 - 4. Shoring and forming of elevated concrete slabs shall be kept in place until tests indicate concrete has achieved minimum strength of 3,000 psi.



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PART 2 - PRODUCTS

- A. Acceptable:
1. Exposed Concrete: New 8-8 Plyform, 4-foot x 8-foot sheets.
 2. Non-Exposed Concrete: Plywood, steel, or dressed lumber.
 3. Form Ties: Adjustable in length to permit tightening of forms and of such type to leave no metal closer than 1-inch to the surface nor holes or depressions larger than 7/8-inch in diameter.
 4. Form Oil: Non-staining.
 5. Slab Edge Premolded Filler: Bituminous fiber type in accordance with ASTM D1751.
 6. Fiber Voids: Grade beam void forms shall be "SureVoid Products" from VoidForm Products, Inc., Englewood, CO; or approved substitute.
 7. Slab Expansion and Construction Joint Forms: "Keyed Kold" from Burke Concrete Accessories, Inc. or approved substitute.
 8. Waterstops: "Greenstreak PVC Waterstop" from Sika USA, or approved substitute.
 9. Underslab Gravel Bed if required by the geotechnical engineer: Clean, granular fill, pit run gravel. Minimum 3/4-inch aggregate.
 10. Slab Premolded Expansion and Control joint Fillers: "The Original Zip Strip" by Superior Profiles, or approved substitute.

03 20 00 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

- A. Summary - Section includes:
1. Concrete reinforcing steel.
 2. Bar supports and spacers.
 3. Tie wire.
 4. Welded wire fabric.
- B. Referenced Standards/Minimum Criteria:
1. Detailing, fabrication, and placement: Follow ACI 301 "Specifications for Structural Concrete", ACI 315 "Guide to Presenting Reinforcing Steel Design Details", and ACI 318 "Building Code Requirements for Structural Concrete and Commentary" (latest editions).
 2. Bar Bending Details and Placing Drawings: In accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (latest edition).
 3. Welded Wire Fabric: Conform to ASTM A1064.
- C. Submittals Required:
1. Product data.
 2. Shop drawings.
- D. Restrictions/Critical Criteria:
1. Provide 24 hours minimum notice to the Architect to allow his observation of concrete reinforcement before placing concrete.



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PART 2 - PRODUCTS

- A. Acceptable Manufacturers/Products:
 - 1. No specific requirements.

03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

- A. Summary - Section includes:
 - 1. Cast-in-place concrete.

- B. Referenced Standards/Minimum Criteria:
 - 1. ACI 301 (latest edition).
 - 2. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete" (latest edition).
 - 3. Cold Weather Placement ACI 306R "Guide to Cold Weather Concreting" (latest edition).
 - 4. Hot Weather Placement ACI 305.1 "Specification for Hot Weather Concreting" (latest edition).
 - 5. General: Use ready-mixed concrete conforming to ASTM C94-19 "Standard Specification for Ready-Mixed Concrete". No on-job mixed concrete will be allowed.
 - 6. Cement: Conform to ASTM C150-19a "Standard Specification for Portland Cement", type of cement per geotechnical engineer.
 - 7. Aggregates: Fine aggregate (natural sand) and coarse aggregate (gravel or crushed stone), shall conform to ASTM C33-18. Maximum coarse aggregate size shall be as indicated in mix design.
 - 8. Bonding Agent: ASTM C1059-13 and ASTM C881-15 for epoxy bonding adhesive.
 - 9. Air Entraining Agent: Conform to ASTM C260-16.
 - 10. Chemical Admixtures: Conform to ASTM C494-19.
 - 11. Mineral Admixtures: Conform to ASTM C618-19.
 - 12. Curing Compound: Conform to C309-19, Type 1.
 - 13. Use and Type of Mechanical Vibrators: Conform to ACI 309-19.
 - 14. Fly ash if approved by the Owner, ASTM C618-19, Class for Class C.
 - 15. Control tests by testing laboratory employed by the School District; in accordance with ASTM C138-17a, ASTM C143-15a, ASTM C173-16, ASTM C231-17a, and ASTM C1064-17. Curing of test cylinders per ASTM C31-19a and ASTM C172-14a. Control tests of concrete work shall be on every fifty (50) cubic yards or fraction thereof of concrete placed. A minimum of once during each day's pour. Samples shall be taken only after any extra water has been added and thoroughly mixed. Each test shall consist of six (6) inch test cylinders cast and cured in accordance with ASTM C31-19a and ASTM C172-14a. Two (2) cylinders shall be broken at the end of seven (7) days after placing, two (2) cylinders shall be broken at the end of 28 days after placing, and the remaining two (2) cylinders shall be stored until their disposition is determined by the Architect.
 - 16. Slump Tests: The Contractor shall provide necessary equipment and shall make tests in conformity with ASTM C143-15a. The Contractor shall keep an accurate record of the time, location in the work, and the results of slump tests which shall be available for inspection by the School District and the Architect.



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- C. Submittals Required:
1. Mix Designs: Prior to placing concrete, the Contractor shall submit concrete mixes to the Architect for approval. Submittals shall include all information used in designing the mixes.
 2. Test Reports: Reports of control tests, special tests or core tests shall be distributed by the testing laboratory.
 3. Contractor record listing time, date and temperature when concrete placement occurred.
- D. Restrictions/Critical Criteria:
1. Additional Water: Deliver concrete to the job in exact quantities required by the design mix. Should additional water be required before placing concrete, the Contractor shall have sole authority to authorize the addition of water. Any added water shall not exceed the maximum water/cement ratio or maximum slump of the approved mix design. Any additional water added to the mix after leaving the batch plant shall be indicated on the truck ticket and signed by the Contractor.
 2. General: Unless adequate protection is provided, concrete shall not be placed during rain, sleet, or snow.
 3. Protection: Protect newly finished concrete from rain or hail damage. Cover adjacent walls, glazing, and other finish materials with polyethylene sheeting or otherwise protect from damage due to placing of concrete.
 4. No admixtures, accelerating mixtures, or water reducing agents shall be used by the Contractor unless authorized by the Architect.
 5. Use fibrous reinforcing only in exterior sidewalks, curbs/gutters, concrete paving, and other site concrete as approved by the School District.
 6. Tolerances: Per ACI 117-10 "Specification for Tolerances for Concrete Construction and Materials" requirements:
 - a. Class AA Surface Finish Tolerance: Floors to receive seamless quartz flooring or wood floors shall meet Class AA surface tolerance of 1/8-inch in 10-feet.
 - b. Class BX Surface Finish Tolerance: Concrete floors shall meet Class BX surface tolerance of 1/4-inch in 10-feet except where drains occur.
 7. Finishes: The selection of finishes shall be in accordance with Section 11.8 of ACI Standard 301-16 "Specifications for Structural Concrete".
 8. Curing Compound Application: Apply curing compound, the same working day that the forms are removed. Cover horizontal surfaces with polyethylene sheeting. Omit curing compound on concrete floors scheduled to receive seamless quartz flooring, ceramic tile, or resilient playing surface systems flooring.
 9. Floor Sealing: Apply sealer to concrete floors not receiving other finishes.

PART 2 - PRODUCTS

- A. Products/Materials are unrestricted provided they meet specified requirements.



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03 35 43 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

- A. Summary - Section includes:
 - 1. Polished concrete finishing.
 - a. Desired level of aggregate exposure is "Salt-and-Pepper".
 - 2. Concrete Stain (dye).
 - 3. Protection of concrete slabs to be stained and polished.
- B. Referenced Standards/Minimum Criteria:
 - 1. Standards of the Concrete Polishing Association of America (CPAA).
- C. Submittals Required:
 - 1. Product Data.
 - 2. Shop drawings.
 - 3. Samples for color selection.
- D. Restrictions/Critical Criteria:
 - 1. The contractor shall be a licensed installer for the product and system specified, with not less than 3 years experience.
 - 2. An accredited member of the CPAA, or similar qualification.
 - 3. Mockups: Provide a mockup of each polished concrete finish indicated, to verify selections made under submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship.
- E. Protection of Concrete Slabs to be Stained and Polished:
 - 1. Contractor and all sub-contractors shall take precautions to prevent damage and soiling of concrete slabs scheduled to be polished as final finish.
 - a. The following substances can penetrate the surface and stain the slab: Red chalk, permanent markers, wax pencils, adhesives, oils, gas, primer, paint, stain, poly seal, caulk, PVC primer/cleaner, PVC adhesive, food, grease, beverages and rust from metal or nails.
 - b. Lumber, wood boards, sawdust plywood, thermo-ply, pressboard, insulation board and plastic all draw moisture from the slab. If left, they can transfer resins, tannins and water stains to the slab.
 - 2. Precautions shall include but not be limited to:
 - a. Prevent damage to floor slabs from substances listed in above paragraphs.
 - b. Prohibit parking or driving of vehicles on concrete slab until protective cover is installed.
 - 1) If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.
 - c. Prohibit temporary placement and storage of steel members on concrete slab.



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- d. Install protective covering of heavy cardboard, rosin paper, hardboard, plywood, Masonite, or other protective sheeting over entire floor surface.
 - 1) 6 mil black plastic is acceptable, overlapping by one foot, and taped at the seams. Do not tape to the floor.
 - e. Prohibit pipe cutting and using pipe cutting machinery on concrete slabs.
 - f. Do not write on the slab with anything except light pencil.
 - g. Do not allow use of red chalk for lay-out lines.
 - h. Do not allow use of unprotected floors for lay down, staging, or use by any trades.
 - i. Floors must be completely protected during application of primer, paint, stain, or lacquer. Painters may use Green Tape, 24-hour tape, craft paper, or drop cloths to protect floor and the field. Only Green Tape or lacquer-free tape is acceptable for the protection of acid-stained floors. Do not leave tape down for longer than 72 hours as it can leave a residue or pull off sealed surfaces.
 - j. Keep area clean.
3. Coordinate requirements for concrete slab protection with polished concrete subcontractor to assure compliance with requirements.

PART 2 - PRODUCTS

- A. Acceptable Manufacturers/Products:
 1. Concrete polishing system based on materials and written procedures of the "FGS PermaShine Concrete Polishing System" by Laticrete www.laticrete.com. Comparable products, based on use with comparable concrete polishing system, by one of the following will also be considered.
 - a. "Retroplate" by Advanced Floor Products: www.retroplate.com.
 - b. "Certi-Shine" by Vexcon Chemicals: www.vexcon.com.
 - c. Approved substitute.
- B. Concrete Dye: "AmeriPolish Classic Dye" by Ameripolish: www.ameripolish.com, or as approved by Architect.
 1. Solvent-based, mixed with acetone which will not grind off during polishing.
 2. Colors: As selected by Architect.



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03 41 00 – PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

- A. Summary - Section includes:
 - 1. Structural precast concrete (design, fabrication and erection) including columns, beams, double-tees, etc.

- B. Referenced Standards/Minimum Criteria:
 - 1. Precast Concrete Members: ACI 318-19 "Building Code Requirements for Structural Concrete" and AISC "Manual of Steel Construction" (latest edition).
 - 2. Welding: "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction" AWS D12.1, and AWS D1.4-2011 "Structural Welding Code – Reinforcing Steel" (latest edition).
 - 3. "Architectural Precast Concrete Manual" of the Precast / Prestressed Concrete Institute, (latest edition) for tolerance definitions and sketches.

- C. Submittals Required:
 - 1. Certificate indicating precaster is a member of PCI.
 - 2. Shop drawings and setting diagrams.
 - 3. Design calculations.
 - 4. Quality Control Submittals: The manufacturer shall make available to the Architect, upon request, records of concrete cylinder breaks for concrete used in the precast concrete products and mill tests of reinforcing steel used.

- D. Restrictions/Critical Criteria:
 - 1. Require Contractor to use only "AWS" certified welding operators.
 - 2. Design of precast units by precast manufacturer shall be under the direct supervision of a professional engineer registered in Colorado and shall bear his seal and signature.
 - 3. Fire Rating: As required for location and building type (1HR or 2HR).
 - 4. Design Loads: The precast manufacturer shall design units to support the live and dead loads as determined by the structural consultant/architect.
 - 5. Prestress Force: Tensioning and releasing of stressing strand may be either single or multiple procedures.
 - 6. Concrete Strength: Concrete strength and reinforcing strength shall conform to the requirements outline by the structural consultant/architect and in approved design calculations. Minimum 28-day compressive strength shall be at least 4,000 psi for precast elements.
 - 7. Erection: Installation of precast concrete shall be performed by the manufacturer or competent erection contractor specializing in the erection of precast. Lift members by means of suitable lifting devices at points by the fabricator. Temporary shoring and bracing, if necessary, shall comply with manufacturer's recommendations.



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PART 2 - PRODUCTS

- A. Acceptable Manufacturers: All precast concrete products shall be provided and erected under a single subcontract responsibility. Any of the following manufacturers will be acceptable:
1. Stresscon Corporation: www.strasscon.com.
 2. Rocky Mountain Prestress: www.rmpprestress.
 3. Approved substitute.

03 45 00 – PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

- A. Summary - Section includes:
1. Precast concrete exterior seating units.
 2. Precast copings, sills, and other trim.
- B. Referenced Standards/Minimum Criteria:
1. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
 2. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."
- C. Submittals Required:
1. Design Mixtures.
 2. Shop drawings.
 3. Samples.
- D. Restrictions/Critical Criteria:
1. Provide full-sized mock-up on site.
- E. Reinforcing Materials:
1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
 2. Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) or ASTM A 706/A 706M deformed bars, with ASTM A 767/A 767M, Class II zinc coating and chromate treatment.
 3. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420) or ASTM A 706/A 706M, deformed bars, assembled with clips.
 4. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from galvanized- steel wire into flat sheets.



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- F. Concrete Materials:
1. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.
 - a. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.
 2. Supplementary Cementitious Materials:
 - a. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - b. Metakaolin: ASTM C 618, Class N.
 - c. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.
 - d. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

PART 2 - PRODUCTS

- A. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.
- B. Acceptable Manufacturers/Products:
1. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 - a. Designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units.

03 60 00 – GROUT

PART 1 - GENERAL

- A. Summary - Section includes:
1. Non-shrink grout.
- B. Referenced Standards/Minimum Criteria:
1. ASTM C1107-17 "Standard Specification for Packaged Dry, Hydraulic-Cement Grout".
- C. Submittals Required:
1. Product data.
- D. Restrictions/Critical Criteria:
1. Mix and install grout according to manufacturer's recommendations.



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PART 2 - PRODUCTS

A. Acceptable Manufacturers/Products:

1. "Masterflow 928" by Master Builders: www.master-builders-solutions.com.
2. "Five Star Grout" by Five Star Products, Inc. www.fivestarprouducts.com.
3. "L&M Crystex" by Laticrete International, Inc. www.laticrete.com.
4. Approved substitute.

END OF SECTION