READ THIS FIRST

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any “Notes” boxes such as this one--you should remove these “Notes” sections as you go. Also, do a search for all bracket characters “ [ ] “ as they are used to show you areas containing options or project specific details (you can use Microsoft Word’s Find feature {Ctrl-F} to jump to an open bracket “ [ “ character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document’s built in styles and formatting your outline should be fine (turn on the formatting toolbar by going to View > Toolbars > Formatting). Most paragraphs will use the style “Numbered Material” and can be promoted (Shift) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to reapply the “Numbered Material” format.

1. GENERAL
   1. SUMMARY OF WORK
   2. The extent and location of “Cast-In-Place Concrete” Work is shown in the Contract Documents. GOVERNING CODES, STANDARDS, AND REFERENCES
      1. American Concrete Institute (ACI)
         1. ACI 211.1 - Recommended Practice for Selecting Proportions for Concrete (current edition)
         2. ACI 301.1 – Specification for Hot Weather Concreting (current edition)
         3. ACI 318 - Building Code Requirements for Structural Concrete (current edition)
      2. American Society for Testing and Materials (ASTM)
         1. ASTM C33 - Standard Specification for Concrete Aggregates (current edition)
         2. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens (current edition)
         3. ASTM C94 - Standard Specification for Ready-Mixed Concrete (current edition)
         4. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete (current edition)
         5. ASTM C150 - Standard Specification for Portland Cement (current edition)
         6. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete (current edition)
         7. ASTM C187 - Standard Test Method for Amount of Water Required for Normal Consistency of Hydraulic Cement Paste (current edition)
         8. ASTM C260 - Standard Specification for Air Entraining Admixtures for Concrete (current edition)
         9. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete (current edition)
         10. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures (current edition)
         11. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars (current edition)
         12. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink) (current edition)
         13. ASTM C1582 - Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete (current edition)
      3. International Code Council (ICC)
         1. International Building Code (IBC) as adopted by the [City of Seattle as the Seattle Building Code] [Seattle-Tacoma International Airport Building Department] [Authority Having Jurisdiction] [other] (current edition)
      4. National Ready Mix Concrete Association (NRMCA);
         1. NRMCA Certification of Ready Mixed Concrete Production Facilities. Quality Control (QC) Manual (current edition)
         2. NRMCA Truck Mixer Manufacturer’s Bureau (TMMB) 100 – Concrete Carrier Standards (current edition)
      5. Washington State Department of Transportation (WSDOT)
         1. WSDOT Standard Specifications for Road, Bridge, and Municipal Construction; and Amendments (current edition)
            1. WSDOT 9-03 Aggregates
            2. WSDOT 6-02.3(6)A Weather and Temperature Limits to Protect Concrete
            3. WSDOT 9-25.1 Water for Concrete
   3. SUBMITTALS
      1. Submit materials data in accordance with Section 01 33 00 - Submittals. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.
      2. Submittals shall include the following:
         1. Mix Design:
            1. Proposed design mix for each class of concrete required for this portion of the Work, including admixture proportions
            2. Expected mix design results, including compressive strength, air entrainment, and slump. If test data from previous usages of the same mix design is available, include previous test results.
            3. Name and address of the proposed concrete supplier
            4. Grading of coarse and fine aggregate
            5. Type and specification of cement
            6. Component manufacturer’s name and product name or catalog number
            7. Component manufacturer’s certification of ASTM compliance, where applicable
            8. Admixture manufacturer’s recommended usage and guidelines
            9. For plant-mix concrete, a supplier-provided certificate showing proportions and the seven-day strength of the concrete mix being furnished
         2. Non-Shrink Grout:
            1. Manufacturer name and product name or catalog number
            2. Manufacturer’s certification of ASTM compliance
            3. Manufacturer’s recommended usage and installation guidelines
         3. Membrane:
            1. Manufacturer name and product name or catalog number
            2. Manufacturer’s recommended usage and guidelines
         4. Contractor Quality Control Testing and Inspection: The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall submit the specified reports to the Engineer, and shall take the action required by the Engineer
            1. Sampling and Testing of Materials:
            2. Scales, Batching, and Recording:
            3. Batch Plant Control:
            4. Concrete Mixture:
            5. Inspection Before Placing
            6. Vibrators:
            7. Curing Inspection:
            8. Water Protection:
            9. Mixer Uniformity:
            10. Reports:
         5. Inspection and Testing Report:
            1. Reports per [Section 01 45 29 - Quality Control; Testing Laboratory Services] [Section 01 45 16.13 - Contractor’s Quality Control Program]
         6. Concrete Batch Ticket:
            1. Approved batch tickets for each load of ready-mixed concreteb. Placement sequence when multiple pours are required
         7. Concrete Placement:
            1. Placement diagram showing extents of each class of concreteb. Placement sequence when multiple pours are required
         8. Finishing Procedure:
            1. List of materials and tools
            2. Written procedure
2. MATERIALS

A. If only one product is acceptable (single or sole source product), obtain an approved Competition Waiver and submit to the CPO Construction, Contract Administrator. The language shall read as: “Manufacturer Name, Product # XXXXX, No Equal.” Refer to CPO-6 Competition Waiver Policy for more information.

B. If a Competition Waiver is not approved or more than one product is acceptable, this section must list a minimum of 2 products plus the language “Or Approved Equal,” along with salient characteristics. Refer to CPO Construction’s Salient Characteristics Guidelines for more information.

* 1. PROJECT INFORMATION
  2. PREPARATION FOR MATERIALS
     1. All associated formwork and reinforcing bars shall be properly placed, inspected, and approved as required by specification Section 03 11 00 – Concrete Forms and Section 03 21 00 – Concrete Reinforcement, respectively, prior to placement of concrete.
  3. FABRICATION, PRODUCTION, & SUPPLY OF MATERIALS
  4. MATERIAL REQUIREMENTS
     1. General
        1. All concrete shall meet the requirements of the current edition of the [Seattle] [International] Building Code. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions shall govern.
        2. All concrete is reinforced, unless stated otherwise. The amount of reinforcing shall not be less than the minimum required by the Code.
     2. Concrete
        1. Properties:
           1. Concrete of the tabulated classes shall have the following properties unless specifically approved otherwise.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class:** | **Minimum Compressive Strength** | **Minimum Sacks of Cement/C.Y.:b** | **Maximum**  **Water-Cement Ratio** | **Slump Limits:** | **Additional Requirements** |
| A | f’c = 6000 psi | See “c” |  | See “c” | Include set retarder |
| B | f’c = 4000 psi | 6.5 |  | 3” max | Include set retarder and air-entrainment |
| C | f’c = 3750 psi | 6.3 |  | 4” max |  |
| D | f’c = 3000 psi | 6.2 |  | 3-1/2” max |  |
| E | f’c = 3000 psi | 6 |  | 3-1/2” max |  |
| F | f’c = 2500 psi | 5.5 |  | 4” max |  |
| P | fct = 650 psi | 5.5 |  | 1-1/2” c |  |
| R | fct = 850 psi | 6.2 |  | 1” c |  |
| X | f’c = 3750 psi | w/ non-shrink\* |  | Per admixture c |  |
| Y | f’c = 3000 psi | w/ non-shrink\* |  | Per admixture c |  |

a The minimum compressive strengths tabulated are the strength at 28 days for ordinary concrete, or the strength at seven days for high-early-strength concrete.

b Mixes utilizing less cement may be approved upon submittal of compression test reports

c Determined by mix design

Delete all classes of concrete not used on this project.

* + - * 1. General intended placement types for each class uses are described in section 3.03.A.3
      1. Cement:
         1. All cement shall be Portland cement conforming to ASTM C150, Type IL.
         2. All cement shall be the product of one manufacturer.
         3. The maximum water-cement ratios required in subparagraph Water-Cement Ratio will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1.
         4. Concrete made with coarse aggregate of “Grading No. 5” as described in WSDOT Standard Specification, paragraph 9-03.1(3)C, shall have an extra one-half sack of cement added to the minimum indicated in the table in section 2.04.A.1.
         5. All classes of concrete may contain an appropriate amount of Fly Ash as a pozzolanic material.

Concrete mix designs including Fly Ash, shall be prepared by a certified laboratory and have the approval of the Engineer prior to use.

Pozzolan shall conform to ASTM C618, Class C or F, including low alkali [multiple factor,] [drying shrinkage,] [uniformity,] [and [moderate] [severe] [sulfate resistance] requirements in Table 3 of ASTM C618.

If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent.

* + - * 1. If specifically approved by the Engineer or noted in the drawings and specifications, concrete may include ground granulated blast-furnace (GGBF) slag.

GGBF slag shall comply with ASTM C989, Grade 120.

If used, GGBF slag shall be as a 1:1 replacement of Portland cement, with not less than 15% nor more than 60% replacement.

* + - * 1. If specifically approved by the Engineer or noted in the drawings and specifications, concrete may include silica fume.

Silica fume shall conform to ASTM C1240. Available alkalis shall conform to the optimal limit given in Table 2 of ASTM C1240.

Silica fume may be furnished as a dry, densified material or as a slurry.

If used, provide at no cost to the Port the services of a manufacturer's technical representative experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume.

* + - 1. Aggregates:
         1. Aggregates for standard Portland cement concrete shall conform to the quality requirements of the WSDOT Standard Specifications.
         2. Aggregate for lightweight concrete shall be approved prior to the mix design. Lightweight aggregate shall have a maximum dry loose weight of 70 pounds per cubic foot.
         3. See section 2.04.A.2.d for requirements associated with WSDOT Standard Specification “Grading No. 5.”
         4. Maximum aggregate size for a given mix should not exceed:

1/5 the dimension of non-reinforced members.

3/4 the clear spacing between reinforcing bars or between reinforcing bars and forms.

1/3 the depth of nonreinforced slabs on the ground.

* + - 1. Water:
         1. Water used for mixing concrete shall conform to the quality requirements of WSDOT Standard Specifications, paragraph 9-25.1
      2. Admixtures:
         1. All admixtures shall be supplied by one manufacturer and approved by the Engineer.
         2. Use all admixtures in strict accordance with the manufacturer’s recommendations, including proportioning and procedures.
         3. Air-Entraining Agents shall be BASF MB VR, MB AE-10, W.R. Grace product, Or Approved Equal, conforming to ASTM C260. Where guidance is not provided by the manufacturer, added to obtain [4-1/2%] entrained air.
         4. Water-Reducing Agents shall conform to ASTM C494, Type A for water-reducing, Type D for water-reducing and retarding, and Type E for water-reducing and accelerating.
         5. Set Retarding Agents shall be BASF “Pozzolith 300R,” W. R. Grace “Daratard,” Or Approved Equal set-retarding admixture compliant with ASTM C494 at three to five fluid ounces per 100 pounds of cement as recommended by the manufacturer.
         6. Accelerators shall be approved by the Engineer and shall comply with ASTM C494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.
    1. Non-Shrink Grout
       1. Use premixed and packaged, non-metallic grout conforming to ASTM C1107. The use of powdered aluminum will not be permitted without written permission of the Engineer.
       2. Grout shall be tested to comply with ASTM C827 for volume change, ASTM C187 and C143 for workability, and ASTM C39 for compressive strength.
    2. Moisture Retaining Membranes
       1. All curing membrane shall conform to ASTM C171, and may be white polyethylene film, a combination sheet polyethylene and paper, Or Approved Equal, approved in advance by the Engineer.
       2. All cement or tape used for sealing membrane joints shall be only as recommended by the manufacturer of the membrane being joined.
    3. Other Materials
       1. All other materials not specifically described but required for a complete and proper installation of cast-in-place concrete shall be as selected by the Contractor subject to the approval of the Engineer.
  1. MATERIAL HANDLING, DELIVERY, & STORAGE
     1. Protection:
        1. Use all means necessary to protect cast-in-place concrete materials before, during, and after installation and to protect the installed Work and materials of all other trades.
     2. Replacement:
        1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Port.
  2. DELIVERABLES
  3. QUALITY ASSURANCE
     1. Independent Inspection and Testing:
        1. The Port of Seattle will provide field or plant inspection and testing service to the satisfaction of the Engineer. Sampling and testing to assure compliance with the contract provisions shall be in accordance with [Section 01 45 29 - Quality Control; Testing Laboratory Services] [Section 01 45 16.13 – Contractor’s Quality Control Program] of these specifications.
        2. The Contractor may obtain copies of results of tests performed by the Port of Seattle from the office of the Resident Engineer at no cost.
        3. Tests conducted for the sole benefit of the Contractor shall be at the Contractor's expense.

Use “Independent Inspection and Testing” section above when the project does not utilize CQC. Coordinate closely with Section 01 45 29 - Quality Control; Testing Laboratory Services to assure Sampling and Testing on materials called for in that section agree with intent of this section.

OR

Use “Contractor Quality Control Testing and Inspection” section above when project utilizes CQC and Section 01 45 16.13 - Contractor’s Quality Control Program. Provide text for inspection and testing to be performed by the Contractor with specifics on frequency and scope.

* + 1. Qualifications of Manufacturer:
       1. Ready-mixed concrete plants shall be approved and certified by the [City of Seattle Building Department] [NRMCA].
       2. Ready-mixed concrete shall be batched in accordance with the applicable portions of ASTM C94.
    2. Control of Concrete Production:
       1. All concrete, unless otherwise specifically permitted by the Engineer, shall be batched and mixed at an approved plant.
       2. Concrete production shall be under supervision of [a recognized testing laboratory, selected and paid for by the Port, which shall design the mixes and furnish inspection of batched aggregates at the mixing plant] [the City of Seattle Building Department] [the Port of Seattle Engineering Department].
    3. Qualifications of Workers:
       1. Provide at least one person who shall be present at all times during execution of this portion of the Work. This person shall be thoroughly trained and experienced in placing the types of concrete specified and shall direct all Work performed under this section.
       2. Thoroughly trained and experienced journeyman concrete finishers shall be [employed] [responsible] for finishing of exposed surfaces.

1. EXECUTION
   1. PROJECT INFORMATION
   2. PREPARATION FOR EXECUTION OF WORK
      1. Inspection:
         1. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.
         2. Verify that concrete may be placed to the lines and elevations indicated on the drawings with all required clearances for reinforcement. Where concrete clear cover is not shown on the drawings, ensure minimum clearances based on ACI 318 requirements.
         3. Embedded Items
            1. Before placement of concrete, determine that all embedded items are firmly and securely fastened in place in the location and orientation indicated on the drawings or required.
            2. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale.
            3. The embedding of wood in concrete will be permitted only when specifically authorized or directed.
            4. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids.
         4. Verify completion and acceptance of all inspections required by the Engineer and/or Independent Testing Agency.
      2. Cleaning:
         1. Thoroughly clean all areas in which concrete is to be placed. Clean and roughen existing concrete or concrete from a previous pour to provide a bondable surface. Thoroughly wet down concrete forms which have not been treated with oils, waxes, or other bond breakers prior to placing concrete.
         2. Clean all transporting and handling equipment of all hardened concrete.
      3. Preparation of Previously Placed Concrete for Bonded Joints
         1. Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the Construction joint surface with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Keep the surface of horizontal construction joints continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete.
         2. Prepare concrete at the side of vertical construction joints as approved by the Engineer.
         3. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel.
         4. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface.
         5. The surface shall be washed completely clean as the last operation prior to placing the next lift.
         6. The edges of the coarse aggregate shall not be undercut.
      4. Discrepancies:
         1. In the event of discrepancy, immediately notify the Engineer. Do not proceed with installation until all discrepancies have been fully resolved.
      5. Notification:
         1. Notify the Engineer at least 48 hours in advance of concrete pour.
   3. EXECUTION OF WORK
      1. Placing Concrete:
         1. General:
            1. Place concrete as soon as possible after mixing. Concrete shall be plastic and readily workable when placed in the forms. Concrete that does not reach its final position in the forms within 1-1/2 hours after the addition of cement shall not be used.
            2. The method and manner of placing concrete shall not allow segregation of the aggregates or displacement of reinforcement.
            3. Conveyor belts, when used, shall be limited to approximately 300 feet in length to prevent segregation and shall be covered to protect the concrete from sun or rain.
            4. Do not use aluminum conduits or tremis for pumping or placing concrete.
            5. Place concrete in continuous horizontal layers and compact so that there will be no line of separation between layers. Carefully fill each part of the forms by depositing concrete directly at or as near as possible to the final position.
            6. When concrete must be dropped more than five feet into the forms, it shall be deposited through approved conduit. Approved conduit shall also be used to place concrete in sloping forms or in other locations, as directed, to prevent concrete from sliding around reinforcing or other embedments.
            7. In general, the method of depositing and compacting concrete shall be conducted to form a compact, dense, impervious concrete with the required surface and a minimum of segregation. Remove defective concrete as directed by the Engineer at no additional cost to the Port. “Plastering” will not be permitted.
            8. Do not place concrete where other Work in the area, such as the driving of piling or sheets, or other vibratory action, will adversely affect the initial set or strength of the concrete.
         2. Ready-Mixed Concrete
            1. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC Section 3.
            2. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94, except as otherwise specified.
            3. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100.
            4. Ready-mixed concrete shall be placed in its final position within 1-1/2 hours after the addition of cement.
            5. Mix concrete only in such quantities as are required for immediate use and use while fresh before initial set has taken place. Concrete which has developed initial set shall not be used. Concrete which has partially hardened shall not be re-tempered or remixed.
         3. Placement by Classification:
            1. Class A concrete is to be used as precast-prestressed or post-tensioned concrete, for uses such as piling, deck, wall, or roof panels and other high-stress, heavily reinforced structures.
            2. Class B concrete is to be used in the same type of structures as Class A except that the units will not be prestressed or post-tensioned.
            3. Class C concrete is to be used for heavily reinforced structural members, such as pile caps, steel pile bulkhead caps, bull rails, etc.
            4. Class D concrete is to be used for reinforced structural members, but only those which require placement in such a way or location that proper vibration or consolidation is questionable. The additional strength is required to overcome the doubtful placement technique.
            5. Class E concrete is to be used in all other reinforced members or sections.
            6. Class F concrete is to be used only in un-reinforced sections, such as footing blocks, mass pours, fence anchors, etc.
            7. Class P or R concrete is to be used for paving runways, taxiways, ramps, etc.
            8. Class X concrete is to be used for cast-in-place closure between the ends of deck panels or other areas which are highly reinforced or under extreme stresses.
            9. Class Y concrete is to be used for cast-in-place shear keys between adjacent deck panels or similar locations.
         4. Cold Weather Placement
            1. Do not place concrete on frozen ground or against frosted reinforcing steel or forms.
            2. Do not mix or place concrete while the atmospheric temperature is below 40°F.

If the Project requires concrete to be placed during cold weather, specify placement per WSDOT Standard Specifications, paragraph 6-02.3(6)A.

* + - 1. Hot Weather Placement:
         1. When job-site conditions are present or anticipated that accelerate the rate of moisture loss or rate of cement hydration of freshly mixed concrete, including an ambient temperature of 80 degrees F or higher, and an evaporation rate that exceeds 0.2 lb/ft2/h, concrete Work shall conform to all requirements of ACI 305.1.
      2. Underwater Placement:
         1. In no case place concrete in running water or in water with a temperature below 35 degrees F.
         2. Whenever permission is given to place concrete under water, place concrete within the confines of a compartment, such as a cofferdam, tube, or caisson.
         3. Method of placement, forms, confining structure, special concrete mix and all equipment shall have prior approval of the Engineer.
      3. Vibration of Concrete:
         1. Provide suitable internal vibrating tampers for use in placing and compacting all concrete except that which is placed under water. The vibrators shall be of the type designed to be placed directly in the concrete, and their frequency of vibration shall be not less than [7,000] impulses per minute when in actual operation. The type of vibrator and its method of use shall be subject to the approval of the Engineer.
         2. Vibration shall be such that the concrete becomes uniformly plastic. Insert vibrators to a depth sufficient to vibrate the bottom of each layer effectively, but do not penetrate partially hardened concrete. Do not apply the vibrators directly to steel which extends into partially hardened concrete.
         3. Do not continue vibration in any one spot until pools of grout are formed. In vibrating and finishing top surfaces which are exposed to weather or wear, extreme care shall be exercised to avoid drawing water or laitance to the surface. In relatively high lifts, the top layer shall be comparatively shallow and the concrete mix shall be as stiff as can be effectively vibrated into place and properly finished. Do not use vibrators to transport or move concrete inside the form.
         4. Supply a sufficient number of vibrating tampers to effectively vibrate all of the concrete placed. Hand-tamping shall be required wherever necessary to secure a smooth and dense concrete on the outside surfaces.
    1. Finishing Concrete Surfaces
       1. Finish concrete surfaces in accordance with the procedure specified for each type of surface.
       2. Unformed Surfaces:
          1. Finish U-1: the top surface of footings, piers, columns, walls and other formed concrete which will ultimately receive additional concrete. The surface may contain shear keys, reinforcing steel, anchor bolts, or other embedments as indicated on the drawings.

The surface shall be rodded across the grade strip or forms such that the resulting surface will have no irregularities, except shear keys, greater than the maximum-size aggregate. Grade strips, if used, are considered forms, and the accuracy of setting and the exposed appearance shall fall within the appropriate finish designation tolerances.

Clean the surface of laitance, dirt, foul water, or other deleterious material to the satisfaction of the Engineer prior to placing additional concrete. If “green cutting” air and water jets are used to remove laitance, sufficient time shall have elapsed after the pour so as not to weaken the joint by loosening the top aggregate.

* + - * 1. Finish U-2: the top surface of unexposed slabs, beams, buttresses, corbels, etc., which will not receive additional concrete and will not be exposed to view.

The surface shall be rodded across the top of the forms or screeds and smoothed with a wood float to remove irregularities greater than 3/8 inch in depth or variations from a grade of more than 1/2 inch in ten feet.

* + - * 1. Finish U-3: the top surface of exposed exterior slabs, such as sidewalks, porch decks, stair treads, driveways, approaches, etc.

The surface shall be rodded across the screeds and smoothed with a “bull float” light steel trowel and broom-finished. The general surface shall have no irregularities greater than 3/16 inch in depth or variations in grade of more than 3/8 inch in ten feet. The broom stria shall be approximately 1/8 inch in depth. The slab shall be edged or patterned with a two-inch-wide edging tool having a [3/4]-inch corner radius.

* + - * 1. Finish U-4: the same as U-3 except that the maximum irregularity shall be 1/8 inch in depth and the broom stria shall be approximately 1/16 inch.
        2. Finish U-5: the top surface of interior slabs or other shapes, exposed to public view or to receive a subsequent surface coating, treatment, or material. The ultimate use of this surface is for foot traffic, machinery, or furniture.

The surface shall be rodded across the screeds and smoothed with a “bull float,” the larger aggregate shall be depressed with a “jitter bug” or similar device; and the surface shall be hand- or power-steel-troweled to a finish that has no irregularities greater than 1/32 inch in depth and shall not vary from a true plane by more than 1/8 inch in ten feet.

* + - * 1. Finish U-6: [Project-specific]
      1. Formed Surfaces:
         1. Finish F-1: The formed surface created by boards, plywood, or steel sheets which may ultimately serve as a form for an additional concrete pour or as an unexposed side of a bulkhead, pier, or foundation wall. The surface may contain shear key, keyways, reinforcing steel, anchor bolts, or other embedments as indicated on the drawings.

The surface shall have no treatment except for repair of rock pockets in excess of 3/4 inch deep and filling tie or she-bolt holes. The surface plane dimensions shall be within a tolerance of minus 1/2 inch or plus 1-1/2 inch of design dimensions.

The surface shall be cleaned of laitance, dirt, or other deleterious material to the satisfaction of the Engineer prior to placement of additional concrete or special coating.

* + - * 1. Finish F-2: The formed surface created by boards, plywood, steel, or other sheets which may be exposed to industrial view.

The surface shall have no treatment except for the repair of rock pockets greater than 1/2 inch in depth, the filling of tie or the bolt holes, and the removal of fins or other protrusions in excess of 3/8 inch.

The surface plane dimensions shall be within a tolerance of minus 1/4 inch or plus 3/4 inch of design dimensions.

The surface shall be cleaned of laitance, dirt, or other deleterious material to the satisfaction of the Engineer prior to placement of any coating or surface treatment.

* + - * 1. Finish F-3: The formed surface created by plywood, steel, or other sheets which may be exposed to public view.

The surface shall be ground smooth to remove all fins and protrusions, all rock pockets and tie holes, and shall be repaired by dry-packing. All depressions shall be filled with a one-to-one sand cement grout and sack- or carpet-rubbed with a one-to-one sand/cement dry mix.

The surface plane dimension shall be within a tolerance of plus or minus 1/4 inch of design dimensions, and the surface shall be free of irregularities greater than 3/16 inch in ten feet in any direction.

* + - * 1. Finish F-4: [Project-specific]
    1. Curing Concrete
       1. General
          1. Keep all concrete surfaces, except those on retaining walls, roadway slabs, sidewalk slabs and rail bases, continuously wet with water for not less than three days after the concrete is placed. This curing may be done by covering the surface with sand, cotton mats, burlap, or moisture-retaining membrane, or by wetting the outside surfaces of the forms.
          2. Keep all other concrete continuously wet with water for not less than ten days when Type I cement is used and not less than three days when Type III cement is used.
          3. Retaining walls may be cured by wetting the outside surfaces of the forms or covering the outside surfaces with white polyethylene sheeting.
       2. Curing Compound Covered with Curing Sheet
          1. Application:

Apply an epoxy-chlorinated, rubber-type curing compound to the fresh concrete immediately after finishing the concrete on roadway slabs, sidewalk slabs and roof slabs and as soon as the visible bleed water has evaporated or at such time as directed by the Engineer.

The rate of coverage shall be at least one gallon per 100 square feet and sufficient to effectively obscure the original color of the concrete.

Apply the curing compound in two applications to ensure full coverage of the concrete, with the second coat applied in a direction perpendicular to that of the first application.

Care shall be taken to avoid getting any curing compound on construction joints or on exposed reinforcing steel. Curing compound on construction joints or reinforcing steel shall be completely removed before the following concrete pour.

Use white-pigmented-type curing compound, except that when bonding other materials to the concrete surface is required, the clear-type curing material shall be used. Thoroughly agitate the white-pigmented-type curing compound immediately before and during application.

Supply a separate work bridge, backup spray equipment and sufficient workmen to properly apply the curing compound.

* + - * 1. Not later than ten-hours following the application of the curing compound, the top surfaces shall be covered with cotton mats, two-inches of clean sand, an approved vapor-proof curing paper, or white polyethylene sheeting. If the covering used is sand or cotton mats, it shall be kept continuously wet day and night for the period of time specified above, and if curing paper or plastic film is used, it shall be left in place for the same length of time.
        2. Curing paper and white polyethylene sheeting must be kept tightly in place by taping and weighting joints, or other methods as the Contractor may devise, for the prescribed length of time.
        3. Sprinkling, ponding, or covering with material other than clean sand, cotton mats, curing paper, or white polyethylene sheeting will not be allowed.
        4. Membrane curing compounds which leave a waxy film on the concrete will not be allowed.
        5. After the concrete has cured for the required time, the sand covering, if used, shall be removed and the slabs shall be swept clean.
  1. DELIVERABLES
  2. QUALITY ASSURANCE

1. MEASUREMENT AND PAYMENT
   1. GENERAL
      1. No separate measurement or payment will be made for the Work required by this section. The cost for this portion of the Work will be considered incidental to, and included in the payments made for the applicable bid items in the [Schedule of Unit Prices] [Lump Sum price bid for the Project].

End of Section

Revision History:

05/01/2014 Conversion to 2004 CSI Numbering System

10/15/2014 Added Sole Source and Salient Characteristics Note to Part 2

01/12/2025 Revised 2.04.B.2 & 2.07.A