
USACE / NAVFAC / AFCEC / NASA UFGS-03 35 00.00 10 (May 2014)

Preparing Activity: USACE Superseding
UFGS-03 35 00.00 10 (November 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2018

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CONCRETE FINISHING

05/14

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SECTION 03 35 00.00 10

CONCRETE FINISHING 05/14

NOTE: This guide specification covers the requirements for cast-in-place concrete finishing.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

NOTE: This specification covers concrete work primarily for buildings, but may also be used for other applications such as wharves, docks, drainage structures, warehouse type slabs, and driveways. The following guide specifications are relative to this section and will be included to the extent applicable in projects where this section is used:

Section 03 11 13.00 10 CONCRETE FORMING
Section 03 20 00.00 10 CONCRETE REINFORCING
Section 03 15 00.00 10 CONCRETE ACCESSORIES
Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE
Section 03 31 01.00 10 STRUCTURAL CONCRETE FOR CIVIL
WORKS
Section 07 92 00 JOINT SEALANTS

Specifications on concrete for bridge construction should be in a separate section and should be essentially in agreement with concrete construction requirements in the American Association of State Highway and Transportation Officials, "Standard Specifications for Highway Bridges". Requirements for deck slabs, curbs, gutters, and sidewalks forming an integral part of the bridge should be included in the section concerning concrete for bridge construction.

In addition to specified requirements the following information will be shown on project drawings:

1. Details which require a depressed structural slab for tile, terrazzo, or other floor finishes in order to provide finished surfaces at the same elevations.

2. When exposed concrete surfaces are specified, the locations in the finished structure should be indicated. If other than cast finish is required, the type and location must be indicated.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 301 (2016) Specifications for Structural Concrete

ACI 301M (2016) Metric Specifications for

Structural Concrete

ACI 303R	(2012) Guide to Cast-In-Place Architectural Concrete Practice
ACI 305R	(2010) Guide to Hot Weather Concreting
ASTM INTERNATIONAL (ASTM)	
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Use the "S" classification only in SD-11 Closeout Submittals. The "S" following a submittal item indicates that the submittal is required for the Sustainability eNotebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the

Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Recycled Content Products; (LEED)

SD-04 Samples

Field Test Panels
Sample Wall Panels
Slab Panels

SD-08 Manufacturer's Instructions

Dry Shake Finish

1.3 QUALITY ASSURANCE

1.3.1 Field Test Panels

NOTE: Edit these paragraphs as appropriate.
Specify location for all field test panels. Add
requirements for mock-ups if applicable. Add
requirements for slab panels if exposed aggregate
slab finish is required or if superflat slab finish
is required.

Construct field test panels prior to beginning of work using the materials and procedures proposed for use on the job, to demonstrate the results to be attained. The quality and appearance of each panel is subject to the approval of the Contracting Officer, and, if not judged satisfactory, construct additional panels until approval is attained. Formed or finished surfaces in the completed structure must match the quality and appearance of the approved field example.

1.3.1.1 Sample Wall Panels

Construct one sample panel at least 1220 mm 4 feet by 1525 mm 5 feet and 150 mm 6 inches thick to demonstrate Class A formed finish and a similar one for Class B formed finish. Locate panels [_____]. Each panel must include a full length and full width joint line and have at least two voids each at least 300 mm 12 inches by 300 mm 12 inches by 75 mm 3 inches deep either impressed in the concrete as placed or chipped in the hardened concrete. After the concrete is 7 days old, patch the voids to demonstrate the effectiveness and the appearance of the Contractor's repair procedures.

1.3.1.2 Slab Panels

Construct a slab panel at least 1220 mm 4 feet by 1525 mm 5 feet and 100 mm 4 inches thick to demonstrate exposed aggregate slab finish and a similar panel for extra high class slab finish. Locate panels [_____]. Each panel must have a full length joint line.

PART 2 PRODUCTS

NOTE: Edit this PART to include only those products
which are locally available, are required by the
project, and are acceptable to the designer.

In accordance with Section 01 33 29 SUSTAINABILITY REPORTING submit documentation indicating: distance between manufacturing facility and the project site, distance of raw material origin from the project site, percentage of post-industrial and post-consumer recycled content per unit of product and relative dollar value of recycled content products to total dollar value of products included in project. Provide submittals as specified in the subject Section.

2.1 DRY SHAKE FLOOR TOPPING MATERIAL

NOTE: Edit and supplement this paragraph for light
reflective, spark resistant, static disseminating
floors as applicable to the project.

Premixed ready-to-use dry shake proportioned, mixed and packaged at the factory, and delivered to the jobsite in sealed, moisture resistant bags, ready to apply, finish and cure. The manufacturer of the dry shake material must have at least 10 years experience in the manufacture of such material. Do not use any material from a manufacturer who makes any disclaimer of the materials performance.

PART 3 EXECUTION

3.1 FINISHING FORMED SURFACES

NOTE: Formwork, form materials and form
construction are specified in Section 03 11 13.00 10
STRUCTURAL CAST-IN-PLACE CONCRETE FORMING. Classes
of finish to be used for various formed surfaces of
the structure must be indicated on the drawings or
clearly specified herein. Criteria to use in
choosing class of finish are as follows:

Class A Finish. This finish is for surfaces permanently exposed to public view that require excellent appearance at close range. Examples: Exterior walls of office and residential buildings, of warehouse/industrial type buildings where frequent public access occurs, and of other similar exposed structures; and interior walls, columns or beams of these same structures where no other finish treatment is to be added.

Class B Finish. This finish is for surfaces exposed to public view that do not require the excellent appearance of Class A. Exterior walls of warehouse/industrial buildings where public access is infrequent, structures on combat training ranges,

and other similar exposed structures; interior exposed surfaces of such structures, and interior surfaces of liquid containers.

Class C Finish. This finish is for concealed surfaces not exposed to view and for all surfaces not covered by Class A, B, or D finish. **Examples:** Interior surfaces that will be covered by dry wall or other applied surfaces, surfaces of mechanical rooms and elevator shafts.

Class D Finish. This finish is for surfaces where roughness and irregularities are not objectionable. **Examples:** Walls and foundation surfaces against which backfill will be placed, exterior surfaces permanently submerged in water where no coating is to be applied.

When a Class A or B Finish is specified, add to paragraph FIELD TEST PANELS in PART 1 requirements for the Contractor to construct a sample panel for approval before start of construction. Finishes for surfaces to be exposed to high velocity flow of water (above 40 ft per sec) will be designed and constructed in accordance with Civil Works criteria.

Forms, form materials, and form construction are specified in Section 03 11 13.00 10 STRUCTURAL CAST-IN-PLACE CONCRETE FORMING. Finish formed surfaces as specified herein. Unless another type of architectural or special finish is specified, leave surfaces with the texture imparted by the forms except that defective surfaces must be repaired. [Apply other finishes to the following structures or portions of structures:]

TYPES OF FINISH	STRUCTURE OR PORTION OF STRUCTURE
[Grout-cleaned]	[_____]
[Textured]	[_____]
[Exposed aggregate]	[_____]
[Sand-blast]	[_____]
[Tooled]	[_____]

Maintain uniform color of the concrete by use of only one mixture without changes in materials or proportions for any structure or portion of structure [that requires a Class A or B finish][that is exposed to view or on which a special finish is required]. The form panels used to produce the finish must be orderly in arrangement, with joints between panels planned in approved relation to openings, building corners, and other architectural features. [The finished surface of sand-blasted, textured, tooled, and exposed aggregate finishes must duplicate the preapproved sample panel.]Do not reuse forms if there is any evidence of surface wear or defects that would impair the quality of the surface.

3.1.1 Class A Finish

Class A finish is required [where indicated.] [in the following areas, [____].] Formed surfaces meet the requirements of ACI 301M ACI 301, surface finish SF-3.0.

3.1.2 Class B Finish

Class B finish is required [where indicated.] [in the following areas, [____].] Formed surfaces meet the requirements of ACI 301M ACI 301, surface finish SF-2.0.

3.1.3 Class C and Class D Finish

Class C finish is required [where indicated.] [in the following areas, [____].] Class D finish is required [where indicated.] [in the following areas, [____].] Formed surfaces meet the requirements of ACI 301M ACI 301, surface finish SF-1.0.

3.1.4 Architectural and Special Finishes

NOTE: The specification writer must ensure that any areas to receive architectural and special finishes are indicated on the drawings or specified in Section 03 33 00 CAST-IN-PLACE ARCHITECTURAL CONCRETE or herein. Where these paragraphs require a finish to match a sample panel on display during the bidding period, the specification writer must ensure that such panel is fabricated and displayed. When considered appropriate, require a test panel to be fabricated for approval before start of construction.

Architectural concrete finishes are specified in Section 03 33 00 CAST-IN-PLACE ARCHITECTURAL CONCRETE. Conform special finishes to the requirements specified herein.

3.1.4.1 Smooth Finish

After other concrete construction is complete in each overall separate contiguous area of the structure, apply smooth finish to [the areas indicated] [the following areas, [____]]. Use a mortar mix consisting of one part portland cement and two parts well-graded sand passing a 0.6 mm No. 30 sieve, with water added to give the consistency of thick paint. Where the finished surface will not receive other applied surface, use white cement to replace part of the job cement to produce an approved color, which must be uniform throughout the surfaces of the structure. After the surface has been thoroughly wetted and allowed to approach surface dryness, vigorously apply the mortar to the area by clean burlap pads or by cork or wood-floating, to completely fill all surface voids. Scrape off excess grout with a trowel. As soon as it can be accomplished without pulling the mortar from the voids, rub the area with burlap pads having on their surface the same sand-cement mix specified above but without any mixing water, until all of the visible grout film is removed. Tightly stretch the burlap pads used for this operation around a board to prevent dishing the mortar in the voids. Complete the finish of any area in the same day, and make the limits of a finished area at natural breaks

in the surface. Continuously moist cure the surface for 48 hours commencing immediately after finishing operations in each area. The temperature of the air adjacent to the surface must be not less than 10 degrees C 50 degrees F for 24 hours prior to, and 48 hours after, the application. In hot, dry weather apply the smooth finish in shaded areas or at night, and never be apply when there is significant hot, dry wind.

[3.1.4.2 Grout-Cleaned Finish

NOTE: See the appropriate DM and EM 1110-2-2000 for surfaces to receive a grout-cleaned finish. Be sure this is shown in the drawings.

The surfaces of [_____] must be given a grout-cleaned finish as described, as approved by the Contracting Officer and after all required curing, cleaning, and repairs have been completed. Moist cure surfaces to be grout-cleaned for the required period of time before application of the grout-cleaned finish. Delay grout-cleaning until near the end of construction on all surfaces not to be painted in order to achieve uniformity of appearance and reduce the chance of discoloring caused by subsequent construction operations. The temperature of the air adjacent to the surface must be not less than 5 degrees C 40 degrees F for 24 hours prior to and 72 hours following the application of the finish. Complete the finish for any area in the same day, and make the limits of a finished area at natural breaks in the finished surface. Thoroughly wet the surface to receive grout-cleaned finish to prevent absorption of water from the grout but have no free water present. Then coat the surface with grout. Apply the grout as soon as the surface of the concrete approaches surface dryness and vigorously and thoroughly rubbed over the area with clean burlap pads, cork floats or stones, so as to fill all voids. The grout is composed of one part portland cement as used on the project, to two parts by volume of well-graded sand passing a 600-µm (No. 30) sieve mixed with water to the consistency of thick paint. Use white portland cement for all or part of the cement as approved by the Contracting Officer to give the desired finish color. The applied coating must be uniform, completely filling all pits, air bubbles, and surface voids. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, burlap pad, or other means. Then, after the surface whitens from drying (about 30 minutes at normal temperature) rub vigorously with clean burlap pads. Immediately after rubbing is completed, moist cure the finished surface for 72 hours. Tightly stretch burlap pads used for this operation around a board to prevent dishing the mortar in the voids.

] [3.1.4.3 Textured Finish

Apply this type of finish where specified to conform to details indicated by use of approved textured form liners. Secure liner panels in the forms by methods recommended by the manufacturer but not by methods that will permit impressions of nail heads, screw heads, washers, or the like to be imparted to the surface of the concrete. Seal edges of textured panels to each other to prevent grout leakage. Use sealant that is nonstaining to the surface. The finish must be similar to and shall closely match the finish on the sample panel.

]3.1.4.4 Exposed Coarse-Aggregate Finish

Coarse aggregate consisting of [_____] material, meeting the specified

quality requirements, and graded as follows: [_____]. Expose coarse aggregate by an approved method. The finish must be similar to and closely match the finish on the sample panel put on display during the bidding period, and the finish on the approved preconstruction test panel.

3.1.4.5 Sandblast Finish

Blast the concrete surface at an approved age with approved wet sandblasting procedures to obtain a [brush] [light] [medium] [heavy] finish which will match the descriptive photographs in ACI 303R. The finish must be similar to and closely match the finish on the approved preconstruction test panel.

3.1.4.6 Tooled Finish

Dress the thoroughly cured concrete at an approved age with approved electric, air, or hand tools to a uniform texture with a [hand-tooled] [rough] [fine-pointed] [crandalled] [or] [bush-hammered] surface texture. The finish must be similar to and closely match the finish on the approved preconstruction test panel.

3.2 REPAIRS

Repair in accordance with ACI 301M ACI 301, Section 5.

3.3 FINISHING UNFORMED SURFACES

NOTE: Type of finish of unformed surfaces should be indicated on the drawings. If not on the drawings, it must be specified here. Correlate this paragraph with paragraph Tolerances in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE or paragraph CONSTRUCTION TOLERANCES in 03 31 01.00 10 STRUCTURAL CONCRETE FOR CIVIL WORKS.

The finish of all unformed surfaces must meet the requirements of paragraph [TOLERANCES in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE] [CONSTRUCTION TOLERANCES in Section 03 31 01.00 10 STRUCTURAL CONCRETE FOR CIVIL WORKS], when tested as specified herein.

3.3.1 General

The ambient temperature of spaces adjacent to unformed surfaces being finished and of the base on which concrete will be placed must not be less than[10 degrees C 50 degrees F][5 degrees C 40 degrees F]. In hot weather meet all requirements of Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE paragraphs HOT WEATHER REQUIREMENTS and PREVENTION OF PLASTIC SHRINKAGE CRACKING. In hot weather when the rate of evaporation of surface moisture, as determined by use of Figure 2.1.5 of ACI 305R, may reasonably be expected to exceed 1.0 kg/square meter 0.2 pounds per square foot per hour. Make provisions for windbreaks, shading, fog spraying, or wet covering with a light-colored material in advance of placement, and take such protective measures as quickly as finishing operations will allow. Float finish unformed surfaces that are not to be covered by additional concrete or backfill, with additional finishing as specified below, and true to the elevation indicated. Bring surfaces to receive additional concrete or backfill to the elevation indicated, properly consolidate, and

leave true and regular. Unless otherwise indicated, evenly slope exterior surfaces for drainage. Where drains are provided, evenly slope interior floors to the drains. Carefully make joints with a jointing or edging tool. Protect the finished surfaces from stains or abrasions. Grate tampers or "jitterbugs" cannot be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing is not be permitted. If bleedwater is present prior to finishing, carefully drag off the excess water or remove by absorption with porous materials such as burlap. During finishing operations, take extreme care to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Remove and replace any slabs with surfaces which exhibit significant crazing. During finishing operations, check surfaces with a 3 m 10 foot straightedge, applied in both directions at regular intervals while the concrete is still plastic, to detect high or low areas.

3.3.2 Rough Slab Finish

NOTE: Rough-slab finish alone is used when a bonded surface course for heavy use industrial floor is specified, or where roof fill or thick mortar setting bed is used. If the drawings do not indicate the slabs to receive only a rough slab finish, they must be specified here. Rough slab finish must be retained as the first operation for all subsequent finishing.

In accordance with ACI 301M ACI 301, Section 5.

3.3.3 Float Finish

NOTE: If the drawings do not indicate the areas to receive a floated finish, they must be specified here.

In accordance with ACI 301M ACI 301, Section 5.

3.3.4 Trowel Finish

NOTE: If the drawings do not indicate the areas to receive a trowel finish, they must be specified here. A troweled finish will be specified for most wearing surfaces and where a smooth dense surface finish is required. Delete this paragraph when no troweled finish or subsequent finish is required.

In accordance with ACI 301M ACI 301, Section 5.

3.3.5 Superflat Finish

NOTE: If the drawings do not indicate the areas to receive a superflat surface, they must be specified

here. Correlate this paragraph with the "Tolerances" paragraph in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE or the CONSTRUCTION TOLERANCE paragraph in 03 31 01.00 10 STRUCTURAL CONCRETE FOR CIVIL WORKS. Primary locations where superflat floors are required are warehouse aisles where very high lift forklifts and other type stackers operate. Delete this paragraph when superflat finish is not required.

[Areas as indicated] [Construct the following areas [____]] as superflat floors. Take extreme care to meet specified tolerances. If necessary, use special heavy duty, laser guided machines built especially for this work and experienced, factory-trained operators. Use a long-handled 3 meter 10 foot "highway type" cutting straightedges plus any other tools necessary to meet the surface tolerance requirements. Conform the surface finish to paragraph [TROWELED FINISH] [____].

3.3.6 Non-Slip Finish

NOTE: If drawings do not indicate the areas to receive non-slip finish, they must be specified here. Delete this paragraphs when Non-Slip Finish is not required.

Construct non-slip floors in accordance with ACI 301M ACI 301, Section 5..

3.3.7 Dry Shake Finish

NOTE: If the drawings do not indicate the areas to receive a dry shake finish, they must be specified here. When dry shake finish is required, add to paragraph Technical Service for Specialized Concrete in Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE, a requirement that a manufacturer's representative be present during use of dry shake finish.

Construct[areas as indicated][the following areas [____]] with a dry shake finish. Use [dry shake floor armoring topping] [dry shake conductive and spark resistant floor topping] [dry shake non-metallic, light reflective floor topping] to surface the floor. Construct the base slab and apply the dry shake material in accordance with the manufacturer's written instructions, furnished by the Contractor. Submit manufacturer's written instructions on application of dry shake material 15 days prior to start of construction. Apply the dry shake material in a two-stage application. Total application must be at the rate recommended by the manufacturer but at a rate not less than 7.5 kg per square meter 1.5 psf.

- a. The first application must be at the rate of two-thirds of the total and applied immediately following floating of total area. First apply the dry shake material to the floated concrete adjacent to forms, entryways, columns, and walls where moisture will be lost first. Distribute dry shake material evenly using an approved mechanical spreader. Do not hand throw the material on the surface. Use

finishing machines with float shoes as soon as dry shake has absorbed moisture (indicated by darkening of surface); do the floating just sufficiently to bring moisture from base slab through the shake.

- b. Immediately following floating of the first shake, apply the remaining one-third of the total specified shake in the same manner and machine float. Further compact the surface by a third mechanical floating if time and setting characteristics will allow. At no time can water be added to the surface.
- c. As surface further stiffens, indicated by loss of sheen, hand or mechanically trowel the surface with blades relatively flat. Remove all marks and pinholes in the final raised trowel operation.
- d. Cure floors finished with dry shake material using a curing compound recommended by the manufacturer of the dry shake material. Apply membrane curing compound immediately after the floor surface has hardened sufficiently so surface will not be marred by the application. Apply the compound uniformly over the entire surface at a coverage which will provide moisture retention in excess of the requirements of ASTM C309. When dry, protect the coating from droppings of plaster, paint, dirt, and other debris by a covering of scuffproof, non-staining building paper.
- e. Keep the floor covered and free of traffic and loads for at least 10 days after completion. Make adequate provision to maintain the concrete temperature at 10 degrees C 50 degrees F or above during the curing period. Leave the curing compound in place for not less than 30 days. Remove the curing compound by a manufacturer recommended method prior to turning the facility over to the Government.

3.4 SPECIALTY FLOORS

3.4.1 Heavy Duty Floors

NOTE: Heavy duty floors are to be used only for floors that will receive major traffic of tracked vehicles or steel wheeled equipment when the designer is concerned about wear. Moderate amounts of such traffic can be accommodated by ordinary concrete floors. If drawings do not indicate areas to receive heavy duty finish, they must be specified here. Delete this subparagraph if not required. Edit bracketed items. Add to and strengthen this subparagraph as needed but do not delete any of the listed requirements.

Place concrete as nearly as practicable in final position, in a uniform layer. Place and screed the overlay slightly above the required finished grade, compacted by rolling with rollers weighing not less than 4.5 kg/linear 25 mm 10 pounds/linear inch of roller width or by approved tamping equipment and finish screeded to established grade. Do not use grid type tampers. Float the concrete, while still green but sufficiently hardened to bear a person's weight without deep imprint, to a true even plane with no coarse aggregate visible. Float with an approved disc-type mechanical float which has integral impact mechanism. Leave the surface of the overlay undisturbed until the concrete has hardened enough to prevent

excess fines from being worked to the top. Form joints to match those in the base slab.

3.4.2 Bonded Two-Course Floor Construction

NOTE: Where it is anticipated that the surface of a floor slab may be damaged during construction operations, a two-course floor may be specified with the second course applied late in the contract. If the drawings do not indicate areas to receive two-course floor construction, they must be specified here. Delete this subparagraph when two-course floor is not required. Edit bracketed items.

[Areas as indicated] [Construct the following areas [____]] with two-course construction. Construct a bonded two-course floor by placing a bonded topping on the thoroughly hardened indicated. The floor topping mixture must have a specified compressive strength of 41.4 MPa 6,000 psi at 28 days, a 50 mm 2 inch maximum slump, 13 mm 1/2 inch maximum-size coarse aggregate and proportioned to obtain required finishability. Thoroughly clean the surface of the base slab by sandblasting or high pressure water jet in accordance with paragraph PREPARATION FOR PLACING in Section [03 30 00.00 10 CAST-IN-PLACE CONCRETE][03 31 01.00 10 STRUCTURAL CONCRETE FOR CIVIL WORKS]. Keep the base slab continuously wet for the first 12 hours during the 24-hour period immediately prior to placing the finished floor. After all free water has evaporated or has been removed from the surface, scrub in a grout. The grout must be a 1:1 mixture of portland cement and sand passing the 2.36 mm No. 8 sieve mixed to a creamlike consistency. Apply the grout just ahead of the concrete-placing operation. While the grout is still damp, spread and screed the top course. Then float the surface with a disc power float or equivalent, followed by a minimum of two power trowelings. Remove trowel marks left by the machine by final, hard steel troweling by hand. Moist cure the finished floor in accordance with Section 03 39 00.00 10 CONCRETE CURING. Form joints to match those in the base slab.

3.4.3 Unbonded Two-Course Floor

Construct an unbonded two-course floor by placing a bond-breaker on the thoroughly hardened concrete slab left a distance below final grade as indicated. The floor topping mixture must have a specified compressive strength of 41.4 MPa 6,000 psi 28 days, a 50 mm 2 inch maximum slump, 13 mm 1/2 inch nominal maximum-size coarse aggregate, and proportioned to obtain required finishability. Screed and bull-float the base (bottom) course. Use a bond-breaker consisting of plastic sheeting, felt paper, a bond-breaking compound or a sand cushion. Float the topping with a disc power float or equivalent, followed by a minimum of two power trowelings. Remove trowel marks left by the machine by final, hard steel troweling by hand. <Moist cure the finished floor in accordance with Section 03 39 00.00 10 CONCRETE CURING.

3.5 EXTERIOR SLAB AND RELATED ITEMS

NOTE: Edit bracketed statements and use these paragraphs only when minor amounts of specified

items are required in the project. Remove affected paragraph when pertinent Section (Ex: 32 13 14.13 CONCRETE PAVING FOR AIRFIELDS AND OTHER HEAVY DUTY PAVEMENTS, 32 16 13 CONCRETE SIDEWALKS AND CURBS AND GUTTERS) is included in the contract.

3.5.1 Pavements

Immediately following the final consolidation of the surface, float the pavement longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, place and screed additional concrete, and operate the float until a satisfactory surface has been produced. Advance the floating operation not more than half the length of the float and then continued over the new and previously floated surfaces. After finishing is completed but while the concrete is still plastic, eliminate minor irregularities and score marks in the pavement surface by means of long-handled cutting straightedges. Use straightedges that are 3.75 m 12 feet in length and operated from the sides of the pavement and from bridges. Equip a straightedge operated from the side of the pavement with a handle 1 m 3 feet longer than one-half the width of the pavement. Test the surface for trueness with a 3.75 12 foot straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. Advance the straightedge along the pavement in successive stages of not more than one-half the length of the straightedge. Immediately fill depressions with freshly mixed concrete, strike off, consolidate, and refinish. Also strike and refinish projections above the required elevation. Continue the straightedge testing and finishing until the entire surface of the concrete is true. Before the surface sheen has disappeared and well before the concrete becomes nonplastic, give the surface of the pavement a nonslip sandy surface texture by [belting with approved "belt" and procedures] [use of a burlap drag. A strip of clean, wet burlap from 1.0 to 1.5 m 3 to 5 feet wide and 0.7 m 2 feet longer than the pavement width shall be carefully pulled across the surface]. Round edges and joints with an edger having a radius of 3 mm 1/8 inch.

3.5.2 Sidewalks

Apply a lightly broomed finish.

3.5.3 Curbs and Gutters

Finish exposed surfaces using a stiff bristled brush.

-- End of Section --