# PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

A. This Section includes the following:
   1. Ceramic tile and base.
   2. Porcelain tile and base.
   3. Concrete tile.
   4. Terra cotta tile.
   5. Waterproof and crack isolation membrane for thin-set tile installations.
   6. Metal edge strips installed as part of tile installations.

B. Related Sections include the following:
   1. Section 018113 “Sustainable Design Requirements.”
   2. Section 033000 "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
   3. Section 092900 “Gypsum Board” for tile backer board.

## 1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

## 1.4 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

D. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

## 1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Include DCOF data for floor tiles.

B. LEED Submittals: Credit MRc4 and EQc4.1. Refer to Section 018113 “Sustainable Design Requirements” for additional submittal requirements.

C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

D. Samples for Initial Selection: For grout, sealant and accessories involving color selection.
   1. Full-size units of tile requiring sealer with only half of the tile sealed.

E. Samples for Verification:
   1. Full-size units of each type and composition of tile and for each color and finish required.
   2. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.
   3. Full-size units of each type of trim and accessory for each color and finish required.
   4. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product, signed by product manufacturer.

B. Qualification Data: Installer.

C. Sample Warranty: For special warranty.

1.7 QUALITY ASSURANCE

A. Installer Qualification: For qualified Installer proof of completion of an authorized certification course as offered by TCAA, NTCA or other approved course.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquid latexes in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

1.11 WARRANTY

A. Special Waterproofing Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the systems components that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
   1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
   1. Waterproof crack isolation membrane and joint sealants shall be from same manufacturer as setting and grouting materials.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
   1. Metal edge strips and thresholds.

D. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard grade requirements unless otherwise indicated.

E. Coefficient of Friction (COF): Tile shall meet Dynamic COF value of 0.42 when measured per the DCOF AcuTest in accordance with ANSI A137.1-12.

2.2 PRODUCTS, GENERAL

A. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

B. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
   1. As selected by Architect from manufacturer's full range.

C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
   1. Where tile is indicated for installation on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

F. LEED Materials: Credit MRc4 and EQc4.1. Refer to Section 018113 “Sustainable Design Requirements” for additional material requirements.

2.3 TILE PRODUCTS

A. Tile and Wall Base: As indicated on Interior Finish Schedule on Drawings.

2.4 WATERPROOFING AND CRACK SUPRESSION MEMBRANE

A. Fluid-Applied Waterproofing and Anti-Fracture Membrane: Elastomeric, waterproofing and crack suppression membrane continuously installed as required for thin-set tile installations complying with ANSI 118.10 for waterproof and ANSI A118.12 for crack suppression membranes.
   1. Products: Subject to compliance with requirements, provide the following:
      a. MAPEI Corporation; Mapelastic AquaDefense
      b. Custom Building Products; RedGard Water Proofing & Crack Isolation Membrane.
      c. Laticrete International Inc; Hydro Ban Water Proofing & Crack Isolation Membrane.
      d. Omega Products International; Siena Dragon Skin.
      e. Or Equal.

2.5 SETTING MATERIALS

A. Portland cement Mortar (Thickset) Installation Materials: ANSI A108.02.
   1. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum-wire size.
   2. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

B. Professional, Modified Thin-Set and Medium Bed mortar at Large Format Tile: Single-component, polymer-modified Portland cement mortar, complying with A118.4, and A118.11.
   1. Products: Subject to compliance with requirements, provide the following:
      a. MAPEI Corporation; Ultraflex LFT.
      b. Custom Building Products ProLite Tile & Stone Mortar.
      c. Laticrete International; 220 Marble & Granite w/3701 Mortar Admix.
      d. Omega Products International; Medium Set Pro M400.
      e. Or Equal.
   2. Comply with manufacturer's written recommendations at large format tile, 15-inches or larger.

C. Premium Epoxy Mortar: High-strength, 100-percent solids epoxy mortar, complying with ANSI A118.3.
   1. Products: Subject to compliance with requirements, provide the following:
      a. MAPEI Corporation; Kerapoxy CQ.
      b. Custom Building Products, EBM-Lite Premium
      c. Laticrete International, Latipoxy 210.
      d. Omega Products International; Epoxy Mortar.
      e. Or Equal.
   2. Comply with manufacturer's written recommendations at large format tile, 15-inches or larger.

## 2.6 GROUT MATERIALS

A. Polymer-Modified Tile Grout, Non-Efflorescence: ANSI A118.6, and ANSI A118.7.
   1. Products: Subject to compliance with requirements, provide the following:
      a. MAPEI Corporation; Ultracolor Plus
      b. Custom Building Products; Prism Sure Color Grout
      c. Laticrete International, Inc.; Perma Color
      d. Omega Products International; Sanded GS300 or Non-Sanded NS200.
      e. Or Equal.

B. Premium Grade Epoxy Grout: 100 percent solids, water cleanable, improved resistance to chemical and heat exposure and complying with ANSI A118.3.
   1. Products: Subject to compliance with requirements, provide the following:
      a. MAPEI Corporation; Kerapoxy CQ
      b. Custom Building Products; CEG-Lite Epoxy Grout.
      c. Laticrete International, Inc; SpectraLock PRO Premium Grout.
      d. Omega Products International; Epoxy Grout.
      e. Or Equal.

C. Colors: Provide colors of grout as indicated on Material Finish Schedule on Drawings or as selected by Architect.

## 2.7 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants" as recommended by setting material manufacturer.
   1. 100-percent silicone sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT (at vertical applications) and Use T (at horizontal traffic applications), Use I (at horizontal wet applications), M, and G.

2. Sealants shall have a VOC content complying with south coast and local air quality management district requirements.
3. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
4. Products: Subject to compliance with requirements, provide the following:
   a. MAPEI Corporation; Mapesil 100-percent Silicone Sealant.
   b. Custom Building Products; Commercial 100-percent Silicone Caulk.
   c. Laticrete International, Inc.; Latisil.
   d. Omega Products International; Caulk CX300.
   e. Or Equal.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Commercial Floor Sealer/Vapor Barrier: Barrier recommended by waterproofing and setting manufacturer(s) to assure compatibility with flooring and related adhesive materials for use in reducing the moisture-vapor-emissions, relative humidity, and alkalinity rates to maximum allowed by flooring manufacturer.

C. Metal Edge Strips: Special shapes, metallic, designed specifically for flooring applications, stainless steel 304; ASTM A 666, exposed-edge material. Brushed no.4 or equal finish, unless noted otherwise.
   1. Products: Provide the following: Match shapes and models as indicated on Drawings.
      a. Schluter Systems (Basis-of-Design)
      b. Custom Building Products.
      c. Or Equal.

D. Floor Sealer: Colorless, slip- and stain-resistant sealer that does not affect color or physical properties of surfaces, as recommended by tile manufacturer for application indicated.
   1. Manufacturers: Subject to compliance with requirements, provide tile sealer from one the following:
      a. Miracle
      b. Stonetech
      c. Dry Treat
      d. Aquamix
      e. Or Equal.

E. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
   1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.

F. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
   1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated and in compliance with tile manufacturer’s recommendations.
   2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
      a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
      b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
   3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
   4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesion and installation properties.
   2. Subfloor finishes shall comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving crack isolation membrane.
   3. Subfloors shall be free of cracks, ridges, depressions, scale, and foreign deposits.
   4. Perform concrete floor testing in accordance with manufactures recommendations at a rate of one (1) test for each 1,000 square feet of flooring in accordance with the below methods:
      a. ASTM F1869 water vapor emission: Not greater than 5.0 lbs.
      b. ASTM F710 digital alkalinity-pH test: Not greater than 9.0pH
      c. ASTM F2170 relative humidity test: Not greater than 75-percent RH
   5. Apply floor sealer as recommended by waterproofing and setting manufacturers if concrete substrate does not meet moisture vapor emissions and alkalinity rates complying with flooring manufacturer’s written recommendations.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

A. Comply with the latest edition of the TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
   1. Follow procedures in the ANSI A108 Series of tile installation standards for providing 95-percent mortar coverage for all stone and ceramic tile installations.
      a. Average uniform contact area shall be not less than 95-percent when no less than three tiles are removed for inspection. To facilitate this coverage back butter the individual tiles or select the correct size notch to assure proper coverage. Key the mortar into the substrate with the flat side of the trowel and comb mortar in one direction. Tile shall be placed by pushing into the mortar perpendicular to the combed ridges.

B. Joint Widths: Install tile with the following joint widths:
   1. Ceramic/Porcelain Tile: 1/16 inch, unless noted otherwise noted or recommended by manufacturer.
   2. Stone Tile: 1/8 inch, unless noted otherwise noted or recommended by manufacturer.

C. Leveling System: Install per manufacturer’s and tile manufacturer’s recommendations to reduce lippage.
   1. Select appropriate base size for joint size selected.
   2. Remove stem and cap per manufacturer’s written instructions.

D. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
   1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
   2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
   3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
   2. Comply with TCNA EJ171 Movement Joint Guidelines.

I. Metal Edge Strips: Install at locations indicated and where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

J. Apply stone tile sealer to cleaned stone according to sealer manufacturer's written instructions.

K. Apply floor tile sealer to cleaned concrete and terra cotta tile according to sealer and tile manufacturers' written instructions. Apply two coats.

L. Grout Installation: Apply grout at concrete and terra cotta tiles with a grout bag or grout release to prevent staining.

M. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

## 3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

## 3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 WATERPROOFING AND CRACK ISOLATION INSTALLATION

A. Install waterproofing and crack isolation membrane to comply with ANSI A108.13 and A108.17 and manufacturer's written instructions to produce waterproof crack isolation membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over crack isolation waterproofing until crack isolation waterproofing has cured and been tested to determine that it is cured and watertight.

3.7 FIELD QUALITY CONTROL

A. During Installation: Contractor shall pull off randomly selected, freshly placed tiles to ensure 95 to 100 percent mortar coverage. Selection of tiles will be made by Owner's field representative and the Architect. Additionally, those setting the tile shall re-inspect backs for voids two or three times during the installation process. Mortar shall come into full contact with both tile and substrate surfaces.

3.8 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 EXTERIOR FLOOR TILE INSTALLATION SCHEDULE

A. Exterior Tile Floor Installations, Above-ground Concrete Locations:
   1. Tile Floor Installation TCNA F102-15: Medium set or thin-set mortar over concrete.
      a. Crack Suppression: Fluid-Applied Waterproofing and Anti-Fracture Membrane
      b. Bond Coat at Large Format Tile: Professional Modified Medium Bed Mortar.
      c. Bond Coat at all other locations: Professional Modified Thin set Mortar.
      d. Grout: Polymer-Modified Tile Grout, Non-Efflorescence.

3.10 INTERIOR WALL TILE INSTALLATION SCHEDULE

A. Interior Large Format Tile Wall Installations, tile backer units:
   1. Tile Installation TCNA W244C-15: Medium-set or thin-set mortar on tile backer units.
      a. Crack Suppression and Waterproofing: Fluid-Applied Waterproofing and Anti-Fracture Membrane.
      b. Bond Coat at Large Format Tile: Professional Modified Medium Bed Mortar.
      c. Bond Coat at all other locations: Professional Modified Thin set Mortar.
      d. Grout at Toilet Rooms: Premium Grade Epoxy Grout.
      e. Grout: Polymer-Modified Tile Grout, Non-Efflorescence.

3.11 INTERIOR FLOOR TILE INSTALLATION SCHEDULE

A. Interior Tile Floor Installations, Above-ground and On-Ground Concrete Locations:
   1. Tile Floor Installation TCNA F114-15: Unbonded mortar bed over concrete.
      a. Portland Cement Mortar with Reinforcing Wire Fabric, comply with Section 092400 “Cement Plastering.”
      b. Crack Suppression: Fluid-Applied Waterproofing and Anti-Fracture Membrane
      c. Bond Coat at Large Format Tile: Professional Modified Medium Bed Mortar.
      d. Bond Coat at all other locations: Professional Modified Thin set Mortar.
      e. Grout at Toilet Rooms: Premium Grade Epoxy Grout.
      f. Grout: Polymer-Modified Tile Grout, Non-Efflorescence.

3.12 INTERIOR STAIR TILE INSTALLATION SCHEDULE

A. Interior Tile Floor Installations, Concrete Stair Locations:
   1. Tile Floor Installation TCNA F113-15: Thin-set mortar over concrete.
      a. Crack Suppression: Fluid-Applied Waterproofing and Anti-Fracture Membrane
      b. Bond Coat at Stairs: Premium Epoxy Mortar.
      c. Grout: Polymer-Modified Tile Grout, Non-Efflorescence.

END OF SECTION