

## SECTION 09 30 00

### TILING

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Tile.
- B. Marble thresholds.
- C. Setting bed and adhesive.
- D. Grout.
- E. Reinforcement.
- F. Cleavage membrane.
- G. Sealant.
- H. Cementitious backer board.
- I. Cementitious backer board accessories.

##### 1.02 RELATED SECTIONS

- A. Lath and portland-cement plaster backing (scratch coat) for wall tile applied over full mortar setting bed is specified in Section 09 24 11 - Portland Cement Plaster.
- B. Granite flooring is specified in Section 09 63 19 - Stone Flooring.

##### 1.03 MEASUREMENT AND PAYMENT

- A. General: Ceramic and quarry tilework will not be measured separately for payment but will be paid for as part of the Contract lump sum price for Architectural Work.

##### 1.04 REFERENCES

- A. American National Standards Institute (ANSI):
  - 1. ANSI A108.1 Installation of Ceramic Tile with Portland Cement Mortar
  - 2. ANSI A108.4 Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive
  - 3. ANSI A108.5 Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
  - 4. ANSI A108.6 Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy

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5. ANSI A108.10 Installation of Grout in Tilework
6. ANSI 108.11 Interior Installation of Cementitious Backer Units
7. ANSI A118.1 Specifications for Dry-Set Portland Cement Mortar
8. ANSI A118.3 Specifications for Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive
9. ANSI A118.4 Specifications for Latex-Portland Cement Mortar
10. ANSI A118.6 Specifications for Ceramic Tile Grouts
11. ANSI 118.9 Cementitious Backer Units
12. ANSI A136.1 Organic Adhesives for Installation of Ceramic Tile
13. ANSI A137.1 Ceramic Tile

### B. American Society for Testing and Materials (ASTM):

1. ASTM C144 Specification for Aggregate for Masonry Mortar
2. ASTM C150 Specification for Portland Cement
3. ASTM C207 Specification for Hydrated Lime for Masonry Purposes
4. ASTM C920 Specification for Elastomeric Joint Sealants
5. ASTM C1325 Specification for Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets
6. ASTM D2178 Specification for Asphalt Glass Felt Used in Roofing and Waterproofing

### C. Tile Council of America (TCA):

1. TCA Handbook for Ceramic Tile Installation

## 1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Shop Drawings: Submit fully detailed Shop Drawings, showing tile layouts, dimensions, bedding and joint details, and connections to adjoining work.

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- C. Product Data: Submit manufacturer's specifications, catalog cuts, color range of tile, data sheets, installation instructions, and maintenance instructions. Include certifications and other data to show compliance with Contract requirements.
- D. Samples: Submit samples of each type, class, finish, and color of tile and grout, not less than 12 inches square, on plywood backing, with grouted joints as indicated. Include at least one complete grouted tile intersection. Samples shall show full range of color and texture. Samples shall match the Engineer's control samples. Samples require approval of the Engineer before they may be used in the work.

### **1.06 QUALITY ASSURANCE**

- A. Master Grade Certificates: Furnish a Master Grade Certificate as specified in ANSI A137.1 for each type of tile, signed by the manufacturer and the Contractor, certifying to the grade, type and quantity of tile, together with satisfactory information for identification of the containers to which they apply.
- B. Control Samples: Tile shall match the Engineer's control samples in all respects. Control samples require the Engineer's approval before they may be used as a standard.
- C. Single Source Responsibility: Obtain each material required for any one type and color of tilework from a single source to minimize variations in appearance and quality.
- D. Installation Standards: Comply with TCA Handbook for Ceramic Tile Installation and the herein referenced standards for all tile installations.

### **1.07 FIELD MOCK-UP**

- A. Requirements: Provide field mock-ups, as specified, for the Engineer's approval.
- B. Typical Floor Panel: The Contractor shall install a typical floor panel, approximately 3-feet square in an appropriate location. Mock-up shall include joint treatment and other accessories as required for a finished installation. Keep panel damp until mortar has set; dry slowly to attain true appearance of finished work. Maintain accepted panel as the standard for completed work. Provide a typical floor panel for each different type of tile flooring and floor design indicated.
- C. Typical Wall Panel: The Contractor shall install a typical wall panel, approximately 3 feet by 4 feet, in an appropriate location. Mock-up shall include joint treatment, trim shapes, wainscot cap when applicable, cove base, and other accessories as required for a finished installation. Keep panel damp until mortar has set; dry slowly to attain true appearance of finished work. Maintain accepted panel as the standard for completed work. Provide a typical wall panel for each different type of tile wall and wall design indicated.
- D. Acceptance: Approved typical floor and wall panels will be used to establish acceptable minimum standards of appearance and work quality. Acceptance will be based on uniformity, color match, proper texture, and proper construction methods.

### **1.08 PRODUCT DELIVERY AND STORAGE**

- A. Deliver materials, other than bulk materials, in manufacturer's unopened containers, fully identified with name, brand, type, grade, class, size, color, and pattern. Store materials above

ground and protect from weather and damage. Store in accordance with the respective manufacturer's instructions.

**1.09 JOB CONDITIONS**

- A. Examine substrates and adjoining construction, and the conditions under which tilework is to be installed. Do not proceed with tilework until conditions detrimental to the proper and timely completion of this work have been corrected.
- B. Allowable Variations in Substrate Levels:
  - 1. For Full Mortar Setting Bed Floors: plus or minus 1/4 inch in ten feet in any direction and 3/8 inch total maximum variation from levels indicated.
  - 2. For Full Mortar Setting Bed Walls: plus or minus 1/8 inch in 8 feet in any direction and 1/4 inch total maximum variation from indicated planes.
  - 3. For Thin-Set Tilework: Substrate shall conform with the allowable variations in finished work as specified in Article 3.03 herein. Where floor drains occur, substrate shall have minimum slope of 1/8 inch per foot to drain.
- C. Set tile and grout tile joints when ambient temperature is above 50 degrees F. Do not set or grout tile when ambient temperature is above 90 degrees F.

**1.10 MAINTENANCE MATERIALS**

- A. Upon completion of the Work, deliver to the Engineer an additional two percent of total of each tile size, pattern, and color used on the job, for use in future repair and maintenance work. Furnish boxes of whole tiles, sealed and properly identified. Include trim shapes.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Tile: ANSI A137.1, Standard grade. Tile types, sizes, colors, and finishes shall be as indicated.
  - 1. Floor Tile: Machine-made tiles including porcelain stone, natural clay-type ceramic, or quarry floor tile of sizes, thickness, colors, and textures indicated, matching the Engineer's control samples for the location.
  - 2. Wall Tile and Base: Machine-made natural clay-type ceramic wall tile of sizes, thickness, colors, and textures indicated, matching the Engineer's control samples for the location. Provide cove base with straight top at floors where there is tile wall above and cove base with bullnose top at floors where there is no tile above.
  - 3. Trim: Include matching stops, returns, trimmers, caps, and special shapes required to produce complete, neatly finished installation. Provide cove base at intersection of floors and walls. Tops of wainscots shall have bullnose shape.

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- B. Marble Thresholds: Saddle-type thresholds of profile and dimensions indicated, cut accurately to correct door-opening dimensions. Marble shall be a white or off-white, honed or polished marble appropriate for thresholds.
- C. Setting Bed and Adhesive Materials:
1. Full-Thick Portland Cement Mortar Setting Bed:
    - a. Portland Cement: ASTM C150, Type I.
    - b. Lime: ASTM C207, Type S.
    - c. Sand: ASTM C144.
    - d. Water: Clean and potable.
    - e. Proportions: In accordance with ANSI A108.1.
    - f. Bond Coat: ANSI A118.1 dry-set portland cement mortar or ANSI A118.4 latex portland cement mortar skim coat.
  2. Thinset, Dry-Set Portland Cement Mortar: ANSI A118.1.
  3. Thinset, Latex-Portland Cement Mortar: ANSI A118.4.
  4. Epoxy Adhesive: ANSI A118.3.
  5. Water-Resistant Organic Adhesive: ANSI A136.1. Water-resistant organic adhesive only shall be used for the application of wall tile over W/R gypsum board backing surfaces.
- D. Grout: ANSI A118.6, colors as indicated. If indicated colors are not available from manufacturer's standard colors, custom colors shall be provided. If colors are not indicated, colors shall be as selected by the Engineer from manufacturer's standard colors.
- E. Reinforcement: 2-inch by 2-inch mesh, 16 gage galvanized steel wire fabric.
- F. Cleavage Membrane: ASTM D2178, asphalt-impregnated glass felt, Type III - standard ply sheet, with overlap of 4 inches minimum.
- G. Sealant: Mildew-resistant urethane or silicone sealant conforming with applicable requirements of ASTM C920. Provide Grade P for joints in horizontal surfaces and Grade NS for joints in vertical surfaces. Provide for M and G uses. Sealant may be Type S or Type M as appropriate. Color shall match color of grouted joints. Include proper backer rod where indicated or required.
- H. Cementitious Backer Board: ASTM C1325 or ANSI A118.9 for use as backing for tile.

- I. Cementitious Backer Board Accessories:
  - 1. Two-inch wide glass fiber mesh tape for use over cementitious backer board in ceramic tile installation.
  - 2. Fasteners shall be non-corrosive and non-oxidizing.

**PART 3 - EXECUTION**

**3.01 EXAMINATION OF SUBSTRATE SURFACES**

- A. Examine subfloor and substrate surfaces to receive tile. Subfloor and substrate surfaces shall be firm, dry, clean, and free from defects or irregularities that may impair bond or jeopardize the quality of the work, and no tile work shall be performed over affected areas until suitable corrections have been made.
- B. Verify that work of other trades, in or behind the tile, is installed before proceeding with tilework.
- C. Confirm that metal stud spacing and gage comply with ceramic tile installation requirements.

**3.02 PREPARATION**

- A. Etch concrete and concrete block substrate with ten percent solution of muriatic acid as required to remove curing compounds or other substances that may interfere with proper bond of specified mortar for tile. Rinse clean with water to remove traces of acid.
- B. Seal around all openings in floors and walls, at junctions of floors and walls, and in corners and joints with sealant before installing tile.
- C. Install cementitious backer board in accordance with ANSI 108.11. Space horizontal and vertical joints and corners 1/8 inch and fill solid with dry-set or latex-portland cement mortar. Maximum variation in backing surface shall be 1/4 inch in 10 feet. Cementitious backer board shall be taped and finished smooth using glass fiber mesh tape embedded in a skim coat of mortar over joints and corners. Where waterproof membrane occurs, coordinate installation of cementitious backer board and waterproof membrane.

**3.03 INSTALLATION STANDARDS**

- A. Comply with the TCA Handbook for Ceramic Tile Installation methods specified in the Contract Specifications.
- B. Comply also with ANSI A108.1, A108.4, A108.5, A108.6, and A108.10 as applicable for the indicated installation.
- C. Comply with manufacturer's instructions and recommendations for special requirements not covered by referenced standards.

**3.04 INSTALLATION**

- A. Lay out tilework in patterns indicated using field tile and trim shapes as indicated or required. Center tile fields in both directions in each space or on each wall area, and adjust to minimize tile cutting. Provide uniform joint widths of 1/16 inch, unless otherwise indicated.
- B. Cut field tile, not trim shapes, unless otherwise indicated.
  - 1. Avoid cutting tile but, if necessary, use a power-operated abrasive saw. Finish cut edges of tile with a carborundum stone to match the uncut edges.
  - 2. Tiles which are cut to permit the passage of another element through the finished surface are to fit it neatly around such penetration, not less than 3/8 inch nor more than 1/2 inch from such penetration. Make templates as required. Use power operated wetsaws, bandsaws, and core drills as required.
- C. Tile floors shall be in true planes, sloped a minimum of 1/8 inch per foot to floor drains. Waves or depressions in floors will not be accepted. Tile walls shall be in true planes, plumb and level. Tile joints in floors and walls shall line up. Tile out of line or out of plane will not be accepted.
- D. Extend tilework into recesses and under equipment and fixtures in the spaces indicated or scheduled to receive tile. Form a complete covering without interruptions. Terminate work neatly at obstructions, edges, and corners, without disruption of pattern or joint alignments.
- E. Provide expansion joints in tilework where indicated. Provide sealant and backer rod as required. Joints shall coincide with building expansion joints where they occur, and shall penetrate the tile setting bed completely.
- F. Install cleavage membrane over concrete or masonry surfaces where indicated or required.
- G. Install metal reinforcement in full-thick mortar setting bed for floor tile where indicated or required.

**3.05 GROUTING**

- A. Comply with applicable requirements of ANSI A108.10. Force a maximum of grout into all joints. Grouted joints shall be full and integral with setting bed. Before grout sets, strike or tool the joints of cushion-edge tile to depth of cushion, filling all gaps or skips, and with square-edge tile, fill joints flush with their surface, tooling joints smooth and dense.

**3.06 TOLERANCES**

- A. The finished work shall not exceed the following deviations from level and plumb, and from elevations, locations, slopes, and alignments indicated:
  - 1. Floors: 1/8 inch in 8 feet in any direction; plus or minus 1/8 inch at any location; 1/32 inch offset at any location.
  - 2. Walls: 1/8 inch in 8 feet in any direction; plus or minus 1/8 inch at any location; 1/32 inch offset at any location.

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3. Joints: Nominal 1/16-inch standard joint width, plus or minus 1/32-inch variation at any location; 1/16 inch in 8 feet for deviation from the plumb, and for other variations in alignment of joints.

### **3.07 FIELD QUALITY CONTROL**

- A. Provide quality control checks of completed tilework by tapping (or sounding) tile surfaces with a soft wood or rubber mallet to detect individual tiles which are not properly bedded or bonded.

### **3.08 CLEANING**

- A. After grout has set, sponge and wash tiles thoroughly and then polish with clean, dry cloths. Use no acids or abrasive soaps on tile, except as approved by the tile manufacturer. Tile having stains or discoloration that are not removable with soap and clean water shall be replaced.
- B. In addition to the initial cleaning procedure required, and not more than two days before final acceptance of this work, provide a final cleaning and polishing of ceramic tilework as recommended by the tile manufacturer.

### **3.09 PROTECTION OF COMPLETED WORK**

- A. Close spaces in which tile is being set to traffic and other work; keep closed until firmly set. Protect from damage until Contract acceptance by the District. Before traffic is permitted on tile floors, cover floors with nonstaining building paper. Lay board walkways on floors that are to be used as passageways by workers. Remove cracked, broken or damaged tile; replace with new tile.

**END OF SECTION 09 30 00**