

SECTION 096600 – TERRAZZO FLOORING

PART 1 - GENERAL

1.1 M.S.U. ISSUES

- A. Typical locations include major interior public lobbies and main corridors that must sustain high traffic wear as well as present a high quality finish with minimum maintenance.
- B. Terrazzo floors and stair landings shall normally be the non-bonded type, poured over a cleavage plane. Terrazzo stairs and base shall be bonded to the structural sub-surface. Project drawings are to show type and location of terrazzo and control joints. Other types of terrazzo may be considered as follows:
 - 1. Pre-cast Terrazzo: Use in areas of repetitive shapes such as stair treads, thresholds, and bases for high quality control
 - 2. Epoxy Resin Terrazzo Matrix: Use for areas not exposed to sunlight (ultraviolet) or strong acids, which require high bond strength, mild acid resistance, and strong alkali resistance.
 - 3. Polyacrylate-Modified Cement Terrazzo Matrix: Use for areas not exposed to constant wetting or acids or alkalis, which require high bond strength, alkali resistance, and food and uric acid resistance.
 - 4. Polyester Resin Terrazzo Matrix: Use for areas not exposed to alkalis, which require high compressive strength, abrasion, weathering, stain and burn resistance, and good acid resistance.
 - 5. Conductive Terrazzo: Use resin matrix only. Use in areas required to avoid build-up of static electricity, per NFPA Standard 56A, such as computer rooms, photo rooms, operating rooms or clean rooms.
- C. It is the intent of MSU that all terrazzo installation used on its projects will comply with LEED™ NC 3 Credit Requirements MR Credit 4.1: Adhesives and Sealants.
- D. It is the intent of MSU that all terrazzo materials and methods of installation shall meet the latest ICC/ANSI A117.1 standards for slip resistance and provide barrier free access for mobility and physically impaired users.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cementitious terrazzo, sand-cushion type, bonded type, and monolithic type.
 - 2. Pre-cast cementitious terrazzo.
 - 3. Epoxy matrix terrazzo.
- B. Related Sections include the following
 - 1. Division 07 Section JOINT SEALANTS for sealants installed with terrazzo.

1.3 SUBMITTALS

- A. Product Data: For each type of terrazzo and accessory indicated.
- B. Shop Drawings: Include terrazzo fabrication and installation requirements. Include plans, elevations, sections, component details, and attachments to other Work. Show layout of the following:
 - 1. Divider and control- and expansion-joint strips.
 - 2. Base and border strips.
 - 3. Abrasive strips.
 - 4. Stair treads, risers, and landings.
 - 5. Pre-cast terrazzo jointing and edge configurations.
 - 6. Terrazzo patterns, colors, type, and formula for each type.
- C. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:
 - 1. Terrazzo: 6-inch-square samples.
 - 2. Pre-cast Terrazzo: 6-inch-square samples.
 - 3. Accessories: 6-inch-long samples of each exposed strip item required.
- D. Qualification Data: For Installer.
- E. Material Certificates: For each terrazzo type, signed by manufacturers, including certification that products meet or exceed Flame Spread Classification of less than 75 (ASTM E-84), and Smoke Density of less than 450 (ASTM E-662). Listing in UL Building Materials Directory or other approved agency is acceptable.
- F. Maintenance Data: For each terrazzo type to include in maintenance manuals.
- G. Submit printed VOC statement and product data for adhesives, grout and sealant in accordance with the General Administrative Requirements of the MSU Construction Standards 01300.1.2. Maximum VOC content when calculated according to South Coast Air Quality Management District (SCAQMD) Rule #1168, effective July 1, 2005 and amended January 7, 2005:
 - 1. Adhesives 65 g/l
 - 2. Epoxy Grouts 65 g/l
 - 3. Elastometric Sealants 250 g/l

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is a contractor member of NTMA.
- B. Source Limitations: Obtain primary terrazzo materials through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

- C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of aggregate from one source with resources to provide materials of consistent quality in appearance and physical properties.
- D. NTMA Standards: Comply with NTMA Guide Specification and written recommendations for terrazzo type indicated unless more stringent requirements are specified.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
- C. Close spaces to traffic during epoxy terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- D. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS TERRAZZO

- A. Cementitious Terrazzo Type: Sand cushion, Bonded, and Monolithic.
 - 1. Thickness: Minimum ½ inch.
- B. Materials:
 - 1. Portland Cement: ASTM C 150, Type 1.
 - a. Color for Exposed Matrix: As required by mix indicated.
 - 2. Water: Potable.
 - 3. Sand: ASTM C 33.
 - 4. Marble Chips: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.

- a. Hardness: Ha-10 minimum per ASTM C 241.
 - b. 24-Hour Absorption Rate: Less than 0.75 percent.
 - c. Dust Content: Less than 1.0 percent by weight.
5. Matrix Pigments: Pure mineral or synthetic pigments, alkali resistant, color stable, and compatible with matrix binder.
 6. Under-bed Bonding Agent: Neat portland cement.
 7. Topping Bonding Agent: Neat portland cement, or epoxy or acrylic bonding agents formulated for use with topping indicated.
 8. Sand-Cushion-Terrazzo Under-bed Reinforcement: Galvanized welded-wire fabric, 2 by 2 inches by 0.062-inch- diameter wire, complying with ASTM A 185 and ASTM A 82 requirements, except for wire size.
 9. Sand-Cushion-Terrazzo Isolation Membrane: Polyethylene sheeting, ASTM D 4397, 4 mils thick.
 10. Divider-Strip Adhesive: Adhesive recommended by manufacturer for this use.

C. Mixes:

1. Sand-Cushion or Bonded Cementitious Terrazzo Under-bed: Comply with NTMA Guide Specification for terrazzo type indicated for component proportions and mixing.
2. Cementitious Terrazzo: Comply with NTMA Guide Specification for terrazzo type indicated for matrix and marble-chip proportions and mixing.

2.2 EPOXY TERRAZZO

A. Thickness: 3/8 inch.

B. Materials:

1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate crack preparation and reflective crack reduction.
 - a. Reinforcement: Fiberglass scrim, as recommended by the manufacturer.
2. Primer: Product of manufacturer recommended for substrate and use indicated.
3. Epoxy Resin: Manufacturer's standard recommended for use indicated and in color required for mix indicated.
 - a. Physical Properties without Aggregates:
 - 1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
 - 2) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
 - 3) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
 - 4) Chemical Resistance: No deleterious effects by contaminants listed below after 7-day immersion at room temperature per ASTM D 1308.
 - a) Distilled water.
 - b) Mineral water.

- c) Isopropanol.
 - d) Ethanol.
 - e) 0.025 percent detergent solution.
 - f) 1.0 percent soap solution.
 - g) 10 percent sodium hydroxide.
 - h) 10 percent hydrochloric acid.
 - i) 30 percent sulfuric acid.
 - j) 5 percent acetic acid.
- b. Physical Properties with Aggregates: For resin blended with Georgia White marble, ground, grouted, and cured per requirements in NTMA's "Guide Specification for Epoxy Terrazzo," comply with the following:
- 1) Flammability: Self-extinguishing, maximum extent of burning 0.25 inch per ASTM D 635.
 - 2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F for temperature range of minus 12 to 140 deg F per ASTM D 696.
4. Marble Chips: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.
- a. Hardness: Ha-10 minimum per ASTM C 241.
 - b. 24-Hour Absorption Rate: Less than 0.75 percent.
 - c. Dust Content: Less than 1.0 percent by weight.
5. Divider-Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer.
6. Finishing Grout: Resin based.
7. Seal Coat: Slip resistant, thin-coat terrazzo sealer of or approved by terrazzo manufacturer and M.S.U. Maintenance.
- C. Mix: Comply with NTMA's "Guide Specification for Epoxy Terrazzo" and manufacturer's written instructions for component proportions and mixing.

2.3 DIVIDER AND ACCESSORY STRIPS

- A. Heavy-Top Divider Strips: Straight or angle type with anchoring device and in depth required for topping thickness indicated.
- 1. Bottom-Section Material: Matching top-section material.
 - 2. Top-Section Material: White zinc alloy.
- B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated.
- C. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
- 1. Base bead and base dividers.

2. Nosings for stair treads and landings.
3. Edge beads for exposed edges of terrazzo.

2.4 PRE-CAST CEMENTITIOUS TERRAZZO

- A. Pre-cast Terrazzo Base Units: Minimum 3/4-inch- thick, reinforced-cementitious terrazzo units cast in maximum lengths possible, but not less than 36 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

- A. Clean substrates to produce clean, dry, and neutral substrate for terrazzo application.
 1. Bonded Systems: Remove substances that might impair bond of terrazzo system, including oil, grease, and curing compounds.
 - a. Concrete: Roughen concrete substrates before installing terrazzo system according to NTMA's written recommendations.
- B. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.

3.3 INSTALLATION, GENERAL

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.
- B. Construction Tolerances: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet
- C. Repair: Cut out and replace terrazzo areas that evidence lack of bond with substrate or under-bed, including areas that emit a "hollow" sound if tapped. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

3.4 CEMENTITIOUS TERRAZZO INSTALLATION

- A. General:
 1. Seed additional stone chips in matrix to uniformly distribute chips on surface.

2. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
 3. Fine Grinding: Grind with 120 or finer grit stones until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure.
- B. Sand-Cushion Cementitious Terrazzo: Place, cure, grind, grout, and finish terrazzo according to NTMA's "Guide Specification for Sand Cushion Terrazzo."
- C. Bonded Cementitious Terrazzo: Place, cure, grind, grout, and finish terrazzo according to NTMA's "Guide Specification for Bonded Terrazzo."
- D. Monolithic Cementitious Terrazzo: Place, cure, grind, grout, and finish terrazzo according to NTMA's "Guide Specification for Monolithic Terrazzo."

3.5 PRECAST TERRAZZO INSTALLATION

- A. Install units using method recommended in writing by manufacturer unless otherwise indicated. Set units with alignment level and true to dimensions, varying 1/8-inch maximum in length, height, or width.
1. Treads: Back-butter for full contact with substrate.
- B. Seal joints between units with joint sealants.

3.6 EPOXY TERRAZZO INSTALLATION

- A. General:
1. Comply with NTMA's written recommendations for terrazzo and accessory installation.
 2. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Guide Specification for Epoxy Terrazzo."
 3. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
 4. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
- B. Flexible Reinforcing Membrane:
1. Prepare and pre-fill substrate cracks with membrane material.
 2. Install membrane to produce full substrate coverage in areas to receive terrazzo.
 3. Reinforce membrane with fiberglass scrim.
 4. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
- C. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.

3.7 CLEANING AND PROTECTING

A. Terrazzo:

1. Remove grinding dust from installation and adjacent areas.
2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow to dry thoroughly.

B. Seal surfaces according to NTMA's written recommendations and approval M.S.U. Maintenance. Apply sealer according to sealer manufacturer's written instructions.

C. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 096600