This master should be used by designers working on Port of Portland construction projects and by designers working for PDX tenants (“Tenants”). Usage notes highlight a few specific editing choices, however the entire section should be evaluated and edited to fit specific project needs.

This master should only be used for PDX projects.

SECTION 096623 - RESINOUS MATRIX TERRAZZO FLOORING

1. GENERAL
	* + 1. DESCRIPTION
				1. This section describes epoxy-resin, thin-set (3/8-inch thick) terrazzo over crack isolation membrane.
			2. RELATED WORK SPECIFIED ELSEWHERE
				1. Section 072613, Moisture Mitigation System
				2. Section 090561, Common Work Results for Flooring Preparation
			3. REFERENCES
				1. ASTM: American Society for Testing and Materials

ASTM C241: Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.

ANSI A137.1: American National Standards Specifications for Ceramic Tile

ASTM D2047: Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes

* + - * 1. NTMA: National Terrazzo and Mosaic Association
				2. OAR: Oregon Administrative Rules
				3. VOC Limits State of Oregon Department of Environmental Quality
			1. SYSTEM DESCRIPTION
				1. After grinding and sealing, terrazzo surfaces shall have a static coefficient of friction of at least 0.6 when tested in accordance with ANSI A137.1.
			2. SUBMITTALS
				1. Product Data: For each type of terrazzo, component material, and accessory specified.
				2. Shop Drawings: Show terrazzo fabrication and installation requirements including plans, elevations, sections, component details, and attachments to other work. Show layout of the following:

Divider, edge, control-joint, and accessory strips. Show location and widths of each strip.

Large-scale details of terrazzo patterns.

* + - * 1. 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 manufacturer’s matrix color and marble-chip 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.

Terrazzo: Minimum 6-inch-square samples.

Accessories: 6-inch-long samples of each exposed strip item required.

Provide iterations of terrazzo samples until each color and pattern is deemed acceptable by the Port.

Where matching an existing color, remove the finish from an inconspicuous area of existing terrazzo to be matched to achieve best color match. The Port will determine the area to be used for this purpose.

* + - * 1. Qualification Data: To demonstrate capabilities and experience of firms and persons. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
				2. Material Certificates signed by suppliers or manufacturers certifying that each material complies with NMTA requirements.
				3. Maintenance Data: For each terrazzo type to include in the maintenance manuals.
			1. QUALITY ASSURANCE
				1. Installer Qualifications: Engage an experienced installer who has completed terrazzo installations similar in material, design, and extent to that indicated for this work and with a record of successful in-service performance.
				2. Source Limitations for Marble: Obtain each color, grade, type, and variety of marble from one source with resources to provide materials of consistent quality in appearance and physical properties without delaying the work.
				3. Comply with the NTMA Guide Specification and written recommendations, unless more stringent requirements are specified.
				4. Regulatory Requirements: The quantity of VOC’s in materials provided under this section shall not exceed the limits permitted by the Oregon Department of Environmental Quality (DEQ) for architectural coatings used in the Portland Oregon Air Quality Management Area.
				5. Pre-Installation Meeting: Conduct the meeting at work site. Review related methods and procedures including, but not limited to, the following:

Condition of substrate and other preparatory work performed by other trades.

Review structural loading limitations.

Review and finalize construction schedule and verify availability of materials, installer’s personnel, equipment, and facilities needed to make progress and avoid delays.

Review dust control procedures.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver materials to work 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.
				2. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
			2. PROJECT CONDITIONS
				1. Comply with manufacturer’s instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
				2. Control and collect dust produced by grinding operations. Protect any adjacent construction from detrimental effects of grinding operations. Provide dustproof partitions and temporary enclosures to limit dust and migration and to separate areas from noise.
1. PRODUCTS
	* + 1. MATERIALS
				1. Aggregate (Marble, Glass, Synthetics, Metal):

Comply with NTMA gradation standards.

Abrasion and Impact Resistance: Loss of 40 percent or less when tested according to ASTM C 131 (LA Abrasion).

Aggregates shall contain no deleterious or foreign matter.

For each color, use aggregate mix indicated in Terrazzo Color Schedule at end of this section.

* + - * 1. Epoxy-Resin Matrix: Two-component, high solids product meeting NTMA Guide Specification and DEQ VOC limits. For each color, use epoxy mix indicated in Terrazzo Color Schedule at end of this section.
				2. Divider Strips: L-type, 3/8 inch deep, and as follows:

Material: White alloy of zinc, aluminum, and brass.

Top Width: 1/8 inch and 1/4 inch.

* + - * 1. Control-Joint Strips: Separate, double L-type that match material, thickness, depth, and color of divider.
				2. Control-Joint Sealant: Self-leveling aliphatic urethane.
				3. Accessory Strips: Match divider strip depth.
				4. Flexible Epoxy Membrane: Epoxy-resin matrix manufacturer’s 100% solids epoxy membrane for crack suppression. Membrane shall provide 140% to 160% elongation to allow for substrate movement.
				5. Fiberglass Scrim: Fiberglass reinforcing membrane approved for use with the flexible epoxy membrane, by the epoxy-resin matrix manufacturer.
				6. Divider-Strip Adhesive: Adhesive recommended by manufacturer for this use and acceptable to epoxy-resin matrix materials manufacturer.
				7. Primer: As recommended, manufactured, and supplied by epoxy-resin matrix materials manufacturer.
				8. Finishing Grout: Epoxy-resin matrix material manufacturer’s resin-based finishing grout.
				9. Patching and Fill Material: Epoxy-resin matrix material manufacturer’s resinous product approved and recommended by manufacturer for application indicated.
				10. Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
				11. Sealer: Use slip- and stain-resistant sealer that is chemically neutral with pH factor between 7 and 12, has a surface friction of not less than 0.6 according to ASTM D2047, does not affect color or physical properties of terrazzo type indicated, is recommended by sealer manufacturer for this use, and complies with NTMA Guide Specification for terrazzo type indicated.

3M Stone Floor Protection System. No substitution allowed.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates and areas for compliance with requirements for installation tolerances and other conditions affecting performance of terrazzo. Do not proceed with installation until unsatisfactory conditions, including levelness tolerances, have been corrected.
			2. PREPARATION
				1. Clean substrates of substances that impair terrazzo’s or underbed’s bond including oil, grease, and curing compounds. Provide clean, dry, and neutral substrate for terrazzo application. Prepare thin-set-terrazzo substrates according to epoxy-resin matrix material manufacturer’s instructions.
				2. Concrete Slabs:

Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.

Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

Repair damaged and deteriorated concrete according to epoxy-resin matrix material manufacturer’s written recommendations.

Use patching and fill material to fill holes and depressions in substrates according to epoxy-resin matrix material manufacturer’s instructions.

Verify that concrete substrates are visibly dry and free of moisture.

Test for moisture content by method recommended in writing by epoxy-resin matrix materials manufacturer or the following if the manufacturer has no specific recommendations.

Test for moisture by relative humidity probe and digital meter method according to ASTM F2170. Proceed with installation only after substrates have a maximum relative-humidity-measurement reading of 70 to 75 percent in 24 hours.

See Section 072613 for moisture remediation.

Proceed with installation only after substrates pass testing.

* + - * 1. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with governing environmental protection regulations and requirements of the contract documents. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.
			1. INSTALLATION
				1. General: Comply with NTMA Guide Specification for terrazzo type indicated and NTMA’s written recommendations for substrate preparation and terrazzo installation.

Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer’s instructions and NTMA’s “Terrazzo Specifications and Design Guide.”

Installation Tolerance:

From Level: Limit variation in terrazzo surface from level to 1/8 inch in 10 feet, noncumulative.

From Smooth: Limit variation in terrazzo surface from smooth to 1/32 inch in 2 feet.

Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.

Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

* + - * 1. Thickness: 3/8 inch, nominal.
				2. Flexible Reinforcing Membrane:

Pour flexible epoxy membrane to produce full substrate coverage in areas receiving terrazzo.

Prepare and prefill substrate cracks:

Cracks up to 1/8 inch: Fill with flexible epoxy membrane.

Cracks over 1/8 inch: Imbed fiberglass scrim into wet flexible epoxy membrane and saturate with additional membrane material across crack a minimum of 6 inches on either side.

Extensive cracks: Imbed fiberglass scrim over entire area. Place into wet flexible epoxy membrane and saturate with additional membrane material.

Prepare membrane according to manufacturer’s instructions before applying substrate primer.

* + - * 1. Primer: Apply to terrazzo substrates according to manufacturer’s instructions.
				2. Install divider, control-joint, and accessory strips according to NTMA’s written recommendations.

Divider and Control-Joint Strips:

Locate divider strips in locations indicated.

Install control-joint strips directly above concrete-slab saw-cut control joints in locations indicated. Install one strip on both sides of the concrete control joint. Pour sealant in gap. Keep sealant off top surface of control-joint strips.

Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.

Accessory Strips: Install accessory strips as required to provide a complete installation in locations indicated.

* + - * 1. Install strips and similar accessories in adhesive setting bed without voids below strips. Provide mechanical anchorage of strips as required for adequate attachment of strips to substrate. Locate strips and joints between strips as indicated.
				2. Mix epoxy resin matrix and aggregate per manufacturer’s recommendations for maximum aggregate density (about 30 pounds of aggregate per gallon of epoxy resin matrix) to ensure good density and even distribution.
				3. To distribute the aggregate evenly in all areas, it is acceptable to broadcast aggregate into the poured epoxy resin and work it into the matrix, per manufacturer’s recommendation.
				4. Pour terrazzo matrix to complete a section or quadrant in one pour. Cold joints within a section or quadrant are not acceptable.
				5. Fine Grinding: Grind with stones 120 grit or finer until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding.
				6. Repair: Remove and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, if approved by the Port.
			1. SEALER APPLICATION
				1. Remove grinding dust from installation and adjacent areas.
				2. Wash surfaces with cleaner according to NTMA’s written recommendations and manufacturer’s instructions.
				3. Rinse surfaces with water and allow to dry thoroughly.
				4. Seal surfaces according to NTMA’s written recommendations and according to sealer manufacturer’s instructions.
				5. Apply in multiple coats to achieve a coverage of 3,000 to 4,000 square feet per gallon of sealer product.
			2. PROTECTING AND CLEANING
				1. Provide final protection and maintain conditions that ensure terrazzo is without damage or deterioration at the time of substantial completion.
				2. Clean terrazzo as recommended by manufacturer of sealer when area is ready for substantial completion.
			3. TERRAZZO COLOR SCHEDULE
				1. General: Match color of existing terrazzo installation. All epoxy mixes shall be Terrazzo & Marble Supply (T&M), as indicated, or equal.
				2. TZ-1:

Color: Cream.

Epoxy mix: T&M Portland White #20082.

Aggregate mix: 20% China White #0, 20% China White #1, 35% China White #2, 10% MOP %3 and 15% Blackstallion #1.

* + - * 1. TZ-2:

Color: Green.

Epoxy mix: T & M Campsite #20573.

Aggregate mix: 5% Blackstallion #1, 10% Blackstallion #2, 12.5% Verde Antique #0, 12.5% Verde Antique #1, 15% Verde Antique #2, 20% MOP #3, 10% Chocolate Glass #1, 7.5% Shamrock Green #0 and 7.5% Shamrock Green #1.

* + - * 1. TZ-3:

Color: Light Green.

Epoxy mix: T&M North Lights #20572.

Aggregate mix: 5% Clear Plate #1, 10% Sea Kelp, 10% Country Club Green #1, 10% Country Club Green #2, 5% Chocolate Glass #0, 5% Chocolate Glass #1, 2% Blackstallion #1, 2% Blackstallion #2, 10% Old Yellow #1, 11% Shamrock #1, 20% MOP #3 and 10% Sea Green Grass.

* + - * 1. TZ-4:

Color: Blue.

Epoxy mix: T&M Prince #2447.

Aggregate mix: 15% Clear Plate #1, 15% Sky Blue #0, 15% Midnight Blue #1, 2% Amber #1, 20% MOP #3, 10% Blackstallion #1 and 23% Chocolate Glass #1.

* + - * 1. TZ-5:

Color: Light Blue.

Epoxy mix: T&M Autumn Eve #2056.

Aggregate mix: 20% Midnight Blue #0, 20% Midnight Blue #1, 20% MOP #3, 5% Clear Plate #1, 2% Amber #1, 5% Honey #1, 14% Sea Green Grass and 14% Sky Blue #0.

* + - * 1. TZ-6:

Color: Red.

Epoxy mix: T&M Spectrum Red.

Aggregate mix: 30% Scarlett Red #1, 30% Clear Plate #1, 30% MOP #2 and 10% Blackstallion #1.

* + - * 1. TZ-7:

Color: Beige.

Epoxy mix: T&M Reston Beige #5999.

Aggregate mix: 23.5% Texas Blue #0, 23.5% Texas Blue #1, 24% Gun Metal #0, 24% Gun Metal #1 and 5% Blackstallion #1.

* + - * 1. TZ-8:

Color: Tan.

Epoxy mix: T&M Malibu Sand #2361.

Aggregate mix: 22.5% Texas Blue #0, 15% Texas Blue #1, 17.5% Gun Metal #1, 10% Italian Red Verona #0, 10% Italian Red Verona #1, 10% Blackstallion #0, 5% Blackstallion #1, 5% Burgundy #0 and 5% Burgundy #1.

END OF SECTION 096623