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SECTION 09 66 23.16

POXY-RESIN TERRAZZO FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes.

1. Thin-set epoxy terrazzo.
2. Precast, thin-set, epoxy terrazzo [**wall base**] [**and**] [**tread/riser**] [**and**] [**flat tread[with riser]**] units.
3. Cast stair nosing.
4. Related accessories.

B. Related Requirements:

1. Section 01 81 13 Sustainable Design Requirements.
2. Section 03 30 00, Cast In Place Concrete.
3. Section 04 20 00, Unit Masonry.
4. Section 05 51 00, Metal Stairs.
5. Section 07 26 16, Under-slab Vapor Retarder/Barrier.
6. Section 07 90 00, Joint Protection.
7. Section 09 90 00, Painting.
8. Section <**insert section number**> Furnishing and setting floor drains.
9. Section <**insert section number**> Setting of Metal Base Beads and Wood Grounds.
10. Section <**insert section number**> Temporary heat, water and electricity.
11. Section <**insert section number**> Other adjacent floor finish trades (for transition details).

1.2 REFERENCES

A. American Concrete Institute (ACI):

1. ACI Committee No. 403 Bulletin Title No. 59-43.

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

1. ASTM C131 "Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine."
2. ASTM C140 "Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units."
3. ASTM C373 "Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products."
4. ASTM C1021 Standard Practice for Laboratories Engaged in the Testing of Building Sealants."

5. ASTM C1093 Standard Practice for Accreditation of Testing Agencies for Masonry."
 6. ASTM D412 "Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension."
 7. ASTM D638 "Standard Test Method for Tensile Properties of Plastics."
 8. ASTM D695 "Standard Test Method for Compressive Properties of Rigid Plastics."
 9. ASTM D696 "Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer."
 10. ASTM D1308 "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes."
 11. ASTM D2240 "Standard Test Method for Rubber Property—Durometer Hardness."
 12. ASTM D2370 "Standard Test Method for Tensile Properties of Organic Coatings."
 13. ASTM E96 "Standard Test Methods for Water Vapor Transmission of Materials."
 14. ASTM F1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride."
 15. ASTM F2170 "Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes."
- C. The International Accreditation Service (IAS)
1. IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC Standard 17025.
- D. International Concrete Repair Institute (ICRI):
1. "Technical Guidelines 03732: Guide for Selecting and Specifying Surface Preparation for Sealers, Coatings, and Membranes."
- E. The International Laboratory Accreditation Cooperation (ILAC).
1. IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC Standard 17025.
- F. [International Masonry Institute \(IMI\)](#).
- G. International Organization for Standardization (ISO):
1. ISO 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."
- H. The National Terrazzo & Mosaic Association Inc. (NTMA):
1. "Terrazzo Specifications and Design Guide"
 2. "Guide Specification for Epoxy Terrazzo"
 3. Technical Bulletin #111.
- I. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED®) Green Building Rating System for:
 - 1) Core and Shell Development (CS), version **<insert version designation>**.
 - 2) New Construction & Major Renovations (NC), version **<insert version designation>**.

- 3) Existing Buildings Upgrades, Operations, and Maintenance (EB), version <insert version designation>.
- 4) Commercial Interiors (CI), version <insert version designation>.

1.3 DEFINITIONS

- A. Recycled Content: Recycled content is defined in accordance with the International Organization of Standards document, ISO 14021 — Environmental labels and declarations — Self-declared environmental claims (Type II environmental labeling).
1. Preconsumer Recycled Material: Material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e., rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.
 2. Postconsumer Recycled Material: Waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.
- B. VOC: Volatile Organic Chemical

1.4 COORDINATION

- A. Coordinate the types of traffic allowed on terrazzo between the following events:\
1. Completion of pouring and before coarse grinding.
 2. Completion of grouting and before polishing.
- B. Coordinate the preparation for terrazzo work with the installation of plumbing, electrical, communications, and data work in the floor area to receive terrazzo.
1. Verify that fixtures, equipment, and outlets will be located properly and at the correct elevation.

1.5 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: [**Prior to installation of concrete substrates, conduct**] [**Conduct**] conference at [**Project site**] <Insert location> to comply with requirements in Section [**01 31 00 Project Management and Coordination**] [**01 31 19 Project Meetings**] <Insert section number and title>. Review methods and procedures related to terrazzo including, but not limited to, the following:
1. Inspect and discuss installation procedures, joint details, jobsite conditions, substrate specification, vapor barrier details and coordination with other trades.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
 3. Review special terrazzo designs and patterns.
 4. Review dust control procedures.
 5. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.
 6. Review concrete substrate tolerance requirements for acceptable terrazzo installation.

1.6 SUBMITTALS

- A. Product Data: Manufacturer's product data for each type of terrazzo and accessory including the following information:
1. Physical properties.
 2. Performance properties.
 3. Independent Lab Testing for Moisture Mitigation System and Bond Strength Testing
 4. For tests not listed in published data, supply missing data according to standard referenced.
- B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details and attachments to other work. Show layout of the following:
1. Divider strips.
 2. Control- and expansion-joint strips.
 3. Base and border strips.
 4. Abrasive strips.
 5. Stair treads, risers and landings.
 6. Precast terrazzo-jointing and edge configurations including anchorage details.
 7. Terrazzo patterns.
 8. Layout of special graphic patterns.
 9. Large scale details of terrazzo patterns and metal or other material inserts.
 10. <Insert requirements>.
- C. Samples: For each exposed product and for each color and texture specified, **6" x 6" (150 mm x 150 mm)** in size.
- D. Samples for Initial Selection: Provide [NTMA] [Manufacturer's] color plates showing the full range of colors and patterns available for each terrazzo type indicated.
- E. 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 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. Epoxy Terrazzo: minimum **6" x 6" (150 mm x 150 mm)** sample of each color and type of terrazzo.
 2. Precast Epoxy Terrazzo: minimum **6" x 6" (150 mm x 150 mm)** sample of each color and type of terrazzo.
 3. Accessories: **6" (150 mm)** length of each kind of divider strip, stop strip and control joint strip required.
 4. Stair Treads: **12" (300 mm)** length wide sample [**tread/riser**] [**flat tread[with riser]**] units including cast-in nosing.
- F. Coordination Drawings: <Insert description of drawing type> [and other details], drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. <Insert requirements>.

- G. Qualification Data: For **[Installer]** **[and]** **[Manufacturer]**.
- H. Material Certificates: For each type of terrazzo flooring system product, provide supplier or manufacturer's written certificate stating that materials comply with or exceed NTMA specified properties and performance requirements of this Section.
- I. Material Test Reports: For moisture and/or relative humidity of substrate, by a qualified testing agency.
- J. Precast Terrazzo Flooring Test Reports: Provide test reports for precast terrazzo flooring, for the following tests performed by manufacturer and witnessed by a qualified testing agency:
1. Compressive Strength: ASTM D695.
 2. Water Absorption: ASTM C373/ASTM C140.
 3. Flexural Strength: ASTM D638.
 4. Tensile Strength: ASTM D638.
- K. **[Preconstruction Examination Reports: For list conditions of in place substrate which will detrimental to performance of terrazzo flooring installation.]**
- L. **[LEED] [Sustainable Design]** Submittals:
1. Product Data:
 - 1) Recycled Content[**for Credit MR 4**]: products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2) Include statement that indicates cost for each product having recycled content.
 - 3) Local and Regional Materials[**for Credit MR 5**]: For products manufactured within a 500-mile radius of the project.
 - 4) Low-Emitting Materials—Adhesives and Sealants[**for Credit IEQ 4.1**]: For adhesives, including printed statement of VOC content and chemical components. .
 - 5) Low-Emitting Materials—Flooring Systems[**for Credit IEQ 4.3**]: For sealers, documentation including printed statement of VOC content.
 2. Laboratory Test Reports[**for Credit IEQ 4**]: For **[adhesives]** **[sealers]** **[and]** **[flooring system]**, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- M. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: NTMA maintenance recommendations and manufacturer's instructions to include in maintenance manuals.
- B. Repair Procedures: Provide written procedures for the following:
 - 1. Epoxy Terrazzo Flooring: Removal and replacing damaged portions of flooring.
 - 2. Precast Terrazzo Flooring: Removing individual precast units and replacing them.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a terrazzo manufacturer with minimum 5 years documented manufacturing experience producing epoxy binder, and flexible crack isolation membranes; including the following:
 - 1. Proof of NTMA membership.
 - 2. Furnish documentation for at least 5 epoxy terrazzo projects of the same scope and complexity; installed in the past 5 years using material being submitted for this project.
 - 3. For each epoxy terrazzo project submitted, provide the following information:
 - 1) Project name.
 - 2) Square footage of terrazzo installed.
 - 3) [Lineal footage of precast base and cast in place base.]
 - 4) Address of facility with contact name and phone number.
 - 5) Contact name, address and phone number of prime contractor or construction manager.
 - 6) Field experience resumes of key project personnel including lead supervisor and field technicians to be used on this project.
- B. Installer Qualifications: Submit proof of Contractor's membership in NTMA or IMI with a letter recognizing that they are a qualified installer in good standing and is acceptable to epoxy terrazzo manufacturer.
 - 1. Furnish documentation for at least 3 epoxy terrazzo projects of the same scope and complexity; installed in the past 5 years using material being submitted for this project.
 - 2. For each epoxy terrazzo project submitted, provide the following information:
 - 1) Project name.
 - 2) Square footage of terrazzo installed.
 - 3) [**Lineal footage of precast base and cast in place base.**]
 - 4) Address of facility with contact name and phone number.
 - 5) Contact name, address and phone number of prime contractor or construction manager.
 - 6) Field experience resumes of key project personnel including lead supervisor and field technicians to be used on this project.
 - 3. For each epoxy terrazzo project submitted, provide the following information:

- C. Precast Terrazzo Flooring Fabricator Qualifications: Shop that employs skilled workers who custom fabricate precast terrazzo flooring products similar to those required for this Project and whose products have a record of successful in-service performance .
 - 1. Furnish a list of at least five (5) precast terrazzo flooring projects using material being submitted for this project installed during the last five (5) years of the same scope, complexity and at least 50 percent of the square footage.
- D. Testing Agency Qualifications: Qualified according to [ASTM C1021] [ASTM C1093] for testing indicated[and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC Standard 17025].
- E. Mockups: Build mockups to verify selections made under sample submittals; to demonstrate aesthetic effects; and to set quality standards for materials and execution.
 - 1. Build mockup of typical terrazzo flooring installation [as shown on Drawings] [where indicated on the Drawings] [in location directed by Architect] <insert location>.
 - 1) Size: Minimum **100 sq. ft. (9 sq. m.)** of typical poured-in-place flooring [**and base**] condition for each color and pattern [**in locations directed by Architect**] <Insert location requirements>.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's undamaged, unopened containers with a label on each container clearly marked with the following information:
 - 1. Product name
 - 2. Manufacturer's name
 - 3. Component designation (A or B, etc.)
 - 4. Ratio of component mixture
 - 5. CHEMTREC Emergency Response Information
- B. Handle materials by methods which prevent damage.
- C. Inspect direct jobsite deliveries to assure quantities are correct; materials comply with requirements; and materials are not damaged.
- D. Immediately return materials found to be defective in manufacturing and materials damaged in transit, handling or storage.
 - 1. Replace defective materials at no cost to Owner.

- E. Store materials per manufacturer's instructions and as follows:
 - 1. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity.
 - 2. Maintain storage temperatures between **60° F (15.6° C)** and **90° F (32.2° C)**.
 - 3. Maintain seals and labels intact and legible.
 - 4. Do not use materials which have been stored for a longer period of time than the manufacturer's maximum recommended shelf life.
- F. Precast Terrazzo Protective Wrapping: Wrap precast units individually in a nonstaining protective cover and mark each unit for proper identification of installation location.

1.10 FIELD CONDITIONS

- A. Temperature:
 - 1. Maintain the ambient room and substrate temperature at **55° F (12.8° C)** or above during stripping and pouring.
 - a. Maintain this temperature at least 48 hours after completion of pouring.
 - 2. After terrazzo has been poured, maintain substrate temperature at **40° F (4.4° C)** or above until substantial completion.
 - 3. Each day of installation, before beginning work, verify that the dew point is at least **5° F (-15.0° C)** less than the slab and air temperature.
- B. Verify that adequate ventilation is provided.
- C. Maintain a minimum uniform level of 50-60 foot candles (538.2 Lux – 645.8 Lux) in areas where terrazzo system is being installed.
- D. Field Measurements, Precast Terrazzo: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- E. Acceptable Substrate Conditions:
 - 1. Flatness Tolerance: Maximum variation from flatness of **1/4 inch in 10 feet (6 mm in 3 m)**.
 - 2. Concrete floor Finish: Steel trowel finish.
 - 3. Allow concrete to receive epoxy terrazzo to cure for at least 30 days before beginning installation process.
 - a. Allow no curing agents to be used in areas to receive terrazzo.
 - 4. Test concrete substrate to determine acceptable moisture levels prior to terrazzo installation.
 - 5. Saw cutting of control joints must be done between 12 and 24 hours after placement of the structural concrete and at a frequency compatible to ACI recommendations.
- F. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

- G. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- H. Provide protection from other trades prior to final acceptance by owner.
- I. Dust Control: Control and collect dust produced by grinding operations.[**Comply with requirements of Section [01 50 00 Temporary Facilities and Controls] <insert section number and title>.**]

1.11 WARRANTY

- A. Special Warranty: Manufacturer and installer, jointly, agree to provide labor and material to repair (and if necessary to replace) components of epoxy terrazzo flooring system that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, loss of bond and damage due to normal wear and tear.
 - 2. Failures do not include the following:
 - 1) Damage due to bubbling or loss of adhesion due to moisture penetration through the substrate.
 - 2) Acts of God or other elements beyond scope of protection of this system.
 - 3) Reflective cracks from substrate.
 - 3. Warranty Period: [One] <Insert number> year[s] from date of Substantial Completion.
 - 4. Limitations:
 - 1) In case of warranty claim, Owner will provide written notice to terrazzo manufacturer and installer within 30 days of problem's discovery.
 - 2) Owner will provide free access to area during normal working hours.
 - 3) Owner assumes responsibility for protection and maintenance of epoxy terrazzo flooring from date of Substantial Completion on.
 - 4) Remedies provided by epoxy terrazzo flooring manufacturer and installer are limited to direct repair of Epoxy Terrazzo Flooring System.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products by Master Terrazzo Technologies, Levittown, PA (www.masterterrazzo.com) indicated in Part 2 Articles below[.][**or comparable products by one of the following:**]
 - 1. <Insert manufacturer's name>.
 - 2. <Insert manufacturer's name>.

B. Source Limitations: Obtain primary Epoxy Terrazzo Flooring System materials including membranes, primers, resins, and hardening agents from a single manufacturer.

1. Obtain aggregates, solvents, divider strips, sealers and cleaners from source recommended by primary materials manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

B. [LEED][Sustainable Design] Performance Requirements:

1. Provide materials and products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent or 20 percent, based on cost, of the total materials value.
2. Field Applied Adhesives, Sealants and Sealant Primers: Comply with South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits listed in the table below correspond to an effective date of July 1, 2005, and rule amendment date of January 7, 2005.
 - 1) VOC Limits: [65] <Insert value> g/L or less.
3. Field Applied Adhesives, Sealants and Sealant Primers: Comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Recycled Content: Use materials with recycled content such that the sum of postconsumer recycled content plus 1/2 of the preconsumer content constitutes at least [10 percent] [20 percent] <Insert Percentage>, based on cost, of the total value of the materials in the project.
 - 1) The recycled content value of a material assembly is determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

2.3 EPOXY TERRAZZO FLOORING SYSTEM

A. Materials:

1. Epoxy Resin: Manufacturer's standard recommended for use indicated and in color required for mix indicated.
 - a. Physical Properties without Aggregates:
 - 1) Hardness: ASTM D2240 70-85 Shore D
 - 2) Minimum Tensile Strength: 4,800 psi (33 mPA) per ASTM D638 for a 2-inch (50 mm) specimen made using a "C" die per ASTM D412.

- 3) Minimum Compressive Strength: **12,000 psi (83 mPA)** per ASTM D695, Specimen B cylinder.
 - 4) Chemical Resistance: No deleterious effects by contaminants listed below after 7-day immersion at room temperature per ASTM D1308.
 - a) Distilled water
 - b) Mineral water
 - c) Isopropanol
 - d) Ethanol
 - e) 0.025 percent detergent solution
 - f) 1 percent soap solution
 - g) 10 percent sodium hydroxide
 - h) 10 percent hydrochloric acid
 - i) 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 (6 mm)** per ASTM D635.
 - 2) Linear Coefficient of Thermal Expansion: **25.0x10-6 in/in per °F (11.4x10-7 cm/cm per °C)** for temperature range of **-12° to 140° F (-24° to 60° C)** per ASTM D696.
 - 3) Bond Strength: When tested in accordance with Field Test Method for surface soundness and adhesion as described in ACI Committee No. 403 Bulletin Title No. 59-43 the Epoxy terrazzo shall comply with the following value: 100 percent concrete failure minimum, with **300 psi (2.1 mPA)** minimum tensile strength.
2. Marble Chips: [**Granite**] [**Glass**] [**Synthetic**] [**Mother of Pearl**]:
- a. Sizes: #2's, #1's and #0's, conforming to NTMA gradation standards.
 - b. Abrasion and Impact Resistance: ASTM C131-89; maximum 40 percent loss.
 - c. Chips shall contain no deleterious or foreign matter.
 - d. Post-Industrial Recycled Content: **<Insert Value>** percent.
- B. Mix: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.
1. Color and Pattern Schedule: Where the following designations are indicated, provide specified terrazzo matrices matching [**Morricite® epoxy matrix color number and chip plate number**][**architect's samples**] [**NTMA color plates specified**]:
 - a. TZ**<Insert Designation #>**: **<Insert Sample # or NTMA Color Plate #>**.
 - 1) Color Number: **<Insert Morricite® Epoxy Matrix Color Number>**.
 - 2) Chip Plate Number: **<Insert Morricite® Chip Plate Number>**.

2.4 PRECAST TERRAZZO UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Precast Terrazzo Enterprises, Raleigh, NC 800-849-8849
 2. Romoco Precast Terrazzo Products, Manheim, PA 717-665-2739
 3. Wausau Tile, Wausau, WI 800-388-8728
 4. Substitutions: **[As requirements of Section 01 60 00 - Product Requirements allow.] [Not Permitted.]**
- B. Precast Wall Base Units[(TZ<Insert Designation #>)]: Precast epoxy terrazzo [cove] [straight] base units, **3/8 inch (9.5 mm)** thick, unless otherwise indicated[**with 3/4 inch (19 mm) radius cove**]; cast in maximum lengths possible, but not more than **48 inches (1200 mm)**.
1. Configuration: **[As indicated on Drawings] [As selected by the Architect from full range of manufacturer's standard units].**
 2. Height: **[As indicated on Drawings] [4 inches (100 mm)] [6 inches (150 mm)] [8 inches (200 mm)].**
 3. Outside Corner Units: With finished returned edges at outside corner.
 4. Colors and Patterns: **[As indicated by the Morricite® designations [as follows:] [as indicated on the Drawings.]] [NTMA color plates [as follows:] [as indicated on the Drawings.]] [To match epoxy terrazzo flooring system.] [Match Architect's samples.] [As selected by Architect from manufacturer's full range.]**
 - a. Color: **<Insert Sample # or NTMA Color Plate #>**
 - b. Color Number: **<Insert Morricite® Epoxy Matrix Color Number>**.
 - c. Chip Plate Number: **<Insert Morricite® Chip Plate Number>**.
- C. Toe Strips for Precast Wall Base: L-type or T-type strips to fit cove base units in depth required for topping thickness indicated.
1. Material: To match divider strips.
 2. Top Width: To match divider strips.
- D. Precast **[Tread/Riser] [Flat Tread[with Riser]]** Units [(TZ<Insert Designation #>)]: Thin-set, precast epoxy terrazzo base units with cast-in nosing.
1. Size and Configuration: As indicated on Drawings.
 2. **[Tread/Riser][Flat Tread[with Riser]]** Units: **1/2 inch (12 mm)** thick epoxy, with abrasive pattern consisting of **[2] [3]** lines of abrasive strips.
 3. Colors and Patterns: **[As indicated by the Morricite® designations [as follows:] [as indicated on the Drawings.]] [NTMA color plates [as follows:] [as indicated on the Drawings.]] [To match epoxy terrazzo flooring system.] [Match Architect's samples.] [As selected by Architect from manufacturer's full range.]**
 - a. Color: **<Insert Sample # or NTMA Color Plate #>**

- b. Color Number: <Insert Morricite® Epoxy Matrix Color Number>.
- c. Chip Plate Number: <Insert Morricite® Chip Plate Number>.

2.5 DIVIDER AND ACCESSORY STRIPS

- A. Thin –Set Divider Strips: L-type and T-type.
 1. Material: [White zinc alloy] [half hard brass] [or] [plastic, in color selected from manufacturers product range].
 2. Top Width: 1/16 inch (1.6 mm).
- B. Heavy-Top Divider Strips: Angle type in depth required for topping thickness indicated.
 1. Bottom-Section Material: Matching top-section material.
 2. Top-Section Material: White zinc alloy, unless otherwise indicated.
 3. Top-Section Width: [1/8 inch (3 mm)] [1/4 inch (6 mm)], unless otherwise indicated.
- C. Control joint Strips: Separate, double L-type divider strips, positioned back to back with 3/8 inch (9.5 mm) separation filled with sealant.
- D. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated.[**Provide the following types of accessory strips:**]
 1. Base bead and base dividers.
 2. Edge beads for exposed edges of terrazzo.
- E. Nosings for Stair Treads and Landings: Extruded aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder.
 1. Fabricate nosings in sizes and configurations indicated and in uninterrupted lengths necessary for an accurate fit.
 - a. For Precast Treads and Landings: Apply clear lacquer to concealed bottoms, sides, and edges of extruded units set into precast terrazzo units.
 2. Available Manufacturers and Products:
 - a. Wooster Products Inc. Type 128 with Time Saver Anchor.
 - b. Balco Inc.
 3. Nosings: Square-back units, 1-7/8 inches (48 mm) wide with 1-1/8 inches (29 mm) lip, for casting into terrazzo steps.
 4. Provide anchors welded to underside of nosing for embedding units in terrazzo[, **as indicated on drawings**].

2.6 MISCELLANEOUS PRODUCTS

- A. Concrete Patch and Topping: 100 percent solids fill mortar system including blended aggregate.
1. Basis of Design Product: MorriFill™ Epoxy Slope and Fill Mortar.
 2. Compressive Strength: ASTM C579, **8,000 psi (55 mPA)** minimum.
 3. Hardness: ASTM D2240, 75-80 Shore D
- B. Moisture Remediation System: Two-component formulation designed to reduce moisture vapor transmission through concrete and provide bond with epoxy terrazzo flooring system.
1. Basis of Design: Morricite MVP™ Moisture Suppression System by Master Terrazzo Technologies.
 2. Adhesion: ASTM D4541, **500 psi (3.5 mPA)**.
 3. Moisture Vapor Transmission: ASTM E96, 0.131 perm.
- C. Primer: 100 percent solids, epoxy primer moisture insensitive. No solvent containing primers are allowed
1. Basis of Design Product: Morricite® Primer.
 2. Moisture Vapor Transmission: ASTM E96, 1 perm maximum.
- D. Crack Isolation Membrane
1. Basis of Design Product: MasterFlex™ Flexible Epoxy Membrane.
 2. Flexible Epoxy Membrane: Flexible epoxy membrane with 100 percent solids with the following properties:
 - a. Tensile Strength: ASTM D2370 at **68° F (20° C) 1,500 psi (10 mPA)**.
 - b. Elongation: ASTM D2370 at **68° F (20° C) 130 percent**.
 - c. Adhesion: ASTM D4541, **350 psi (2.4 mPA)**
- E. Membrane Reinforcing: Fiberglass mesh reinforcement fabric compatible with crack isolation membrane.
1. Basis of Design Product: MasterFlex™ Fabric.
- F. Divider-Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer.
1. **[Use adhesive that has a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).]**
- G. Anchoring Devices:
1. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
 2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by Terrazzo Contractor for proper anchorage and support of units for conditions of installation and support.

- H. Finishing Grout: Epoxy grout with 100 percent Solids.
 - 1. Basis of Design Product: Morricite® Terrazzo Grout.
- I. Control Joint Filler: Flexible, grindable, epoxy joint filler, 100 percent solids, with the following properties:
 - 1. Basis of Design Product: MTT ColorFlex™.
 - 2. Tensile Strength: ASTM D2370 at 68° F (20° C) 1,600 psi (11 mPA)
 - 3. Elongation: ASTM D2370 at 68° F (20° C) 100 percent
 - 4. Tensile Modulus: ASTM D2370 at 68° F (20° C) 27,800 psi (192 mPA)
 - 5. Color: As selected by the Architect.
- J. Joint Sealant: **[MTT ColorFlex™ flexible sealant.] [Comply with requirements of Section 07 90 00 "Joint Sealants."]**
- K. Expansion Joints: Comply with requirements of **[Section 07 90 00 "Joint Sealants"] [and] [Section 07 95 00 "Expansion Control"]**.
- L. Abrasive Strips: Metal channels matching strips to receive epoxy and abrasive aggregate.
 - 1. **[Barrier free profile, extruded aluminum base and anchor for casting into concrete fill, aluminum oxide blend abrasive filled, ribbed style with anti-slip surface, color as selected; 3 inches wide by 1/8 inch less the tread width long.]**
 - 2. **[Two piece aluminum; with anchor assembly for casting into concrete and screw attached abrasive insert forming finish nosing surface.]**
- M. Terrazzo Cleaner: As recommended by cleaner manufacturer for use on terrazzo type specified and as follows:
 - 1. Biodegradable
 - 2. Chemically neutral
 - 3. pH factor between 7 and 10
 - 4. Free from phosphate, crystallizing salts, and water soluble alkaline salts.
- N. Terrazzo Sealers: Slip- and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, a standard coefficient of friction of 0.6 or higher, does not affect physical properties of terrazzo and complies with NTMA's "Terrazzo Specifications and Design Guide."
 - 1. General: Provide sealers **[produced by] [or] [approved by]** terrazzo flooring system manufacturer.
 - 2. Water Based Sealer: Provide a medium gloss water based sealer and finish system.
 - a. Basis of Design Product: MTT SealOn Waterborne Sealer.

2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to evaluate epoxy terrazzo flooring **[fabricator's quality-control and testing methods]**.

- B. Testing: Test and inspect epoxy terrazzo flooring according to the following requirements:
 - 1. Cure specimens for 7 days at 75° F (28.9° C) plus or minus 2° F (1.1° C) and 50 percent plus or minus 2 percent RH.
 - 2. Conduct tests according to the test methods indicate for each product and characteristic indicated above in Part 2 of this Section.
- C. Epoxy terrazzo flooring will be considered defective if it does not pass tests and inspections.
 - 1. Acceptable results for each product and characteristic indicated above in Part 2 of this Section.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Terrazzo Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Evaluate slab condition, including slab moisture content and extent of repairs required to comply with substrate requirements of NTMA's "Terrazzo Specifications and Design Guide" and the requirements of this Section.
 - 2. Verify that concrete substrate was poured no fewer than 30 days prior to date of examinations.
 - 3. Verify existing work has no defects affect proper execution of terrazzo work.
 - 4. Verify that concrete substrate meets flatness tolerances.
 - 5. Verify that concrete substrates are visibly dry and free of moisture.
- B. **[Prepare written preconstruction examination report, endorsed by Installer, listing conditions detrimental to performance.]**
- C. Proceed with installation only after unsatisfactory conditions, including flatness tolerances, have been corrected.
- D. Verify measurements and dimensions; coordinate the installation of insert and work of other trades.

3.2 PREINSTALLATION TESTING

- A. Concrete Moisture Testing, General
 - 1. Conduct relative humidity test at each test site.
 - 2. Conduct one pH test at each test site.
- B. Calcium Chloride Testing:
 - 1. Perform tests in accordance with ASTM F1869.

C. Relative Humidity Testing:

1. Perform tests in accordance with ASTM F2170.
2. Conduct relative humidity testing at the following depths:
 - a. **[Basement Slabs and]** Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.
 - b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.
3. Drill test hole at each test site to accommodate test sleeve.
4. Hole Diameter: In accordance with test equipment manufacturer's instructions.
5. Drilling Fluids: Not permitted.
6. Vacuum dust and debris from test hole.
7. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.
8. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.
9. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.
10. Measure and record temperature and relative humidity at the test site.

D. Proceed with terrazzo installation only after substrates have a maximum relative humidity measurement reading less than 80 percent.

1. If concrete substrate moisture exceeds 80% according to ASTM F2170, consult terrazzo manufacturer for additional drying or negative side moisture remediation methods.

3.3 PREPARATION

A. Clean substrates of substances, including oil, grease and curing compounds, that might impair terrazzo bond. Provide clean, dry and neutral substrate for terrazzo application.

B. Provide clean, dry, and neutral substrate for terrazzo application.

1. Determine dryness characteristics by performing moisture tests recommended by terrazzo manufacturer.

C. Concrete Slabs:

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

a. Prepare concrete mechanically by **[shot blasting]** **[or]** **[by grinding]**.

- 1) Surface preparation results should achieve a CSP3-CSP4 profile according to International Concrete Repair Institute Guideline No. 03732.

b. Remove contaminating and bond breaking substances including but not limited to the following:

- 1) Dust.
- 2) Laitance.
- 3) Curing compounds.
- 4) Coatings.
- 5) Sealers.
- 6) Oil.
- 7) Grease.
- 8) Mastics.
- 9) Adhesives.

- c. Chemically remove oil and grease not removed by vacuum blasting.
- d. Mechanically remove spalled and deteriorated concrete with scabbling or chipping hammers.
- e. Do not acid etch concrete.
- f. Repair or level damaged concrete with concrete patch and topping.
- g. Do not use latex fills and self leveling underlayments.
- h. Cracks and non-expansion joints greater than **1/16 inch (1.6 mm)** wide after surface preparation shall be prepared until sound.

- 1) Repair cracks and non-expansion joints according to NTMA Technical Bulletin #111.

D. Protect other work from dust generated by [**shot blasting**] [**and**] [**by grinding**] operations. Control dust to prevent air pollution and comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

E. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

F. Apply [**one coat**] [**two coats**] of moisture remediation system over concrete surface prepared to receive epoxy-resin terrazzo flooring according to manufacturer's written instructions[**where indicated on drawings**].

3.4 INSTALLATION, EPOXY TERRAZZO

A. General:

1. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type and accessory indicated unless more stringent requirements are specified within this section.
2. Comply with written directions of product manufacturer.
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. Full Membrane Application
1. Flexible Reinforcing Membrane:
 - a. Prepare and prefill substrate cracks with concrete patch and topping material or with primer and allow to cure.
 - b. Apply 25 mils of crack isolation membrane over prepared substrate to produce full substrate coverage in areas to receive terrazzo.
 - c. Apply second coat of crack isolation membrane, 15 mils thick and install reinforcing fabric.
 - d. Prepare membrane according to manufacturer's written instructions before applying primer.
 2. Primer: Install primer if required by manufacturer over crack isolation membrane.
- C. Crack Detailing Application
1. Crack Treatment[**Type 1**]: After surface preparation, fill less than **1/16 inch (1.6 mm)** wide with crack isolation membrane. Apply detail coat of crack isolation membrane over cracks and embed **12 inches (300 mm)** wide strips of membrane reinforcing fabric.
 2. Crack Treatment[**Type 2**]: Fill cracks and joints which are greater than **1/16 inch (1.6 mm)** width with crack isolation membrane or primer.
 - a. Apply minimum 30 mil detail coat of crack isolation membrane. Extend coverage at least **12 inches (300 mm)** on each side of crack.
 - b. After crack isolation membrane has leveled, lay minimum **9 inches (230 mm)** wide precut strips of membrane reinforcing fabric into uncured crack isolation membrane. Saturate reinforcing fabric with additional crack isolation membrane.
 3. Crack Treatment[**Type 3**]: Fill cracks greater than **1/16 inch (1.6 mm)** with crack isolation membrane.
 - a. Apply 25 to 30 mil detail coat so that membrane extends at least **9 to 12 inches (230 to 300 mm)** on each side of crack or joint.
 - b. After crack isolation membrane has leveled, lay precut membrane reinforcing fabric into uncured crack isolation membrane.
 - c. Smooth cloth with a flat steel trowel, allowing cloth to be encapsulated but remain exposed on the surface of Membrane.
 - d. Prior to applying primer, lightly abrade treated cracks or wipe treated cracks with solvent.
 4. Primer: Apply epoxy primer evenly over entire prepared substrate, including cracks and non-expansion joints, at a rate of **200-250 square feet per gallon (5 - 6 sq. m per liter)**.
 - a. Thoroughly wet surface with primer.
 - b. Do not allow primer to pond.

- D. Divider and Accessory Strips: Install in locations indicated in adhesive setting bed without voids below strips.
1. Anchoring Strips: Adhere the strips to the floor with primer or hot glue.
- E. Control Joint Strips: Provide **[one of]** the following **[where indicated]**:
1. **[Back to Back Strips: Install L-type divider strips back to back over [full membrane] [crack treatment] parallel to control and non-doweled construction joints leaving a space appropriate for anticipated movement - typically 1/4 to 3/8 inch (6 to 9.5 mm) according to NTMA Technical Bulletin #111, Detail #1.**
 - a. **Fill gap between control joints with joint sealant.]**
 2. **[Single Strip: Fill saw cut joint with control joint filler. Place L-type divider strip on concrete adjacent to joint according to NTMA Technical Bulletin #111, Detail 2.]**
 3. **[Buried Joint: Fill saw cut joints with control joint filler and cover with crack isolation membrane with embedded membrane reinforcing fabric according to NTMA Technical Bulletin #111, Detail 3.]**
- F. Placing Terrazzo:
1. Mix terrazzo binder with chips and fillers in ratios as approved by manufacturer.
 2. Trowel-apply terrazzo mixture over epoxy primer to provide smooth seamless surface at a minimum of **3/8 inch (9.5 mm)** thick.
 - a. Allow terrazzo mixture to cure per manufacturer's recommendations prior to grinding operations.
- G. Nosings for Cast Stair Treads and Landings: Install nosings in sizes and configurations indicated and in uninterrupted lengths necessary for an accurate fit with clear lacquer applied to concealed bottoms, sides, and edges of extruded units set into terrazzo.
- H. Rough Grinding: Grind with 24 grit or finer stones or with comparable diamond plates.
- I. Intermediate Grinding: Follow initial grind with 80 grit or finer stones .
- J. Grouting: Prior to final grinding, apply epoxy grout as follows:
1. Cleanse floor with clean water and rinse thoroughly.
 2. Remove excess rinse water by wet vacuum and machine until completely dry.
 3. Apply epoxy grout to fill voids.
- K. Fine Grinding: Grind with 120 grit or finer stones until all grout is removed from surface.
1. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding.
 2. Produce surface with a minimum of 70 percent aggregate exposure.

- L. Remove terrazzo in areas where terrazzo fails to bond properly to substrate and install new terrazzo.
 - 1. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo.
- M. Construction Tolerances: Limit variation in terrazzo surface from level **1/4 inch in 10 feet (6 mm in 3 m)**.

3.5 INSTALLATION, PRECAST TERRAZZO

- A. Set units using method recommended by NTMA and by epoxy terrazzo flooring manufacturer unless otherwise indicated.
- B. Set units with alignment level and true to dimensions, varying **1/8 inch (3.2 mm)** maximum in length, height, or width.
 - 1. [**Tread/Riser**][**Flat Tread[with Riser]**] Units: Back-butter for full contact with substrate.
- C. Seal joints between units with joint sealants.

3.6 ADJUSTING

- A. Cut out 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, as approved by Architect.

3.7 CLEANING

- A. Cleaning:
 - 1. Wash surfaces with cleaner according to NTMA's Maintenance Guide and manufacturer's written instructions.
 - 2. Remove grinding dust from installation and wash surfaces according to manufacturers recommended cleaning procedures.
 - 3. Allow surfaces to thoroughly dry before sealing.

3.8 PROTECTION

- A. Protect surrounding substrates and surfaces, as well as in-place equipment from damage during surface preparation and system application.
- B. Maintain area where terrazzo work is being done be free of other trades during surface preparation, crack detailing, divider strip installation, terrazzo pouring, and for a period of 36 hours upon completion.
- C. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
 2. Apply terrazzo sealer according to sealer manufacturer's written instructions.
- D. 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