

SECTION 123640 - STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of dimensioned stone:

1. Granite for kitchen countertops.
2. Marble for bathroom vanity tops.

1.2 RELATED SECTIONS

- A. Refer DIVISION 064100 "Custom Cabinetry" for installation dimensions of stone on countertops in general.
- B. Allowances: Furnish preconstruction testing under Inspection and Testing Allowances.

1.3 PERFORMANCE REQUIREMENTS

- A. Granites and marbles must be of a consistent colour and texture, granite with a maximum porosity of 0.5%.
- B. General : design stone anchors and anchoring systems according to ASTM C 1242.
- C. Structural Performance: Provide dimensioned stone countertops capable of withstanding the effects of gravity loads and acceptable loads and stresses within limits and under conditions indicated.
- D. Safety Factors for Stone: Design dimension stone cladding system to withstand loads indicated without exceeding allowable working stress of stone determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:
Safety Factor for Granite: 3.
Safety Factor for Marble: 5.
Safety Factor for Travertine: 8.

1.4 SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and other manufactured products indicated.
- B. Shop Drawings: Show fabrication and installation details for all stone systems, including dimensions and profiles (including edge detail) of stone units.
1. Show locations and details of joints both within stone system and between stone and other construction elements.
 2. Show locations and details of anchors and backup structure.

3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Stone Sample for each color, grade, finish, and variety of stone required; not less than 300 mm square in area.
- D. Colored Pointing Mortar Samples: For each color required.
- E. Sealant Samples: For each type and color of joint sealant required.
- F. Material Test Reports: From a qualified independent testing agency, as follows:
 1. Stone Test Reports: For each stone variety proposed for use on Project, provide test data indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Source Limitations for Stone ; wherever possible, obtain each variety of stone, regardless of finish, from a single quarry.
- C. Preconstruction Stone Testing: Owner may engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner from the Inspection and Testing Allowance, as authorized by Change Orders.
 1. Furnish test specimens that are representative of materials proposed for incorporation into the Work.
 2. Physical Property Tests: For each stone variety proposed for use on Project, tested for compliance with physical property requirements, other than abrasion resistance, according to referenced ASTM standards.
 3. Flexural Strength Tests: For each combination of stone variety, thickness, orientation of cut, and finish, proposed for use on Project, tested according to ASTM C 880, in both wet and dry conditions.
 4. Anchorage Tests: For each combination of stone variety, orientation of cut, finish, and anchor type proposed for use on Project, tested according to ASTM C 1354.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockups of typical specified countertop, with stone approximately 24 inches (605 mm) long by 48 inches (1210 mm) high.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations for Mortar: Do not use aged or reconstituted adhesive bed in which to lay countertops. Comply with hot-weather

construction and protection requirements for masonry work as contained in ACI 530.1/ASCE 6/TMS 602.

- B. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or when joint substrates are wet.

PART 2 - PRODUCTS

2.1 STONE PRODUCTS

A. GRANITE

1. Granite content :-

Silica(SiO ₂)	70-77%
Alumina(Al ₂ O ₃)	11- 14%
Potassium Oxide(P ₂ O ₅)	3 - 5%
Soda(Na ₂ O)	3 - 5%
Lime	1%
Iron(Fe ₂ O ₃)	1-2%
Iron(FeO)	1 - 3%
Magnesia(MgO)	5 - 1%
Titina	Less than 1%(.38%)
Water(H ₂ O)	0.03%

2.2 LIMESTONE

- A. Limestone (marble): Comply with ASTM C 568.

1. Marble attributes:-

Colour	To Owner/Architect requirements
Luster/Gloss	Glassy
Reflectivity	80-95%
Transparency	Translucent
Hardness	2.8-3.5
Abrasive Index	8-42
Solubility	Soluble residue negligible
Sp. gravity	2.7 - 2.9
Absorption	Negligible
Strength	Capacity to resist stress, depends upon rift, hardness, degree of cohesion & interlocking (56-190mpa)
Transverse Strength	4.2 - 28 mpa
Compressive Strength	50 - 90 mpa

2.3 MARBLE TRAVERTINE

2.4 MATERIAL

- A. Travertine: Comply with ASTM C 1527, Classification - Interior.

i. Physical Properties of Travertine

Light transmission	Typically subtranslucent in all but extremely thin pieces
Luster	Dull to pearly or even subvitreous.
Miscellany	Effervesces with dilute HCl.
Hardness	3-4 Moh's scale
Color	Colorless, White, Pink, Yellow, Brown
Density	2.71
Streak	White
Specific gravity	1.68

ii. Chemical Properties of Travertine

Flash point	89°F / 31°C
Solubility	In water : at 68°F / 20°C : insoluble In solvents : soluble in many organic solvents like benzene hydrocarbons and chlorinated hydrocarbons, acetone, phthalates, methanol ,ethanol e.t.c.

- B. Cut: Orientation of veining as indicated.
- C. Filling: Fill pores on faces of stone with cementitious filler of color .selected by Architect. .matching Architect's sample.
- D. Finish: As indicated by Owner/Architect's sample.

2.5 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Low-Alkali Cement: Portland cement for use with limestone shall contain not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207.
- C. Aggregate: ASTM C 144.
- D. Mortar Pigments: Natural and synthetic iron oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.
- E. Water: Potable.

2.6 ANCHORS AND BACKUP STRUCTURE

- A. Fabricate anchors., including shelf angles,. from stainless steel, ASTM A 666, Type 304.316. Fabricate dowels and pins from stainless steel, ASTM A 276, Type 304.316.
- B. Fabricate angle brackets, if required, for limestone from hot-dip galvanized steel, ASTM A 36/A 36M for materials and ASTM A 123/A 123M for galvanizing.

- C. Cast-in-Place Concrete Inserts: Steel, cast iron, or malleable iron adjustable inserts, with bolts, nuts, washers, and shims; all hot-dip galvanized or mechanically zinc coated, with capability to sustain, without failure, a load equal to 4 times the loads imposed as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- D. Threaded Fasteners:
 - 1. For stainless steel, use stainless-steel bolts, nuts, and washers; ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4).
 - 2. For galvanized steel shelf angles and backup structure, use carbon steel bolts, nuts, and washers; (ASTM F 568M, Property Class 4.6), for bolts; (ASTM A 563M), Grade A, for nuts; and (ASTM F 436M) for washers; all hot-dip or mechanically zinc coated.
- E. Steel Trusses, Strongback Frames, and Miscellaneous Steel Framing: For framing members in contact with stone fabricate from same material and finish specified for anchors. For framing members not in contact with stone, comply with requirements indicated below:
 - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M, minimum thickness of (5 mm).
 - 2. Steel Tubing: ASTM A 500 (cold formed), or ASTM A 513, Type 5 (mandrel drawn), minimum thickness of (5 mm).
 - 3. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3, made from galvanized steel complying with ASTM A 653/A 653M, structural steel, (Grade 230), with (Z275) coating, and not less than (2.74-mm) nominal thickness. steel sheet complying with ASTM A 1008/A 1008M, structural steel, (Grade 230), not less than (2.66-mm) nominal thickness, hot-dip galvanized after fabrication to comply with ASTM A 123/A 123M..
- F. Prefabricated Steel Stud Frames: Galvanized steel wall framing complying with Division 05 Section "Cold-Formed Metal Framing."

2.7 STONE ACCESSORIES

- A. Setting Shims: Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70., nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- B. Sealants for Joints in Stone: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements and do not stain stone.
 - a. Multicomponent Single-component, nonsag, polysulfide sealant.
 - b. Multicomponent Single-component, nonsag, urethane sealant.
 - c. Single-component, neutral-curing silicone sealant.

2.8 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions. Do not use admixtures, unless otherwise indicated.
- B. Portland Cement-Lime Setting Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
 - a. Set granite with Type S mortar.
 - b. Set limestone with Type N mortar.
 - c. Set marble with Type S mortar.
 - d. Set travertine with Type N mortar.
 - i. Backcharge travertine with Type O mortar.
 - e. Pointing Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated. Provide pointing mortar mixed to match Architect's requirements.

PART 3 - EXECUTION

- A. Execute stone countertop installation using skilled mechanics and employ skilled stone fitters to do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone.
- B. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure material in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated with minimal joints and with edges and faces aligned according to established relationships and indicated tolerances.
- C. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.

3.2 JOINT-SEALANT INSTALLATION

- A. Where essential, prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements.

3.3 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean stone work as installation progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.
- B. Final Cleaning: Clean stone countertops no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.
- C. Protect finishes surfaces carefully from other trades.

END OF SECTION 123640