SECTION 04 72 00

CAST STONE MASONRY

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\*\* NOTE TO SPECIFIER \*\* DeVinci Precast LLC; Architectural Stone, Precast, Cast Stone and GFRC.
This section is based on the Cast Stone products of DeVinci Precast LLC, located at:
4520 MacArthur Blvd.
Oklahoma City, OK 73179
Tele: (405) 680-5600
Email: info@devinciprecast.com
Web: <https://devinciprecast.com>
[Click Here] for additional information.
DeVinci has been producing GFRC, cast stone and architectural precast sinceCurrently located on a 6+ acre complex with over 32,000 sq. ft. of indoor manufacturing, DeVinci continues to be a leader in the cast stone and GFRC industry through innovation, craftsmanship, superior customer service, integrity, and continual improvement. Design professionals choose to specify DeVinci Precast when projects demand state of the art technology combined with old world craftmanship, or just peace of mind that materials will be delivered when promised.
DeVinci offers design assist and budgeting services. Many aspects of our product can be customized to meet unique needs for specialized applications.
This specification covers Cast Stone Masonr Common applications of cast stone include caps, trim, sills, heads, quoins and many other architectural accents facades or veneers. Cast stone is most often produced to mimic the color and finish of natural stone such as limestone. Color and profile options are limitless with material and methods used to produce. All DeVinci Cast Stone Masonry is manufactured using 'Wet Cast' method.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Cast Stone Masonry - Wet Cast Method: Performance criteria, materials, design, production, and installation.
			1. Cast Stone Items:
				1. Sills.
				2. Decorative accents.
				3. Mullions.
				4. Column covers.
				5. Window heads.
				6. Trim bands.
				7. Steps.
				8. Coping.
				9. Caps.
				10. Trim.
				11. Curbing.
				12. Other shapes and applications.
			2. Mold materials.
			3. Cast stone masonry materials.
			4. Concrete mixtures.
			5. Mold fabrication.
			6. Cast stone fabrication.
			7. Fabrication tolerances.
			8. Finishes.
			9. Anchors, connectors, and miscellaneous materials.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 45 13 - Faced Architectural Precast Concrete. For use in combination with Cast Stone where structural performance is required.
		2. Section 03 49 00 - Glass-Fiber-Reinforced Concrete.
		3. Section 05 12 13 - Architecturally-Exposed Structural Steel Framing. For attaching connection devices to steel framing.
		4. Section 04 20 00 - Unit Masonry. For installing cast-stone units in unit masonry.
		5. Section 07 91 23 - Backer Rods. For elastomeric joint sealants and sealant backings.
		6. Section 04 05 19.13 - Continuous Joint Reinforcing. For attaching Cast Stone Masonry.
	1. REFERENCES
		1. ASTM International (ASTM):
			1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
			2. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
			3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
			4. ASTM C150/C150M - Standard Specification for Portland Cement.
			5. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
			6. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.
			7. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
			8. ASTM A615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.
			9. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
			10. ASTM C260 - Standard Specification for Air-Entrained Admixtures for Concrete.
			11. ASTM C666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
			12. ASTM C1116 - Standard Specification for Fiber Reinforced Concrete and Shotcrete.
			13. ASTM C1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.
		2. Precast/Prestressed Concrete Institute (PCI)
			1. PCI MNL 117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products
			2. PCI MNL 120 - PCI Design Handbook - Precast and Prestressed Concrete
	2. DEFINITIONS

\*\* NOTE TO SPECIFIER \*\* Design reference samples are samples available for viewing at bidding or submitted at bidding. Delete if not required.

* + 1. Cast Stone: Refined architectural concrete building unit manufactured to simulate natural cut stone, used in Division 4 masonry applications.
		2. Design Reference Sample: Sample of Cast Stone color, finish, and texture that has been preapproved by Architect before execution of the Contract.

\*\* NOTE TO SPECIFIER \*\* Insert description of approved design reference samples.

* + - 1. Design Reference Sample Identification Description: \_\_\_\_\_\_\_\_.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: For each product.
			1. Cast Stone Masonry design mixes.
			2. Manufacturer's data sheets on each product to be used.
			3. Preparation instructions and recommendations.
			4. Storage and handling requirements and recommendations.
			5. Typical installation methods.
		3. Shop Drawings: Fabrication and installation details for Cast Stone materials.
			1. Elevations, sections, and dimensions.
			2. Reinforcement details.
			3. Finishes.
			4. Joint and attachment details.
			5. Connection Hardware Attached to Structure: Locations and details.
			6. Items cast into stones.
			7. Erection sequences.
			8. Relationship to adjacent materials.
			9. Loose, cast-in, and field hardware.
		4. Verification Samples: 12 by 12 inches (305 by 305 mm). For expose surface finishes. Representative of finish, color, and texture expected.

\*\* NOTE TO SPECIFIER \*\* Delete Delegated-Design Submittal Paragraph if not required.

* + 1. Delegated-Design Submittal: Product analysis and data signed and sealed by the responsible Professional Engineer.
		2. Qualification Data: For manufacturer.
		3. Source Quality-Control Program: For Cast Stone Masonry manufacturer.
			1. Test Reports: For inserts, and anchors.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Designated an APA-certified plant for Cast Stone Masonry production.
		2. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
		3. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense.

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Demonstrate aesthetic effects and set quality standards for fabrication and installation along with reviewing interaction of other construction materials.
			1. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
			2. Retain mock-up during construction as a standard for comparison with completed work.

\*\* NOTE TO SPECIFIER \*\* Delete one of the two following paragraphs.

* + - 1. Do not alter or remove mock-up until work is completed or removal is authorized.
			2. Approved Mockups: May become part of the completed project.

\*\* NOTE TO SPECIFIER \*\* Indicate portion of wall and or features represented by mockup on Drawings or draw mockup as separate element.

* + - 1. Build mockup of typical wall area as shown on Drawings.
				1. Typical Components: Building structure attachments, and installation methods.
				2. Window Openings: Sills, heads, and jambs where required.
				3. Sealant-Filled Joints: Complying with requirements in Section 07 91 23 - Backer Rods.

\*\* NOTE TO SPECIFIER \*\* Delete "Pre-installation Conference if not required.

* 1. PRE-INSTALLATION CONFERENCE
		1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.
	2. DELIVERY, STORAGE, AND HANDLING
		1. Handle and transport Cast Stone masonry on protective material and with protective spacers between stones.
		2. Store Cast Stone off ground on sturdy pallets, supported on protective material and with protective resilient spacers between stones. Place stored stones so identification marks are clearly visible.
		3. Prevent prolonged contact of materials that retain moisture.
1. PRODUCTS
	1. MANUFACTURERS

\*\* NOTE TO SPECIFIER \*\* Retain "Manufacturers" Paragraph belowif naming Cast Stone manufacturers. See APA's Web site, www.archprecast.org, for current APA-certified plant listings

* + 1. Acceptable Manufacturer: DeVinci PreCast, which is located at: 4520 S. MacArthur Blvd.; Oklahoma City, OK 73179; Tel: 405-680-5600; Fax: 405-680-5614; Email: [request info (ericsutliff@devinciprecast.com)](https://admin.arcat.com/users.pl?action=UserEmail&company=DeVinci+PreCast&coid=42066&rep=&fax=405-680-5614&message=RE:%20Spec%20Question%20(04720dvp):%20%20&mf=); Web: <https://devinciprecast.com> | <http://www.devincicaststone.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs: coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
	1. PERFORMANCE REQUIREMENTS

\*\* NOTE TO SPECIFIER \*\* Retain "Delegated Design" Paragraph below if Supplier is required to assume responsibility for design.

* + 1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements to design Cast Stone materials.
		2. Structural Performance: Cast Stone materials must withstand design loads and dimensional changes due to thermal and moisture extreme, as governed by applicable codes and standards.
	1. MOLD MATERlALS
		1. Molds: Rigid, dimensionally stable, non-absorptive alkali resistant, warp, and buckle free. Provide continuous surfaces within tolerances; and capable of producing required finish surfaces.
			1. Mold-Release Agent: Commercial liquid-release. Must not bond with, stain, or affect cast stone surfaces.

\*\* NOTE TO SPECIFIER \*\* Delete form liner option not required or delete both if form liners are not required.

* + - 1. Form Liners: Units of face design, texture, arrangement, and configuration indicated.
				1. Solid backing and form support ensure liners remain in place during material placement. Use manufacturer's recommended liquid-release agent.
			2. Form Liners: Units of face design, texture, arrangement, and configuration to match design reference sample.
				1. Solid backing and form support ensure liners remain in place during concrete placement. Use manufacturer's recommended liquid-release agent.

\*\* NOTE TO SPECIFIER \*\* Retain "Surface Retarder" Paragraph below if using retarder to help obtain exposed-aggregate finish.

* + 1. Surface Retarder: Liquid used to delay hardening of newly placed concrete mix to depth of reveal specified.
	1. CAST STONE MASONRY MATERlALS
		1. Portland Cement: ASTM C150/C150M; Type I, II, or III. Surfaces Exposed to View in Finished Structure: Use white of same type, brand, and source throughout Cast Stone production.
		2. Coarse Aggregates: ASTM C33, except for gradation.
		3. Fine Aggregates: Manufactured or natural sands, ASTM C33, except for gradation.
		4. Air Entraining Admixtures: Conforming to ASTM C260.
		5. Water: Potable.
		6. Reinforcing Bars: ASTM A615/A615M: Grades 40 or 60 steel galvanized, or epoxy coated when cover is less than 1.5 inches (38 mm).

\*\* NOTE TO SPECIFIER \*\* Fiber reinforcement is optional. Delete if not required.

* + 1. Fiber Reinforcement: ASTM C1116.
		2. Coloring Admixture: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.

\*\* NOTE TO SPECIFIER \*\* Delete color options not required.

* + - 1. Color: As determined by the Architect.
			2. Color: As detailed on the Drawings.
			3. Color: \_\_\_\_\_\_\_\_.
		1. Potable Water: No material affecting color stability, setting, or strength.

\*\* NOTE TO SPECIFIER \*\* DeVinci Precast uses high range water reducer in all Cast Stone products.

* + 1. Chemical Admixtures: ASTM C494/C494M, containing 0.1 percent or less chloride ions.
			1. Admixture: To be determined by the precast manufacturer.
			2. Admixture: \_\_\_\_\_\_\_\_.
		2. Cast Stone Masonry Physical Material Properties as Follows:
			1. Compressive Strength per ASTM C1194: 6,500 psi (44.82 MPa) at 28 days.
			2. Air Content per ASTM C231: 4 to 8 percent for freeze thaw protection.
			3. Absorption: 6 percent maximum; cold water method.
			4. Freeze-thaw: CPWL less than 5 percent after 300 cycles.
	1. CONCRETE MIXTURES
		1. Prepare design mixtures for each type of cast stone material required.
		2. Design mixtures shall be prepared by qualified plant personnel or may be formulated by independent outside qualified laboratories.
	2. MOLD FABRICATI0N
		1. Mold Construction: To result in finished Cast Stone with profiles, dimensions, and tolerances indicated, without damaging cast stones during stripping. Prevent water leakage and loss of cement paste.
		2. Wash or Slope on horizontal surfaces where possible.
		3. Drips on projections where possible to protect staining below.
		4. Maintain molds to provide completed Cast Stone units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

\*\* NOTE TO SPECIFIER \*\* Delete one of the two following options not required. Keep the second paragraph if exposed-aggregate surfaces require surface retarder to achieve desired finish.

* + - 1. Coat contact surfaces of molds with form-release agent.
			2. Coat contact surfaces of molds with surface retarder.

\*\* NOTE TO SPECIFIER \*\* Delete the following paragraph if form liners are not required.

* + 1. Form Liners: Place accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
	1. FABRICATION
		1. Manufacturing Process: Wet Cast
		2. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
			1. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
			2. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

\*\* NOTE TO SPECIFIER \*\* Delete "Embedded Anchors and Miscellaneous Hardware" Paragraph if not required or delete material option not required.

* + 1. Embedded Anchors and Miscellaneous Hardware:
			1. Material: Stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666, Type 304.
			2. Material: Steel complying with ASTM A36/A36M and hot-dip galvanized complying with ASTM A123/A123M.
		2. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
		3. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
		4. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.
		5. Cure concrete: According to requirements in PCI MNL 117. Cure units until compressive strength is high enough to ensure that stripping does not influence performance or appearance of final product.
		6. Discard and replace architectural precast concrete units that do not comply with requirements.
		7. Panel Identification: Mark stones with identification marks on Shop Drawings. Mark casting date on each piece.
	1. FABRICATI0N TOLERANCES

\*\* NOTE TO SPECIFIER \*\* Delete manufacturing tolerances option not required. First paragraph incorporates tolerances by reference.

* + 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch (3 mm).
		2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater, but in no case by more than 1/4 inch (6 mm).
		3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater.
		4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch (3 mm) on formed surfaces of units and 3/8 inch (10 mm) on unformed surfaces.

\*\* NOTE TO SPECIFIER \*\* Revise this article to add requirements if Cast Stone finish is to match another product such as architectural precast concrete or GFRC.

* 1. FlNlSHES
		1. Exposed Faces: Free of joint marks, grain, and obvious defects.
		2. Corners Including False Joints: Uniform, straight, and defined.
		3. Finish exposed-face surfaces of Cast Stone to match approved design reference sample or mockups and GFRC and Architectural Precast where intent is to match finish.

\*\* NOTE TO SPECIFIER \*\* Delete finish paragraphs below that are not required. If more than one finish is required, insert locations, or indicate on Drawings. Add more detail if greater definition is required. Standard finish is Acid etched to give the appearance and texture of natural limestone. Contact DeVinci Precast for complete or custom finish options.

* + - 1. As-Cast-Surface Finish: Surfaces to match approved sample for acceptable surface, air voids, sand streaks, and honeycomb, with uniform color and texture.
			2. Textured-Surface Finish: Impart by form liners.
			3. Retarded Finish: Use chemical-retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
			4. Acid-Etched Finish: Use acid and hot-water solution equipment, application techniques, and cleaning procedures to expose fine aggregate and surrounding matrix surfaces.
	1. SOURCE QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* PCI MNL mandates source testing requirements. APA or PCI certification also ensures periodic auditing of plants for compliance with standards in PCI MNL 117.

* + 1. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, ASTM C1610/C1610M, ASTM C1611/C1611M, ASTM C1621/C1621M, and ASTM C1712.
1. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until substrates have been properly constructed and prepared.
		2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.
		2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	3. ERECTION
		1. Install clips, hangers, and other accessories required for connecting Cast Stone materials to supporting members and backup materials.
		2. Install Cast Stone level, plumb, square, and in alignment. Provide temporary supports and bracing as required.
			1. Maintain horizontal and vertical joint alignment and uniform joint width.
		3. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
		4. Set units in full bed of mortar with full head joints unless otherwise indicated.

\*\* NOTE TO SPECIFIER \*\* Delete set units with joints options not required.

* + - 1. Set units with joints: 1/4 to 3/8 inch (6 to 10 mm) wide unless otherwise indicated.
			2. Set units with joints: 3/8 to 1/2 inch (10 to 13 mm) wide unless otherwise indicated.
			3. Set units with joints: \_\_ to \_\_ inch (\_\_ to \_\_ mm) wide unless otherwise indicated.
			4. Build anchors and ties into mortar joints as units are set.
			5. Fill dowel holes and anchor slots with mortar.
			6. Build concealed flashing into mortar joints as units are set.
		1. Comply with Noncumulative Tolerances:
			1. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
			2. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
			3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.
			4. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch (1.5 mm), except where variation is due to warpage of units within tolerances specified.
	1. REPAIRS

\*\* NOTE TO SPECIFIER \*\* Production blemishes are generally corrected at manufacturer's plant. Blemishes occurring after delivery are normally repaired before final joint cleaning and sealing.

* + 1. Maintain structural adequacy of panel do not impair appearance. Must be approved by Architect.
		2. Patches must blend with color, texture, and uniformity of adjacent exposed surfaces.
		3. Remove and replace damaged Cast Stone material if repairs do not comply with requirements.
	1. CLEANING AND PROTECTION
		1. Clean per Cast Stone manufacturer's written instructions.
			1. Soiled Surfaces: Clean with detergent and water, with soft fiber brushes and sponges. Rinse with clean water.
			2. Prevent damage to Cast Stone surfaces

END OF SECTION