SECTION 03 45 00

PRECAST ARCHITECTURAL CONCRETE

Display hidden notes to specifier. (Don't know how? [Click Here](https://www.arcat.com/sd/display_hidden_notes.shtml))

*Copyright 2022 - 2022 ARCAT, Inc. - All rights reserved*

\*\* NOTE TO SPECIFIER \*\* DeVinci Precast LLC; Architectural Stone, Precast, Cast Stone and GFRC.
This section is based on the Precast Architectural Concrete of DeVinci Precast LLC, which is located at:
4520 MacArthur Blvd.
Oklahoma City, OK 73179
Phone: (405) 680-5600
Email: info@devinciprecast.com
Web: <https://devinciprecast.com>
[Click Here] for additional information.
DeVinci has been producing precast architectural concrete, GFRC, and cast stone 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 Architectural Precast Concrete. Architectural Precast Concrete is often used to satisfy a decorative as well as structural function and 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. Architectural Precast Concrete: Performance criteria, materials, design, production, and installation.
			1. Precast Architectural Precast Items:
				1. Architectural precast cladding.
				2. Architectural precast load bearing units.
				3. Brick Faced architectural units.
				4. Architectural precast columns.
				5. Load bearing window heads.
				6. Architectural precast steps.
				7. Water table architectural precast units.
				8. Architectural precast wall panels.
				9. Other shapes and applications.
			2. Mold materials.
			3. Reinforcing materials.
			4. Architectural precast concrete materials.
			5. Steel connection materials
				1. Anchors, fasteners, and miscellaneous materials.
			6. Accessories.
			7. Grout materials.
			8. Concrete mixtures.
			9. Mold fabrication.
			10. Architectural precast concrete fabrication.
			11. Fabrication tolerances.
			12. Finishes.
	1. RELATED SECTIONS

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

* + 1. Section 04 72 00 - Cast Stone Masonry. For use in combination with Architectural Precast Concrete where application allows for trim, banding, and accessories.
		2. Section 03 49 00 - Glass-Fiber-Reinforced Concrete. For use in combination with Architectural Precast Concrete where application allows for soffits, panels, and accessories.
		3. Section 05 12 13 - Architecturally-Exposed Structural Steel Framing. For attaching connection devices to steel framing.
		4. Section 07 91 23 - Backer Rods. For elastomeric joint sealants and sealant backings.
		5. Section 05 50 00 - Metal Fabrications. For kickers and other miscellaneous steel shapes.
	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. Architectural Precast Concrete: Precast concrete that is structural as well as decorative in function.
		2. Design Reference Sample: Sample of Architectural Precast Concrete 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. Architectural precast design mixes.
			2. Manufacturer's data sheets on each product to be used.
				1. Preparation instructions and recommendations.
			3. Storage and handling requirements and recommendations.
			4. Typical installation methods.
		3. Shop Drawings: Detail fabrication and installation of architectural precast concrete units.
			1. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
			2. Indicate joints, reveals, and extent and location of each surface finish.
			3. Reinforcement details.
			4. Finishes.
			5. Joint and attachment details.
			6. Indicate type, size, and length of welded connections by AWS standard symbols.
			7. Detail loose and cast-in hardware and connections.
			8. Location and details of connection hardware attached to structure.
			9. Items cast into stones.
			10. Erection sequences.
			11. Relationship to adjacent materials.
			12. 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: Precast Architectural Concrete manufacturer.
		4. Test Reports:
			1. Inserts and embeds.
			2. Cementitious materials.
			3. Admixtures.
			4. Reinforcing materials.
			5. Structural steel shapes and hollow sections.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed in the governing jurisdiction of the Project.
			1. Designated an APA-certified plant for production of architectural precast concrete products.
		2. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
		3. Installer Qualifications: Company specializing in performing Work of this section with minimum ten years documented experience with projects of similar scope and complexity.
		4. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."
		5. 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. COORDINATION
		1. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work.
		2. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.
	3. DELIVERY, STORAGE, AND HANDLING
		1. Handle and transport Precast Architectural Concrete on protective material and with protective spacers between units.
		2. Support units at designated points to prevent distortion, cracking, warping or other damage while stored.
		3. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.
		4. Store Architectural Precast Concrete units off ground on adequate dunnage with bracing as required, support with protective non-staining spacers between units if stacked.
		5. Place stored stones so identification marks are clearly visible.
		6. Prevent prolonged contact of materials that retain moisture.
		7. Lift and support units only at designated points indicated on shop drawings.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: DeVinci PreCast, which is located at:4520 S. MacArthur Blvd.Oklahoma City, OK 73179Tel: 405-680-5600Fax: 405-680-5614Email: [request info (ericsutliff@devinciprecast.com)](https://arcat.com/rfi?action=email&company=DeVinci%252BPreCast&message=RE%253A%2520Spec%2520Question%2520(03450dvp)%253A%2520&coid=42066&spec=03450dvp&rep=&fax=405-680-5614);Web: <https://devinciprecast.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 \*\* Delete "Delegated Design" Paragraph if Supplier is not 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 Architectural Precast Concrete.
		2. Structural Performance: Architectural Precast units must withstand design loads and dimensional changes due to thermal and moisture extreme, as governed by applicable codes and standards.
	1. MOLD MATERIALS
		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 Architectural Precast Concrete 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 \*\* Delete "Surface Retarder" Paragraph if not 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. REINFORCING MATERIALS

\*\* NOTE TO SPECIFIER \*\* Delete reinforcement materials paragraphs not required.

* + 1. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
		2. Galvanized Reinforcing Bars: ASTM A615/A615M, Grade 60 / ASTM A706/A706M, deformed bars, with ASTM A767/A767M, Class II zinc coating and chromate treatment.
		3. Epoxy-Coated Reinforcing Bars: ASTM A615/A615M, Grade 60- ASTM A706/A706M, deformed bars, ASTM A775/A775M or ASTM A934/A934M epoxy coated.
		4. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.
		5. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 ASTM A706/A706M, deformed bars, assembled with clips.
		6. Deformed-Steel Welded Wire Reinforcement: ASTM A497/A497M, flat sheet.
		7. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.
	1. ARCHITECTURAL PRECAST CONCRETE MATERIALS
		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 Architectural Precast Concrete 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.

\*\* 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 Architectural Precast Concrete 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. Architectural Precast Concrete 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. STEEL CONNECTION MATERIALS

\*\* NOTE TO SPECIFIER \*\* Delete steel connection materials not required.

* + 1. Carbon-Steel Shapes and Plates: ASTM A36/A36M.
		2. Carbon-Steel-Headed Studs: ASTM A108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1 M, Type A or Type B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
		3. Deformed-Steel Wire or Bar Anchors: ASTM A496/A496M or ASTM A706/A706M.
		4. Carbon-Steel Structural Tubing: ASTM A500/A500M, Grade B or Grade C.
		5. Carbon-Steel Bolts and Studs: ASTM A307, Grade A or ASTM F1554, Grade 36; carbon-steel, hex-head bolts, and studs; carbon-steel nuts, ASTM A563; and flat, unhardened steel washers, ASTM F844.
		6. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
		7. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123/A123M or ASTM A153/A153M electrodeposition according to ASTM B633, SC 3, Types 1 and 2.
			1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
			2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight and complying with DOD-P-21035B or SSPC-Paint 20.
		8. Welding Electrodes: Comply with AWS standards.
	1. ACCESSORIES

\*\* NOTE TO SPECIFIER \*\* Delete accessories not required. Accessories are provided by others unless previously agreed to furnish.

* + 1. Reglet: Specified in Section 07 62 00 - Sheet Metal Flashing and Trim.
		2. Precast Accessories: Clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.
	1. GROUT MATERIALS

\*\* NOTE TO SPECIFIER \*\* Delete paragraphs not required. Grout materials are not provided by Devinci Precast

* + 1. Sand-Cement Grout: Portland cement, ASTM C150/C150M, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.
		2. Nonmetallic, Non-shrink Grout: Packaged, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, Grade A for dry pack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.
		3. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C881/C881M, of type, grade, and class to suit requirements.
	1. CONCRETE MIXTURES
		1. Prepare design mixtures for each type of Architectural Precast Concrete material required.
		2. Design mixtures shall be prepared by qualified plant personnel or may be formulated by independent outside qualified laboratories.
		3. Compressive Strength (28 Days): 6500 psi (44.8 MPa) minimum.
		4. Maximum Water-Cementitious Materials Ratio: 0.45.
		5. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C1218/C1218M.
		6. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.
		7. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
		8. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
	2. MOLD FABRICATION
		1. Mold Construction: To result in finished Architectural Precast units with profiles, dimensions, and tolerances indicated, without damaging units during stripping. Prevent water leakage and loss of cement paste.
		2. Construct molds with sufficient strength to withstand pressures due to concrete placement.
		3. Wash or Slope on horizontal surfaces where possible.
		4. Drips on projections where possible to protect staining below.
		5. Uniform edge treatment radiused or chamfered.
		6. Maintain molds to provide completed Architectural Precast 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. ARCHITECTURAL PRECAST CONCRETE FABRICATION
		1. 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.
			3. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

\*\* 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. 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.
		5. 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.
		6. Identify pickup points of architectural precast concrete.
		7. 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.
		8. Discard and replace architectural precast concrete units that do not comply with requirements.
		9. Unit Identification: Mark stones with identification marks on Shop Drawings. Mark casting date on each piece.
	1. FABRICATION TOLERANCES

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

* + 1. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
		2. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch (3 mm).
		3. 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).
		4. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater.
		5. 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 Architectural Precast Concrete finish is to match another product such as cast stone or GFRC.

* 1. FINISHES
		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 Architectural Precast Concrete 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.
		2. Strength of precast concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
		3. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, pre-caster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42/C42M and ACI 318.
		4. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.
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.
		3. Proceed with installation only after unsatisfactory conditions have been corrected.
	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 Architectural Precast Concrete units to supporting members and backup materials.
		2. Erect Architectural precast concrete units level, plumb, square, and in alignment. Provide temporary supports and bracing as required.
			1. Maintain horizontal and vertical joint alignment and uniform joint width.
			2. Grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
		3. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
		4. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
			1. Protect Architectural Precast units and other materials from damage with noncombustible shields.
			2. Welds not otherwise specified shall be continuous filet welds minimum size as specified by AWS.
		5. Secure bolted connections using lock washers, tack welding or other methods to prevent loosening.
			1. Verify bolt position and tightness on static bolt connections.
			2. Properly adjust sliding connections that provide for intentional movement.
			3. Slip critical connections shall be pretensioned according to specified method.
		6. Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated.
			1. Retain flowable grout in place until hard enough to support itself.
			2. Pack spaces with stiff dry-pack grout material, tamping until voids are filled.
			3. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces.
			4. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.
	4. ERECTION TOLERANCES
		1. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.
		2. 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.
	5. FIELD QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* Delete paragraphs below not required. Add requirements as needed. Field inspection is the responsibility of others than DeVinci Precast,

* + 1. Special Inspections: Owner may engage a qualified special inspector to perform special inspections and prepare reports.
		2. Visually inspect field welds and test according to ASTM E165 or to ASTM E709 and ASTM E1444.
		3. High-strength bolted connections are subject to inspections.
		4. Testing agency will report test results promptly and in writing to Contractor and Architect.
		5. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
		6. Additional testing and inspecting, shall be performed to determine compliance of replaced or additional work with specified requirements.
	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 Architectural Precast units if repairs do not comply with requirements.
		4. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780/A780M.
		5. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
	1. CLEANING AND PROTECTION
		1. Clean per Architectural Precast Concrete 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 Architectural Precast Concrete surfaces.

END OF SECTION