

ACI 533.1R-20

IN-LB

Inch-Pound Units

SI

International System of Units

Guide for Design and Construction Responsibilities for Architectural Precast Concrete

Reported by ACI Committee 533



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Guide for Design and Construction Responsibilities for Architectural Precast Concrete

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Architectural precast concrete is a subcategory of concrete construction that involves the same basic entities as other concrete construction, but is cast in a plant and has a more decorative appeal by using color, texture, distinguished surface finishes, or all of these. This document outlines the responsibilities for various parties of the design/construction team for architectural precast concrete projects and does not necessarily apply to concrete or precast concrete in general.

Keywords: architect; architectural precast concrete; construction manager; general contractor; owner; precaster; specialty structural engineer; structural engineer of record.

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Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

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CHAPTER 1—INTRODUCTION AND SCOPE

1.1—Introduction

Design and construction with architectural precast concrete is most successful when all parties are working as cooperative partners. Clearly defining the scope of work and the responsibilities of the involved parties is critical to achieving an efficient, cost-effective, safe, and high-quality structure. For each project, contracts, referenced contract documents, and project specifications should clearly define the responsibilities and relationships between the parties. This guide explains the responsibilities for all major parties involved in an architectural precast concrete project.

1.2—Scope

A successful precast concrete project requires teamwork among all the participants, including the owner, architect, structural engineer of record, construction manager, general contractor, precast concrete manufacturer (precaster), specialty structural engineer, and erector. Establishing the scope of the precast concrete work and the responsibilities of each party at an early stage in the development of a project is important to achieve quality and keep the project on schedule. During construction, each party is responsible for communicating with all other parties through the construction manager/general contractor. When roles and responsibilities are coordinated, problems and conflicts of responsibility can be avoided. Lines of communication among the parties involved in a project may be established by written documents, or during prebid and preconstruction conferences at which time the communication lines and responsibilities can be reviewed and the design requirements discussed.

To design economical structures for their clients, the designer needs to be familiar with architectural precast concrete and obtain design input from a local precaster early in the schematic design process. The precaster will help inform the design and construction team regarding economical fabrication, delivery, erection processes, and any possible manufacturing limitations. In the event alternatives are approved, the design team retains responsibility for providing revised details as needed and to show how other materials interface with the precast concrete. The structural engineer of record takes overall responsibility for the structural design of the completed structure. Certain aspects of the design, however, are often delegated to the specialty structural engineer working for the precaster. When any of this delegated structural design work for a portion of the structure involves engineering, the structural engineer of record should review the structural design.

The design should be performed in accordance with the requirements of applicable state and local building codes governing the practice of architecture and engineering. This generally requires that an architect, serving as the prime

design professional, and a licensed design professional, serving as structural engineer of record, accept responsibility for ensuring that these requirements are met. The architect and structural engineer of record seal and submit their respective contract documents to regulatory authorities for the building permit. Local regulatory authorities may approve design documents for starting construction without final design of the precast concrete components. These initial design documents are typically referred to as building permit drawings or drawings for permit. In most cases, the design of the precast concrete can be performed and submitted at a later time to the design team through the construction manager/general contractor, after the precast concrete work is under contract for design and shop drawings. When part of the architectural precast erection drawings prepared by the precaster are to be included with the permit set, they may require the seal of the precaster's licensed staff engineer or specialty structural engineer licensed to practice in that jurisdiction. The structural engineer of record typically requires a licensed engineer to seal the documents, depicting the designs delegated to the precaster. This does not relieve the structural engineer of record of the responsibility to review submissions and ensure that the designated loading requirements were properly interpreted and structural interaction with the nonprecast portions of the structure was fully coordinated. One of the basic principles of the construction industry is that each party in a construction project has responsibility and authority for their own work. If a party requires compliance, they should also accept responsibility for that work. If the architect or structural engineer of record is involved with construction-management functions, they should be aware that their responsibilities may include quality of construction and safety in addition to design.

CHAPTER 2—DEFINITIONS

Please refer to the latest version of ACI Concrete Terminology for a comprehensive list of definitions. Definitions provided herein complement that resource.

agent construction manager—person or entity who enters into a contract with the owner to manage a construction project, and generally does not act as a general contractor.

architect—firm with licensed architect(s) hired by the owner to design the building/project and produces the architectural contract drawings.

concrete material supplier—entity that produces concrete and delivers it to the project in a freshly mixed and unhardened state.

construction manager at risk—entity or person that enters into a contract with the contractors who perform the work and functions as a general contractor.

design/builder—person or entity who undertakes a combination of both design and construction for either an entire project or a significant portion of a project.

failure analysis consultant—person or entity who investigates failures or alleged deficiencies associated with the design or construction of the work, the quality of construction materials, practices, or all the aforementioned.

general contractor—firm contracted to the owner for constructing the building/project to the project documents.

hardware supplier—party responsible for supplying loose field materials to complete the erection of the precast identified in contracts.

precaster—precast concrete manufacturer.

prime contractor—person or entity who has a contract directly with the owner for a discrete portion of the work but is not a general contractor; applicable only when there is more than one entity with such a contract.

prime design professional—architect or structural engineer of record for a given building/project.

specialty structural engineer—licensed design professional retained by a contractor or specialty subcontractor to design a delegated portion of the project.

specialty subcontractor—person or entity whose scope of work includes the design and construction of a portion of the project.

standard of care—level of skill and competence ordinarily and contemporaneously demonstrated by professionals of the same discipline practicing in the same locale and faced with the same or similar facts and circumstances.

structural engineer of record—licensed structural engineer hired by the architect to design the structural portion of the building/project and produces the structural contract drawings.

subcontractor—person or entity whose scope of work includes construction but not design of a contractually defined portion of the project.

testing/inspection agency—entity retained to perform tests and inspections required by the contract documents, applicable laws and regulations, or both.

CHAPTER 3—GENERAL RESPONSIBILITIES

The owner's project requirements should be to define the overall goals and objectives with regard to building type, intended use, project delivery method, budget, and schedule. The owner then enters into a contract with a licensed design professional (commonly an architectural or engineering firm) to design and prepare contract documents for the building, or pursue a design-build contract, or one of the alternate project delivery schemes. These contract documents can then be used to obtain bids by a construction manager or general contractor.

3.1—Owner responsibilities

If the owner plans to have an active role in the project, it is recommended that both this role and the lines of communication with the other parties are clearly defined in written documents. The owner should allow sufficient time in the various phases of the construction process to achieve the necessary review, coordination, and implementation of the project requirements. Design changes should be made as early in the project as possible. Late changes initiated after the approval of architectural precast concrete design and shop drawings will likely add cost and schedule delays. Even though architectural precast panels may not have been cast, changes can result in significant impacts to the precaster,

such as delays from the precast shop drawing revision and checking process, resubmittal of shop drawings, formwork changes, additional procurement of long lead time components (for example, hot-dipped galvanized steel embed assemblies), and delays to the precast casting schedule.

3.1.1 Owner's designated representative—The designated representative, who may be the owner's representative, construction manager, or general contractor, contracting directly with the precaster, should keep the precaster supplied with the most current contract documents and written information issued by the architect and structural engineer of record. The owner's representative is responsible for keeping contract documents current and distributing to all necessary parties. If revised documents are furnished after bidding, it may be necessary to modify the contract.

3.1.2 Owner's project delivery method—In a traditional design-bid-build project delivery method, the owner contracts with a licensed design professional to design the structure and produce a set of contract documents for the construction managers/general contractors to bid on. In the design-build project delivery method, the owner contracts with a general contractor or construction manager to design and build the structure. The general contractor or construction manager—not the owner—then contracts with the architect and structural engineer of record. The owner will have one contract with the design-build general contractor or construction manager. Under this arrangement, the owner sometimes retains another architect or engineer for consultation on design criteria and verification that the design intent is achieved.

Proponents of the design-build project delivery method cite that one of the primary benefits to an owner using design-build project delivery is that the owner is able to look to the design-builder as the single point of responsibility for the entire project. The design-builder is the party responsible to the owner, regardless of whether a defect is based in the design or the construction of the project. With design-build, the owner provides the design-builder with the owner's project criteria upon which the design-builder is contractually required to base the design and construction of the project. Depending upon the project, the project criteria may be largely conceptual in nature or, alternatively, may be developed to the point of preliminary design documents prepared by a separate consultant of the owner. This separate consultant is sometimes referred to as the bridging architect/engineer and the preliminary design documents are referred to as bridging documents. The bridging documents will become a part of the project criteria provided to the design-builder. The greater the degree of specificity and detail provided to the design-builder by the owner, the less responsibility the design-builder will have for the design because decisions are already made. If performance specifications in the project criteria specify the results the owner wants to achieve, rather than the method for achieving the design, the design-builder will have flexibility in the design but remains responsible for achieving the owner's stated results.