DESIGN COLLABORATION ON CONSTRUCTION PROJECTS

PART II:

Design Assist—Collaborative Design Approach Guidelines for the Fabricated Structural Steel Industry

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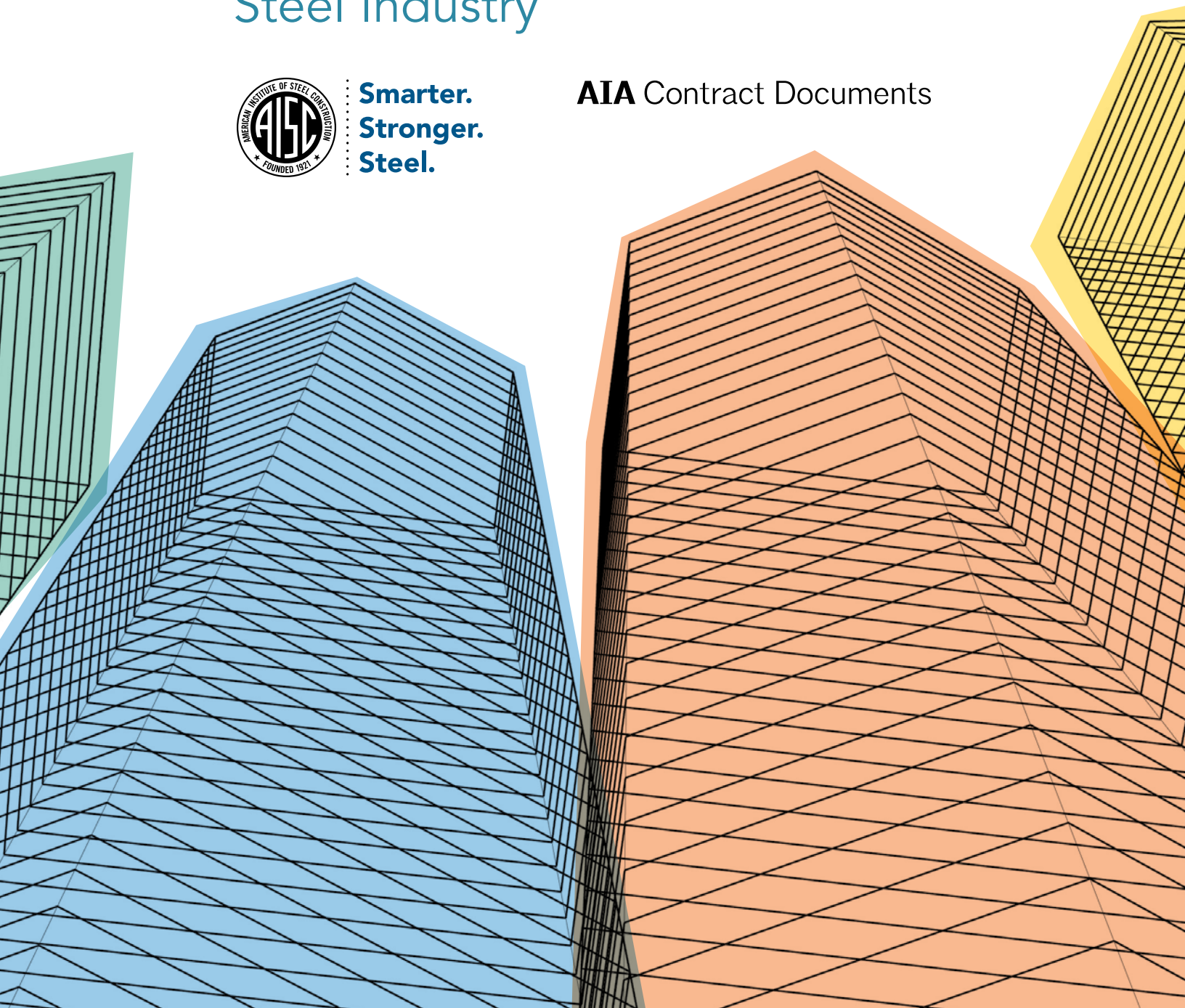

by

American Institute of Steel Construction

Part II addresses Design Assist and Delegated Connection Design as applied to the fabricated structural steel industry.

Part II was written by American Institute of Steel Construction with significant contribution from the AISC Committee on the Code of Standard Practice and a review by AIA Contract Documents.

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1. INTRODUCTION

1.1. Part I AISC Collaboration with AIA and Part II Review by ACD

The American Institute of Architects (AIA), through members of the contract documents content development team and Risk Management Committee, and the American Institute of Steel Construction (AISC) collaborated on a Part I document published in August 2020 to provide general guidance about design collaboration on construction projects. This document was entitled "Delegated Design, Design Assist and Informal Involvement – What Does It All Mean?" Members of the AIA Contract Documents (ACD) content development team[1] reviewed Part II for general conformance with the principles set forth in the Part I document, which addressed three common collaboration strategies: informal involvement, design assist, and delegated design. All are common in various parts of the construction industry.[2]

1.2. Summary of Part I and Introduction to Part II

Part I describes in general terms the roles and responsibilities of the various project participants under each of the three design collaboration strategies and offers definitions and guidelines that design professionals and the construction industry can adopt for their use. Part I focused on collaboration strategies that have been employed in the construction industry for decades. It pointed out that collaboration strategies are routinely used in the design of fire protection systems, vertical transportation systems, mechanical systems, retaining walls, clean rooms, curtain walls, and fabricated structural steel, to name a few of the more common applications. These collaboration strategies range along a continuum from informal discussions (Informal Involvement) all the way to contractor acceptance of design responsibility for certain defined elements of a project (delegated design). The goal for each of the collaboration approaches described in Part I is to deliver a project on a defined schedule and budget, minimizing the costs and impacts of design or other changes issued later. It was further emphasized that these three collaboration strategies termed (1) informal involvement, (2) design assist, and (3) delegated design are not considered project delivery methods, but rather collaborative techniques that can be applied with any delivery method. These include the traditional design-bid-build method and alternative delivery methods such as design-build, construction manager at-risk/-advisor, and integrated project delivery as defined by the Associated General Contractors of America (AGC) and the American Institute of Architects (AIA) *Primer on Project Delivery, 2nd Ed.*, and the American Institute of Architects (AIA) *The Architect's Handbook of Professional Practice, 15th Ed.*

One collaboration strategy discussed in Part I—informal involvement—is not discussed in Part II. As explained in Part I, informal involvement is a separate and distinct strategy from design assist and delegated design; it constitutes an informal exchange of information between a design professional and contractor where there is typically no agreement, no compensation, and no expectation that the contractor will guarantee or be responsible for the accuracy of the information provided. Refer to the Part I document for further explanation.

[1] In late 2020, the AIA partnered with True Wind Capital, a long-term growth-oriented private equity firm focused on investing in high quality tech companies to invest in the ACD platform and product suite to enhance value to members and customers. As a result of that partnership, a new business entity was created, ACD Operations LLC. AIA Contract Documents are now developed through ACD Operations LLC and its content development team in conjunction with the AIA Contract Documents Committee.

[2] ACD did not review Part II regarding its application in the practice of architecture, the design team selection process, or any review or endorsement of the *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22) or other published AISC specifications.

1.2.1. Design Assist Defined for Part I

In Part I, design assist, as applied in general to the various disciplines and systems used today in the construction industry, was defined as a form of collaboration where a contractor provides information to assist a design professional, typically before a price for the work has been agreed upon or before the work has been awarded. The design professional and contractor typically have separate written contracts with the owner that describe the scope of the contractor's design assist services and the extent to which the design professional can rely upon the contractor's information. The contractor may incur liability arising under contract for the information it provides, but the design professional is responsible for incorporating and coordinating the contractor's information into its design and maintains professional responsibility for the overall design. It was pointed out in Part I that the term "contractor" as referenced for the different disciplines and building components commonly used on a project can apply to general contractors, construction managers, specialty contractors, subcontractors, suppliers, and product manufacturers.

1.2.2. Introduction to Part II: Design Assist as Applied to Fabricated Structural Steel

This document complements Part I by describing in detail how two collaboration strategies (design assist and delegated connection design) are currently applied specifically to fabricated structural steel. For the purposes of this Part II document, the term "design assist" as it applies to the structural steel industry is defined as follows:

> A form of collaboration where a structural steel fabricator and/or erector (or a fabricator/erector team under one contract, depending on project circumstances) provides information under a contract with the owner or other party as designated by the owner, to assist a structural engineer of record (SER) and other designated members of the design assist team with the design of the structural steel for buildings or building-like structures.

The collaboration typically begins early in the design phase. The design assist fabricator/erector contractor can be selected and potentially contracted to provide design assist work as early as the conceptual design and as late as the construction document phase. The ability to impact design diminishes with the progression of design completion.

In some cases, the design assist fabricator/erector team is contracted early with provisions to either continue or terminate their engagement, depending on the perceived success of the design assist efforts. The design assist team normally consists of the owner or owner's agent, a construction manager (CM) or general contractor (GC), architect, structural engineer of record (SER), fabricator/erector and other members as agreed to by the design assist team. The design assist team member participants will vary depending upon the delivery method used on the project and the owner's retention of a construction manager or other consultant to assist the owner in administering the project. Note that Part II of this document uses the term "fabricator/erector" as if they are contracted as one entity. When that is not the case on a project, the guidelines described can be applied to each party separately as deemed appropriate for the project.

As parties enter a design assist process, there are several challenges that should be carefully managed. First, there is the acknowledgment that design assist is itself not a unique delivery method, but rather a form of collaboration that can be used with any project delivery method. Second, all parties must manage expectations by clearly defining their responsibilities throughout the collaboration process. This is particularly true in a fast-track environment where the design assist and delivery process are proceeding without many of the important decisions having been made and the architectural and structural design are still evolving—and possibly changing—to accommodate the owner's evolving project goals and program. It is important that the parties acknowledge this dynamic and clearly define in their agreements the financial obligations and schedule changes that may be required during the design assist process. This includes a need to define how those changes will be identified, communicated, documented, agreed to, and compensated.

2. PURPOSE AND GOAL FOR PART II

2.1. Overview of Design Assist and Design Delegation Model for the Fabricated Structural Steel Industry

The design community and steel construction industry have long promoted collaborative design strategies in the fabrication and erection of structural steel. With the fabricator/erector's input, the structural steel can be designed so it can be fabricated and erected more efficiently and rapidly to shorten the schedule, providing earlier site access to other trades and earlier project occupancy when this collaborative process is properly employed. Scheduling efficiency for structural steel translates to cost savings by one or more of the following:

- Reducing the overall critical path by completing the structure sooner,
- Reducing general condition costs with a shorter construction schedule,
- Increasing revenue from early occupancy due to faster construction, and
- Reducing the likelihood of changes during construction.

For the last several decades, collaboration and early involvement by fabricators and erectors have been used in the fabricated structural steel industry to enhance its advantages in accelerated design and construction. The practice has been identified in the marketplace as "early involvement," "fast track construction," "alternate delivery," and more recently as "design assist." The term "design assist" has become common jargon in the design and construction industry, yet to date there is no universally accepted definition of this term. Depending on how each party defines this involvement, the framework of the relationship can vary from project to project, leaving some contractors to wonder exactly what their roles, responsibilities, and liabilities are when they offer design input. Contracts on some projects are often unclear about the responsibilities for design assist involvement. A specific design assist contract is required to overcome these problems.

This document provides a clear definition of the term "design assist" as it applies to the fabricated structural steel industry, clearly defines the responsibilities of all parties involved, and provides explicit guidelines on how it can be applied to achieve the objectives described above for reduced cost, reduced schedule, and increased success for all the parties involved.

The main goal of fabricators and erectors that pursue design assist projects is to participate in early stages of project development to bring steel-specific input to the design, planning, budgeting, and scheduling process so they can participate in a successful project as the selected fabricator/erector team. Fabricator/erectors' business plans seldom include providing stand-alone design services. The design assist work plan should consider the fabricator/erector's main goal, because the compensation paid for the design assist work alone and the potential risk involved may make this involvement unattractive to many fabricators and erectors.

2.2. Application to All Common Project Delivery Methods and Contract Forms

It was stated in Part I and repeated here in Part II, that design assist is a collaborative strategy that can be applied to all the common delivery methods in vogue today, including design-bid-build (DBB) and alternative delivery methods such as design-build (DB), construction manager at risk (CM at-risk), and integrated project delivery (IPD).

3. FUNDAMENTAL PRINCIPLES FOR DESIGN ASSIST COLLABORATION

3.1. General Requirements

3.1.1. Topics to Consider

Each project that uses a design assist approach must consider the following before an agreement is reached among the parties and must develop a work plan that assigns roles and responsibilities. The typical topics to be considered by members of the design assist team are listed below and discussed further in the following text. (Refer also to Appendix A for items to consider in a checklist form). Note the design assist process and sequence of items listed below may vary for each project.

Topic 1: Identify owner, owner's agent, or owner contact representative who has authority to make decisions on behalf of owner.

Topic 2: Define the delivery method to be used for the project, typically DBB, DB, CM at-risk, or IPD.

Topic 3: Identify design assist team members for the project consistent with the delivery method. The qualifications-based selection process (QBS) described in this section is ideally suited.

Topic 4: Define the leader of the design assist team and their responsibilities.

Topic 5: Define the entity that holds the contract with the design assist fabricator/erector and the compensation that will be paid for the design assist work. This may vary with the delivery method selected and the owner's preference.

Topic 6: Define whether, and under what conditions, the design assist fabricator/erector will be allowed by contract to bid the work and to serve as the fabricator/erector performing the work for the project. Define any conditions for performing the work, if applicable to the delivery method.

Topic 7: Prepare and execute a formal design assist work plan that defines the roles and responsibilities of each member of the design assist team.

Topic 8: Define the contractual roles and responsibilities for each member of the design assist team and confirm that the contract for each member includes and is consistent with the design assist process and design assist work plan as they evolve. This may require later contract modifications depending on the sequence and timing of contract execution for the various parties of the design assist team.

Topic 9: Define the overall target project budget as well as the target budget assigned specifically to structural steel fabrication and erection. Note that the target budget could change for a variety of reasons as changes are made during the project.

Topic 10: Define management of the project contingencies for unknown items carried by the owner and other parties such as the contractor [CM, GC, or owner's designated representative for construction (ODRC)] and fabricator/erector to avoid duplicated contingencies.

Topic 11: Define the various allowances carried for known items of unquantifiable cost at the time of contract execution; this includes a separate allowance carried for connections that have been delegated to be designed by the fabricator. Refer to the *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22) Section 3.2.3(3) Option 3 requirements for delegation of connection design to a fabricator. Note that these allowances could change if design changes are made during the project.

Topic 12: Develop a project schedule with milestone dates for key decisions and deliverables for each party. Note, too, that the schedule could change as changes are made during the project.

Topic 13: Review ANSI/AISC 303-22 to clearly define and document any contractual provisions with the fabricator/erector that constitute "specific instructions to the contrary" as required by Section 1.1 and other sections of ANSI/AISC 303-22. (Refer to Appendix B of this document.)

Topic 14: Define the scope, quantity, and character of work for the project that will be part of the contract with the fabricator/erector. (Refer to Appendix C of this document.)

Topic 15: Review Section 3.2 of ANSI/AISC 303-22 pertaining to information required to be shown and included on the contract documents, allowances to be defined for incomplete or undefined information, and how the project is to be managed as information becomes available or changes are made during the project. Review Section A4.2 of the *Specification for Structural Steel Buildings* (ANSI/AISC 360-22) for requirements pertaining to structural design documents and specifications. These references include requirements related to bidding of structural steel for fabrication and erection as well as the basis of a contract with a fabricator/erector.

Topic 16: Establish clear lines of communication among all the parties to the design assist team. Set up and require regular meetings throughout the project and provide a written record of the meetings including action items and dates for resolution to all members of the design assist team. Provide written documentation of all decisions that affect all team members. Commit to freely sharing information that is necessary to accomplish the work.

Topic 17: Execute the contract with the fabricator/erector as soon as practical and prior to the commitment of financial resources by the fabricator/erector (e.g., ordering structural steel; placing mill orders; starting detailing, fabrication and erection activities, etc.).

Topic 18: Closely monitor and document any changes to the design, project schedule, and milestones that affect the project budget and cost of the work. Formally approve in a timely manner any changes that affect the schedule or cost of the work.

Topic 19: Consider defining an alternative dispute resolution process for the project to avoid potential expensive and time-consuming litigation.

Topic 20: Resolve items of conflict among the design assist team members in a timely and professional manner as they become known.

The design assist guidelines and key items to consider as described herein are intended to serve as a general reference applicable to most fabricated structural steel projects. Of course, each project has its own delivery method and set of circumstances that may warrant modifications to the enclosed guidelines. The design assist work plan should be modified as required to accommodate actual project conditions with input and agreement among all the affected parties.

Additional issues that should be considered on each project are provided in the sections that follow. A checklist of items to consider is presented in Appendix A as a convenient reference.

3.1.2. Design Assist Work Plan

The information discussed in this document serves as a guideline for the design assist team to develop a formal work plan agreed to by all design assist team members. The work plan should be agreed to and signed by all parties or referenced in a memorandum of understanding signed by all parties. This practice will help to manage expectations and help ensure that all parties have a clear understanding of their responsibilities as well as those of the other team members.

3.1.3. Contractual Role and Responsibility of the Parties

Each member participating in the design assist collaborative effort should have their role and responsibility as defined in the work plan be clearly reflected in their respective contract. The owner or designated agent should review all the contracts for coordination of the roles and responsibilities assigned to each design assist team member.

3.1.4. Contractual Allegiance of Each Party

Each participant in the design assist work plan should designate their contractual relationship as identified in each party's contract. Knowledge of contractual relationships helps to provide transparency throughout the design assist process.

3.1.5. Qualifications-Based Selection (QBS) Process for Selection of Design Assist Team Members

Owners should give careful consideration to the process used to select the members of the design assist team. A QBS process is recommended as endorsed by American Council of Engineering Companies (ACEC). As the name implies, selection is primarily based on the necessary qualifications that each member brings to the team as related to the design assist process; experience; a demonstrable record of teamwork; and success with the particular project type, size, and complexity. While fees are always an important consideration, fee alone should not be the primary driver of the selection process as it may not always yield the best results. It is noteworthy that the federal government endorses a QBS approach as defined in the 1972 Brooks Bill which outlines the details of the QBS process.

3.1.6. Checklist for Design Assist Collaboration

Refer to Appendix A here for a detailed checklist that can be used in the planning and execution of a structural steel project utilizing design assist. It can be modified to suit actual project conditions which can vary for any given project.

3.2. Define the Designated Organizational Leader and Members of the Design Assist Team

3.2.1. Designated Leader of Design Assist Team

One of the project stakeholders must be designated as the organizational leader of the design assist collaborative effort. Depending upon the delivery method used and the relationships between the owner and design assist team members, this could be the owner/owner's agent directly, the GC/CM, the architect, or the structural engineer. All project stakeholders should understand who is the designated organizational leader of the design assist process, and that leader's role and corresponding responsibilities should be reflected in the various contracts of the design assist team members.

3.2.2. Design Assist Team Members

The members of the design assist team must be clearly identified. This generally includes the owner and/or owner's agent as applicable, GC or CM as applicable, architect, structural engineer of record, fabricator/erector and any licensed engineer hired by them (if applicable), a delegated connection designer employed by the fabricator (if applicable), the steel detailer, and any other appropriate party designated by the leader of the design assist team.

3.3. Good Faith and Fair Dealing Among the Parties

It is crucial to the success of any design assist project that all designated team members act in accordance with their duty for fair dealing, which is a fundamental concept of contract law, along with meeting their contractual obligations. At a minimum this requires the parties to deal with each other honestly, fairly, and in good faith. Efforts to work together as a dedicated team with mutual trust and respect for each fellow team member should bolster the efficiency in using a design assist process.

3.4. Roles and Responsibilities of Each Party

Depending on the delivery method chosen for the project, the roles and responsibilities of the design assist team members may vary. This is demonstrated in some typical cases that are discussed in Appendix D and the flow charts shown in Figures D-1 through D-3.

3.4.1. Owner or Owner's Agent

The owner or owner's agent must establish a detailed project program in collaboration with the architect and other design assist team members. The program should identify project functions and space planning that are anticipated. In addition, the initial target budget, target start date, and a target substantial completion date of the project should be established. If the owner or owner's agent is designated as the organizational leader of the design assist team, this role should be established at the start of the design assist effort. It is critical that the owner works with the team members to make all decisions in a timely manner and avoid unexpected changes as the architectural design and structural design progresses. When untimely changes are made, they can often lead to delays in the schedule and increases in the cost of the work. Any changes from past decisions that are made as the project proceeds should be documented for record.

3.4.2. General Contractor (GC) or Construction Manager (CM)

Depending on the delivery method chosen and the owner's preference, the GC or CM is often designated as the leader of the design assist team. In this role, the GC/CM manages the overall design assist team and is responsible for establishing effective and regular communication guidelines among the parties. This includes establishing regular project meetings; setting goals and deadlines for assigned tasks; and documenting all decisions made at the meetings. The GC/CM maintains the target budget and project schedule and updates them based on updated drawings and information requested from the various parties at designated milestones agreed to in the design assist work plan.

3.4.3. Architect

The architect normally works with the owner to establish the project program, a target budget, and desired target schedule for substantial completion of the project. The design assist process can serve to inform the architect and the overall building design about design options, cost, and schedule. The architect can then develop plans and specifications at designated milestone dates and distribute such documents to the design assist team in a timely fashion as defined in the design assist work plan.

Most accelerated schedule projects demand that the architect and other project consultants commit to establishing a building design early on, while requesting critical information from the owner in a specified order and according to the predetermined target schedule established by the GC/CM. This process allows the structural design to proceed with early foundation permitting, early mill orders, and other critical path items in a phased construction schedule that reduces construction time. The architect and structural engineer must work together to furnish the critical information needed by the GC/CM and the fabricator/erector to establish construction costs and set the construction schedule according to the work plan that evolves in the design assist process. Column locations, grid lines, and the overall building geometry should be established early on so the structural engineer can proceed with the structural design. The design assist work plan can then inform the architect in developing the architectural design in a sequence and timing that allows the structural design to proceed in an orderly fashion with minimal changes that could delay the schedule. Unexpected changes to the owner's program and the architectural design that violate the established work plan can be avoided. These changes often lead to increases in the project cost and schedule. The design assist process can serve to avoid these problems.

3.4.4. Structural Engineer of Record (SER)

The structural engineer of record (SER), frequently referred to as the engineer of record (EOR), bears the responsibility to produce a structural design that meets the requirements of the applicable building code and accommodate the cost and schedule reflecting the work plan established by mutual agreement among design assist team members. This requires close collaboration with the architect and other project consultants to advance the building design in the order and sequence that accommodates the project cost and schedule as defined in the work plan.

The architect and structural engineer working together should clearly define the complete building geometry and then maintain that geometry as much as possible throughout the subsequent design development. This includes all column locations and gridlines; floor and roof elevations; floor edge locations; building elevations and sections; connection type limitations; acceptable lateral system and brace locations; and all other information required by the fabricator to commence ordering materials and preparing fabrication documents as dictated by the project schedule.

The structural engineer and fabricator/erector should work together to decide upon preferred connection types, material preferences, and desired fabrication/erection methods to optimize the structural system. The SER must be willing and able to collaborate with the fabricator/erector, seeking input from the multiple departments (such as purchasing, shipping, detailing, fabrication, erection, and estimating). The SER must then be willing and able to incorporate the agreed-upon components into the final design. A detailed list of items required by the structural design to allow construction to commence can be found in ANSI/AISC 303-22 Section 3.1, "Structural Design Documents and Specifications Issued for Construction." Further guidelines for partially complete design documents that may be issued as contract documents to accommodate an accelerated schedule can be found in ANSI/AISC 303-22 Section 3.2.2, "Structural Design Documents and Specifications Issued as Contract Documents." These sections of ANSI/AISC 303-22 cover the SER's issuance of design documents and specifications that serve as construction and/or contract documents for the fabricator/erector.

3.4.5. Fabricator

The fabricator is clearly a key participant and crucial to the success of any design assist structural steel project, working in close collaboration with the rest of the team to optimize the design, minimize cost, and accommodate the project schedule. Their design assist consulting services include providing information about the quality, availability, and cost of materials; fabrication costs; and connection types best suited to the structural engineer's design intent. The fabricator/erector's role is to gather and disseminate information from all internal departments and effectively communicate it to the SER and other members of the design assist team.

The type of information and level of assistance can vary by project. Items to consider include the following: material availability and cost: shipping implications that impact design; pricing estimates for alternate designs; material versus labor cost tradeoffs; connection preferences; and other input that has the potential to improve the design and construction process. Given the wide variation in industry practice over recent years, it is essential that the scope of work, responsibilities, project conditions, and expectations be clearly laid out and documented in the design assist work plan and contract with the fabricator/erector.

When project specifications reference ANSI/AISC 303-22 as a controlling document, the trade practices and industry standards defined within it are mandatory unless specific instructions to the contrary are provided in the contract documents. In a design assist project involving fabricated structural steel, the fabricator/erector serving in a design assist consulting role must be compensated for their design assist consulting services. If applicable to the project and project delivery method, the parties should establish the conditions and timing for implementing a contract beyond the agreement for initial consulting services. Refer to Section 3.10 of this document for specific requirements.

The design assist team should together establish allowances for any portion of the structural design that is incomplete when the fabricator's contract commences as defined in Section 9 of ANSI/AISC 303-22. The allowances will be converted to final costs at a time when the design is complete and the cost of the work can reasonably be determined by the fabricator. Refer to Section 3.12 of this document for specific requirements.

When the SER elects to delegate the connection design to the fabricator, it must follow the requirements defined in ANSI/AISC 303-22 Section 3.2.3(3) Option 3; and it is required that allowances be established for the fabrication and erection of all connections until such a time when the connections are designed by the delegated connection designer and approved by the SER. A guarantee of the contract price and contract time from a fabricator/erector should not be sought until the scope of work has been defined to an extent that will allow for accurate pricing and scheduling and there is a fair accommodation of allowances and contingencies. Refer to Section 3.13 of this document for discussion of delegated connection design and the required allowances for it.

3.4.6. Erector

In many cases, the fabricator and erector will be a single entity under one contract and the conditions described in the previous section apply to both parties. If the erector has a separate design assist contract, the same conditions described for the fabricator apply to the erector in the design assist planning, management, and execution. Erector input can include considerations such as crane requirements, erection sequencing, bolt/weld preference, and other factors that can guide an efficient design. ANSI/AISC 303-22 Section 7 states that the erector may plan the erection process in the most efficient manner consistent with the contract documents.

3.4.7. Other Parties Designated Part of the Design Assist Team

Depending on the type of project and project conditions, the owner may elect to include other members as part of the design assist team. Possible examples include the delegated connection designer and the designated structural steel detailer employed by the fabricator/erector to prepare fabrication and erection documents.

3.5. Requirements in ANSI/AISC 360-22, ANSI/AISC 341-22, and the Applicable Building Code

The 2022 edition of the *Specification for Structural Steel Buildings* (ANSI/AISC 360-22) and the *Seismic Provisions for Structural Steel Buildings* (ANSI/AISC 341-22) both contain updated and new requirements for design documents and specifications issued for construction. These requirements are specifically established to address the final documents that are to be used to construct the building and therefore deal directly with life safety and serviceability requirements. Both standards (ANSI/AISC 360 and ANSI/AISC 341) are referenced in most applicable building codes, including the *International Building Code.*

The requirements stated in Section A4 of the 2022 editions of both ANSI/AISC standards are legally required to have the force of law by virtue of their incorporation into most building codes. It is important that the entire design assist team have a thorough understanding of these requirements when the final scope of work and responsibilities are defined within the respective contracts of each party. ANSI/AISC 360-22 Section A4 also addresses requirements for releasing design documents and specifications in general, as well as proper labeling of these documents to define their purpose and date of issue. A new ANSI/AISC 360-22 Section A5 addresses the requirements for review and approval of the structural design documents and specifications issued for construction.

3.6. Requirements in the *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22)

A fundamental principle of design assist as applied to structural steel is that in the absence of any specific instructions to the contrary in the contract documents, the trade practices defined in ANSI/AISC 303-22 govern the fabrication and erection of the structural steel on a project. Section 1.1 of the *Code* states that the contract with the fabricator/erector shall identify by *Code* section number any specific instructions to the contrary that deviate from the design documents and specifications. These new requirements are intended to help ensure a common understanding of the scope of work and conditions of the contract for the work. Section 1.1 also makes it clear that any modifications specified must be fair and balanced without shifting risk unfairly to any of the parties to the contract. A summary of items that are considered as industry custom and practice applicable to the contract with a fabricator/erector, unless specific modifications are identified on the structural documents or specifically identified by *Code* section number in the contract, can be found in Appendix B of this document.

ANSI/AISC 303-22 and ANSI/AISC 360-22 Section A4 contain new requirements for issuing structural design documents that are to be used for any purpose, such as budget pricing, guaranteed maximum pricing (GMP), for permit, for mill order, or issued for construction. Design documents and specifications that are issued for construction by the SER must include the requirements as contained in Section A4 of both ANSI/AISC 360-22 and ANSI/AISC 341-22 as well as the applicable building code. ANSI/AISC 360-22 Section A4.2 requires design documents and specifications released for any other purpose by another party to have proper labeling by the SER with the purpose and date. ANSI/AISC 303-22 Section 3.2.2 also requires incomplete contract documents (such as structural design documents, specifications, or a contract for structural steel that specify items the team knows will be part of a project but that have not yet been completely defined) to incorporate specific monetary allowances reflecting mutual agreement of the design assist team. These allowances are also required to address specific connections that are delegated by the SER as defined in ANSI/AISC 303-22 Section 3.2.3(3) for Option 3. Once the design of these items is complete and defined so that accurate costs for the work can be determined, the allowances are converted to actual costs in the contract for construction per ANSI/AISC 303-22 Section 9.1.5.

3.7. Importance of Frequent and Documented Communication Among Parties

For design assist to be successful, it is imperative that regular, open, and candid communications and project meetings occur with all the design assist team members. The project meetings should address project progress, potential problems, updates on the responsibilities of each party, action items, and documentation of all decisions made during the design assist process. A written record of project meetings and all decisions made should be compiled for the project record and distributed to all members of the design assist team for review. This places a burden and responsibility on the organizational leader of the design assist team to help the owner ensure that the cost of all items is being accounted for on a project. Each member of the design assist team must provide input to the process to ensure that the owner's program is satisfied in the final design and construction within the established budget and schedule.

3.8. Defining and Updating the Project's Structural Steel Budget

Alternate delivery methods using accelerated design and construction with design assist require that the design assist team discuss and define appropriate contingencies for items they don't anticipate. Allowances for items not sufficiently defined at the time of contract execution with the fabricator/erector should also be established. The allowances should be converted to actual agreed-upon construction costs as these costs are determined.

For this process to be successful, it is important that careful upfront planning and regular communication occur throughout the project among all the parties to the design assist team. For items where allowances have been established for known items of unknown cost, the contract with the fabricator/erector should clearly define the agreed-upon scope, quantity, and character of the work. Refer to Appendix C for guidelines for addressing the scope, quantity, and character of the work for structural steel fabrication and erection. The design assist planning process should consider potential costs and scheduling of other trades that interact with structural steel based on past experience of the design assist team members.

3.9. Defining and Updating the Project Schedule

Developing an accurate project schedule requires careful planning among all team members with regular and frequent communication to update the schedule as the design progresses. Interruptions or changes to the normal sequence and flow of the work as established by the project schedule, because of owner program changes, structural design, detailing, connection design, fabrication document preparation, fabrication, shipping, delivery, or unloading of components for erection can have a negative effect on fabrication and erection costs. Untimely owner program changes or architectural design changes can lead to changes in the structural design, detailing, fabrication documents, and/or fabrication schedules, all of which can impact fabrication and erection costs as well as design fees for the A/E team. These changes must be properly addressed for the success of any design assist approach.

3.10. Timing of Contract Execution with a Fabricator/Erector

It is required that the fabricator/erector be compensated for design assist services pursuant to a formal design assist consultant agreement. The conditions and timing upon which a contract for the fabricator/erector may be executed (beyond the initial design assist consulting services) for the actual fabrication and erection of the structural steel is an owner option that can vary depending on project conditions. As the structural design evolves and the fabricator/erector updates the cost and schedule to conform to the owner's budget, a new contract or earlier contract modification can be executed as an owner option to also fabricate and erect the structural steel.

There must be a clear understanding that the owner may terminate the fabricator/erector's design assist consulting services at any point before the final design if the fabricator/erector states that they can no longer accommodate the SER's design and comes to an agreement with the owner on the final cost and schedule of the work. If the owner and fabricator/erector agree on the final cost and schedule for the work at the end of the designated structural design and design assist consulting services period, then a new or extended contract can be executed for the fabrication and erection work. Otherwise, the owner retains the right to bid the design as completed by the SER through the design assist process with the stipulation that the fabricator/erector does not retain ownership of its design assist contributions.

Clearly, under this scenario, it is in every party's best interest to plan the project carefully and maintain the established budget and schedule to optimize the chances for success of the design assist project. In any case, it is recommended that a formal construction contract be in place to fabricate and erect the structural steel prior to any materials being ordered and any cost commitments made for ordering of material, detailing services, or other costs associated with the final agreed-upon fabrication and erection work.

3.11. Defining Scope, Quantity, and Character of the Work for Structural Steel Fabrication and Erection

One of the biggest challenges faced by the design assist team is identifying accurate allowances in the budget for work that is not completely defined at the time the final budget for the work is established, which is usually at the end of the design assist period. This is particularly true for connection design work that is delegated to a fabricator but defined only conceptually on the structural design documents and specifications issued for establishing a final budget for the work. ANSI/AISC 303-22 Section 3.2.4(2) requires that the SER show project-specific connection details with sufficient information to accurately estimate the work. Experience has shown that a large portion of the fabricated structural steel cost is in the detailing, shop fabrication labor, and erection time associated with connections and member reinforcement required at connections.

Another challenge is defining the scope, quantity, and character of the work on a project so that equitable adjustments in the cost of the work can be made when changes in the design occur that lead to change order requests. Refer to Appendix C for guidelines on factors to consider in defining the scope, quantity, and character of the work required to determine accurate fabrication and erection costs.

3.12. The Role of Contingencies and Allowances

It is common and responsible practice for the design assist team members to establish reasonable contingencies in the project budget to accommodate unforeseen costs that can occur as well as allowances for items known to be required but not quantifiable at the time of contract execution. It is acknowledged that in some cases contingency costs are not necessarily shared with all members of the design assist team. However, the more transparency there can be in the design assist process with shared budget information, the more opportunity there is for avoiding a duplication of costs that can lead to an expanded budget.

3.12.1. Owner Contingency

The owner usually carries a monetary contingency to cover additions, modifications, and omissions that can occur in the scope of the work as the design progresses.

3.12.2. GC or CM Contingency

The GC or CM typically carries a monetary contingency specified in its contract with the owner to cover the cost of risks in construction. This contingency should include unexpected and unforeseen costs associated with all facets of the GC/CM's contractual responsibilities, including fabrication and erection, but excluding all design-associated issues. Unexpected or unforeseen costs associated with any design-related issues are treated as changes and are governed by the appropriate contractual change order provisions. A design assist process that is well-conceived and carried out may mitigate the number of structural steel design changes and, thus, limit disputes and allow for a more efficient construction process. Consideration should be given to additional costs associated with the work of other trades.

3.12.3. Fabricator/Erector Contingency

It is recommended that the fabricator/erector also carry a structural steel contingency for items that, based on experience in the industry, may cause unforeseen costs and schedule extensions. It is important that transparency among the parties be maintained through discussion in project meetings to avoid unnecessary duplication. Some owners may prefer to have one contingency amount from all subcontractors included in the contractor's contingency.

3.12.4. Allowances

For any portion of the architectural and structural design that has known but undefined or incomplete items that are not addressed by the design documents during the design assist period, the design assist team must establish mutually agreed upon allowances for the fabrication and erection of those items as discussed in ANSI/AISC 303-22 Sections 3.2.2 and 9. The allowances are converted to actual costs at a time when the design is complete and the fabricator/erector can make accurate cost and schedule determinations.

3.13. Delegated Connection Design and Allowances

For projects selecting Option 3 for delegated connection design under ANSI/AISC 303-22 Section 3.2.3(3), the connections defined and shown conceptually by the structural engineer on the design documents are to be used as the basis for mutually agreed-upon allowances. ANSI/AISC 303-22 defines allowances in the glossary and Section 9 discusses them further.

Allowances may also be required for licensing of proprietary technology to be used in the structural steel design, such as proprietary seismic connections. The delegated connection design process demands careful consideration of all the different connection types applicable to all the different member sizes and types envisioned on the project. The scope, quantity, and character of the work for the identified member and connection types (including material quantity for connections and member reinforcement, shop labor costs, shipping costs, and erection costs) must be carefully developed into applicable allowances. These allowances must be documented in the contract with the fabricator/erector. Once the connections are designed and the fabricator/erector can accurately determine the final fabrication and erection costs, the allowances specified in the contract are converted to final costs for the work per ANSI/AISC 303-22 Section 9.1.5. The GC/CM must manage the process of monitoring and evaluating the fabrication/erection budget as it evolves during the design assist process via updates from the fabricator/erector team in close collaboration with the structural engineer. Refer to Appendix C of this document for guidelines on developing allowances based on the scope, quantity, and character of the work as defined in ANSI/AISC 303-22.

3.14. Proprietary Information and Confidentiality

Project participants may have proprietary approaches to their work that provide an advantage over competitors—which may be lost if reasonable precautions are not taken to prevent disclosure. The nature of design assist will likely encourage sharing of such information during the design process. Parties with proprietary information may seek to protect their information from unintended third-party disclosure through reasonable means, such as confidentiality and non-disclosure agreements. The use of such agreements is encouraged to incentivize open discussion.

4. SUMMARY AND CONCLUSIONS

Part I of the AIA/AISC collaboration resulted in a paper recently published entitled "Delegated Design, Design Assist and Informal Involvement – What Does It All Mean." It describes in general terms the roles and responsibilities of the project participants under each of three design collaboration strategies and offers definitions and guidelines that design professionals and the construction industry can adopt for their use. The three strategies were identified as informal collaboration, design assist, and delegated design.

Part I focused on collaboration strategies that have been employed in the construction industry for decades. It pointed out that collaboration strategies are routinely used in the design of fire protection systems, vertical transportation systems, mechanical systems, retaining walls, clean rooms, curtain walls, and fabricated structural steel, to name a few of the more common applications. These collaboration strategies range along a continuum from informal discussions all the way to contractor acceptance of responsibility for certain defined elements of a project. It was further emphasized that the three collaboration strategies described are not considered project delivery methods but rather collaborative techniques that can be applied with any delivery methods that are used. These include the traditional design-bid-build method and alternative delivery methods such as design-build, CM at-risk or as advisor, and integrated project delivery.

This document is Part II of that paper, describing in detail how two collaboration strategies, design assist and delegated connection design, are currently being applied specifically to fabricated structural steel. It can be applied to all the common contract forms and delivery methods in use today in the construction industry. Section 3 outlines in detail the fundamental principles involved in applying a design assist strategy for fabricated structural steel. Each of the principles described is important to the success of the strategy. The parties must deal with each other honestly, fairly, and in good faith to help ensure the success of the project. A written design assist work plan defining roles and responsibilities is recommended; open, honest, and regular communication among the team members is essential for the success of this process. All communication and meeting decisions should be documented for the record. Three example cases of design assist models that have been used successfully on many different structure types, project sizes, and degrees of complexity are presented for reference. These examples are described in detail in Appendix D and the Figures D-1 through D-3 flow charts.

As the parties enter a design assist collaboration model, there are several challenges that should be carefully managed. All parties must manage expectations by clearly defining the responsibilities of each of the parties in the collaboration process. This is particularly true in a fast-track environment where the delivery process is occurring before many of the important decisions have been made and the architectural and structural design are still evolving (and possibly changing) to accommodate the owner's evolving project goals and program. It is important that the parties acknowledge this context and clearly define the contractual obligations for financial and schedule adjustments that are to be made as changes occur during the process. This includes a need to define how those changes will be identified, agreed to, communicated, documented, and compensated.

Appendix A outlines the design assist procedure in a checklist form for convenient reference in managing the design assist process. Appendix B and Table B-1 provide a checklist for managing the design assist plan in conjunction with ANSI/AISC 303-22, which describes trade practices and industry standards that apply to design assist collaboration in all delivery methods. Note that when project specifications invoke ANSI/AISC 303-22, it applies as written unless specific instructions to the contrary are documented in the contract documents or shown in the structural design documents and specifications. Finally, Appendix C and Table C-1 provide detailed guidelines for defining the scope, quantity, and character to establish allowances for unquantifiable work to be performed by a fabricator/erector. The criteria described can be used to establish the basis for the original contract cost and cost parameters that can be used to assess any changes to the scope as the design is completed and any changes are made during the design and construction phases of the project. Criteria are also presented for defining owner and contractor contingencies for unanticipated work as well as for establishing allowances for known work that cannot be reasonably estimated at the time of executing the contract with the fabricator/erector. This includes establishing an allowance for the cost of connections when delegated connection design (Option 3 in ANSI/AISC 303-22) is specified by the structural engineer. Appendix D provides several model examples for how the design assist process can work for different contract types.

ABBREVIATIONS

AESS (architecturally exposed structural steel)

ACD (AIA Contract Documents)

AGC (Associated General Contractors of America)

AIA (American Institute of Architects)

AISC (American Institute of Steel Construction)

CM (construction manager)

CM at-risk (construction manager at-risk)

DB (design-build)

DBB (design-bid-build)

EOR (engineer of record)

GC (general contractor)

IPD (integrated project delivery)

ODRC (owner's designated representative for construction, often the GC or CM depending on delivery method)

ODRD (owner's designated representative for design, often the SER or EOR)

QBS (qualifications-based selection)

RFI (request for information)

SER (structural engineer of record)

GLOSSARY

Allowance. A monetary amount included in a contract as a placeholder for work that is anticipated but not defined at the time the contract is executed.

Contract documents. The documents that define the responsibilities of the parties that are involved in bidding, fabricating, and erecting structural steel. Contract documents include the design documents, the specifications, and the contract.

Design assist (as applied to the structural steel industry). A form of collaboration where a fabricator and erector (or a fabricator/erector team under one contract, depending on project circumstances) provide information under a design assist contract with the owner, or other party as designated by the owner, to assist a structural engineer of record (SER) and other designated members of the design assist team in the design of the structural steel for buildings or building-like structures.

Design assist work plan. A formal agreement developed by all parties of a design assist collaboration that defines the design assist process to be employed on a structural steel project. It defines the roles and responsibilities of all parties and is either signed by all parties or referenced in a memorandum of understanding signed by all parties. The roles and responsibilities of the parties agreed to in the work plan are contained in the contracts of the various parties.

Design documents. Design drawings, design model, or a combination of drawings and models.

EOR. engineer, engineer of record. See structural engineer of record.

Erector. The entity that is responsible for the erection of the structural steel.

Fabricator. The entity that is responsible for detailing and fabricating the structural steel.

Owner. The entity that is identified as such in the contract documents.

Issued for construction. The engineer of record's designation that the design documents and specifications are authorized to be used to construct the steel structure depicted in the design documents and specifications and that these design documents and specifications incorporate information that is to be provided per the requirements of Section A4 of the *Specification for Structural Steel Buildings* (ANSI/AISC 360-22) and Section 3 of ANSI/AISC 303-22.

Owner's designated representative for construction (ODRC). The owner or the entity that is responsible to the owner for the overall construction of the project, including its planning, quality, and completion. This is usually the general contractor, the construction manager, or a similar authority at the jobsite.

Owner's designated representative for design (ODRD). The owner or the entity that is responsible to the owner for the overall structural design of the project, including the structural steel frame. This is usually the structural engineer of record.

Released for construction. The term that describes the status of contract documents that are in such a condition that the fabricator/erector can rely upon them for the performance of their work, subject to the ODRD's designation that the design documents and specifications have been released for contract documents as required by Sections 3.0 and 3.2 of ANSI/AISC 303-22, including the ordering of material, the preparation of shop and erection drawings, or fabrication and erection models.

Scope, quantity, and character of the work. A project-specific description of the structural steel that is fabricated and erected as shown in the design documents and specifications that are part of the contract documents. The description is defined by the type, cost, and availability of structural steel and related materials in the marketplace; the type of members and assemblies (including beams, girders, columns, trusses, moment frames, braced frames, transfer members, and other types as shown on the design documents); the types of connections and member reinforcement, including quantities of bolts and welds; the number of pieces; the material and labor rates required for fabrication and erection of all members including their connections (where material and labor rates are agreed to be part of the contract terms for defining total cost); the size and weight of the members, assemblies and connections; the surface area of members as required for coatings; the project schedule for fabrication and erection; and other project-specific qualities that define the cost of the work to be performed on the project.

Specifications. The portion of the contract documents that consists of the written requirements for materials, standards, and workmanship.

Structural engineer of record (SER). The licensed professional who is responsible for sealing the contract documents, which indicates that he or she has performed or supervised the analysis, design, and document preparation for the structure and has knowledge of the load-carrying structural system.

REFERENCES

AIA-AISC (2019), *Part I – Delegated Design, Design Assist, Informal Involvement – What Does It All Mean?*, AIA, Washington DC.

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AISC (2022b), *Seismic Provisions for Structural Steel Buildings*, ANSI/AISC 341-22, American Institute of Steel Construction, Chicago, IL.

AISC (2022c), *Specification for Structural Steel Buildings*, ANSI/AISC 360-22, American Institute of Steel Construction, Chicago, IL.

APPENDICES

APPENDIX A: APPLICATION CHECKLIST FOR DESIGN ASSIST COLLABORATION

Appendix A provides a global checklist for application of a design assist collaboration for a fabricated structural steel project. The designated organizational leader of the design assist team (commonly the GC or CM, the owner's designated agent, or the architect) should use this checklist for information to guide the process and to inform all members of the design assist team of their respective roles and responsibilities as defined in the work plan.

This design assist method of collaboration can apply to all types of fabricated structural steel projects and building types. It should be recognized that each project has its own set of circumstances that warrant modifications to the enclosed design assist collaboration approach. This checklist should be modified as required for actual project conditions with input and agreement among all the affected parties. Refer to Appendix B for the important role that ANSI/AISC 303-22 plays in the design assist method of collaboration as defined in Part II of this paper. Refer also to Appendix C that defines the scope, quantity, and character of the work for the specific project that is a key factor for determining the cost and schedule and any cost (or the effects of any costs) or schedule changes that may occur after the contract is executed with the fabricator/erector.

It is crucial to the success of any design assist project that all designated team members act in accordance with their duty and fair dealing, which is a fundamental concept of contract law, along with meeting their contractual obligations. At a minimum this requires the parties to deal with each other honestly, fairly, and in good faith. Further, efforts to work together as a dedicated team with mutual trust and respect for each fellow team member should bolster the efficiency in using a design assist process.

Enclosed below is a convenient checklist that can be referenced for items to be considered and defined in the management of a project utilizing design assist:

1. Identify owner, owner's agent, or owner contact representative who has authority to make decisions on behalf of owner.
2. Define the delivery method to be used for the project, typically design-bid-build (DBB), design-build (DB), construction manager at-risk (CM at-risk), or integrated project delivery (IPD).
3. Identify design assist team members for the project consistent with the delivery method. The qualifications-based selection process (QBS) described in this section is ideally suited.
4. Define the leader of the design assist team and their responsibilities.
5. Define the entity that holds the contract with the design assist fabricator/erector and the compensation that will be paid for the design assist work. This may vary with the delivery method selected and the owner's preference.
6. Define whether, and under what conditions, the design assist fabricator/erector will be allowed by contract to bid the work and to serve as the fabricator/erector performing the work for the project. Define any conditions for performing the work, if applicable to the delivery method.
7. Prepare and execute a formal design assist work plan that defines the roles and responsibilities of each member of the design assist team.
8. Define the contractual roles and responsibilities for each member of the design assist team and confirm that the contract for each member includes and is consistent with the design assist process and design assist work plan as they evolve. This may require later contract modifications depending on the sequence and timing of contract execution for the various parties of the design assist team.

9. Define the overall target project budget as well as the target budget assigned specifically to structural steel fabrication and erection. Note that the target budget could change for a variety of reasons as changes are made during the project.
10. Define management of the project contingencies carried by the owner and other parties such as the contractor [CM, GC or owner's designated representative for construction (ODRC)] and fabricator/erector to avoid duplicated contingencies.
11. Define the various allowances carried for unknown or undefined items at the time of contract execution; this includes a separate allowance carried for the connections that have been delegated to be designed by the fabricator. Refer to ANSI/AISC 303-22 Section 3.2.3(3) Option 3 requirements for delegation of connection design to a fabricator. Note that allowances could change if design changes are made during the project.
12. Develop a project schedule with milestone dates for key decisions and deliverables for each party. Note, too, that the schedule could change as changes are made during the project.
13. Review ANSI/AISC 303-22 to clearly define and document any contractual provisions with the fabricator/erector that constitute "specific instructions to the contrary" as stated in and required by Section 1.1 and other sections of ANSI/AISC 303-22. (Refer to Appendix B of this document.)
14. Define the scope, quantity and character of work for the project that will be part of the contract with the fabricator/erector. (Refer to Appendix C of this document.)
15. Review Section 3.2 of ANSI/AISC 303-22 pertaining to information required to be shown and included on the contract documents, allowances to be defined for incomplete or undefined information and how the project is to be managed as information becomes available or changes are made during the project. Review Section A4.2 of ANSI/AISC 360-22 for requirements pertaining to structural design documents and specifications. These references include requirements related to bidding of structural steel for fabrication and erection as well as the basis of a contract with a fabricator/erector.
16. Establish clear lines of communication among all the parties to the design assist team, set up and require regular meetings throughout the project and provide a written record of the meetings including action items and dates for resolution of them to all members of the design assist team. Provide written documentation of all decisions that affect all team members. Commit to freely sharing information that is necessary to accomplish the work.
17. Execute the contract with the fabricator/erector as soon as practical and prior to the commitment of financial resources by the fabricator/erector (e.g., ordering structural steel; placing mill orders; starting fabrication and erection activities, etc.).
18. Closely monitor and document any changes to the design, project schedule and milestones that affect the project budget and cost of the work. Formally approve in a timely manner any changes that affect the schedule or cost of the work.
19. Consider defining an alternative dispute resolution process for the project instead of litigation.
20. Resolve items of conflict among the design assist team members in a timely and professional manner as they become known.

APPENDIX B: PROJECT-SPECIFIC REQUIREMENTS AND MODIFICATIONS FROM ANSI/AISC 303-22 REQUIREMENTS

Appendix B provides a general checklist of trade practices and standards involved in the design and construction of steel buildings, bridges, and other structures as defined in ANSI/AISC 303 that are applicable to the design assist method as described in the various examples in Appendix D. It is included to provide guidance to the design assist team for many of the requirements that are covered in ANSI/AISC 303-22 and which apply to the design assist process, barring any project-specific exceptions or modifications.

A fundamental principle of design assist as applied to structural steel is that in the absence of any specific instructions to the contrary in the contract documents, the trade practices defined in ANSI/AISC 303-22 govern the fabrication and erection of the structural steel on a project. Section 1.1 of ANSI/AISC 303-22 states that the contract with the fabricator or erector shall identify by ANSI/AISC 303-22 section number any specific instructions to the contrary not contained in the design documents and specifications. These new requirements are intended to help ensure a common understanding of the scope of work and conditions of the contract for the work. This section also makes it clear that any modifications specified must be fair and balanced without shifting risk unfairly to any of the parties to the contract.

The design assist method of collaboration defined in Part II of this document is intended to fully embrace and adhere to all trade practices and industry standards as defined in ANSI/AISC 303-22 and any modifications made to it. Refer to the *Code* and its commentary for additional information that applies when managing the design assist plan as defined in this Part II paper. A summary of items that should be considered from ANSI/AISC 303-22 can be found in Appendix B of this document.

TABLE B-1. CHECKLIST FOR PROJECT-SPECIFIC DESIGN ASSIST MODIFICATIONS FROM ANSI/AISC 303-22 *CODE OF STANDARD PRACTICE* REQUIREMENTS

CATEGORY	ITEM	ANSI/AISC 303-22 REFERENCE	COMMENTARY
General Provisions	Scope	Section 1	1. Section 1 states that all *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22) provisions apply unless any modifications are specifically listed by section number and clearly defined in the contract. This procedure should be implemented in the design assist plan. 2. The design assist provisions in Part II are intended to follow all trade practices and industry standards as defined in ANSI/AISC 303-22 unless specific instructions to the contrary are defined in the contract documents.
Classification of Materials	Definition of Structural Steel	Section 2	Items that are, and are not, defined as structural steel must be defined in the design assist plan.
Design Documents and Specifications	Requirements for Construction and for Contract Documents	Section 3	1. Section 3.1 of ANSI/AISC 303-22 lists all items that are required to be shown on design documents and specifications issued for construction, which references Section A4 of ANSI/AISC 360-22 and ANSI/AISC 341-22 and the IBC or applicable building code. The requirements should be reviewed and modified as required to suit the project type. 2. Requirements for design documents and specifications issued as part of the contract with a fabricator/erector for any applicable delivery method are defined in Section 3.2 of ANSI/AISC 303-22. This includes design assist collaboration. 3. All design documents and specifications released on the project must be labeled by the EOR for the purpose of issuance as stated in Section 3 of ANSI/AISC 303-22. This section refers to Section A4.2 of ANSI/AISC 360-22. 4. Requirements for managing the design process for member reinforcement and all connections are defined in Section 3. 5. These requirements apply to the design assist project unless specific instructions to the contrary are defined in the contract.

TABLE B-1 (CON'T.): CHECKLIST FOR PROJECT-SPECIFIC DESIGN ASSIST MODIFICATIONS FROM ANSI/AISC 303-22 *CODE OF STANDARD PRACTICE* REQUIREMENTS			
Approval Process	Responsibilities of Each Party	Section 4	Section 4 of ANSI/AISC 303-22 defines the requirements for the owner and fabricator, when the fabricator is contracted to fabricate the final steel frame, for approval documents. These requirements apply to the design assist project unless specific instructions to the contrary are defined in the contract.
Materials	Requirements for Materials	Section 5	Section 5 of ANSI/AISC 303-22 defines requirements for materials that are specified on the project. These requirements apply to the design assist project unless specific instructions to the contrary are defined in the contract. Note the requirements listed in Sections 5 through 11 generally apply to all projects, including design assist projects.
Shop Fabrication and Delivery	Fabrication Requirements	Section 6	1. Section 6 of ANSI/AISC 303-22 lists all the fabrication requirements that apply to the project unless specific instructions to the contrary are provided in the contract. 2. Standard practice for the treatment of shop cleaning and painting of structural steel applies unless specific provisions to the contrary are defined in the contract with the fabricator.
Erection	Erection Requirements	Section 7	1. It is stated in Section 7.1 of ANSI/AISC 303-22 that the erector will plan to erect the structure in the most efficient and convenient method unless a specific sequence or plan is defined, agreed to, and documented in the contract. 2. The GC/CM (ODRC) must define any non-steel items that are part of the erection sequence that must be imposed on the erector's work plan. 3. The SER must define the lateral load resisting system and state any special erection conditions that must be adhered to by the erector to maintain stability, position, shores, jacking, or other requirements that are required by the design. 4. Any temporary supports or shores that are required for purposes other than as needed by the erector for the erection procedure and work plan must be communicated by the ODRC to the erector and stipulated in the contract. 5. Field painting requirements applicable to the erector that deviate from ANSI/AISC 303-22 must be stipulated in the contract. 6. All erection requirements stipulated in Section 7 apply to the design assist project unless specific instructions to the contrary are defined in the contract.
Quality Control (QC)	QC Requirements	Section 8	1. The fabricator and erector's quality control program requirements are defined in the applicable building code; design documents and specifications; and ANSI/AISC 303-22 Section 8. 2. The QC requirements stated above apply to the design assist project unless specific instructions to the contrary are defined in the contract.
Contracts	Contract Requirements	Section 9	1. The provisions stated in Section 9 of ANSI/AISC 303-22 apply to the design assist project unless specific instructions to the contrary are documented in the contract. 2. Refer to Appendix A for other contract provisions that apply to the design assist project. 3. Refer to Appendix C Table C-1 for contract provisions that apply that related to the scope, quantity, and character of the work performed by the fabricator/erector.
Architecturally Exposed Structural Steel (AESS)	AESS Requirements	Section 10	1. All AESS should be identified in the contract documents according to the requirements of Section 10 of ANSI/AISC 303-22, unless alternative provisions are specified. 2. A mock-up fabricated and approved in the shop and placed in the field should be specified for AESS Categories 3 and 4 unless stated otherwise in the contract documents. 3. Refer to Table 10.1 (the Category AESS Matrix) in ANSI/AISC 303-22 for additional requirements.
Fabrication and Erection	Tolerances	Section 11	1. Fabrication and erection tolerances are specified in Section 11 of ANSI/AISC 303-22 and apply to the design assist project unless specific instructions to the contrary are stated in the contract. 2. The design documents and specifications should define any modifications to these tolerances and any additional tolerances that apply to the project that are not specified in ANSI/AISC 303-22.

APPENDIX C: PROJECT-SPECIFIC CRITERIA TO DEFINE SCOPE, QUANTITY, AND CHARACTER OF THE WORK

Appendix C describes the characteristics of the structural steel design that define the term "scope, quantity, and character of the work" for a project. The information contained here is intended to assist the members of the design assist collaboration team in defining the initial scope of work and later changes in the work so that accurate costs of the work can be determined. This applies to lump sum contracts and other contract types (see ANSI/AISC 303-22 Section 9.1) for the steel fabrication and erection scope of work that is defined in the contract documents and to unit prices that must be established when setting allowances for work that is undefined at the time of contract execution. The allowances are later converted to actual committed costs after the design is completed and an accurate cost and schedule can be determined.

The term "scope, quantity, and character of the work" is defined as:

> *Scope, quantity, and character of the work.* A project-specific description of the structural steel that is fabricated and erected as shown in the design documents and specifications that are part of the contract documents. The description is defined by the type, cost, and availability of structural steel and related materials in the marketplace; the type of members and assemblies (including beams, girders, columns, trusses, moment frames, braced frames, transfer members, and other types as shown on the design documents); the types of connections and member reinforcement, including quantities of bolts and welds; the number of pieces; the material and labor rates required for fabrication and erection of all members including their connections (where material and labor rates are agreed to be part of the contract terms for defining total cost); the size and weight of the members, assemblies and connections; the surface area of members as required for coatings; the project schedule for fabrication and erection; and other project-specific qualities that define the cost of the work to be performed on the project.

It must be recognized that many of the items addressed in this definition will not be determined until the design for the items listed above are completed and shown on the design documents at some time during the design assist period. In an accelerated design and construction process, the design is continually evolving until issued for construction, and the cost and schedule for the work must be updated by the fabricator/erector and other members of the design assist team. Many of the characteristics that can define the term "scope, quantity, and character of the work" are shown in Table C-1. Members of the design assist team should all agree on a detailed description and cost of the work, including means to assess changes in the cost of the work that are to be applied to a particular project, using the enclosed table as a guideline. The table should be modified as appropriate and supplemented with any additional requirements that apply to a specific project. Because the AISC design standards and ANSI/AISC 303-22 must address all the many kinds of buildings and structures, it is not possible for these standards to define the work or the means of addressing changes to the work using any one definition and set of parameters. This must be worked out among the members of the design assist team and included in the work plan and contract with the fabricator/erector.

TABLE C-1
CHARACTERISTICS THAT DEFINE SCOPE, QUANTITY, AND CHARACTER OF THE WORK (NOTE 1)

CATEGORY	ITEM	REFERENCE	COMMENTARY
Definitions	Structural Steel Items	ANSI/AISC 303-22 Section 2	Structural steel included in the cost of the work is based on the definition for structural steel as defined in ANSI/AISC 303-22 unless specified otherwise in the contract documents. 1. All items specifically added in the contract to the list of structural steel items from what is listed in ANSI/AISC 303-22 are to be specifically identified in the contract. 2. All items that are specifically excluded in the contract from the list of structural steel items listed in ANSI/AISC 303-22 are to be specifically identified in the contract.
	Weight	ANSI/AISC 303-22 Section 9	The method used to calculate the weight of structural steel assemblies, members, connections, and all other components should be based on gross weight as determined from the design documents and specifications and as defined in ANSI/AISC 303-22, unless a specific alternate method is defined in the contract. 1. When weights of members and connections are determined using the design documents and specifications and used to define the work, the SER should specify the offset dimensions from the work point required to permit a calculation of member length. 2. Estimated connection weights and conceptual project specific connection details for Option 3 delegated connection design shown on the design documents should include all components, bolts, and welds required to determine an accurate cost for the work. This information should be developed by the SER (working with the design assist fabricator) and used to define the allowances that are part of the final budget submitted to the owner at the end of the design assist period.
	Allowances	ANSI/AISC 303-22 Section 9	Allowances should be established and agreed to by all members of the design assist team at the time of contract execution wherever elements of the structural design are not yet defined and accurately shown on the design documents and specifications. The allowances should be converted to actual committed fabrication and erection costs when the design is complete and the cost of the work can accurately be determined.
Define all Members and Assemblies for Fabrication	Columns	Design Documents and Specifications ANSI/AISC 303-22 Sections 6 and 11	For all members, the design assist fabricator/erector (working with the SER and design assist team members) should consider the following in establishing a budget and allowances: 1. Number of pieces for fabrication 2. Weight of all members and assemblies to be fabricated 3. Shop and field splice number and locations, welded or bolted splice type 4. Material type (plate, rolled shape), ASTM Grade, and any special material requirements 5. End connection types and loads per ANSI/AISC 303-22, size and quantity of bolts & welds 6. Member reinforcement at end connections and along the member 7. Stiffeners, doublers 8. Additional fabrication tolerances or any that differ from ANSI/AISC 303-22 9. Any special requirements affecting fabrication cost not noted above Identify all architecturally exposed structural steel (AESS) members and assemblies. Refer to ANSI/AISC 303-22 Section 10 Identify any members that are required to be shop-assembled into one assembly prior to leaving the fabrication shop and shipping to the project site. The above information should also be considered by the fabricator/erector performing the work in establishing unit prices that are included in the contract for determining the cost for changes in the work.
	Beams/ Purlins		
	Girders		
	Trusses		
	Braces		
	Transfer Girders		
	Transfer Trusses		
	Assembly of Members		
Specialty Items	Proprietary Seismic Members	Design Documents and Specifications	1. Define performance criteria and loads 2. Identify manufacturers for bidding
	Proprietary Items incl. Connections		
	Expansion Joint Details		
Define all Members and Assemblies for Erection	Columns	ANSI/AISC 303-22 Sections 7 and 11	For all members, the design assist fabricator/erector working with the EOR and design assist team members should consider the following in establishing a budget and allowances: 1. Number of pieces for erection 2. Define all member and assembly weights to be erected, crane size and number of cranes required 3. Define number of field splices and locations, welded or bolted splice type 4. End connection types and loads per ANSI/AISC 303-22, size and quantity of bolts & welds 5. Erection tolerances that deviate from ANSI/AISC 303-22 6. Any special erection sequence or conditions 7. Any special requirements affecting erection cost not noted above 8. Any members to be erected as an assembly 9. All AESS members and assemblies. Refer to ANSI/AISC 303-22 Section 10. The above information should also be considered for determining the unit price cost for changes in the work.
	Beams/ Purlins		
	Girders		
	Trusses		
	Braces		
	Transfer Girders		
	Transfer Trusses		
	Assembly of Members		

TABLE C-1 (CON'T): CHARACTERISTICS THAT DEFINE SCOPE, QUANTITY, AND CHARACTER OF THE WORK (NOTE 1)			
CATEGORY	ITEM	REFERENCE	COMMENTARY
Coatings	Paint Requirements	ANSI/AISC 303-22 Sections 3, 6, and 7	1. ANSI/AISC 303-22 provisions apply unless otherwise specified. 2. Identify all members to be left unpainted. 3. Identify surface preparation for all painted and unpainted members and assemblies. 4. Identify all members that are to be shop-painted, paint type, number of coats, and coat thickness. 5. Define paint system requirements at all connections. 6. Determine responsibility for field touch-up painting.
	Galvanizing Requirements	ANSI/AISC 303-22 Sections 3 and 6	1. ANSI/AISC 303-22 provisions apply unless otherwise specified. 2. Identify surface preparation for galvanized members. 3. Identify all members to be hot dip galvanized or coated and coating thickness. 4. Define requirements at all connections. 5. Determine responsibility for field touch-up of coatings.
Quality Control Requirements	QC for Shop Fabrication and Erection	Applicable Building Code, Design Documents and Specifications, ANSI/AISC 303-22 Section 8	1. Identify any special QC requirements that modify or supplement the requirements of the applicable building code, ANSI/AISC 360-22, ANSI/AISC 341-22, and ANSI/AISC 303-22 contained in the design documents and specifications. 2. Identify any special QC requirements that could interrupt the normal flow of optimum fabrication or erection sequence and schedule as planned by the fabricator/erector.
Quality Assurance Requirements	QA for Shop Fabrication and Erection	Applicable Building Code, Design Documents and Specifications, ANSI/AISC 303-22 Section 8	1. Identify any special QA requirements that modify or supplement the requirements of the applicable building code, ANSI/AISC 360-22, ANSI/AISC 341-22, and ANSI/AISC 303-22 contained in the design documents and specifications 2. Identify any special QA requirements that could interrupt the normal flow of optimum fabrication or erection sequence and schedule as planned by the fabricator/erector.
Schedule Requirements	Project Schedule	Project schedule as prepared by the GC or CM (ODRC)	Define schedule milestones that are required to achieve the established schedule for ordering material, fabrication, and erection.
Shipping Requirements	Shipping Schedule, Details, and Limitations	Project Schedule as prepared by the GC or CM (ODRC)	1. Identify number of members and assemblies to be shipped to the site to meet the required schedule developed by the ODRC. 2. Identify shipping weights. 3. Define any limitations on shipping that could affect normal fabrication and erection schedule and cost as defined by fabricator/erector.
Site Requirements	Site Laydown, Details, and Limits	Site Layout and Project Schedule	1. Identify marshalling, laydown areas, and site access points. 2. Identify crane locations for erection. 3. Define dimension and weight limits. 4. Identify work hour restrictions. 5. Define any other site restrictions.
Define Payment Methods and Unit Cost Rates	Payment Terms	Design Documents and Specifications, General Conditions, ANSI/AISC 303-22 Section 9	1. The contract should identify the method(s) of payment for the work according to the options specified in ANSI/AISC 303-22 Section 9. Some projects may require different methods of payment for different components or conditions on the same project. An initial method of payment based on the contract documents may be a lump sum fixed price for all work that is defined, and other methods (e.g. unit price, price per item, etc.) may be required for allowance items or change orders that occur later in the project. Methods of payment can be defined as: a. Lump-sum fixed price for the work defined in the contract documents b. Price per pound c. Price per item d. Unit-cost prices for categories of structural stee Other methods of payment should be defined in the contract documents. 2. Define fabrication manhours/ton for all member categories where stipulated in the contract as backup for unit-cost member categories. 3. Define what percent change in actual unit cost constitutes a justification for a higher or lower unit-cost rate change for each category of unit cost. This may be specified in contract negotiations for each member type and project type, size, and complexity.

NOTES:

1. Many items identified in the table will not be known initially and will be defined as the design assist collaboration progresses. Allowances should be developed for items known to be required on the project that are not defined until after the contract is signed and a final cost is determined.

APPENDIX D: EXAMPLE DESIGN ASSIST MODELS FOR FABRICATED STRUCTURAL STEEL

Different approaches have been used to apply a design assist collaboration method to structural steel fabrication and erection. As previously discussed, design assist can apply to any of the common industry delivery methods such as design-bid-build (DBB), design-build (DB), construction manager at risk (CM at-risk), CM as advisor, and integrated product delivery (IPD).

The common topics for consideration for all design assist projects in structural steel are:

- A fabricator/erector is brought into the project early on as a consultant to the owner and design team to bring their skill, experience, and knowledge of market conditions to reduce project cost and shorten the schedule for construction.
- It is crucial to the success of any design assist project that all designated team members act in accordance with their duty and fair dealing and work with each other honestly, fairly, and in good faith.
- A qualifications-based selection (QBS) process used in selection of the design assist team members is recommended.
- A documentation of the work plan defining the roles and responsibilities of the parties is recommended to be agreed to and signed by all parties or referenced in a memorandum of understanding signed by the parties.
- Conformance to the applicable building code, ANSI/AISC 360-22, and ANSI/AISC 341 requirements is mandatory.
- Conformance to the trade practices and industry standards defined in ANSI/AISC 303-22 (except for specific instructions to the contrary defined in the contract with the fabricator/erector) is a fundamental principle in the industry.
- Frequent and documented communication among the design assist team members is essential.
- Evaluation and frequent updates to the project budget and schedule are required.
- Clear definition of the scope, quantity, and character of the work for the fabrication/erection is essential for cost control.
- Establishment of appropriate contingencies for the work and setting of allowances for work that is undefined at the time of contract execution is also important.

The variables that exist for application to the different delivery methods and project types are:

- Experience and knowledge of the owner and the role the owner plays in the process. Does the owner have the in-house experience and knowledge to manage the process, or do they rely on an agent or GC/CM to manage the process?
- The contract form used can vary, and the contractual relationships and services provided can change depending on the delivery method chosen.
- It is required that the fabricator/erector be compensated for design assist services pursuant to a formal design assist consultant agreement. The main goal of fabricators and erectors that pursue design assist projects is to participate in early stages of project development bringing steel-specific expertise and input to the design, planning, budgeting, and scheduling process, so they can participate in a successful project as the selected fabricator/erector team. The conditions and timing upon which a contract for the design assist consultant may be executed, (beyond the initial design assist consulting services) for the actual fabrication and erection of the structural steel is an owner option that can vary depending on project conditions.

This appendix will present three example models that have been used and are relatively common in the industry. Numerous other variations on these examples are also possible. The third example, which uses the CM at-risk delivery method, is a very common model that has many advantages and is believed to have a large probability of success if the basic principles of Section 3 of this document are followed.

D.1 Case 1 Example Model: DBB

In this example model, a fabricator/erector is hired under contract as a design assist consultant for the owner or CM as advisor serving as the owner's agent. The contract states that the fabrication and erection work will be bid and negotiated after the design is completed. There is no agreement that this fabricator/erector will perform the work under a later contract. This example is explained further as follows:

STEP 1: The owner hires an architect who in turn hires an SER and other consultants as part of the design team. A QBS process is used by the owner to hire the design team.

STEP 2: A fabricator/erector is hired for design assist consultation under contract to the owner or owner's agent using a QBS process.

STEP 3: The fabricator/erector works collaboratively with the SER and the members of the design team to optimize the structural steel design and to develop the budget and schedule for this work as the design progresses.

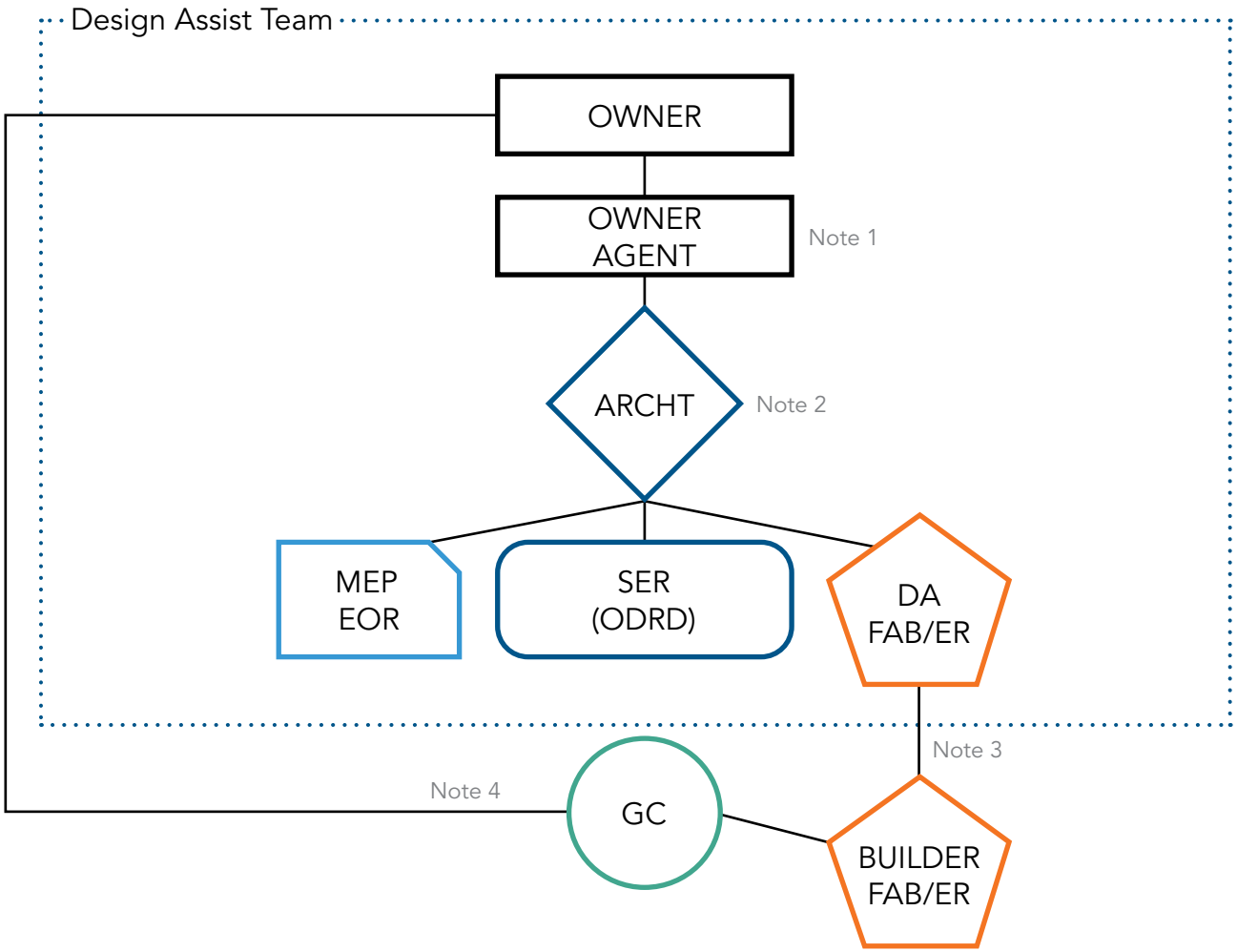
STEP 4: At the end of the design, the owner puts the building design, including the structural steel fabrication and erection, out to a select group of GC/CM bidders. Each GC/CM bidder selects a fabricator/erector to be part of the construction team or competitively solicits bids from various fabricators and erectors. The design assist fabricator/erector consultant may or may not (at the owner's preference) be allowed to submit a bid on one or more of the GC/CM teams.

STEP 5: The owner selects a GC/CM based on qualifications, schedule, and cost of the work.

STEP 6: The selected fabricator/erector must perform the work based on the information provided by the SER as shown on the design documents but may submit requests for information (RFI) for any changes requested to optimize cost and schedule. Any changes must be approved in the normal construction administration period by the owner and design team.

This process has the advantage of bringing informed knowledge about structural steel fabrication and erection cost, schedule, and overall market conditions to the project. However, some of this information may not be preferred by the successful fabricator/erector who may propose changes to the design based on its own preferences. Thus, the structural engineer may have to redesign some of the work if the requested change is in turn approved by the owner as a benefit to the overall project. The redesign work may be an additional cost borne by the owner or successful fabricator/erector depending on the perceived benefit to the owner, considering both the overall project cost and schedule of construction. See Fig. D-1.

FIG. D-1. DESIGN-BID-BUILD (DBB) DELIVERY METHOD



NOTES:

1. Owner agent representative is at owner's option.
2. Leader of design assist team may vary at owner's option.
3. Design assist consultant fabricator/erector may be permitted to bid the work with other bidders at owner's option.
4. Owner bids to multiple general contractors (GC).

D.2 Case 2 Example Model: DB

While both design assist and design build can take on many forms in practice, this case will focus on two possible design build scenarios. The scenario selected often depends on the past relationship(s) with the owner of the different parties involved. It may also depend on the sophistication of the owner with the particular delivery method. Scenario A represents a case in which a single entity, frequently a GC, contracts with an owner for the single-source responsibility to design and then build a project to the owner's performance requirements and other criteria. In this scenario, a fabricator/erector serves as a design assist consultant to the owner. See Fig. D-2a. Scenario B represents a case in which a fabricator/erector contracts with another party (for example, the owner) to design, fabricate, and erect the structural frame as a design-builder. See Fig. D-2b.

Design Assist in Scenario A:

In this scenario, an owner may wish to retain a fabricator/erector as a design assist consultant to provide advice on such topics as a recommended structural steel framing system, its layout, members, materials, etc.; recommendations on performance criteria for the structural system; the budget; and the schedule to complete the system. The design assist consultant may also be retained to evaluate the sufficiency of the various fabricator/erector design build proposals received or to evaluate the work of the design-build contractor to ensure its conformity to the design-build agreement.

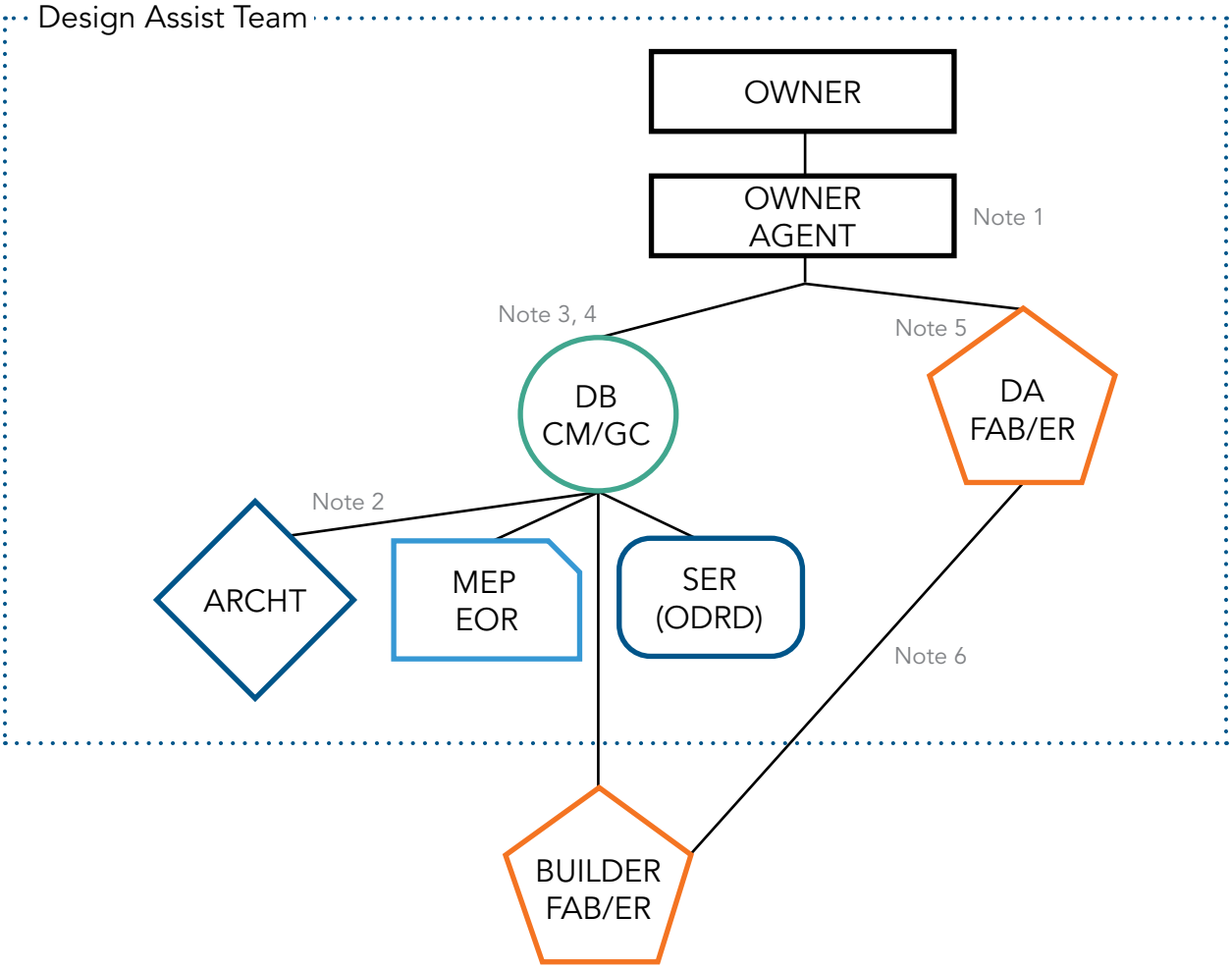
In Scenario A, the single responsible design-build entity may elect to have their own in-house structural engineers or an external structural engineering consultant design the structural steel framing. The completed design could be bid to eligible fabricator/erectors, or the fabricator/erector could be chosen through negotiation. An alternative approach would be for the single responsible design-build party to contract with a fabricator/erector to design and build (fabricate and erect) the structural frame. This alternative is related to Scenario B.

Design Assist in Scenario B:

In this scenario, the fabricator/erector is responsible to design and build (fabricate and erect) the structural frame. The contract for this design build work could be made with a variety of entities depending on the overall project environment. For example, the design build contract could be with the owner (in the case of multiple prime contracts with or without a construction manager), with a single responsible design build entity as described above, or perhaps another third party such as an entity that has responsibility for the design and/or construction of the building shell. While the possibilities are seemingly endless as to who has contracted with the fabricator/erector, one thing is constant: The fabricator/erector has design-build responsibility.

In Scenario B, the design assist fabricator/erector consultant can be retained by the party that best benefits from their advice. That entity is most likely the party that is setting performance criteria, evaluating the design-build proposals, and confirming that the design-build work conforms to the performance criteria. In both scenarios, the most likely major beneficiary of design assist advice is the owner. Whether the design build fabricator/erector is retained directly by the owner or indirectly through others is a project-specific detail.

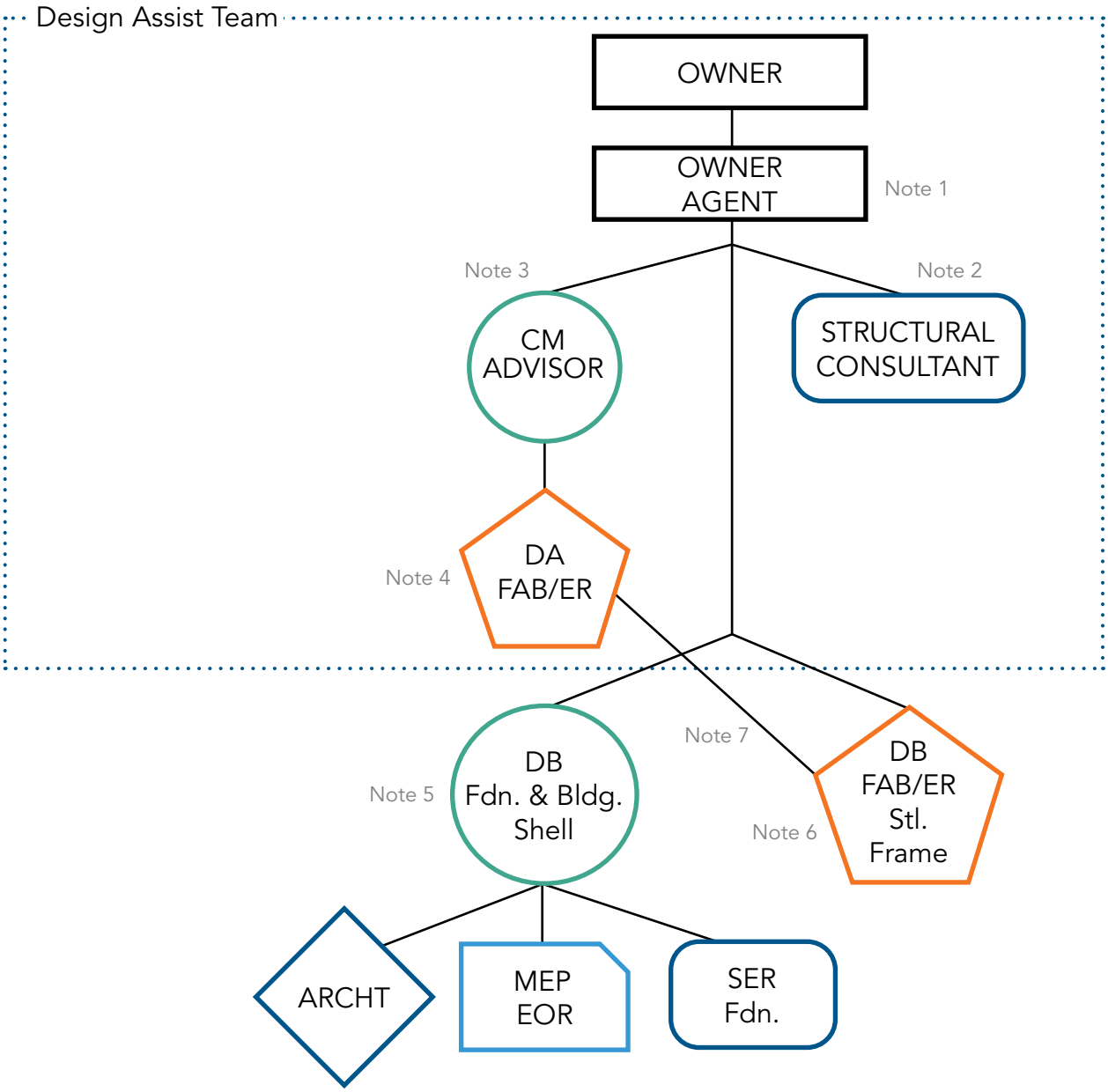
FIG. D-2A. DESIGN-BUILD DELIVERY METHOD SCENARIO A – FAB/ER AS DESIGN ASSIST CONSULTANT



NOTES:

1. Owner agent representative is at owner's option.
2. Design builder CM/GC may hold all contracts with design team or contracts only with architect, who then holds all consultant contracts.
3. Owner contracts directly with design builder CM/GC.
4. Leader of design assist team is usually design builder CM/GC but may vary at owner's option.
5. Design assist fabricator/erector sets performance criteria, sets the budget and schedule, evaluates fabricator/erector proposals and monitors work of design builder CM/GC.
6. Design assist consultant fabricator/erector may be permitted to bid or negotiate to perform the work at owner's option. Otherwise, design builder CM/GC may bid to multiple fabricator/erectors.

FIG. D-2B. DESIGN-BUILD DELIVERY METHOD SCENARIO B – FAB/ER AS DESIGN BUILDER



NOTES:

1. Owner agent representative is at owner's option.
2. Structural consultant for owner sets performance criteria, evaluates design build proposals and reviews all design build structural designs. May act as leader of design assist team if owner elects not to hire a CM advisor.
3. Construction manager acts as advisor to owner, optional hire for owner.
4. Design assist consultant fabricator/erector sets performance criteria with structural consultant, evaluates design build frame proposals and monitors work of design builder of frame.
5. Separate design builder for foundation and building shell with own design team.
6. Design build fabricator/erector for structural frame designs, fabricates and erects the structural frame.
7. Design assist fabricator/erector may be allowed to bid as design builder at owner's option.

D.3 Case 3 Example Model: CM at-Risk

CM at-risk is a model that has been successful for many different structure types, sizes, and complexities. When applied using the fundamental principles described in Section 3 of this document, it fairly balances the risks across the various stakeholders and often represents the best opportunity for achieving the owner's goals for project success. While variations to this model can certainly be considered, it is important to balance the risks with the rewards for each stakeholder. In some instances, practices such as the early bidding of fabrication and erection of structural steel using incomplete progress level design drawings shift risk without shifting reward. The more uncompensated risk that is shifted to the design team, fabricator, or erector by these practices, the more the project costs may increase to cover these originally unanticipated risks; inevitably, there will be an increased possibility for change orders, misunderstanding, miscommunication, disputes, and possible litigation. These conditions and potential risks may be detrimental to the project in the long run, despite the purported short-term gains. This example model is shown in the Figure D-3 and is explained further as follows:

STEP 1: The owner selects the design assist team (GC/CM, architect, and structural engineer) using a QBS process. The GC/CM provides a guaranteed maximum price (GMP) cost and schedule under contract with the owner. The GC/CM consults with a fabricator/erector to establish the steel contract price.

STEP 2: A fabricator/erector is chosen among a qualified shortlist of candidates for design assist consultation under contract based on a QBS process and interviews, with the other members of the design assist team participating and providing feedback to the owner and GC/CM.

STEP 3: The fabricator/erector works collaboratively with the SER and GC/CM to optimize the design and to further develop the budget and schedule as the design progresses.

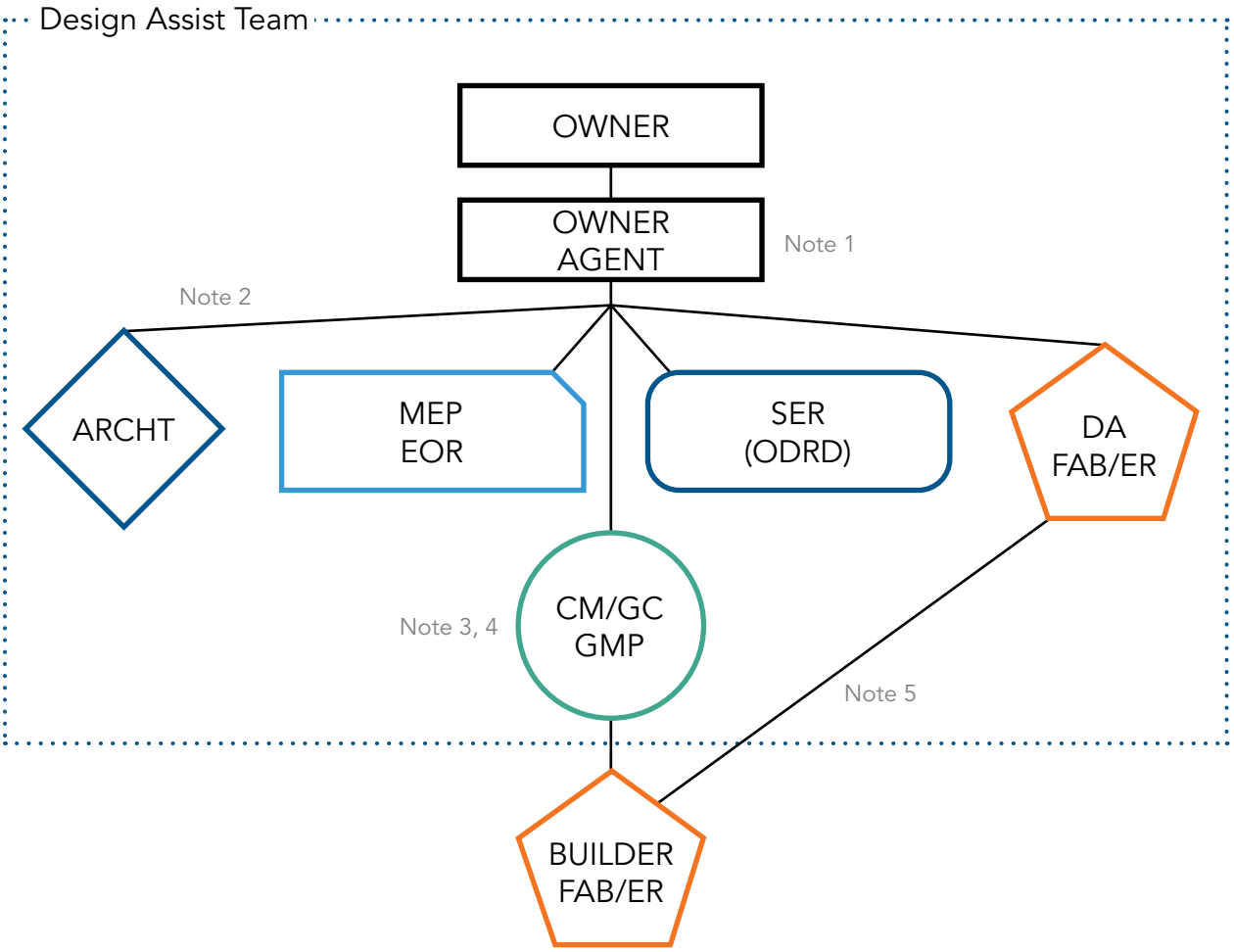
STEP 4: The consultant contract with the fabricator/erector states that they will be designated by the owner to fabricate and erect the structural steel as long as the budget and schedule are developed and maintained during the design period to the satisfaction and approval of the owner and other design assist team members.

STEP 5: If the design assist fabricator/erector fails to maintain the established schedule and budget to the satisfaction of the owner or if there is a failure to reach agreement on these or other material terms, the owner may elect to put the final design documents and specifications out to a select list of fabricator/erector bidders.

STEP 6: If the condition in Step 5 applies, the owner may select the final fabricator/erector based on qualifications, negotiation of terms, cost, and schedule of the work.

It is usually in the interest of the owner to award a contract for fabrication and erection to the fabricator/erector consultant in order to preserve the established schedule and maintain the design assumptions and decisions worked out with the structural engineer and design assist team. This would avoid the need for a potential redesign with a different fabricator/erector team. It is usually in the interest of the fabricator/erector consultant to maintain the budget and schedule established as the design progresses to have the opportunity to fabricate and erect the work. If such a win-win scenario can be achieved, it can avoid any need by the owner to bid the final design documents and specifications.

FIG. D-3. CONSTRUCTION MANAGER AT RISK (CM@R) DELIVERY METHOD



NOTES:

1. Owner agent representative is at owner's option.
2. Owner may hold all contracts with design team or contracts only with architect, who then holds all consultant contracts.
3. Owner contracts directly with CM/GC under a GMP contract.
4. Leader of design assist team is usually CM/GC but may vary at owner's option.
5. Design assist consultant fabricator/erector may be permitted to perform the work at owner's option with budget and schedule control conditions, which is preferred option to benefit all members of design assist team. Otherwise, owner may bid to multiple fabricator/erectors.

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