

TG10-TG15 Subcommittee

Process Model Development for Erection

Summary:

The purpose of this document is to capture the information needed to support the critical exchanges between the stakeholders related to steel bridge erection. This document outlines the typical process for steel bridge erection. The final Process Model document will serve as the basis for the Information Delivery Manual (IDM) needed by software vendors to implement the information into software.

Mission Statement: To determine and provide the erection engineering information needed to support the development of bridge information modeling standardization.

Scope: Data required by the erection engineer to complete his work scope, and the data produced by the erection engineer needed by others in the bridge lifecycle process.

Objectives:

- Clearly define the process for erection engineers
- Identify all actors that partake in the process for erection engineers
- Identify all exchanges between the erection engineer and the various actors in the bridge process
- Identify all data and information needed by the erection engineer, and where that data and information come from
- Identify all data and information produced by the erection engineer and to whom and where it is provided to

Definitions:

Actor: A person, an organization, or person acting on behalf of an organization that has a specific purpose and role in the process.

Activity: The individual and executable act that takes place in a process where something is done. An activity can be a task, loop, or subprocess containing additional activities to achieve an outcome.

Advertisement for Bid: General solicitation for bids put out by the owner/designer.

Bid: The pricing and other documents forming the General Contractor's Proposal that are submitted at a point in time to the Owner and that are required by the Owner to select the General Contractor. **Synonym:** Bid Proposal.

Bid Document: Documents prepared by owner to solicit bids by contractors to complete a project. Includes contract documents and other information pertaining to the project needs. Only prequalified and eligible contractors can acquire bid documents. **Synonym:** Request for Proposal (RFP).

Bid Model: The Exchange Model provided by the Owner to General Contractor during the Bidding and Letting Phase.

Contract Documents: Contract Documents refers to the documents that define the responsibilities of the parties that are involved in bidding, fabricating, and erecting structural steel (and other elements of the project). These documents normally include the design drawings and the specifications. The design drawings and specifications are issued or made available by the Owner to the General Contractor during the bidding phase. The General Contractor bases its bid on these documents, and they are later incorporated into the Contract between Owner and General Contractor.

Contractor's Planning Model: The Exchange Model provided by the General Contractor to the Owner during the Pre-Construction Planning/Detailing Phase which incorporates modifications or changes to the Bid Model. The Contractor's Planning Model becomes the basis for construction and is approved by the Owner as a complement to the Bid Model (or to replace the Bid Model as the case may be). This model is used for construction by the erection engineer, fabricator, detailer, steel erector and general contractor and forms part of the permanent project record. The Contractor's Planning Model may be an overlay of the Bid Model indicating specific modifications and changes approved by the Owner and/or Designer. Depending on the needs of the project, it may also be a distinctly separate exchange model developed by the General Contractor and approved by the Owner and/or Designer.

Data: the quantities, characters, or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media. **Comment:** Data is what is passed through information exchanges that create the BIM models. This can be seen as bits and bytes, where there is no semantic information.

Data Exchange: Exchange of data between two sources, often involving the transformation of the structure from one schema to another. A data exchange differs from an information exchange because information gives meaning to the data that is being exchanged. **Comment:** Data exchanges are how computers communicate.

Design Drawings: The graphical and pictorial portions of the contract documents showing the design, location and dimensions of the work. These documents generally include plans, elevations, sections, details, schedules, diagrams and notes.

Designer: The designer is the actor who is the licensed professional and 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. The designer is also referred to as the Designer of Record or the Engineer of Record.

Detailer: The detailer is the actor who converts the design drawings and Exchange Model to shop drawings (digital or paper) and data files that can be applied by the Fabricator to perform the fabrication of structural steel. The Detailer also prepares erection drawings (field-installation or member-placement drawings to show the Erector the location and attachment of the individual fabricated shipping pieces).

Document Exchange: Documents and other information that give meaning and context of how to use the data communicated in a data exchange. Information includes all supplemental documents and procedures that give data context and meaning. Generally, these are communicated in PDF files or paper documents and may consist of design drawings, specifications, reference documents and other information.

Erection Drawings: Field-installation or member placement drawings that are prepared by the fabricator to show the location and attachment of the individual shipping pieces.

Erection Engineer: The erection engineer is the actor who is responsible for developing, evaluating, and specifying the Contractor's specific procedures and plans for erecting the structural steel of the bridge. The erection engineer is also referred to as the Construction Engineer.

Erector: The erector is the actor who is responsible for the erection of the structural steel. The erector is also referred to as the Erection Specialty Subcontractor.

Exchange Model (EM): A software-neutral and semantically rich data definition of the content needed in the Information Exchange. An EM is typically passed in model form, such as a 3D BIM model or the analytical model.

Exchange Requirement (ER): The set of data that needs to be exchanged to support a particular activity or business requirement. An ER can be viewed as a subset of data needed from the Exchange Model, as the whole model is passed, but not all the data is needed for that particular requirement.

Fabricator: The fabricator is the actor operating the facility(ies) performing such shop activities as cutting, welding, drilling, punching, cleaning, and painting of structural steel. "Fabricator" also includes any agents of the Fabricator, such as subcontract fabricators. In some cases, the Fabricator is subcontracted by the General Contractor.

General Contractor: The general contractor (GC or Contractor) is the actor who is responsible for proper completion of all tasks required by the Contract. Subcontractors, including fabricators, erectors, and field painters, may be used by the Contractor, but the Contractor retains responsibility for all material, operations, and the final product. The Contractor may permit direct subcontractor interaction with the Owner to expedite the project, but subcontractors must inform the Contractor of any proposed modifications to Contract requirements accepted by the Owner.

Information: What is conveyed or represented by a particular arrangement or sequence of things, such as explanation of data. **Comment:** Information includes all supplemental documents and procedures that give data context and meaning. Generally, these are communicated in PDF files or paper documents.

Information Exchange: The set of information (both the Exchange Model and documents and other information) passed between two sources, which include data along with documents and other information that give meaning and context of how to use the data. Information includes all supplemental documents and procedures that give data context and meaning. Generally, these are communicated in PDF files or paper documents. **Comment:** information exchanges are how humans communicate what is needed in a specific data exchange. Documents that provide context for the Exchange Model are an essential component of the Information Exchange and may consist of plans, specifications, reference documents and other information.

Owner: The owner is the actor paying the Contractor to fulfill the terms of the Contract. The Owner also encompasses the following: those preparing the Contract documents, including those responsible for the structure's adequate design; and those authorized to represent the Owner during construction, commonly called the "Engineer" and the "Inspector". The Engineer and Inspector may be employees either of the Owner or of professional firms contracted for the work.

Phase: Temporal, disjointed segments of a period of time in a process, often denoting a where a set of activities take place. **Synonym:** stage.

Process Map: The visual representation of a process model in a graphical workflow diagram. Modeling notation, such as BPMN, is used to represent the various objects in the process model. **Comment:** This map represents the project workflow, including the stakeholders, actors, project stages, and activities.

Process model: A description of a business process that identifies the information flows between the different actors and tasks the actors carry out during a project workflow.

Shop Drawings: Drawings of the individual structural steel shipping pieces that are to be produced in the fabrication shop. In the future shop drawings may be replaced by data files that can be used by all actors.

Specifications: The portion of the Contract Documents that consists of the written requirements for materials, standards and workmanship. These may include the special provisions and supplemental specifications issued by the Owner for a particular project along with standard specifications, applicable codes, standards and other referenced documents and requirements.

Use Case: A specific event of a broader defined process, in which there is only one way of completing a specific goal. In other words, there is no “or” option, in which each would be their own use case.

Assumptions (use case):

- Design-Bid-Build Projects (ignore Design-Build projects)
- Typical steel workhorse bridge - steel I girder or tub girder bridge (single or multi-span and may be straight, skewed or curved). Trusses, arches and other more complex steel bridge types are not considered.
- The information flow will theoretically stay the same among the various actors, even if the General Contractor self-performs any of the actor functions such as Detailer, Fabricator, Erector or Erection Engineer,
- General Contractor bids what is contained in the Contract Documents (adjustment of field splices to accommodate shipping or erection constraints is sometimes discussed, but not specifically addressed during the pre-bid phase exchanges, as bids must conform to the Contract Documents)
- Only activities, exchange models and information models affecting Steel Erection are considered for purposes of this document and the accompanying Erection Data and Process Map. Other activities and exchanges affecting detailers and fabricators (without affecting erection engineers or steel erectors) are dealt with separately.

Specification of Steel Bridge Erection: Owner/Designer

The following lists the activities and sub processes that are performed by the Owner/Designer. The Owner is not distinguished from the Designer, as the Designer is an agent of the Owner. These activities are captured in the process map diagram.

Type	Activity
Name	[A 1.1] Prepare Contract Documents
Project Phase	Bidding and Letting
Description	Prepare Request for Proposal
Models	Sent: "Bid Model" sent to General Contractor and passed through to subcontractors
Documents	Sent: "Bid Documents" to General Contractor and passed through to subcontractors
Messages	None
Related	None

Type	Activity
Name	[A 1.2] Award Contract
Project Phase	Bidding and Letting
Description	Review Bids submitted by the various General Contractors. Based on the internal processes and requirements, award the contract to the General Contractor.
Models	None
Documents	None
Messages	Sent: "Award Notification" to the General Contractor that is being awarded the contract.
Related	None

Type	Activity
Name	[A 1.3] Approve Contract
Project Phase	Bidding and Letting
Description	Review Contract and other documents that are integral to contract formation and approve if acceptable. Send a message to the General Contractor when the Contract is approved and General Contractor can proceed with the project.
Models	None
Documents	Received: "Contract" from the General Contractor
Messages	Sent: "Notice to Proceed" to the General Contract to proceed with the project. In some states notice of approval of the contract automatically triggers the notice to proceed.
Related	None

Type	Activity
Name	[B 1.1] Evaluate RFIs
Project Phase	Pre Construction Planning / Detailing
Description	Review the RFIs and provide feedback, information requested, or clarifications.
Models	None
Documents	Sent/Received: Bidirectional “RFI” correspondence to/from the General Contractor
Messages	none
Related	none

Type	Activity
Name	[B 1.2] Review and Approve Contractor’s Planning Model
Project Phase	Pre Construction Planning / Detailing
Description	Review and confirm that changes in the Bid Model that are proposed by the GC in the Contractor’s Planning Model are acceptable. Resolve any issues with the GC during this review process.
Models	Received: “Contractor’s Planning Model” from the General Contractor
Documents	None
Messages	Sent: “Notification of Approval” to the General Contractor
Related	None

Type	Activity
Name	[B 1.3] Receive Erection Plan and Procedures
Project Phase	Pre Construction Planning / Detailing
Description	Proceed with review of Erection Plan and Procedures to complete the review in the timeframe established in the Contract Documents. Notify GC promptly if additional information is required to complete the review without delaying the start of erection.
Models	None
Documents Sent	Received: “Final Erection Plans and Procedures” from the General Contractor
Messages	Sent: “Acceptance Notification (if required)”. The Contract Documents specify whether the Erector must wait for this acceptance notification before proceeding with erection or can proceed within the time permitted by the Contract Documents.
Related	None

Type	Activity
Name	[D 1.1] Accept Erection
Project Phase	Substantial Completion
Description	Review “As Built” Drawings and Records pertaining to Steel Erection and “punchlist” work completed by Erector to confirm preliminary acceptance

	of steel erection work. Depending on what is required by the Contract Documents, final acceptance may not occur until final completion by the GC and formal acceptance of the project by Owner.
Models	None
Documents Sent	Received: "As-Built Drawings and Records" from General Contract and Subs Complete
Messages	None
Related	"Punchlist" Work affecting steel erection is completed

Specification of Steel Bridge Erection: General Contractor

The following lists the activities and sub processes that are performed by the General Contractor. These activities are captured in the process map diagram.

Type	Activity
Name	[A 3.1] Prepare Bid
Project Phase	Bidding and Letting
Description	Collaborating with the Erection Engineer and Erector, the General Contractor reviews the scope and price of Erector and Erection Engineer Bids and incorporates the Erector's and the Erection Engineer's bids in the General Contractor's Bid to the Owner.
Models	Received: "Bid Model" from the Owner and passed through to the Erection Engineer and the Erector
Documents	Received: "Bid Documents" from the Owner and passed through to the Erection Engineer and the Erector Received: "Bid Price and Scope" from the Erection Engineer Received: "Bid Price and Scope" from the Erector Sent: "Bid" to the Owner
Messages	None
Related	Erection Engineer [A 4.1] Prepare Bid Erector [A 5.1] Prepare Bid

Type	Activity
Name	[A 3.2] Finalize Contract
Project Phase	Bidding and Letting
Description	After receiving the "Award Notification" message from the Owner, the General Contractor finalizes the contract and provides other required documents (typically bonds and insurance).
Models	None
Documents	Sent: "Contract" to the Owner
Messages	Received: "Award Notification" from the Owner
Related	None

Type	Activity with Subprocesses
Name	[B 3.1] Review Bid Model
Project Phase	Pre Construction Planning / Detailing
Description	After receiving the "Notice to Proceed" message from the Owner, the General Contractor notifies the Erection Engineer, the Erector, Fabricator and Detailer to commence Bid Model Review. General Contractor coordinates preconstruction meetings or exchanges where there are discussions of missing or incomplete information, relocations of shop and field splices, and other details and minor changes as allowed by the Contract Documents. Such meetings or exchanges may involve the

	Owner/Designer when appropriate. Information may be exchanged via RFIs and other messaging. These clarifications will form the basis for Bid Model changes that become the Contractor’s Planning Model (see Activity B 3.2 below).
Models	None
Documents	Sent/Received: Bidirectional “RFI” correspondence to/from the Owner Sent/Received: Bidirectional “RFI” correspondence to/from the Erection Engineer Sent/Received: Bidirectional “RFI” correspondence to/from the Erector, Sent/Received: Bidirectional “RFI” correspondence to/from the Detailer Sent/Received: Bidirectional “RFI” correspondence to/from the Fabricator
Messages	Received: “Notice to Proceed” from the Owner Sent: “Notice to Proceed” to the Erection Engineer Sent: “Notice to Proceed” to the Erector
Related	<ul style="list-style-type: none"> • Erection Engineer [B 4.1] Review Bid Model • Erector [B 5.1] Review Bid Model • Fabricator [***]– Review Bid Model • Detailer [***]– Review Bid Model

Type	Activity
Name	[B 3.2] Conduct Preliminary Erection Study and Decide Model Changes
Project Phase	Pre Construction Planning / Detailing
Description	Continuing the work of Activity B 3.1, the General Contractor coordinates collaboration meetings and/or exchanges among the Erection Engineer, Erector, Fabricator and Detailer to decide which changes to the “Bid Model” are feasible. Once all parties agree, the General Contractor is responsible for preparing the Contractor’s Planning Model to reflect agreed changes to the Bid Model, although the General Contractor may delegate this task to a subcontractor or other party.
Models	Sent: “Contractor’s Planning Model” to the Owner
Documents	Sent/Received: Bidirectional “Model Changes” to/from the Erection Engineer Sent/Received: Bidirectional “Model Changes” to/from the Erector Sent/Received: Bidirectional “Model Changes” to/from the Fabricator Sent/Received: Bidirectional “Model Changes” to/from the Detailer
Messages	None
Related	<ul style="list-style-type: none"> • Erection Engineer [B 4.2] Conduct Preliminary Erection Study • Erector [B 5.2] Conduct Preliminary Erection Study • Fabricator [***] Evaluate Fabrication • Detailer [***] Evaluate Detailing

Type	Activity
Name	[B 3.3] Review Erection Plans and Procedures
Project Phase	Pre Construction Planning/Detailing

Description	Once approved shop drawings and erection drawings are provided to the Erection Engineer, the Erection Engineer can finalize the Erection Plans and Procedures. After receiving the “Final Erection Plans and Procedures” from the Erection Engineer, the General Contractor and Erector review, revise, or confirm final erection plans and erection procedures to be submitted to Owner.
Models	
Documents	Sent: “Final Erection Plans and Procedures” to the Owner Received: “Final Erection Plans and Procedures” from Erection Engineer to General Contractor and Erector
Messages	Received: “Acceptance Notification (if required)” from the Owner Sent: “Acceptance Notification (if required)” to the Erection Engineer Sent: “Acceptance Notification (if required)” to the Erector
Related	<ul style="list-style-type: none"> Erection Engineer [B 4.3] Perform Erection Analysis, and Prepare Erection Plans and Procedures Erector [B 5.3] Review Erection Analysis, Plans, and Procedures

Type	Activity
Name	[D 3.1] Assemble Documents and Confirm Work Completion
Project Phase	Substantial Completion
Description	The General Contractor Assembles Steel Erection “As-Built” Drawings and Records and confirms Erection “Punch-list” Work is completed. The General Contractor submits to the Owner with a request for preliminary acceptance of steel erection.
Models	None
Documents	Received/Sent: “As Built Drawings and Records” pass from Erector through the General Contractor to Owner
Messages	Received/Sent: “Work Completed” message passes from Erector through General Contractor to the Owner
Related	<ul style="list-style-type: none"> Erector [D 5.1] Assemble “As-Built” Drawings and Records Erector [D5.2] Complete “Punch List” work

Specification of Steel Bridge Erection: Erection Engineer

The following lists the activities and sub processes that are performed by the Erection Engineer. These activities are captured in the process map diagram.

Type	Activity
Name	[A 4.1] Prepare Bid
Project Phase	Bidding and Letting
Description	Collaborating with the General Contractor and the Erector to determine its scope, the Erection Engineer sends its Bid (scope and price) to the General Contractor.

Models	Received: “Bid Model” from Owner and passed through General Contractor
Documents	Received: “Bid Documents” from Owner and passed through General Contractor Sent: “Bid Price and Scope” to General Contractor
Messages	None
Related	<ul style="list-style-type: none"> • General Contractor [A 3.1] Prepare Bid • Erector [A 5.1] Prepare Bid

Type	Activity with Subprocesses
Name	[B 4.1] Review Bid Model
Project Phase	Pre Construction Planning / Detailing
Description	After receiving the “Notice to Proceed” message from the General Contractor, the Erection Engineer commences discussions with General Contractor, Erector, Fabricator and Detailer regarding missing or incomplete information, location of splices, and other details and minor changes as allowed by the Contract Documents. Information is exchanged via RFIs and other messaging.
Models	None
Documents	Sent/Received: Bidirectional “RFI” correspondence to/from the General Contractor Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Erector Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Fabricator Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Detailer
Messages	Received: “Notice to Proceed” message from the General Contractor
Related	<ul style="list-style-type: none"> • General Contractor [B 3.1] Review Model • Erector [B 5.1] Review Bid Model • Fabricator [***] Review Bid Model • Detailer [***] Review Bid Model

Type	Activity
Name	[B 4.2] Conduct Preliminary Erection Study
Project Phase	Pre Construction Planning / Detailing
Description	The General Contractor coordinates collaboration meetings or exchanges with the Erection Engineer, Fabricator, Detailer and Erector to suggest changes, additions, and clarifications to “Bid Model.” Preliminary erection schemes may be analyzed and reviewed during this activity, including deciding the preliminary locations of cranes and falsework supports. The Erection Engineer, Fabricator or Detailer may be designated

	by the General Contractor to prepare the Contractor Planning Model that GC submits to Owner.
Models	None
Documents Sent	Sent/Received: Bidirectional “Model Changes” to the General Contractor Sent/Received: Bidirectional “Model Changes” to the Erector Sent/Received: Bidirectional “Model Changes” to the Fabricator Sent/Received: Bidirectional “Model Changes” to the Detailer
Messages	None
Related	<ul style="list-style-type: none"> • General Contractor [B 3.2] Conduct Preliminary Erection Study and Decide Model Changes • Erector [B 5.2] Conduct Preliminary Erection Study

Type	Activity
Name	[B 4.3] Perform Erection Analysis and Prepare Erection Plans and Procedures
Project Phase	Pre Construction Planning/Detailing
Description	After receiving the “Notification of Approval” of the Construction Planning Model, Erection Engineer commences final erection analysis and completes the Preliminary Erection Plans and Procedures that are reviewed and agreed with General Contractor and Erector. Final approved erection drawings and shop drawings are required by the Erection Engineer and Erector and must be incorporated into Preliminary Erection Plans and Procedures before they can be passed through the General Contractor to Owner.
Models	None
Documents	Sent/Received: Bidirectional “Preliminary Erection Plans and Procedures” correspondence to/from the General Contractor and Erector Sent: “Final Erection Plans and Procedures” pass through the General Contractor to the Owner Sent: “Final Erection Plans and Procedures” to the Erector
Messages	Received: “Notification of Approval” of Preliminary Erection Plans and Procedures from the General Contractor
Related	<ul style="list-style-type: none"> • General Contractor [B 3.3] Review Erection Analysis, Plans, and Procedures • Erector [B 5.3] Review Erection Analysis, Plans, and Procedures

Type	Activity
Name	[C 4.1] Consult Erection Changes
Project Phase	Construction
Description	The Erection Engineer consults with and advises Erector if any questions, issues, needed changes or problems with the Erection Plans and Procedures arise during construction.
Models	None
Documents Sent	None

Messages	None
Related	Erector [C 5.1] Erect Bridge

Specification of Steel Bridge Erection: Erector

The following lists the activities and sub processes that are performed by the Erector. These activities are captured in the process map diagram.

Type	Activity
Name	[A 5.1] Prepare Bid
Project Phase	Bidding and Letting
Description	Collaborating with the General Contractor and the Erection Engineer, the Erector sends the Bid (scope and price) to the General Contractor for inclusion with General Contractor's Bid to Owner
Models	Received: "Bid Model" from Owner and passed through General Contractor and Erection Engineer
Documents	Received: "Bid Documents" from Owner and passed through General Contractor and Erection Engineer Sent: "Bid Price and Scope" to General Contractor
Messages	None
Related	<ul style="list-style-type: none"> • General Contractor [A 3.1] Prepare Bid • Erection Engineer [A 4.1] Prepare Bid

Type	Activity with Subprocesses
Name	[B 5.1] Review Bid Model
Project Phase	Pre Construction Planning / Detailing
Description	After receiving the "Notice to Proceed" message from the General Contractor, the Erector commences discussions with General Contractor, Erection Engineer, Fabricator and Detailer regarding missing or incomplete information, location of splices, and other details and minor changes to the Bid Model as allowed by the Contract Documents. Such discussions may include the Owner/Designer when appropriate. Information is exchanged via RFIs and other messaging.
Models	None
Documents	Sent/Received: Bidirectional "RFI" correspondence to/from the General Contractor (and Owner/Designer when applicable) Sent/Received: Bidirectional "RFI" correspondence to/from the "RFI" to the Erection Engineer Sent/Received: Bidirectional "RFI" correspondence to/from the "RFI" to the Fabricator Sent/Received: Bidirectional "RFI" correspondence to/from the "RFI" to the Detailer
Messages	Received: "Notice to Proceed" message from the General Contractor
Related	<ul style="list-style-type: none"> • General Contractor [B 3.1] Review Bid Model • Erection Engineer [B 4.1] Review Bid Model • Fabricator [B 6.1] Review Bid Model • Detailer [B 7.1] Review Bid Model

Type	Activity
Name	[B 5.2] Conduct Preliminary Erection Study
Project Phase	Pre Construction Planning / Detailing
Description	The Erector participates in collaborative discussions and exchanges with the General Contractor, Fabricator, Detailer, and Erection Engineer to suggest changes, additions, and clarifications to “Bid Model Preliminary erection schemes may be analyzed and reviewed during this activity, including deciding the preliminary locations of cranes and falsework supports.
Models	None
Documents Sent	Sent/Received: Bidirectional “Model Changes” to the General Contractor Sent/Received: Bidirectional “Model Changes” to the Erection Engineer Sent/Received: Bidirectional “Model Changes” to the Fabricator Sent/Received: Bidirectional “Model Changes” to the Detailer
Messages	None
Related	<ul style="list-style-type: none"> • General Contractor [B 3.2] Conduct Preliminary Erection Study and Decide Model Changes • Erection Engineer [B 4.2] Conduct Preliminary Erection Study • Fabricator [B 6.2] Evaluate Fabrication • Detailer [B 7.2] Evaluate Detailing

Type	Activity
Name	[B 5.3] Review Erection Analysis, Plans, and Procedures
Project Phase	Preconstruction Planning/Detailing Phase
Description	After receiving the preliminary Erection Plans and Procedures from the Erection Engineer, there are collaboration meetings with the General Contractor and Erection Engineer to review, revise, or confirm final erection plans and erection procedures to be submitted to Owner and followed during the construction phase.
Models	None
Documents	Sent/Received: Bidirectional “Preliminary Erection Plans and Procedures” correspondence to/from the General Contractor and Erection Engineer Received: “Final Erection Plans and Procedures” from the Erection Engineer
Messages	Received: “Notification of Approval” from the General Contractor
Related	<ul style="list-style-type: none"> • General Contractor [B 3.3] Review Erection Analysis, Plans, and Procedures • Erection Engineer [B 4.3] Perform Erection Analysis and Prepare Plans and Procedures

Type	Activity
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Name	[C 5.1] Erect Bridge
Project Phase	Construction
Description	The Erector proceeds with erecting the bridge. Any necessary deviations from the erection plans and procedures must be discussed with the Erection Engineer before proceeding.
Models	None
Documents Sent	None
Messages	Received: "Acceptance Notification (if required)" message from the Owner to confirm that erection is authorized to proceed.
Related	Erection Engineer [C 4.1] Consult Erection Changes

Type	Activity
Name	[D 5.1] Assemble "As Built" Drawings and Records
Project Phase	Substantial Completion
Description	The Erector assembles the "As Built" drawings and records that are sent to the General Contractor to be sent to the Owner.
Models	None
Documents	Sent: "As Built Drawings and Records" pass through the General Contractor to the Owner
Messages	None
Related	<ul style="list-style-type: none"> General Contractor [3 5.1] Assemble Documents and Confirm Work Completion

Type	Activity
Name	[D 5.2] Complete "Punch List" Work
Project Phase	Substantial Completion
Description	The erector performs the "punch list" tasks. Once completed, the Erector sends a message to the General Contractor signifying completion.
Models	None
Documents	None
Messages	Sent: "Work Completed" message to General Contractor
Related	<ul style="list-style-type: none"> General Contractor [D 5.1] Assemble Documents and Confirm Work Completion

Specification of Steel Bridge Erection: Fabricator

The following lists the activities and sub processes that are performed by the Fabricator and that are essential interfaces with Steel Erection. These activities are captured in the process map diagram.

Type	Activity with Subprocesses
Name	[B 6.1] Review Bid Model
Project Phase	Pre Construction Planning / Detailing
Description	After receiving the “Notice to Proceed” message from the General Contractor, the Fabricator commences discussions with General Contractor, Erection Engineer, Erector and Detailer regarding missing or incomplete information, location of shop and field splices, and other details and minor changes as allowed by the Contract Documents. Information is exchanged via RFIs and other messaging.
Models	None
Documents	Sent/Received: Bidirectional “RFI” correspondence to/from the General Contractor Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Erection Engineer Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Erector Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Detailer
Messages	Received: “Notice to Proceed” message from the General Contractor
Related	<ul style="list-style-type: none"> • General Contractor [B 3.1] Review Model • Erection Engineer [B 4.1] Review Bid Model • Erector [B 5.1] Review Bid Model • Detailer [B 7.1] Review Bid Model

Type	Activity
Name	[B 6.2] Evaluate Fabrication
Project Phase	Pre Construction Planning / Detailing
Description	The General Contractor coordinates collaboration meetings or exchanges with the Erection Engineer, Fabricator, Detailer and Erector to suggest changes, additions, and clarifications to “Bid Model” that will be incorporated into the Contractor’s Planning Model. Fabrication is evaluated to confirm plate sizes, locations of shop and field splices, preferred fabrication techniques and details to incorporate into detailing and coordinate other fabrication issues that may affect Steel Erection. The Fabricator may be designated by the General Contractor to prepare the portion of the Contractor Planning Model pertaining to steel detailing and erection that GC submits to Owner.
Models	None

Documents Sent	Sent/Received: Bidirectional “Model Changes” to the General Contractor Sent/Received: Bidirectional “Model Changes” to the Erection Engineer Sent/Received: Bidirectional “Model Changes” to the Erector Sent/Received: Bidirectional “Model Changes” to the Detailer
Messages	None
Related	<ul style="list-style-type: none"> • General Contractor [B 3.2] Conduct Preliminary Erection Study and Decide Model Changes • Erection Engineer [B 4.2] Conduct Preliminary Erection Study • Erector [B 5.2] Conduct Preliminary Erection Study • Detailer [B 7.2] Evaluate Detailing

Type	Activity
Name	[B 6.3] Fabrication Planning and Fabrication
Project Phase	Preconstruction Planning/Detailing Phase
Description	Fabricator continues fabrication planning in coordination with development of shop drawings, following the agreed Contractor’s Planning Model. Once materials are received and relevant shop drawings are accepted by the Owner/Designer, fabrication can commence.
Models	None
Documents	Received: “Shop Drawings”
Messages	Received: “Notification of Approval” of Contractor’s Model from the General Contractor
Related	<ul style="list-style-type: none"> • Detailer [B 7.3] Prepare and submit shop drawings for Owner acceptance

Specification of Steel Bridge Erection: Detailer

The following lists the activities and sub processes that are performed by the Detailer and that are essential interfaces with Steel Erection. These activities are captured in the process map diagram.

Type	Activity with Subprocesses
Name	[B 7.1] Review Bid Model
Project Phase	Pre Construction Planning / Detailing
Description	After receiving the “Notice to Proceed” message from the General Contractor, the Detailer commences discussions with General Contractor, Erection Engineer, Erector and Fabricator regarding missing or incomplete information, location of splices, and other details and minor changes as allowed by the Contract Documents. Information is exchanged via RFIs and other messaging.
Models	None
Documents	Sent/Received: Bidirectional “RFI” correspondence to/from the General Contractor Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Erection Engineer Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Erector Sent/Received: Bidirectional “RFI” correspondence to/from the “RFI” to the Fabricator
Messages	Received: “Notice to Proceed” message from the General Contractor
Related	<ul style="list-style-type: none"> • General Contractor [B 3.1] Review Model • Erection Engineer [B 4.1] Review Bid Model • Erector [B 5.1] Review Bid Model • Fabricator [B 6.1] Review Bid Model

Type	Activity
Name	[B 7.2] Evaluate Detailing
Project Phase	Pre Construction Planning / Detailing
Description	The General Contractor coordinates collaboration meetings or exchanges with the Erection Engineer, Fabricator, Detailer and Erector to suggest changes, additions, and clarifications to “Bid Model” that will be incorporated into the Contractor’s Planning Model. The Detailer may be designated by the General Contractor or Fabricator to prepare the Contractor Planning Model that GC submits to Owner.
Models	None
Documents Sent	Sent/Received: Bidirectional “Model Changes” to the General Contractor Sent/Received: Bidirectional “Model Changes” to the Erection Engineer Sent/Received: Bidirectional “Model Changes” to the Erector

	Sent/Received: Bidirectional “Model Changes” to the Fabricator
Messages	None
Related	<ul style="list-style-type: none"> • General Contractor [B 3.2] Conduct Preliminary Erection Study and Decide Model Changes • Erection Engineer [B 4.2] Conduct Preliminary Erection Study • Erector [B 5.2] Conduct Preliminary Erection Study • Fabricator [B 6.2} Evaluate Fabrication

Type	Activity
Name	[B 7.3] Prepare and Submit Shop Drawings for Owner acceptance
Project Phase	Pre Construction Planning/Detailing
Description	Once notification of acceptance of the Contractor’s Planning Model is received, the Detailer can complete shop drawings and submit to Owner through the General Contractor for acceptance.
Models	None
Documents	Sent/Received: Shop Drawings. When Shop drawings are accepted by Owner, they are distributed to the various actors including Erection Engineer and Erector so they can complete their planning activities and initiate steel erection.
Messages	Received: “Notification of Shop Drawings Approval.”

Exchange Models

1. Bid Model

The Exchange Model provided by the Owner to General Contractor during the Bidding and Letting Phase. This model will then be passed to the

2. Contractor's planning model

Exchange Requirement

1. Bid Model: Contractor to Erection Engineering

The exchange requirements that erection engineer and erector need to accurately produce a bid. See Excel document "BrIM_EMSpec_Bid Model 2017 03 28"

2. Contractor's planning model: Contractor to Erection Engineering

The exchange requirements that erection engineer and erector need to accurately produce a bid. See Excel document "BrIM_EMSpec_Contractor's Planning Model 2017 03 28"