
Code of Standard Practice for Steel Buildings and Bridges

March 18, 2005

Supersedes the March 7, 2000 AISC *Code of Standard Practice for Steel Buildings and Bridges* and all previous versions.

Prepared by the American Institute of Steel Construction, Inc. under the direction of the AISC Committee on the Code of Standard Practice and issued by the AISC Board of Directors.



AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

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PREFACE

As in any industry, trade practices have developed among those that are involved in the design, purchase, fabrication and erection of structural steel. This Code provides a useful framework for a common understanding of the acceptable standards when contracting for structural steel. As such, it is useful for owners, architects, engineers, general contractors, construction managers, fabricators, steel detailers, erectors and others that are associated with construction in structural steel. Unless specific provisions to the contrary are contained in the contract documents, the existing trade practices that are contained herein are considered to be the standard custom and usage of the industry and are thereby incorporated into the relationships between the parties to a contract.

The Symbols and Glossary are an integral part of this Code. In many sections of this Code, a non-mandatory Commentary has been prepared to provide background and further explanation for the corresponding Code provisions. The user is encouraged to consult it.

Since the first edition of this Code was published in 1924, AISC has continuously surveyed the structural steel design community and construction industry to determine standard trade practices. Since then, this Code has been periodically updated to reflect new and changing technology and industry practices.

The 2000 edition was the fifth complete revision of this Code since it was first published. The 2005 edition is not a complete revision but does add several important changes and updates. It is the result of the deliberations of a fair and balanced Committee, the membership of which included six structural engineers, two architects, one code official, one general contractor, eight fabricators, one steel detailer, three erectors, two inspectors, and one attorney. The following changes have been made in this revision:

- The intent of Section 1.1 has been clarified with additional Commentary.
- Section 1.5.2 has been modified to better address Owner-established performance criteria.
- The intent of the first sentence in Section 1.8.2 has been clarified.
- The order of paragraphs in Section 3.3 has been reversed to highlight that discovered discrepancies must be reported for resolution.
- The requirements in Section 3.4 for scale of design drawings have been modified.
- A requirement has been added in Section 4.2 for identification of Shop and Erection Drawings. Additionally, a paragraph has been added in the Commentary to this section addressing the use of independent detailing services, and the paragraph addressing the submittal schedule has been modified.
- A paragraph has been added to the Commentary in Section 4.4 addressing Shop and Erection Drawings that are approved subject to corrections noted, as well as Shop and Erection Drawings that are not approved.

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- Coverage has been added of the RFI process in Section 4.6. Concurrently, explicit mention of RFIs has been added in Sections 3.5 and 4.4.2. Additionally, definitions have been added in the Glossary of the terms RFI, Clarification and Revision.
- The requirements for material identification have been modified in Section 6.1. Compatible modifications have also been made in Section 5.1.1.
- The requirements in Section 6.4.5 have been expanded to address fabricated trusses specified without camber. Compatible additions have been made in Sections 7.3.1.2(g) and (h).
- Section 7.4 has been modified to change “building lines” to “lines”.
- The Established Column Line definition in the Glossary has been changed, the definition of the term Column Line has been changed, and the usage of these terms in Section 7.5.1 has been changed for consistency with these definitions.
- Additional Commentary has been provided in Section 7.10.1 to illustrate the required description of the lateral load resisting system.
- Explicit mention of Erection Bracing Drawings has been added in the Commentary to Section 7.10.3.
- The intent of Section 8.5.5 has been clarified.
- Item 9.2.2(d) has been modified to change “detailed overall length” to “overall length”.
- Appendix A has been added to explicitly allow the user of this Code to choose to use electronic means for the exchange of project information.

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GLOSSARY

The following terms are used in this Code. Where used, they are capitalized to alert the user that the term is defined in this Glossary.

AASHTO. American Association of State Highway and Transportation Officials.

Adjustable Items. See Section 7.13.1.3.

AESS. See Architecturally Exposed Structural Steel.

AISC. American Institute of Steel Construction, Inc.

Anchor Bolt. See Anchor Rod.

Anchor Rod. A mechanical device that is either cast or drilled and chemically adhered, grouted or wedged into concrete and/or masonry for the purpose of the subsequent attachment of Structural Steel.

Anchor-Rod Group. A set of Anchor Rods that receives a single fabricated Structural Steel shipping piece.

ANSI. American National Standards Institute.

Architect. The entity that is professionally qualified and duly licensed to perform architectural services.

Architecturally Exposed Structural Steel. See Section 10.

AREMA. American Railway Engineering and Maintenance of Way Association.

ASME. American Society of Mechanical Engineers.

ASTM. American Society for Testing and Materials.

AWS. American Welding Society.

Bearing Devices. Shop-attached base and bearing plates, loose base and bearing plates and leveling devices, such as leveling plates, leveling nuts and washers and leveling screws.

CASE. Council of American Structural Engineers.

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Clarification. An interpretation, of the Design Drawings or Specifications that have been Released for Construction, made in response to an RFI or a note on an approval drawing and providing an explanation that neither revises the information that has been Released for Construction nor alters the cost or schedule of performance of the work.

the Code, this Code. This document, the AISC *Code of Standard Practice for Steel Buildings and Bridges* as adopted by the American Institute of Steel Construction, Inc.

Column line. The grid line of column centers set in the field based on the dimensions shown on the structural design drawings and using the building layout provided by the Owners Designated Representative for Construction. Column offsets are taken from the column line. The column line may be straight or curved as shown in the structural design drawings.

Connection. An assembly of one or more joints that is used to transmit forces between two or more members and/or connection elements.

Contract Documents. The documents that define the responsibilities of the parties that are involved in bidding, fabricating and erecting Structural Steel. These documents normally include the Design Drawings, the Specifications and the contract.

Design Drawings. The graphic 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.

Embedment Drawings. Drawings that show the location and placement of items that are installed to receive Structural Steel.

EOR. See Structural Engineer of Record.

Engineer. See Structural Engineer of Record.

Engineer of Record. See Structural Engineer of Record.

Erection Bracing Drawings. Drawings that are prepared by the Erector to illustrate the sequence of erection, any requirements for temporary supports and the requirements for raising, bolting and/or welding. These drawings are in addition to the Erection Drawings.

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.

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Erector. The entity that is responsible for the erection of the Structural Steel.

Established Column Line. The actual field line that is most representative of the erected column centers along a line of columns placed using the dimensions shown in the structural Design Drawings and the lines and bench marks established by the Owner's Designated Representative for Construction, to be used in applying the erection tolerances given in this Code for column shipping pieces.

Fabricator. The entity that is responsible for fabricating the Structural Steel.

Hazardous Materials. Components, compounds or devices that are either encountered during the performance of the contract work or incorporated into it containing substances that, notwithstanding the application of reasonable care, present a threat of harm to persons and/or the environment.

Inspector. The Owner's testing and inspection agency.

MBMA. Metal Building Manufacturers Association.

Mill Material. Steel mill products that are ordered expressly for the requirements of a specific project.

Owner. The entity that is identified as such in the Contract Documents.

Owner's Designated Representative for Construction. 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 similar authority at the job site.

Owner's Designated Representative for Design. 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.

Plans. See Design Drawings.

RCSC. Research Council on Structural Connections.

Released for Construction. The term that describes the status of Contract Documents that are in such a condition that the Fabricator and the Erector can rely upon them for the performance of their work, including the ordering of material and the preparation of Shop and Erection Drawings.

Revision. An instruction or directive providing information that differs from information that has been Released for Construction. A Revision may, but does not always, impact the cost or schedule of performance of the work.

RFI. A written request for information or clarification generated during the construction phase of the project.

SER. See Structural Engineer of Record.

Shop Drawings. Drawings of the individual Structural Steel shipping pieces that are to be produced in the fabrication shop.

SJI. Steel Joist Institute.

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

SSPC. SSPC: The Society for Protective Coatings, which was formerly known as the Steel Structures Painting Council.

Standard Structural Shapes. Hot-rolled W-, S-, M- and HP-shapes, channels and angles listed in ASTM A6/A6M; structural tees split from the hot-rolled W-, S- and M-shapes listed in ASTM A6/A6M; hollow structural sections produced to ASTM A500, A501, A618 or A847; and, steel pipe produced to ASTM A53/A53M.

Steel Detailer. The entity that produces the Shop and Erection Drawings.

Structural Engineer of Record. 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.

Structural Steel. The elements of the structural frame as given in Section 2.1.

Tier. The Structural Steel framing defined by a column shipping piece.

Weld Show-Through. In Architecturally Exposed Structural Steel, visual indication of the presence of a weld or welds on the side of the member opposite the weld.

CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES

March 7, 2000

SECTION 1. GENERAL PROVISIONS

1.1. Scope

In the absence of specific instructions to the contrary in the Contract Documents, the trade practices that are defined in this Code shall govern the fabrication and erection of Structural Steel.

Commentary:

The practices defined in this Code are the commonly accepted standards of custom and usage for Structural Steel fabrication and erection, which generally represent the most efficient approach. This Code is not intended to define a professional standard of care for the Owners Designated Representative for Design, change the duties and responsibilities of the Owner, Contractor, Architect or Structural Engineer from those set forth in the Contract Documents, or assign to the Owner, Architect or Structural Engineer any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

This Code is not applicable to steel joists or metal building systems, which are addressed by SJI and MBMA, respectively.

1.2. Referenced Specifications, Codes and Standards

The following documents are referenced in this Code:

AASHTO Specification—The 2004 AASHTO *LRFD Bridge Design Specifications*, 3rd Edition, with interims, or the 2002 AASHTO *Standard Specifications for Highway Bridges*, 17th Edition, with interims.

AISC Manual of Steel Construction—The AISC *Manual of Steel Construction*, 13th Edition.

AISC Seismic Provisions—The AISC *Seismic Provisions for Structural Steel Buildings*, March 9, 2005.

AISC Specification—The AISC *Specification for Structural Steel Buildings*, March 9, 2005.

ANSI/ASME B46.1—ANSI/ASME B46.1-95, Surface Texture (Surface Roughness, Waviness and Lay).

AREMA Specification—The 1999 AREMA *Manual for Railway Engineering, Volume II—Structures, Chapter 15*.

ASTM A6/A6M—04a, *Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling*.

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- ASTM A53/A53M—02, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.*
- ASTM A325—04, *Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.*
- ASTM A325M—04, *Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric).*
- ASTM A490—04, *Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.*
- ASTMA490M—04, *Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).*
- ASTM A500—03a, *Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.* No metric equivalent exists.
- ASTM A501—01, *Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.* No metric equivalent exists.
- ASTM A618—04, *Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.* No metric equivalent exists.
- ASTM A847—99a(2003), *Standard Specification for Cold-Formed Welded and Seamless High-Strength, Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.* No metric equivalent exists.
- ASTM F1852/F1852M—04, *Standard Specification for "Twist-Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.*
- AWS D1.1—The AWS D1.1 *Structural Welding Code—Steel*, 2004.
- CASE Document 11—*An Agreement Between Structural Engineer of Record and Contractor for Transfer of Computer Aided Drafting (CAD) files on Electronic Media*, 2000
- CASE Document 962—*The National Practice Guidelines for the Structural Engineer of Record*, Fourth Edition, 2000.
- RCSC Specification—*The Specification for Structural Joints Using ASTM A325 or A490 Bolts*, 2004.
- SSPC SP2—SSPC *Surface Preparation Specification No. 2, Hand Tool Cleaning*, 2004.
- SSPC SP6—SSPC *Surface Preparation Specification No. 6, Commercial Blast Cleaning*, 2004.

1.3. Units

In this Code, the values stated in either U.S. customary units or metric units shall be used. Each system shall be used independently of the other.

Commentary:

In this Code, dimensions, weights and other measures are given in U.S. customary units with rounded or rationalized metric-unit equivalents in

brackets. Because the values stated in each system are not exact equivalents, the selective combination of values from each of the two systems is not permitted.

1.4. Design Criteria

For buildings, in the absence of other design criteria, the provisions in the AISC Specification shall govern the design of the Structural Steel. For bridges, in the absence of other design criteria, the provisions in the AASHTO Specification and AREMA Specification shall govern the design of the Structural Steel, as applicable.

1.5. Responsibility for Design

- 1.5.1. When the Owner's Designated Representative for Design provides the design, Design Drawings and Specifications, the Fabricator and the Erector are not responsible for the suitability, adequacy or building-code conformance of the design.
- 1.5.2. When the Owner enters into a direct contract with the Fabricator to both design and fabricate an entire, completed steel structure, the Fabricator shall be responsible for the suitability, adequacy, conformance with Owner-established performance criteria, and building-code conformance of the Structural Steel design. The Owner shall be responsible for the suitability, adequacy and building-code conformance of the non-Structural Steel elements and shall establish the performance criteria for the Structural Steel frame.

1.6. Patents and Copyrights

The entity or entities that are responsible for the specification and/or selection of proprietary structural designs shall secure all intellectual property rights necessary for the use of those designs.

1.7. Existing Structures

- 1.7.1. Demolition and shoring of any part of an existing structure are not within the scope of work that is provided by either the Fabricator or the Erector. Such demolition and shoring shall be performed in a timely manner so as not to interfere with or delay the work of the Fabricator and the Erector.
- 1.7.2. Protection of an existing structure and its contents and equipment, so as to prevent damage from normal erection processes, is not within the scope of work that is provided by either the Fabricator or the Erector. Such protection shall be performed in a timely manner so as not to interfere with or delay the work of the Fabricator or the Erector.

- 1.7.3. Surveying or field dimensioning of an existing structure is not within the scope of work that is provided by either the Fabricator or the Erector. Such surveying or field dimensioning, which is necessary for the completion of Shop and Erection Drawings and fabrication, shall be performed and furnished to the Fabricator in a timely manner so as not to interfere with or delay the work of the Fabricator or the Erector.
- 1.7.4. Abatement or removal of Hazardous Materials is not within the scope of work that is provided by either the Fabricator or the Erector. Such abatement or removal shall be performed in a timely manner so as not to interfere with or delay the work of the Fabricator and the Erector.

1.8. Means, Methods and Safety of Erection

- 1.8.1. The Erector shall be responsible for the means, methods and safety of erection of the Structural Steel frame.
- 1.8.2. The Structural Engineer of Record shall be responsible for the structural adequacy of the design of the structure in the completed project. The Structural Engineer of Record shall not be responsible for the means, methods and safety of erection of the Structural Steel frame. See also Sections 3.1.4 and 7.10.

SECTION 2. CLASSIFICATION OF MATERIALS

2.1. Definition of Structural Steel

Structural Steel shall consist of the elements of the structural frame that are shown and sized in the structural Design Drawings, essential to support the design loads and described as:

- Anchor Rods that will receive Structural Steel.
- Base plates.
- Beams, including built-up beams, if made from Standard Structural Shapes and/or plates.
- Bearing plates.
- Bearings of steel for girders, trusses or bridges.
- Bracing, if permanent.
- Canopy framing, if made from Standard Structural Shapes and/or plates.
- Columns, including built-up columns, if made from Standard Structural Shapes and/or plates.
- Connection materials for framing Structural Steel to Structural Steel.
- Crane stops, if made from Standard Structural Shapes and/or plates.
- Door frames, if made from Standard Structural Shapes and/or plates and if part of the Structural Steel frame.
- Edge angles and plates, if attached to the Structural Steel frame or steel (open-web) joists.
- Embedded Structural Steel parts, other than bearing plates, that will receive Structural Steel.
- Expansion joints, if attached to the Structural Steel frame.
- Fasteners for connecting Structural Steel items: permanent shop bolts, nuts and washers; shop bolts, nuts and washers for shipment; field bolts, nuts and washers for permanent Connections; and, permanent pins.
- Floor-opening frames, if made from Standard Structural Shapes and/or plates and attached to the Structural Steel frame or steel (open-web) joists.
- Floor plates (checkered or plain), if attached to the Structural Steel frame.
- Girders, including built-up girders, if made from Standard Structural Shapes and/or plates.
- Girts, if made from Standard Structural Shapes.
- Grillage beams and girders.
- Hangers, if made from Standard Structural Shapes, plates and/or rods and framing Structural Steel to Structural Steel.
- Leveling nuts and washers.
- Leveling plates.
- Leveling screws.
- Lintels, if attached to the Structural Steel frame.
- Marquee framing, if made from Standard Structural Shapes and/or plates.

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Machinery supports, if made from Standard Structural Shapes and/or plates and attached to the Structural Steel frame.
 Monorail elements, if made from Standard Structural Shapes and/or plates and attached to the Structural Steel frame.
 Posts, if part of the Structural Steel frame.
 Purlins, if made from Standard Structural Shapes.
 Relieving angles, if attached to the Structural Steel frame.
 Roof-opening frames, if made from Standard Structural Shapes and/or plates and attached to the Structural Steel frame or steel (open-web) joists.
 Roof-screen support frames, if made from Standard Structural Shapes.
 Sag rods, if part of the Structural Steel frame and connecting Structural Steel to Structural Steel.
 Shear stud connectors, if specified to be shop attached.
 Shims, if permanent.
 Struts, if permanent and part of the Structural Steel frame.
 Tie rods, if part of the Structural Steel frame.
 Trusses, if made from Standard Structural Shapes and/or built-up members.
 Wall-opening frames, if made from Standard Structural Shapes and/or plates and attached to the Structural Steel frame.
 Wedges, if permanent.

Commentary:

The Fabricator normally fabricates the items listed in Section 2.1. Such items must be shown, sized and described in the structural Design Drawings. Bracing includes vertical bracing for resistance to wind and seismic load and structural stability, horizontal bracing for floor and roof systems and permanent stability bracing for components of the Structural Steel frame.

2.2. Other Steel, Iron or Metal Items

Structural Steel shall not include other steel, iron or metal items that are not generally described in Section 2.1, even where such items are shown in the structural Design Drawings or are attached to the Structural Steel frame. Other steel, iron or metal items include but are not limited to:

Bearings, if non-steel.
 Cables for permanent bracing or suspension systems.
 Castings.
 Catwalks.
 Chutes.
 Cold-formed steel products.
 Cold-rolled steel products, except those that are specifically covered in the AISC Specification.
 Corner guards.

Crane rails, splices, bolts and clamps.
 Crane stops, if not made from Standard Structural Shapes or plates.
 Door guards.
 Embedded steel parts, other than bearing plates, that do not receive Structural Steel or that are embedded in precast concrete.
 Expansion joints, if not attached to the Structural Steel frame.
 Flagpole support steel.
 Floor plates (checkered or plain), if not attached to the Structural Steel frame.
 Forgings.
 Gage-metal products.
 Grating.
 Handrail.
 Hangers, if not made from Standard Structural Shapes, plates and/or rods or not framing Structural Steel to Structural Steel.
 Hoppers.
 Items that are required for the assembly or erection of materials that are furnished by trades other than the Fabricator or Erector.
 Ladders.
 Lintels, if not attached to the Structural Steel frame.
 Masonry anchors.
 Miscellaneous metal.
 Ornamental metal framing.
 Pressure vessels.
 Reinforcing steel for concrete or masonry.
 Relieving angles, if not attached to the Structural Steel frame.
 Roof screen support frames, if not made from Standard Structural Shapes.
 Safety cages.
 Shear stud connectors, if specified to be field installed.
 Stacks.
 Stairs.
 Steel deck.
 Steel (open-web) joists.
 Steel joist girders.
 Tanks.
 Toe plates.
 Trench or pit covers.

Commentary:

Section 2.2 includes many items that may be furnished by the Fabricator if contracted to do so by specific notation and detail in the Contract Documents. When such items are contracted to be provided by the Fabricator, coordination will normally be required between the Fabricator and other material suppliers

and trades. The provisions in this Code are not intended to apply to items in Section 2.2.

In previous editions of this Code, provisions regarding who should normally furnish field-installed shear stud connectors and cold-formed steel deck support angles were included in Section 7.8. These provisions have been eliminated since field-installed shear stud connectors and steel deck support angles are not defined as Structural Steel in this Code.

SECTION 3. DESIGN DRAWINGS AND SPECIFICATIONS

3.1. Structural Design Drawings and Specifications

Unless otherwise indicated in the Contract Documents, the structural Design Drawings shall be based upon consideration of the design loads and forces to be resisted by the Structural Steel frame in the completed project.

The structural Design Drawings shall clearly show the work that is to be performed and shall give the following information with sufficient dimensions to accurately convey the quantity and nature of the Structural Steel to be fabricated:

- (a) The size, section, material grade and location of all members;
- (b) All geometry and working points necessary for layout;
- (c) Floor elevations;
- (d) Column centers and offsets;
- (e) The camber requirements for members; and,
- (f) The information that is required in Sections 3.1.1 through 3.1.6.

The Structural Steel Specification shall include any special requirements for the fabrication and erection of the Structural Steel.

The structural Design Drawings, Specifications and addenda shall be numbered and dated for the purposes of identification.

Commentary:

Contract Documents vary greatly in complexity and completeness. Nonetheless, the Fabricator and the Erector must be able to rely upon the accuracy and completeness of the Contract Documents. This allows the Fabricator and the Erector to provide the Owner with bids that are adequate and complete. It also enables the preparation of the Shop and Erection Drawings, the ordering of materials and the timely fabrication and erection of shipping pieces.

In some cases, the Owner can benefit when reasonable latitude is allowed in the Contract Documents for alternatives that can reduce cost without compromising quality. However, critical requirements that are necessary to protect the Owner's interest, that affect the integrity of the structure or that are necessary for the Fabricator and the Erector to proceed with their work must be included in the Contract Documents. Some examples of critical information include:

Standard specifications and codes that govern Structural Steel design and construction, including bolting and welding.

Material specifications.

Special material requirements to be reported on the certified mill test reports.

Welded-joint configuration.

Weld-procedure qualification.
 Special requirements for work of other trades.
 Final disposition of backing bars and runoff tabs.
 Lateral bracing.
 Stability bracing.
 Connections or data for Connection selection and/or completion.
 Restrictions on Connection types.
 Column stiffeners (also known as continuity plates).
 Column web doubler plates.
 Bearing stiffeners on beams and girders.
 Web reinforcement.
 Openings for other trades.
 Surface preparation and shop painting requirements.
 Shop and field inspection requirements.
 Non-destructive testing requirements, including acceptance criteria.
 Special requirements on delivery.
 Special erection limitations.
 Identification of non-Structural Steel elements that interact with the
 Structural Steel frame to provide for the lateral stability of the
 Structural Steel frame (see Section 3.1.4).
 Column differential shortening information.
 Special fabrication and erection tolerances for AESS.
 Special pay-weight provisions.

- 3.1.1. Permanent bracing, column stiffeners, column web doubler plates, bearing stiffeners in beams and girders, web reinforcement, openings for other trades and other special details, where required, shall be shown in sufficient detail in the structural Design Drawings so that the quantity, detailing and fabrication requirements for these items can be readily understood.
- 3.1.2. The Owner's Designated Representative for Design shall either show the complete design of the Connections in the structural Design Drawings or allow the Fabricator to select or complete the Connection details while preparing the Shop and Erection Drawings. When the Fabricator is allowed to select or complete the Connection details, the following information shall be provided in the structural Design Drawings:
- (a) Any restrictions on the types of Connections that are permitted;
 - (b) Data concerning the loads, including shears, moments, axial forces and transfer forces, that are to be resisted by the individual members and their Connections, sufficient to allow the Fabricator to select or complete the Connection details while preparing the Shop and Erection Drawings;
 - (c) Whether the data required in (b) is given at the service-load level or the factored-load level; and,

- (d) Whether LRFD or ASD is to be used in the selection or completion of Connection details.

When the Fabricator selects or completes the Connection details, the Fabricator shall utilize the requirements in the AISC Specification and the Contract Documents and submit the Connection details to the Owner's Designated Representative for Design for approval.

Commentary:

When the Owner's Designated Representative for Design shows the complete design of the Connections in the structural Design Drawings, the following information is included:

- (a) All weld sizes and lengths;
- (b) All bolt sizes, locations, quantities and grades;
- (c) All plate and angle sizes, thicknesses and dimensions; and,
- (d) All work point locations and related information.

The intent of this approach is that complete information necessary for Connection detailing, fabrication and erection is shown in the structural Design Drawings. The Steel Detailer will then be able to transfer this information to the Shop and Erection Drawings, applying it to the individual pieces being detailed.

When the Owner's Designated Representative for Design allows the Fabricator to select or complete the Connections, this is commonly done by referring to tables in the Contract Documents or in the AISC Manual of Steel Construction, or by schematically showing the types of Connections required in the structural Design Drawings. The Steel Detailer will then configure the Connections based upon the design loads and other information given in the structural Design Drawings. If the desired Connection is not covered in those tables, a detail of the "special" Connection should be contained in the structural Design Drawings. This detail should provide such information as weld sizes, plate thicknesses and quantities of bolts. However, there may be some geometry and dimensional information that the Steel Detailer must develop. The intent of this method is that the Steel Detailer will select the Connection materials and configuration from the referenced tables or complete the specific Connection configuration (i.e. dimensions, edge distances and bolt spacing) based upon the Connection details that are shown in the structural Design Drawings.

This method will require the skill of an experienced Steel Detailer, who is familiar with the AISC requirements for Connection configurations, capable and experienced in the use of the Connection tables in the AISC Manual of Steel Construction and capable of calculating dimensions and adapting a typical Connection detail to similar situations. Notations of loadings in the structural Design Drawings are only to facilitate selection of the Connections from the

referenced tables. It is not the intent of this method that the Steel Detailer practice engineering.

If there are any restrictions as to the types of Connections to be used, particularly as it relates to simple shear Connections, it is required that these limitations be set forth in the structural Design Drawings and Specifications. There are a variety of Connections available in the AISC Manual of Steel Construction for a given situation. Preference for a particular type will vary between Fabricators and Erectors. Stating these limitations, if any, in the structural Design Drawings and Specifications will help to avoid repeated changes to the Shop and Erection Drawings due to the selection of a Connection that is not acceptable to the Owner's Designated Representative for Design, thereby avoiding additional cost and/or delay for the redrawing of the Shop and Erection Drawings.

The structural Design Drawings must indicate the method of design used as LRFD or ASD. In order to conform to the spirit of the AISC Specification, the Connections must be selected using the same method and the corresponding references.

- 3.1.3. When leveling plates are to be furnished as part of the contract requirements, their locations and required thickness and sizes shall be specified in the Contract Documents.
- 3.1.4. When the Structural Steel frame, in the completely erected and fully connected state, requires interaction with non-Structural Steel elements (see Section 2) for strength and/or stability, those non-Structural Steel elements shall be identified in the Contract Documents as required in Section 7.10.

Commentary:

Examples of non-Structural Steel elements include diaphragms made of steel deck, diaphragms made of concrete on steel deck and masonry and/or concrete shear walls.

- 3.1.5. When camber is required, the magnitude, direction and location of camber shall be specified in the structural Design Drawings.

Commentary:

For cantilevers, the specified camber may be up or down, depending upon the framing and loading.

- 3.1.6. Specific members or portions thereof that are to be left unpainted shall be identified in the Contract Documents. When shop painting is required, the painting requirements shall be specified in the Contract Documents, including the following information:

- (a) The identification of specific members or portions thereof to be painted;
- (b) The surface preparation that is required for these members;
- (c) The paint specifications and manufacturer's product identification that are required for these members; and,
- (d) The minimum dry-film shop-coat thickness that is required for these members.

Commentary:

Some members or portions thereof may be required to be left unpainted, such as those that will be in contact and acting compositely with concrete, or those that will receive spray-applied fire protection materials.

3.2. Architectural, Electrical and Mechanical Design Drawings and Specifications

All requirements for the quantities, sizes and locations of Structural Steel shall be shown or noted in the structural Design Drawings. The use of architectural, electrical and/or mechanical Design Drawings as a supplement to the structural Design Drawings is permitted for the purposes of defining detail configurations and construction information.

3.3. Discrepancies

When discrepancies exist between the Design Drawings and Specifications, the Design Drawings shall govern. When discrepancies exist between scale dimensions in the Design Drawings and the figures written in them, the figures shall govern. When discrepancies exist between the structural Design Drawings and the architectural, electrical or mechanical Design Drawings or Design Drawings for other trades, the structural Design Drawings shall govern.

When a discrepancy is discovered in the Contract Documents in the course of the Fabricator's work, the Fabricator shall promptly notify the Owner's Designated Representative for Construction so that the discrepancy can be resolved by the Owner's Designated Representative for Design. Such resolution shall be timely so as not to delay the Fabricator's work. See Sections 3.5 and 9.3.

Commentary:

While it is the Fabricator's responsibility to report any discrepancies that are discovered in the Contract Documents, it is not the Fabricator's responsibility to discover discrepancies, including those that are associated with the coordination of the various design disciplines. The quality of the Contract Documents is the responsibility of the entities that produce those documents.

3.4. Legibility of Design Drawings

Design Drawings shall be clearly legible and drawn to an identified scale that is appropriate to clearly convey the information.

Commentary:

Historically, the most commonly accepted scale for structural steel plans has been 1/8 in. per ft [10 mm per 1 000 mm]. There are, however, situations where a smaller or larger scale is appropriate. Ultimately, consideration must be given to the clarity of the drawing.

The scaling of the Design Drawings to determine dimensions is not an accepted practice for detailing the Shop and Erection Drawings. However, it should be remembered when preparing Design Drawings that scaling may be the only method available when early-submission drawings are used to determine dimensions for estimating and bidding purposes.

3.5. Revisions to the Design Drawings and Specifications

Revisions to the Design Drawings and Specifications shall be made either by issuing new Design Drawings and Specifications or by reissuing the existing Design Drawings and Specifications. In either case, all Revisions, including Revisions that are communicated through responses to RFIs or the annotation of Shop and/or Erection Drawings (see Section 4.4.2), shall be clearly and individually indicated in the Contract Documents. The Contract Documents shall be dated and identified by Revision number. Each Design Drawing shall be identified by the same drawing number throughout the duration of the project, regardless of the Revision. See also Section 9.3.

Commentary:

Revisions to the Design Drawings and Specifications can be made by issuing sketches and supplemental information separate from the Design Drawings and Specifications. These sketches and supplemental information become amendments to the Design Drawings and Specifications and are considered new Contract Documents. All sketches and supplemental information must be uniquely identified with a number and date as the latest instructions until such time as they may be superseded by new information.

When revisions are made by revising and re-issuing the existing structural Design Drawings and/or Specifications, a unique revision number and date must be added to those documents to identify that information as the latest instructions until such time as they may be superseded by new information. The same unique drawing number must identify each Design Drawing throughout the duration of the project so that revisions can be properly tracked, thus avoiding confusion and miscommunication among the various entities involved in the project.

When revisions are communicated through the annotation of Shop or Erection Drawings or contractor submissions, such changes must be confirmed in writing by one of the aforementioned methods. This written confirmation is imperative to maintain control of the cost and schedule of a project and to avoid potential errors in fabrication.