

## SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for list specific assemblies, miscellaneous steel fabrications and other metal items not defined as structural steel.
2. Section 09 91 13 "Exterior Painting", Section 09 91 23 "Interior Painting," and Section 09 96 00 "High-Performance Coatings" for surface preparation and priming requirements.

#### 1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame as described in ANSI/AISC 303 and indicated on the Structural Drawings.
- B. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the seismic force resisting system and as indicated as "demand critical" on Drawings.

#### 1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Before fabrication, review structural steel and examine procedures for ensuring quality of installation.
  2. Required representative of each entity directly concerned with structural steel to attend, including the following:
    - a. Contractor's superintendent.
    - b. Owner's Representative.
    - c. Architect/Engineer.
    - d. Fabricator.
    - e. Erector.

- f. Installers whose work interfaces or is supported by structural steel.
- 3. Review sequencing, general, quality assurance and submittal requirements, fabrication and shop finishing, erection, erection aid removal, leveling and plumbing, and items being directly attached to structural steel.
  - a. Review protection for items scheduled to remain exposed.
  - b. Review corrective measures and repair materials, including for shop primer and galvanized coatings.

## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural steel.
  - 1. Requirements:
    - a. The steel detailer shall generate all Shop Drawing fabrication and installation details from the Contract Documents, including both Structural and Architectural Drawings (collectively referred to as Drawings) and the Specifications.
    - b. The use of, reproductions or photocopies of the Drawings is not permitted.
    - c. Shop Drawings shall contain sufficient detail and information for complete fabrication and erection without reference to the Drawings either in fabrication or in erection on-site.
    - d. Where CAD, REVIT or other digital files are provided, it is the responsibility of the detailer to remove all information not directly relevant to the creation of Shop Drawings including the removal all references to files sources.
    - e. Resubmittals: Clearly identify all revisions to previous submittals.
      - 1) Draw clouded outlines (revision clouds) around revised items or areas of individual sheets.
      - 2) Information outside of revision clouds will not be reviewed.
  - 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 3. Include embedment drawings.
  - 4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
    - a. Indicate weld finishing for exposed welds.
  - 5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 6. Identify members not to be shop primed.
  - 7. Show orientation of hollow structural steel members that are exposed to view for locating seams.
    - a. Seams are to be oriented away from primary view.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs):
  - 1. Provide in accordance with AWS D1.1 for each welded joint qualified by testing, including the following:
    - a. Power source (constant current or constant voltage).
    - b. For heavy sections, applicable manufacturer's certifications that the filler metal meets the supplemental notch toughness requirements, as applicable.

- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. If requested, include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates.
- F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- G. Mill test reports for structural steel materials, including chemical and physical properties.
- H. Product Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
  - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 2. Shop primers.
  - 3. Grout.
- I. Source quality-control test reports.
- J. Field quality-control test reports.
- K. Surveys: Submit certified copies of each survey conducted by a registered land surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel, and final elevations and locations for major members. Indicate discrepancies between actual installation and Contract Documents.
- L. Quality Assurance Agency Documents: The Agency responsible for quality assurance for members part of the SFRS shall submit QA documents as outlined in AISC 341 Chapter J.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: ~~A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).~~ A fabricator with minimum 5 years' experience in fabrication and erection of similar size and structure required for this Project and acceptable to Owner and Architect, with documented successful in-service performance.
- B. Installer Qualifications: The installer shall have at least five years' experience in similar type and size of project.
- C. Shop-Painting Applicators: Qualified in accordance with AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1 and AWS D1.8 as applicable.
  - 1. Welding and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

- E. Inspection and Nondestructive Testing Personnel: Visual welding inspection, and NDT (including ultrasonic testing technicians) shall be conducted by personnel qualified in accordance with AWS D1.8.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with provisions of the following specifications and documents using the edition referenced in the applicable building code or current edition where no edition is referenced:
  - 1. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges"
  - 2. AISC 360 "Specification for Structural Steel Buildings"

### 2.2 STRUCTURAL-STEEL MATERIALS

- A. Structural Steel Shapes and Bars: Refer to the General Structural Notes.
- B. Welding Electrodes: Comply with AWS requirements and as indicated on Drawings.

### 2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 and A490 Bolts, Nuts, and Washers: ASTM F3125, Grade A325 and A490 respectively, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; with plain finish.
- B. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.

## 2.4 RODS

- A. Headed Anchor Rods: ASTM F1554, Grade 36 straight.
  1. Nuts: ASTM A563 heavy hex carbon steel.
  2. Plate Washers: ASTM A36 carbon steel.
  3. Washers: ASTM F436, Type 1, hardened carbon steel.
  4. Finish: Plain, Hot-dip zinc coating, ASTM A153, Class C where exposed to weather.

## 2.5 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for exterior and interior applications and a 30-minute working time.

## 2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
  1. Camber structural-steel members where indicated.
  2. Fabricate beams with rolling camber up.
  3. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel framing has been erected.
  4. Orient hollow section seams as confirmed in Shop Drawing submittal.
  5. Mark and match-mark materials for field assembly. Do not ~~permantely~~permanently mark surfaces that are exposed to view.
  6. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Re-Entrant Corners: Provide 1/2-inch radius at all re-entrant corners, unless noted otherwise.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.
- G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
  1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not enlarge holes by burning. Thermal cutting of holes is permitted with a surface roughness profile not exceeding 1,000 micro-inches as defined in ASME B46.1.

2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High Strength Bolts" for type of bolt and type of joint specified.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
  1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  2. Continuously seal joined members exposed to weather by continuous welds.
- C. Erection Connections: Place holes, plates, or other attachments required by the Erector so as not to interfere with or cause any other detrimental effect to structural members or their connections.

## 2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123.
  1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
  2. Weep holes shall be provided at exterior closed sections where moisture may accumulate. Sizes shall be in accordance with ASTM A123.
  3. Galvanize assemblies that are exposed to weather attached to structural-steel frame and located in exterior walls.
  4. Materials for galvanizing shall be geometrically suitable for galvanizing as specified in ASTM A384 and A385. For built-up members, assemblies shall be fabricated as required to limit warping and distortion.
- B. Bolts, nuts and washers, and iron and steel hardware components shall be galvanized by the hot-dip process in accordance with ASTM A153.
- C. Surface Preparation: Steel shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter: Clean steel in accordance with Steel Structures Painting Council (SSPC) SSPC-SP-6, "Commercial Blast Cleaning."
- D. Coating Requirements:
  1. Weight: The weight of the galvanized coating shall conform to Table 2 of ASTM A123 or Table 1 of ASTM A153, as appropriate.

2. Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible, and free from any defect that is detrimental to the stated end use of the coated article.
  - a. Determine the integrity of the coating by visual inspection and coating thickness measurements.
  - b. Where slip factors are required for slip-critical connections, these shall be obtained after galvanizing by suitable treatment of the faying surfaces in accordance with the latest edition of the Specification for Structural Joints Using ASTM A325 or A490 bolts as approved by the Research Council on Structural Connections of the Engineering Foundation.
3. Adhesion: The galvanized coating shall be sufficiently adherent to withstand normal handling during transport and erection.

E. Touch-Up and Repair

1. Mechanical Damage: Repair areas damaged by welding; flame cutting; or during handling, transport, or erection in accordance with ASTM A780 by one of the following methods:
  - a. Cold Galvanizing Compound (zinc-rich paint): Per Part 2, "Primer" Article, in accordance with ASTM A780, Annex A2.
    - 1) Spray- or brush-apply the touch-up paint in multiple coats to a dry film that matches the hot-dip galvanizing thickness. Provide minimum thickness of at least 6 mils (4 mils for material less than 1/4-inch thick). Apply a finish coat of aluminum paint to provide a color blend with the surrounding galvanizing.
    - 2) Verify coating thickness by measurements with a magnetic or electromagnetic gauge.
  - b. Zinc-Based Solder: In accordance with ASTM A780, Annex A1.
    - 1) Apply the zinc-based solder that matches the hot-dip galvanizing thickness. Provide a minimum thickness of 4 mils (3 mils for material less than 1/4-inch thick).
    - 2) Verify coating thickness by measurements with a magnetic or electromagnetic gauge.
  - c. Flame-Sprayed Zinc (metalizing): In accordance with ASTM A780, Annex A3.
    - 1) Apply sprayed zinc coating that matches the hot-dip galvanizing thickness with a minimum thickness of 4 mils (3 mils for material less than 1/4-inch thick).
2. Wet Storage Stain:
  - a. Remove any wet storage stain if formed and discovered prior to leaving the galvanizer's plant unless late pick up or acceptance of delivery has necessitated the material being stored in unfavorable conditions. Remove wet storage stain before installation so that premature failure of the coating will not occur. Remove wet storage stain as follows:
    - 1) Arrange the object so that their surfaces dry rapidly.

- 2) Remove light deposits by means of a stiff bristle (not wire) brush. Heavier deposits are to be removed by brushing with a 5 percent solution of sodium or potassium dichromate with the addition of 0.1 percent by volume of concentrated sulfuric acid. Apply with a stiff bristle brush, and leave for approximately 30 seconds before thoroughly rinsing and drying.
- 3) Alternatively, a proprietary product, which is intended for this purpose, may be used according to manufacturer's recommendations.
- 4) Check coating thickness in the affected areas to ensure that the zinc coating remaining after the removal of wet storage stain is sufficient to meet or exceed the requirements of the specification.

## 2.9 SHOP PRIMING

### A. Steel Primer(s):

1. Comply with Section 09 91 13 "Exterior Painting," Section 09 91 23 "Interior Painting," and Section 09 96 00 "High-Performance Coatings."
2. Shop Primer (SP): Fabricator's standard, fast-curing, lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
  - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
3. Water-Based Primer (WBP): Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
4. Epoxy Zinc-Rich Primer (ZRP): Complying with MPI#20 and compatible with topcoat.
5. High-Performance Primer (HP1 and HP2): See Section 09 96 00 "High-Performance Coatings."

### B. Galvanized-Steel Primer: Water-based, MPI #134.

1. Etching Cleaner: MPI#25, for galvanized steel.

### C. Galvanizing Repair Paint: ASTM A780 or DOD-P-21035A.

### D. Surface Preparation, Non-Galvanized: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 3, "Power Tool Cleaning":
  - a. Permanently concealed from view, except zinc-rich primers.
2. SSPC-SP 6 (WAB)/NACE WAB-3, "Commercial Blast Cleaning":
  - a. Permanently exposed to view.
  - b. Concealed items indicated to be epoxy zinc-rich primed.
  - c. Exterior, below-grade items.

### E. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner and in accordance with SSPC-SP 16.

### F. Shop prime steel surfaces except the following:



1. Surfaces embedded in and in direct contact with concrete, mortar or grout except at exterior. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Faying surfaces of slip-critical connections to be high-strength bolted.
  4. Galvanized surfaces unless indicated to be painted.
  5. Surfaces enclosed in interior construction, excluding steel in exterior walls and in contact with insulation.
- G. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils and thickness recommended by primer manufacturer. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
  3. Exterior, Permanently Exposed, Non-Galvanized Items: HP1.
    - a. Below-Grade: HP2 in contact with concrete or soil; extend 4-inches above grade.
  4. Exterior, Concealed, Non-Galvanized Items: ZRP, 5 mil.
  5. Exterior, Galvanized Items:
    - a. Indicated to be Painted: GP.
    - b. Not Painted: None.
  6. Interior, Permanently Exposed: SP, two coats, sand between coats.
  7. Interior, Permanently Concealed:
    - a. Above Grade (finished floor elevation): No primer required except in exterior walls.
      - 1) Where in exterior walls and in contact with insulation, prime with ZRP 3mil. Extend primer 2-inches into concrete.
    - b. Below Grade (finished floor elevations):
      - 1) Encased fully in concrete: No primer.
      - 2) In contact with aggregate and soil: HP2 and extend 2-inches each way into concrete encasements.

## 2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspection agency to inspect shop welds and high-strength bolted connections and tests, and to prepare test reports as indicated in the Drawings and in accordance with "Testing and Inspection" in Part 3.
- B. Fabrication Inspection: When approved by the Building Official, the Owner, and Engineer/Architect, full-time special inspection in the fabrication shop by the Owner's Testing Agency may be waived, subject to the following:
1. All shop inspection is provided by the Contractor, per the requirements herein, and is documented. Reports and test results are to be available for the Owner's Inspector to review.
  2. Periodic inspection by the Owner's Inspection Agency is allowed by the Fabricator.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
  - 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
  2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection, unless it conforms to the requirements of AISC 360 Specification Sections M2.2 and M2.5, and is approved by the Engineer/Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.
- G. Do not enlarge unfair holes in members by burning or using drift pins.
- H. Reaming: Light drifting will be permitted to draw the parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills, care being taken not to weaken the adjoining metal. If, in the judgement of the Engineer/Architect, the extent of the reaming is such that holes cannot be properly filled or accurately adjusted after reaming, the faulty member shall be discarded and replaced with a new one, and all costs and expenses resulting therefrom shall be paid by the Contractor.
- I. Cutting and Fitting: No cutting of sections, either flanges, webs, stems or angles shall be done by the Contractor without the consent of the Engineer/Architect, unless this cutting is particularly specified or shown on the drawings.
- J. Corrective Measures
1. Any errors in locations or inaccuracies in the setting of anchor bolts, base plates, bearing plates, or other items of attachment or support for steel work shall be reported to the Engineer/Architect, and shall be corrected in a manner subject to the approval of the Engineer/Architect.
  2. Any misfits due to errors in fabrication shall be reported immediately to the Engineer/Architect, along with proposed method of correction of same and Engineer/Architect approval obtained before proceeding with corrective measures.
  3. No members shall be cut or burned without specific approval in writing.
  4. Bolted or welded connections, joints, or fastenings, which are classified as defective in the opinion of the Engineer/Architect, shall be corrected by the Contractor in a manner subject to the Engineer/Architect's approval.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
- B. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs, unless noted otherwise, back gouge, and grind steel smooth.
  3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.
- C. Erection Connections, etc: Place holes, plates, or other attachments required by the Erector so as not to interfere with or cause any other detrimental effect to structural members or their connections.

### 3.5 FIELD QUALITY CONTROL

- A. All structural steel is subject to special inspection.
- B. Testing and Inspection Agency: Owner will engage a qualified independent testing and inspecting agency to provide inspection and required tests, and to prepare test reports as indicated in the Drawings.
- C. Testing and Inspecting Agency Requirements:
1. Special Inspector: Testing Agency shall provide qualified "Special Inspector" who will perform the inspection services.
  2. Testing agency will conduct and interpret tests, and state in each report whether test specimens comply with or deviate from requirements.
  3. Testing agency will notify the Owner and Engineer/Architect immediately of discrepancies in the work which are time-critical or affect the construction progress.
  4. Personnel inspecting connections part of the SFRS shall be qualified per AISC 341.
- D. Contractor Responsibilities Related to Shop and Field Inspections:
1. Maintain complete records of all quality control and testing performed by the Contractor.
  2. Furnish all electrical power, turning or moving of members, hoisting, staging, and other facilities required for inspection.
  3. Provide testing agency with access to places where structural steel work is being fabricated and erected so required inspection and testing can be accomplished.
  4. Correct deficiencies in, or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
  5. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.
  6. Grant Inspectors full authority to inspect all material and work that fails to conform in every respect to these specifications.
  7. When required by Engineer/Architect or Owner's Independent Testing Agency or Contractor's engaged inspection organization, make adequate platforms available to the Inspector for the purpose of checking high-strength bolts and welds. Scaffolding shall be provided to ensure safe performance of this operation.
- E. Shop and Field Tests and Inspections: Inspections and testing shall be performed as indicated in the Contract Documents. Additional requirements are as follows:
1. Bolted Connections: Inspect (and test as required) bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1.

- a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:
  - 1) Liquid Penetrant Inspection: ASTM E165.
  - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3) Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."
  - 4) Ultrasonic Inspection: ASTM E164.
- b. Provide testing and inspection of welds for all connections part of the SFRS in accordance with AISC 341 and AWS D1.8.

### 3.6 REPAIRS

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to no less than an equivalent thickness of galvanized finish and complying with ASTM A780.
- B. Touchup, Primers: Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-primed surfaces.
  1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup, Primers: Cleaning and touchup are specified in Section 09 91 13 "Exterior Painting", Section 09 91 23 "Interior Painting" and Section 09 96 00 "High-Performance Coatings."

END OF SECTION