

**SECTION 05 12 00
STRUCTURAL STEEL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members, support members, sag rods, struts, ties, and hangers.
- B. Base plates, shear stud connectors and expansion joint plates.
- C. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 53 - Miscellaneous Cast-In-Place Concrete
- B. Section 05 21 00 - Steel Joist Framing.
- C. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.
- D. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work.
- E. Section 06 05 73 - Wood Treatment: Field-applied termiticide and mildicide for wood.
- F. Section 07 81 00 - Applied Fireproofing: Fireproof protection to framing and metal deck systems.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.
- B. Structural Steel Framing:
 - 1. Basis of Measurement: By the pounds.
 - 2. Basis of Payment: Includes structural members fabricated, placed and anchored.

1.04 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2023, with Errata (2025).
- B. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2025).
- C. ASTM A1 - Standard Specification for Carbon Steel Tee Rails; 2000 (Reapproved 2018).
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- F. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2024.
- G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- H. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- I. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2024.
- J. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- K. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use; 2014 (Reapproved 2020).
- L. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- M. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- N. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2022.

- O. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2019.
- P. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- Q. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance; 2024.
- R. ASTM A759 - Standard Specification for Carbon Steel Crane Rails; 2021.
- S. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.
- T. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.
- U. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- W. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- X. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2024.
- Y. ASTM E165/E165M - Standard Practice for Liquid Penetrant Testing for General Industry; 2023.
- Z. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2021.
- AA. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.
- BB. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- CC. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- DD. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019, with Editorial Revision (2025).
- EE. ITS (DIR) - Directory of Listed Products; Current Edition.
- FF. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.
- GG. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- HH. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- II. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- JJ. SSPC-SP 2 - Hand Tool Cleaning; 2024.
- KK. SSPC-SP 3 - Power Tool Cleaning; 2024.
- LL. SSPC-SP 11 - Power-Tool Cleaning to Bare Metal; 2020.
- MM. UL (FRD) - Fire Resistance Directory; Current Edition.
- NN. AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.
- OO. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; 2010.
- PP. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.
- QQ. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 120464 psi Minimum Tensile Strength (Metric); 2014.

- RR. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength; 2014a.
- SS. ASTM A490M - Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric); 2014a.
- TT. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2015.
- UU. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2007.
- VV. ASTM E94 - Standard Guide for Radiographic Examination; 2004 (Reapproved 2010). AF. ASTM E119 - Standard Test Method for Fire Test of Buildings
- WW. ASTM E 859 - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRM)
- XX. ASTM F436 - Standard Specification for Hardened Steel Washers; 2011.
- YY. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2013.
- ZZ. ASTM F1852 - Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2011.
- AAA. ASTM F2280 - Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 150 ksi Minimum Tensile Strength; 2012.
- BBB. SSPC-SP 6 - Commercial Blast Cleaning; 2007. BB. SSPC-SP 7 - Brush-Off Blast Cleaning; 2007.
- CCC. SSPC-SP 10 - Near-White Blast Cleaning; 2007.
- DDD. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003. BF. UL (FRD)- Fire Resistance Directory; current edition.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Indicate cambers and loads.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
- E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.06 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN)"Steel Construction Manual."
- B. Comply with relevant sections of AISC 358
- C. Comply with relevant sections of AISC 360
- D. Comply with Section 10 of AISC S303 "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

- E. Maintain one copy of each document on site.
- F. Fabricator: Company specializing in performing the work of this section with minimum 3 years of documented experience.
- G. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- H. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- I. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Steel Shapes, Plates, and Bars: ASTM A242/A242M high-strength, corrosion-resistant structural steel.
- E. Steel Shapes, Plates, and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.
- F. Crane Rails: ASTM A1, end hardened, ultrasonic tested, and cross section and length as indicated on drawings.
- G. Crane Rails: ASTM A759, high strength alloy, head-hardened, heat-treated, ends hardened, ends chamfered, ends prepared for welding, and cross section and length as indicated on drawings.
- H. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- I. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- J. Hot-Formed Structural Tubing: ASTM A501/A501M, seamless or welded.
- K. Steel Bars: ASTM A108.
- L. Steel Plate: ASTM A514/A514M.
- M. Steel Sheet: ASTM A1011/A1011M, Designation SS, Grade 30 hot-rolled, or ASTM A1008/A1008M, Designation SS, Grade 30 cold-rolled.
- N. Pipe: ASTM A53/A53M, Grade B, Finish black and galvanized, as indicated.
- O. Shear Stud Connectors: Steel bolts, ASTM A449.
- P. Sag Rods: ASTM A36/A36M.
- Q. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M, Class C.
- R. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 or ASTM A325M, Type 1, medium carbon, galvanized, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436 washers.
- S. High-Strength Structural Bolts: ASTM A490 or ASTM A490M; Type 1 alloy steel, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436 washers.
- T. Tension Control Bolts: Twist-off type; ASTM F1852 or ASTM F2280.
- U. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436 Type 1 washers.

- V. Headed Anchor Rods: ASTM F1554, Grade 55, plain.
- W. Load Indicator Washers: Provide washers complying with ASTM F959 at connections requiring high-strength bolts.
- X. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- Y. Sliding Bearing Plates: Teflon coated.
- Z. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- AA. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- BB. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Space shear stud connectors at inches on center.
- C. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- D. Fabricate connections for bolt, nut, and washer connectors.
- E. Develop required camber for members.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 2 or 3.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.
- C. Leave structural steel members un-primed.
- D. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.

2.04 SOURCE QUALITY CONTROL

- A. Provide shop testing and analysis of structural steel.
 - 1. Members to be Tested: .
 - 2. Percentage Tested: .
 - 3. Test Method: .
 - 4. Minimum Result: .
- B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RRCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts", testing at least 50 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all shop-welded connections and test according to requirements in AWS D1.1 for stud welding. Test at least 50 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC S303 "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT)"Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect / Engineer.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT)"Specification for Structural Joints Using High-Strength Bolts", testing at least 50 percent of bolts at each connection.
- C. The NYCHA shall engage a qualified independent inspecting agent to inspect field welds and high strength bolted connections.
- D. Welded Connections: Visually inspect all field-welded connections and test according to AWS D.1.1 and following inspection procedures, and test at least 50 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION 05 12 00