PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members.
B. Baseplates, shear stud connectors.
C. Grouting under baseplates.
D. Prime coat painting and touchup.
E. Cast-in-place anchor bolts, nuts, plates, etc.
F. 10 gauge steel or 3/4 inch plywood templates for column anchor bolts.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 03300 - Cast in Place Concrete: Anchors for casting into concrete.

1.3 RELATED SECTIONS

A. Section 01400 – Quality Control.
B. Section 05311 - Steel Roof Deck: Support framing for small openings in roof deck.
C. Section 05500 - Metal Fabrications: Non-framing fabrications affecting structural steel work.
D. Section 15500 - Fire Protection: Coordination of holes for fire sprinkler piping.
E. Section 01600 – Material and Equipment: Substitutions.
F. Section 09900 – Painting

1.4 REFERENCE STANDARDS

A. ASTM A36 - Structural Steel.
B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
C. ASTM A108 - Stud type Shear Connectors.
E. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
G. ASTM A325 - High Strength Bolts for Structural Steel Joints.
H. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

I. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

J. ASTM A572 - Grade 50 Structural Steel

K. AWS A2.0 - Standard Welding Symbols.

L. AWS D1.1 - Structural Welding Code.

M. AISC - Specification for Structural Steel Buildings.

N. AISC - Specification for State’s Representative Exposed Structural Steel.

1.5 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Include laboratory test reports and other data to show compliance with specifications (include specified standards). Include certified copies of mill reports covering chemical and physical properties of each type of structural steel.

C. Shop Drawings:
   1. Shop drawings shall include complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
   2. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
   3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.
   4. Dimensions required to locate structural steel for manufactured items such as mechanical equipment, electrical equipment, etc., shall be coordinated and provided by the General Contractor.

D. Procedures:
   1. Provide weld procedures for both prequalified welds and special welds to be submitted to the Owner’s Testing Laboratory and the State’s Representative.
2. Provide installation procedure and inspection for direct tension indicator washers detailed in supplemental specifications provided by the manufacturer for approval.

3. Procedures shall be submitted for both shop and field welds.


E. Manufacturer's Mill Certificate: Submit under provisions of Section 01400 certifying that products meet or exceed specified requirements.

F. Mill Test Reports: Submit under provisions of Section 01400 Manufacturer's Certificates, indicating structural strength, destructive and non-destructive test analysis.

G. Welders' Certificates: Submit under provisions of Section 01400 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.

1.6 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC-Specification for Structural Steel Buildings.

B. Perform Work in accordance with AISC - Specification for State’s Representativeurally Exposed Structural Steel.

C. Maintain one copy of each document on site.

D. Except where other requirements are specified, comply with the following standards by American Institute of Steel Construction (AISC) and American Welding Association (AWS):

1. AISC "Specification for Structural Steel Buildings".

2. AISC "Code of Standard Practice for Steel Buildings and Bridges".

3. AISC "Specifications for Structural Joints Using A325 of A490 Bolts".

4. AISC "Specifications for State’s Representativeurally Exposed Structural Steel".

5. AWS D.1 "Structural Welding Code".

6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

E. Comply with the referenced ASTM standards for materials.
F. Perform all welding only with AWS certified welders.

G. Verification of accuracy:

1. Engage and pay for a registered civil engineer or licensed land surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection. He shall submit written verification that the entire installation is in accordance with the contract documents.

2. Columns shall be verified at each lift. Column shim details and procedures shall be submitted for review.

H. Steel Structures Painting Council (SSPC)

1. SSPC-Vis 1 Pictorial Surface Preparation Standards for Painting Steel Structures
2. SSPC-SP2 Hand Tool Cleaning
3. SSPC-SP3 Power Tool Cleaning
4. SSPC-SP6 Commercial Blast Cleaning
5. SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gauges

I. Paint

1. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommend limits.

2. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.

3. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.

J. Comply with the requirements of the 2007 California Building Code.

1.7 QUALIFICATIONS

A. Fabricator: Company shall be AISC certified for Conventional Steel Building Structures.

B. Erector: Company shall be AISC Certified Steel Erector.

1.8 TESTING AND INSPECTION
A. Testing Laboratory

1. A qualified independent inspection and testing laboratory shall be provided by the Contractor for inspection and testing as required by in specification Section 5120 Structural Steel, Specification section 1400 Qualifications and the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E328 (Recommended Practice for Inspection and Testing Agencies for Concrete and Steel used in Construction).

2. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Contractor shall assume the expense of making the tests and inspection except as otherwise specified in Section 01400. All welding and high strength bolting shall be inspected. All high strength bolts shall be sampled and tested by an independent agency.

3. The testing laboratory will check field fabrication for conformance to the drawings and the referenced standards.

4. Testing laboratory will inspect prime paint for thickness, coverage, and compliance with specifications.

5. Contractor is responsible for inspection overtime (premium time) for all hours beyond a standard 40 hour work week.

B. Cost of Testing and Inspection: All costs, direct and associated costs, of testing and inspection of structural steel shall be paid for by the Contractor.

1. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.

C. Structural Steel Testing and Inspection:

1. For shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable in lieu of testing for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section. Tests shall also be reviewed for supplemental requirements S91 and S5 per materials Section 2.1 herein.
2. For unidentifiable steels listed above, one tension and elongation test and one bend or flattening test for each five tons or fractional part thereof for each size, will be performed by the Testing Laboratory.


D. Welding Inspection:

1. All shop and field welded operations will be observed by a qualified welding inspector employed the Testing Laboratory. Such inspector shall currently hold an AWS Welding Inspector certification or an ICC Structural Steel and Welding Special Inspector certification.

2. The welding inspector will make a systematic record of all welds. This record shall include:
   a. Identification marks of welders.
   b. List of defective welds.
   c. Manner of correction of defects.

3. The welding inspector will check the material, equipment and procedure, as well as the welds. He will also check the ability of the welder. He will furnish the State’s Representative with a report, duly verified by him that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he has used all means to determine the quality of the welds.

4. All full penetration groove welds will be subject to ultrasonic testing, as per AWS D1.1, Section 6 "Inspection, Part "C", Ultrasonic Testing of Groove Welds. All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.

5. All partial penetration groove welds will be tested by ultrasonic testing.

6. When ultrasonic indications arising from the weld root be interpreted as either a weld defect or the backing strip itself, the Engineer will be notified. The Engineer may require the removal of backing strip. The backing strip will be removed at the expense of the Contractor, and if no root defect is visible the weld will be retested. If no defect is indicated on this retest, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it will be repaired and retested at Contractor's expense.

7. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.
8. Other methods of inspection, for example, X-Ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.

9. Tests of end-welded studs shall be per the structural welding code, published by the American Welding Society, latest edition. Randomly test a minimum of 10 studs total with a minimum of 3 from each heat. Physical properties shall conform to the minimums noted herein under Material-Nelson Stud Bolts.

10. At the discretion of the owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:

   a. Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.

   b. A sampling of a least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejectable defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3' in length, each 12 linear inch increment of welds, 1" or less in thickness, will be considered as one weld. For evaluating the reject rate of continuous welds greater than 1" thickness, each 6 linear inches will be considered one weld.

E. High Strength Bolting Tests and Inspection

1. Furnish certified test reports for each lot of bolts in accordance with Section 9 of ASTM A325 and A490. Install bolts under the supervision of a qualified inspector in accordance with Section 9, Research Council "Specifications for Structural Joints using ASTM A325 or A490 Bolts".

2. Testing laboratory will visually inspect all high strength bolts.

3. While the work is in progress, the Inspector shall determine that the requirements of this Specification are met in the work. The Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.
a. In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical, the Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC.

b. Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the plies of the connected elements have been brought into snug contact.

1.9 JOB CONDITIONS

A. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

B. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 SEQUENCING/SCHEDULING

A. Cooperate and coordinate this work with other trades for anchor bolts, and other required inserts, templates, etc. Align this work prior to installation of other materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel Shapes, Plates and Bars: ASTM A36 except for all “W” shapes which shall conform to ASTM A992.

B. Cold-Formed Steel Tubing: ASTM A500, Grade B.

C. Steel Pipe: ASTM A53, Type E or S, Grade B.

D. Anchor Bolts: ASTM A307 or ASTM 325 as indicated on drawings.


F. High Strength Bolts, Nuts and Washers: Install in accordance with requirements for A325 and A490 slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications. Mark bolts that have been completely tightened with an identifying symbol. Final tightening of high strength bolts in webs of beam to column moment connection shall be performed after completion of flange welding.

2. Bolt Geometry. Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard B18.2.1. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.


5. Tension Control Fastener System: Lohr, LeJeune, Nucor Fastener, or Cordova Bolt, Inc.

G. Headed Stud-Type Shear Connectors: ASTM A108 Grade 1015 or 1020 Cold-finished carbon steel with dimensions complying with AISC Specifications.

1. Tensile strength, 60,000 psi.
2. Elongation in 2 inches, 20 percent
3. Reduction of area, 50 percent.

H. Provide hexagonal heads and nuts for all connections.

I. Electrodes for Welding: Comply with AWS Code, E70 Series minimum. Fabricator to select proper electrodes according to weld procedures as submitted.

J. Shop Primer

3. All paints shall meet the California Air Resources Board Standards.
K. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes. Place mill camber tolerance upward for all beams specified no camber.

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

C. Connections: Weld or bolt shop connections, as indicted. Bolt field connections, except where welded connections or other connections are indicated.

D. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.

E. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16" fillet welds.

F. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work. Cut, drill, or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
G. High Strength Bolts:

1. Installation and Tightening

   a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the shift. Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.

   b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened. The tension measuring device shall be used to confirm: (1) the suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work, (2) calibration of wrenches, if applicable, and (3) the understanding and proper use by the bolting crew of the method to be used. The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable. The accuracy of the tension measuring device shall be confirmed through calibration by an approved testing agency at least annually.

   c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition. The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.

   d. Joint Assembly and Tightening of Connections Requiring Full Pretensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.

      1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC. A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension. The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five
percent greater than the tension required for slip-critical connections.

2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the job site in a device capable of indicating bolt tension. The test assembly shall include flat hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned. The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC. Manufacturer’s installation procedure shall be followed for installation of bolts in the calibration device and in all connections. When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners. In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.

3.3 WELDING

A. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building," "AWS Code for Welding in Building Construction," and requirements of this section. Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the State’s Representative.

B. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to State’s Representative. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the State’s Representative for review.

C. Qualification of Welders:

1. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previous qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
2. Welders shall be checked by welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor’s expense.


D. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.

E. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.

F. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint, and any other foreign material.

G. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed, and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.

H. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and State’s Representativeural finishes.

I. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8" for 5/8", and 3/16" for 3/4" diameter. Stud sizes indicated on drawings represent the finish stud height.

3.4 ERECTION


B. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.

C. Before and during erection, keep all structural steel clean. Ship, handle and store steel in manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.

D. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no
cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

E. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by State's Representative capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.

F. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Section 03300 prior to applying vertical load.

G. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be ± 1/4 inch.

H. All welds shall be full and clean, and conform to AISC and AWS specifications.

I. Erection Tolerances: Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:

1. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building. Also install each vertical member on such grids so that its vertical center line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.

2. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

J. Temporary Flooring:

1. Provide planking and scaffolding necessary in connection with erection of structural steel, support of erection machinery, and construction
materials. Temporary floors and use of steel shall be as required by applicable regulatory requirements.

2. If steel decking is used as a working platform, it shall be temporarily tack-welded to supports to extent necessary for such use in accordance with applicable regulatory requirements. The concentrated loading from welding machines and other heavy machinery required for steel erection shall be distributed by planking or other approved means. Metal decking that becomes damaged as the result of being used as a working platform shall be replaced at no additional cost to the Owner.

3.5 PAINTING AND CLEANING

A. Prior to prime coat application, clean all loose rust, mill scale, oil, dirt, and all other materials from all steel to be left exposed. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface for painting.

B. Shop prime all steel except the following:
   1. Steel encased in concrete.
   2. Contact surfaces for high strength bolts.
   3. Areas within 4 inches of field welds.
   4. Tops of members to receive metal decking.
   5. Steel to be fireproofed.
   6. Surfaces to be galvanized.

C. Use the following Type A shop painting systems on all normal environment interior steelwork:
   1. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning. (Where long-term jobsite exposure occurs, SSPC-SP6 Commercial Blast Cleaning is the preferred alternate.).
   4. Number of Coats: One
   5. Dry Film Thickness: 2.0 mils minimum.
   6. Volume Solids: 55.0 + 2.0% minimum
D. Use the following Type B shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes:

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning
2. Application: Follow coating manufacturer’s printed directions.
3. Material: Type B = Tnemec Primer 90-97
4. Number of Coats: One
5. Dry Film Thickness: 2.5 mils minimum.
6. Volume Solids: 63% ± 2%

E. Apply two shop prime coats to areas which will be inaccessible after erection.

F. Clean contact surfaces of high strength bolts of all burrs and material which might prevent solid seating of the parts.

G. After erection, field touch up all welded areas, high strength bolts and damaged areas. For all steel to remain exposed, remove all blemishes, paint drips, and touch up prime coat.

H. Performance Requirements: Coatings applied to sandblasted steel panels and cured two were at 77°F (25°C) unless noted otherwise.

1. Shop Primer/Rust Inhibitive (Series 18 Enviro-Prime).
   a. Adhesion:
      System: 18-1, One coat Series 18 Inviro-Prime.
      Requirement: Not less than a rating of 5, average of three trials.
   b. Humidity:
      Method: ASTM D4585 Condensing Humidity.
      System: Series 18 Enviro-Prime.
      Requirement: No blistering, cracking or delamination of film after 200 hours exposure

2. Shop Primer/Urethane Zinc-Rich (90-97)
a. Salt Spray: Method ASTM B 117. One coat applied to abrasive blast cleaned steel. Requirement: No blistering, cracking, spot rusting or delamination of film. No more than 1/64” rust creepage at scribe and no rusting at edges after 3,000 hours exposure.

b. Adhesion:

ASTM D 3559, Method B. One coat applied to abrasive blasted steel panels.

Requirement: No less than a rating of 5, average of three trials.

3.6 HOISTING AND BRACING

A. Provide all hoisting and erecting equipment and power.

B. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.

C. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.

D. Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check plumbness after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

3.7 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01410.

END OF SECTION 05120
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Steel roof deck and accessories.
B. Formed steel cant strips.
C. Framing for openings up to and including 18 inches.
D. Bearing plates and angles.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete: Concrete topping over metal roof deck.
B. Section 05120 - Structural Steel: Structural framed openings larger than 18 inches.
C. Division 15 - Mechanical: Reinforcement pans with roof drain hub assemblies.
D. Holes for Mechanical and Electrical Work: Divisions 15 and 16.
    1. Cutting and reinforcing of holes for plumbing and electrical conduits shall be part of this work, provided that mechanical and electrical contractors locate holes prior to or during installation. Cutting and reinforcing of holes after installation shall be the responsibility of those trades requiring them.
E. Miscellaneous connection requirements for Mechanical and Electrical Work: Divisions 15 and 16.

1.3 REFERENCE STANDARDS

A. AISI - Specification for the Design of Cold-Formed Steel Structural Members.
B. ASTM A36 - Structural Steel.
C. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
D. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.
E. AWS D1.1 - Structural Welding Code - Steel
F. AWS D1.3 – Structural Welding Code – Sheet Steel
G. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks.
1.4 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.

1.5 QUALITY ASSURANCE

A. Installer: Company specializing in performing the work of this Section with minimum 5 years documented experience. Approved by manufacturer.

B. Certification: Provide affidavits from the manufacturer listing mill test certificates by number for each size and type of decking, in accordance with the requirements of Section 01400, Quality Control.

C. Manufacturer shall provide affidavits of approval by the International Code Council (ICC) for the metal decking shapes proposed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Cut plastic wrap to encourage ventilation.

D. Separate sheets and store decking on dry wood sleepers; slope for positive drainage.

1.7 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on shop drawings.

1.8 TEST AND INSPECTIONS

A. All materials, methods and equipment shall be subject to inspections by the Testing Laboratory at any time.

B. Material Testing: Test reports establishing conformity to the specifications shall be furnished to the Owner for each heat prior to installation.

C. Welding Inspection: Welding of metal deck shall be performed under the inspection of the Testing Laboratory.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS - DECK SYSTEMS

A. Deck Sections and types indicated on Drawings and specified here are as manufactured by Verco Manufacturing or approved equal. Other
manufacturers producing deck complying with these Specifications, and having equivalent properties and dimensions will be subject to State’s Representative’s review upon submission of substantiating data, and may be used only if equivalent to deck sections specified, in State’s Representative’s opinion.

B. Roof deck units shall be approved by International Code Council (ICC) for use as a diaphragm.

1. Diaphragm shear capacities shall be comparable (within 5%) to those listed in ICC Evaluation Service Report No. ER-2078P for the deck, welding, and spans indicated on the Drawings.

2.2 MATERIALS

A. Sheet Steel: ASTM A653, Grade A Structural Quality; with G60 galvanized coating.

B. Welding Materials: AWS D1.1 and AWS D1.3.

2.3 FABRICATION

A. Metal Decking: Sheet steel, configured as indicated.

B. Metal Closure Strips, Wet Concrete Stops, Cover Plates, Cant Strips, and Related Accessories: 18 gage galvanized sheet steel; of profile and size required.

C. Fabricate roof sump pan of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

D. Cant Strips: Formed sheet steel, 18 gage thick, 45 degree slope, 3-1/2 inch nominal width and height, flange for attachment.

E. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

C. Shoring for metal decking shall be provided as required. Coordinate requirements for construction live load with manufacturer.
3.2 INSTALLATION

A. Erect metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks and manufacturer's instructions.

B. Bear decking on steel supports with 3 inch minimum bearing. Align and level.

C. Fasten deck to steel support members at ends and intermediate supports with fusion welds as indicated.

D. Weld in accordance with AWS D1.3.

E. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4 inch steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

F. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction.

G. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

H. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes.

I. Position roof sump pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

J. Place metal cant strips in position and mechanically attach.

K. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

L. Prior to covering metal decking, verify and coordinate installation requirements of suspended metal framing, suspended acoustical ceiling systems, mechanical and electrical work or other items as required. Provide inserts, clips, anchors or fasteners as indicated or as otherwise required to provide for the complete and proper installation of suspended items from the metal deck.

1. At metal roof decks, hang no more than 25 lbs. per metal rib in any span; space hangers no closer than 8'-0" cc. Average of loads suspended from metal deck shall not exceed 3.0 lbs./ sq. ft. over the effected area.

2. Verify and coordinate locations, patterns, spacing, etc. of suspension members and connectors required by other Sections of the Specifications.
3. Where suspension or hanger wires are required under other Sections, verify and coordinate locations, patterns, spacings, etc. with the appropriate trade. Punch or drill holes at bottom of deck flutes of sufficient size to pass support wires. Wire supports shall be looped and secured with a minimum of three (3) tight turns around a minimum 1-1/2" x 8" long furring channel or No. 3 x 8" long reinforcing bar centered above the hole and laid in the deck flutes.

4. At unfilled metal decks or as otherwise indicated, required or shown, provide individual 18 gauge by 1-1/2" wide galvanized hanger tabs 6" long and having 1/2" round holes for attaching tie wires. Tabs shall be hooked over male portion of each edge joint at 16" on center before female joint of next sheet is placed over it.

M. Accessories to the furnished shall include the following:

1. Light gauge plate fillers attached to deck to provide an uninterrupted roof plane.
2. Drain sumps and/or roof drain mounting plates as detailed.
3. Miscellaneous accessories incidental to erection of deck.

N. Bend decking to conform to slopes and warps as required for solid contact to framing that allows proper welding.

3.3 DEFECTIVE DECK

A. Units of decking that become deformed or damaged to such extent that they are weakened or unsuitable for use shall be removed and replaced at no cost to the Owner.

3.4 TOUCH UP AND CLEANING:

A. All welds and abrasions on deck surfaces shall be touched up using a zinc dust-zinc oxide primer.

B. Burn spots on supporting exposed steel shall be touched up with same primer as used on adjacent surface.

C. Clean surfaces of installed deck by effective means to receive sprayed-on fireproofing or finish painting as indicated.

END OF SECTION 05311
PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Load and non-load bearing formed steel stud exterior wall and interior wall.
B. Formed steel framing and accessories.

1.2 RELATED SECTIONS
A. Section 05120 - Structural Steel: Structural building framing.
B. Section 05311 - Steel Roof Deck: Metal roof decking.
C. Section 07210 - Building Insulation: Insulation within framing members.
D. Section 07620 - Sheetmetal Flashing and Trim: Head and sill flashings.
E. Section 07920 – Joint Sealants.
F. Section 09110 - Metal Stud Framing System.
G. Section 09260 - Gypsum Wallboard Systems: Wall sheathing.

1.3 REFERENCE STANDARDS
A. ASTM A90 - Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
B. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process, Physical (Structural) Quality.
C. ASTM A570 - Hot-Rolled Carbon Steel Sheet and Strip. Structural Quality.
D. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.
E. AWCI (Association of Wall and Ceiling Industries) - Specifications Guide for Cold Formed Steel Structural Members.
F. AWS D1.3 - Structural Welding Code – Sheet Steel
G. American Iron and Steel Institute (AISI) – Specification for the Design of Cold Formed Steel Structural Members.

1.4 QUALITY ASSURANCE
A. Welders: Qualified for welding in horizontal, vertical, and overhead positions in accordance with AWS D1.3.
B. Design wall system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperatures.
C. Design wall system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

D. Manufacturer: Company specializing in structural framing components with 5 years minimum experience.

1.5 SUBMITTALS

A. Submit manufacturer's installation instructions under provisions of Section 01330.

PART 2 - PRODUCTS

2.1 ACCEPTED MANUFACTURERS

A. Western Metal, Dale Industries, Inc., U.S. Gypsum or accepted equal.

2.2 METAL FRAMING

A. System Components: Provide manufacturer's standard steel runners, blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended for applications indicated.

B. Materials and Finishes:

1. 16-Gauge and Heavier: Fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000-psi; ASTM A653, A570, or A611.

2. 18-Gauge and Lighter: Fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000-psi; ASTM A446, A570, or A611.

3. Finish: Galvanized complying with ASTM A653, G60. Finish accessories to match main framing components.

C. See drawings for section properties and details.

D. "C" Shape Studs: Manufacturer's standard load-bearing steel studs of size, shape, and gauge indicated, with 1.625-inch flange and flange return lip.

E. Welding Electrodes: E60XX.

F. Galvanizing Repair Paint: High zinc-dust content paint for repair of galvanized surfaces damaged by welding.

2.3 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered, same finish as framing members.
B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

2.4 FASTENERS


B. Anchorage Devices: Powder actuated and Drilled expansion bolts

C. Welding: In conformance with AWS D1.3.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that building framing components are ready to receive work.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install metal framing systems in accordance with manufacturer's printed instructions and recommendations.

B. Runner Tracks:
   1. Install continuous tracks sized to match studs.
   2. Align at base and tops of studs.
   3. Secure as recommended by manufacturer for type of construction involved; do not exceed 24-inch on center spacing for nail or powder driven fasteners, or 16-inch on center for other types of attachment. See drawings for anchorage requirements.
   4. Fasten corners and ends of tracks.

C. Studs:
   1. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces.
   2. Where studs abut structural columns or walls, anchor ends of stiffeners to supporting structure.
   3. Secure studs to top and bottom runner tracks by welding or screw fastening at both flanges.
   4. Install studs in one piece for full height; splicing of studs is not permitted.
5. Provide deflection allowance of 1/2" minimum in stud track, directly below horizontal building framing for non-load-bearing framing.

6. Install supplementary framing, blocking and bracing wherever walls or partitions are indicated to support equipment, services, casework, heavy trim and furnishings and similar work requiring attachment to wall or partition. Comply with stud manufacturer's instructions and industry standards.

7. Frame wall openings larger than 2-foot square with double stud at each jamb. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding; space jack studs same as full-height studs.

8. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.

9. Install horizontal stiffeners spaced not more than 4'-6" on center. Weld at intersections.

10. Place studs at 16 inches o.c; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using welding method.


12. Erect load bearing studs, brace, and reinforce to develop full strength to meet design requirements.

13. Refer to Drawings for locations of partitions extending to ceiling only, and partitions extending through ceiling to structure above.


15. Install intermediate studs above and below openings to match wall stud spacing.

16. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

3.3 ERECTION OF JOISTS

A. Install framing components in accordance with manufacturer’s instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Set joists parallel and level, with lateral bracing and bridging.
D. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.

E. Provide joist web stiffeners at reaction points.

F. Touch-up field welds and damaged galvanized surfaces with primer.

3.4 TOLERANCES

A. Maximum Variation from True Position: AISC Criteria.

B. Maximum Variation of any Member from Plane: AISC Criteria.

END OF SECTION 05400
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated ferrous metal items, galvanized and prime painted.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 03300 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.

1.3 RELATED SECTIONS

A. Section 05120 - Structural Steel: Structural steel column anchor bolts, structural joist bearing plates, including anchorage.

1.4 REFERENCE STANDARDS

A. ASTM A36 - Structural Steel.
B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
C. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
D. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
F. ASTM A325 - High Strength Bolts for Structural Steel Joints.
G. ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products.
H. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
I. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
J. AWS A2.0 - Standard Welding Symbols.
K. AWS D1.1 - Structural Welding Code.
L. SSPC - Steel Structures Painting Council.

1.5 SUBMITTALS

A. Submit under provisions of Section 01330.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B. ASTM A501.

C. Plates: ASTM A283.

D. Pipe: ASTM A53, Grade B

E. Fasteners: as required.


G. Welding Materials: AWS D1.1; type required for materials being welded.

2.2 FABRICATION

A. Verify dimensions on site prior to shop fabrication.

B. Fit and shop assemble in largest practical sections, for delivery to site.

C. Fabricate items with joints tightly fitted and secured.

D. Continuously seal joined members by continuous welds.

E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES
A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.

C. Prime paint items scheduled with one coat.

D. Galvanized items to minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A386.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on Drawings.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain State’s Representative/Engineer approval prior to site cutting or making adjustments not scheduled.

F. After installation, touch-up field welds, scratched or damaged surfaces with primer.

END OF SECTION 05500