

DIVISION

13

SPECIAL CONSTRUCTION



## SECTION 13120

### PRE-ENGINEERED BUILDING SYSTEM

#### 1.0 GENERAL

##### 1.01 DESCRIPTION

- A. Comply with applicable requirements of Division 1.
- B. Provide all labor, materials, supplies, incidentals, accessories, services, engineering/design, submittals, supervision, project management, quality assurance, quality control, transportation, delivery, handling, storage, tools, and equipment necessary to complete Work specified herein, scheduled or indicated on the Drawings to design/engineer, manufacture, fabricate, transport, and erect a structural steel structure, complete, in place, stable, and code conforming. Pre-engineered building structural system shall include, but not necessarily be limited to: rigid primary frames consisting of tapered or straight steel columns and steel roof beams; bracing systems for all lateral loads as required for stability consisting of portal moment frames, "x" bracing, diagonal bracing, and/or special connections; wind beams and girts for wall loads; sag rods; roof framing system including cold formed steel purlins; and all connections for all components. Primary frames shall consist of shop welded steel plates and/or hot rolled structural steel sections. Work includes integration of the pre-engineered building system with all other building materials/systems, especially where any type of load transfer will occur.
- C. Roof slope shall be as shown on the drawings. Bay spacing, span lengths, column locations, eave heights, ridge heights, special features, adjacent roofs, and other dimensions/geometry and special loads shall be as indicated on the drawings.

##### 1.02 RELATED WORK

- A. Section 03300 - Portland Cement Concrete
- B. Section 05120 - Structural Steel
- C. Section 05200 - Steel Joists
- D. Section 07400 - Preformed Sheet Metal Roofing System
- E. Section 07450 - Preformed Sheet Metal Wall System
- F. Section 07600 - Flashing and Sheet Metal
- G. DIVISION 15 - MECHANICAL
- H. DIVISION 16 - ELECTRICAL

##### 1.03 REFERENCE STANDARDS

- A. ASTM - American Society for Testing and Materials.
- B. ANSI - American National Standards Institute.
- C. AISC - American Institute of Steel Construction.
- D. AWS - American Welding Society.

E. AISI - American Iron and Steel Institute

F. MBMA - Metal Building Manufacturers Association.

#### 1.04 SYSTEM PERFORMANCE REQUIREMENTS AND DESIGN

- A. Steel structural system shall be designed for the dead loads, the specified live loads (uniform and concentrated) and collateral loads on roof(s), floor(s) (as applicable) and accessories, erection loads, wind loads and other lateral loads, and the combination of these loads as set forth in the MBMA publication "Recommended Design Practices Manual" and the International Building Code, 2000 edition with the City of New Orleans Amendments. Reduction of loads due to tributary loaded areas will not be permitted. Wind loads shall be at least those pressures associated with  $V_{3S} = 120$  mph winds (basic wind speed 3 second gust, equivalent basic wind speed  $V_{fm} = 110$  mph when conversion is required), exposure C, Importance Factor 1.15, Category II. As a minimum, even if codes allow less, the building structure, including the wind beams and wall girts, shall be designed to withstand a wind load pressure of 35 psf perpendicular to the wall surface in both directions (inward and outward). Additionally, roof structure shall be designed for a minimum collateral (auxiliary) load of 10 psf above and beyond the code required loads. Dead loads shall be the weight of the metal building materials plus all other building materials attached to or supported by the steel structure. NOTE: Roof framing system shall be part of a UL-90 rated system. Certification of UL-90 roof system is required as part of this project, so design loads and design criteria shall be used accordingly to produce a conforming roof system. Deflection of the building frames (displacement at the eave) shall be in accordance with Table 1604.3 of the International Building Code 2000.
- B. Framing and structural members and connections shall be designed and selected in accordance with the AISC publication "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and MBMA "Low Rise Building Systems Manual". Structural cold formed steel framing members and connections shall be designed and selected in accordance with AISI publication "Specification for the Design of Light Gauge Cold-Formed Steel Structural Members".
- C. All welding shall be done in accordance with AWS publication D1.1 "Structural Welding Code".
- D. Primary building frame splice connections shall be field bolted with high strength A325 bolts. Framing for openings in walls and roof shall be designed to structurally replace the covering and framing displaced. Primary framing shall be furnished with factory punched and welded base and splice plates. Primary framing shall be prepunched for attachment of purlins, wind beams, bracing, and other secondary members. The compression flange of all primary members shall be braced laterally with steel angle flange bracing connecting to the webs of purlins wind beams.
- E. End frames shall not be allowed on the south end, use full load rigid frame. All primary frames including the frame at the south end wall shall be full load frames with columns and rafters made of built up "I" sections, tapered or uniform depth and interior columns of pipe or built up "I" sections.
- F. Secondary framing shall consist of purlins, girts, eave struts, base angles, "C" sections, clips, and other required components. Purlins and girts shall be cold-formed "Z" sections or "C" sections (where indicated on drawings) with stiffened flanges, prepunched for attachment to primary members. Purlins and girts shall be of the simple span or continuous span design, as determined by design requirements. Eave struts shall be cold-formed "C" sections with unequal stiffened flanges, prepunched for attachment to

primary members. Eave struts shall be of the simple span design. Base angles shall be cold formed angles attached to the concrete with suitable galvanized fasteners. Base angles shall be hot dipped galvanized. Framing for openings in roof and walls shall be cold-formed "C" sections with equal stiffened flanges, minimum 16 gauge, prepunched for attachment to primary and other secondary members.

- G. Wind bracing for roofs and walls shall be diagonal bracing consisting of steel rods or angles (no cables). Portal frames shall be used in sidewalls in lieu of diagonal bracing where required by architectural design of the building. Frame side sway shall be minimum  $H/200$ .
- H. Anchor bolt spacing/locations shall be specified on the anchor bolt setting plan by the building designer/manufacturer.
- I. There shall be no field modifications to primary structural members or bracing members, except as authorized and specified by the building manufacturer in writing, and approved by the Architect.

#### 1.05 SUBMITTALS

- A. Submit shop drawings (including design drawings, fabrication drawings, and erection drawings), complete design calculations, instruction manuals, erection manual, samples, product specifications and product data as required in Section 01340. Include painting, priming, and finishing specifications which detail surface preparation requirements. Include other data as required to clearly and completely describe the design, materials, sizes, layouts, construction details, fasteners and connections, erection, and code compliance. Clearly detail jointing, length of sections, and installation details. Provide an anchor bolt setting plan with horizontal and vertical column reactions. Provide elevations, sections and details to adequately describe the system.
- B. Submit design calculations for selection of members, design of members, fabrication of members, connections and details of fabrications and erection stamped and signed by a Louisiana Registered Professional Civil Engineer specializing in steel structures. Include engineering calculations for all components of the primary and secondary structural systems and the connections therefore. Include design of anchor bolts at base of columns. Include the magnitude and location of design loads, support conditions, material properties, and type and size of each member. If wall panels and/or roof panels are considered part of the pre-engineered system, include these components in the calculations as well. Conform to AISC specifications and codes. For computer generated designs, include stress values and a "letter of design certification" signed by the Louisiana Registered Professional Civil Engineer stating the design criteria and procedures used are adequate and accurate, and attesting to the adequacy and accuracy of the design.
- C. Submit manufacturer's approval of installer. Must be on manufacturer's letterhead, signed by an officer of the company and must clearly state "Approval".
- D. Submit foundation reactions and anchor bolts sizes.

#### 1.06 QUALITY ASSURANCE

- A. Products used in the Work of this Section shall be designed/fabricated/produced by a manufacturer regularly engaged in manufacture of pre-engineered steel building structural systems and with a history of successful production acceptable to the Architect, minimum 10 years documented experience with minimum 15 projects at least as large as this project within the last 5 years. The manufacturer shall be a member of the Metal

Building Manufacturer's Association (MBMA) and shall be certified by the American Institute of Steel Construction (AISC) Metal Building Certification Program (MB).

- B. Design calculations for selection of members, design of members, connections and details of fabrications, stability, and erection shall be performed by and stamped and signed by a Louisiana Registered Professional Civil Engineer specializing in steel structures. Conform to AISC specifications and codes including "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings". All cold formed steel structural members shall be designed in accordance with AISI "Specifications for the Design of Cold-Formed Steel Structural Members". All loads shall be applied and the design of all other components shall be as specified in the MBMA "Recommended Design Practices Manual".
- C. Installer/erector shall be a company specializing in the installation of the Work of this section with minimum 5 years documented successful experience and shall be approved by the manufacturer. Erector shall use proper tools and equipment in good working condition with adequate capacity for the application. Erection shall conform to Section 6 of MBMA "Low Rise Building Systems Manual" and Section 5 of MBMA "Code of Standard Practices" and the AISC "Code of Standard Practice for Steel Buildings and Bridges".
- D. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.
- E. Welding Qualifications: Prior to commencing welding, welding procedures, welding operations, welding processes, and welder's shall be qualified in accordance with AWS D1.1, "Standard Qualification Procedure". Provide certificates.
  - 1. Welders who have not performed welding for a period of 3 or more months shall be re-qualified.
  - 2. Certificates shall certify that all welders employed to work on this project have satisfactorily passed AWS qualification tests within the previous 12 months.
  - 3. Welders whose work fails to pass inspection shall be re-qualified before performing further welding.
  - 4. The costs of certifying qualifications shall be included as part of the work of this section.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Ship, store, and handle structural steel in a manner to prevent rusting or deformation. Store steel products off grade and position to drain any rainwater readily. Avoid all damage to fabricated steel and to the shop coat. Store pieces without bending or distortion. Store all components above ground, do not allow steel components to touch the ground any time. The size and weight of prefabricated components shall permit easy handling in the field; and the maximum size and weight of any component shall be suitable for transportation by commercial carrier. Each piece and part shall be clearly and legibly marked to correspond with the shop drawings.
- B. Immediately upon delivery, inspect products for damage, defects and conformance with specified requirements. Remove damaged, defective or non-conforming products from the site immediately. Do not install damaged, defective or non-conforming products.
- C. Deliver bolts, nuts, and washers in bags or boxes, properly tagged for identification. Store in a weather tight and dry place until ready for use in the work. Bolts, nuts, etc. shall be delivered in manufacturer's original, undamaged packaging with labels in fact

and legible.

- D. Products shall be delivered to the site undamaged and free of dampness and wet storage stains, discoloration and corrosion. In the event of damage make replacements with new pieces as necessary, and at no additional cost to Owner. Do not manipulate steel in the field unless specifically approved by the Architect.

## 2.0 PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Star Building Systems.
- B. Gulf States Manufacturers, Inc.
- C. Ludwig Building Systems, Inc.
- D. Butler – Widespan Structural Systems.
- E. Prior Approved Equal.

### 2.02 MATERIALS

- A. Hot rolled steel bars, plates, sheets, or strips for primary frames and other welded members shall have a minimum yield stress of 55,000 psi, ASTM A-572 Gr. 50. Hot rolled W shaped structural section - ASTM A-529 Gr. 42. Rods used for bracing - ASTM A-529 Gr. 50.
- B. Hot rolled steel plates, sheets, or strips for secondary shall have a minimum yield stress of 55,000 psi, ASTM A-572 Gr. 50.
- C. Cold-formed members shall have a minimum yield stress of 55,000 psi, ASTM A-375 or A-570.
- D. Round pipe shall have a minimum yield stress of 36,000 psi, ASTM A-53, Type E or S, Grade B. W, M, and S shapes shall be ASTM A36, yield strength 36,000 psi.
- E. Galvanized steel shall conform to ASTM A-446 with a coating conforming to QQ-S-775, Type G-90, minimum spangle, chemically treated, lightly oiled having a minimum yield stress of 50,000 psi, 55,000 psi, or 80,000 psi as required by design.
- F. Bolts, Nuts and Washers: high strength type recommended for structural steel joints, conforming to requirements of ASTM A325, Type 1, medium carbon steel, quenched and tempered, ASTM A563, Grade DH, Heavy Hex and ASTM F436, all items hot dipped galvanized unless specified otherwise. Only where noted, use ASTM A307 Grade A low carbon steel bolts with ASTM A-563 Grade A nuts and ANSI B27.2 or B27.4 washers. All bolts, nuts, and washers that are not hot dipped galvanized shall be plated. All bolts and nuts shall be of domestic manufacture. No imported bolts or nuts allowed.
- G. All bolts, nuts & washers exposed to weather or moisture, or exposed to view in the completed building shall be hot dipped galvanized steel unless specified otherwise.
- H. Welding Materials: Conform to ASTM A233, Series E70, type required for material being welded and conforming to applicable AWS Specifications A5.1 or A5.5. Welding shall be submerged arc continuous weld process.

- I. Shims and Leveling Devices: Provide as required for temporary support.
- J. Shop Primer: Tnemec No. 10-99 G or approved equal conforming to TT-P-636, 3.0 mils minimum dry film thickness.
- K. Roof Panel System: See Section 07400.
- L. Wall Panel System: See Section 07450.

## 2.03 FABRICATION

- A. All primary and secondary framing shall be designed and fabricated for field assembly by means of bolting. Cutting and welding in the field shall only be performed with specific approval of the Architect.
- B. Fabricate structural steel members in accordance with approved shop drawings and as recommended by the A.I.S.C. "Specification" and the A.W.S.: Verify all dimensions prior to fabrication. Verify all conditions relative to work of this Section, take all necessary field measurements, including anchor bolt settings, to make work fit accurately.
- C. Provide openings in structural members as required for other building components. Reinforce openings with steel members sized and welded in place to restore members to original strength. Locate holes so as not to cause any appreciable reduction in strength of members.
- D. Accurately cut and mill column ends and bearing plates to assure full contact of bearing surfaces prior to welding. Finish exposed Work smooth with even, close joints and neat connections. Profiles shall be true to detail, clean, straight and sharply defined.
- E. Clean, prepare and shop prime (other than galvanized) all structural steel members, primary and secondary after fabrication. Do not prime surfaces to be field welded. Do not prime surfaces of steel to receive spray on fire proofing if priming is not allowed by fire proofing material manufacturer.
- F. Field connections: Bolted as per ASTM A325 unless specifically otherwise indicated. Tighten all A325 bolted connections in accordance with AISC calibrated wrench method. Provide hardened washers under torqued head and nut.
- G. Shop connections: Electric arc welded unless otherwise indicated. All welding (shop and field) shall conform to AWS D1.1. Weld by shielded-arc method, submerged-arc method, flux-coated arc method, or other method approved by AWS. Groove joint welds shall develop the full strength of the members connected.
- H. Prior to fabrication, straighten material by methods which will not injure material. Prior to assembling component parts of a connection, thoroughly clean contact surfaces of loose scale, rust, burrs, etc., and remove local twists and bends.
- I. Galvanizing (where indicated): hot-dipped galvanized after fabrication in accordance with the Standard Specifications of the American Hot Dip Galvanizers Association. Members and assemblies indicated shall receive a heavy hot dip zinc coating in compliance with ASTM A 386, A 123, or A 153 with a minimum of 1.5 ounces of zinc per square foot of metal surface. The coating shall have a uniform thickness, free of un-coated spots or dross.
- J. Other than galvanized, shop paint all steel with one or two coats of primer, 3-mil minimum dry-film thickness. Tnemec 10-99G or approved equal. Prior to painting, all surfaces

shall be clean and dry. All dirt, rust and loose mill scale shall be removed according to the paint manufacturer's recommendations for surface preparation or brush blast cleaning according to SSPC-SP7 and as follows. Apply shop primer within 8 hours of surface cleaning.

- K. Temporary Coating: Coat contact of steel which will be grouted for bearing, such as column base plates and similar items, with an oil-based, rust-inhibitive temporary coating containing no metallic pigment; Exxon Petroleum Co., "Rust-Ban 394"; Co. "Rust-Veto 342"; or approved equal.

### 3.0 EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which Work of this Section will be installed. Erector shall notify Contractor of conditions detrimental to the proper and timely completion of the Work. Verify that Work of other trades is ready to receive work of this section. Do not proceed until unsatisfactory conditions have been corrected. Beginning of installation means acceptance of existing conditions.
- B. Verify that substrates are level, square, plumb, accurate, smooth, dry and clean to extent needed for structural steel work.

#### 3.02 GENERAL ERECTION

- A. Erection shall be in accordance with the approved erection instructions and drawings, in accordance with code requirements and the requirements herein. Dissimilar materials which are not compatible when contacting each other shall be insulated from each other by means of gaskets or insulating compounds. Exposed surfaces shall be kept clean and free foreign materials. Erection of the steel structural system shall conform to Section 6 of the MBMA "Low Rise Building Systems Manual" and Section 5 of MBMA "Code of Standard Practices" and the AISC "Code of Standard Practice for Steel Buildings and Bridges" and shall be performed by a qualified erector.
- B. Uniform full bearing under column base plates and sill members shall be provided using packed in place non-shrink, non-metallic, high strength structural bearing grout. Column base plates shall be set level on steel shims or otherwise supported and the structure aligned and plumbed prior to grouting under the base plates.
- C. Members shall be accurately spaced and shall be installed square, plumb, level, and true to lines and locations. As erection progresses, the work shall be securely fastened to resist the dead load and wind and erection stresses. Field modifications to structural members shall not be made except as authorized in writing by the building manufacturer.
- D. Locate and space girts and purlins to suit door, window, louver and other openings. Secure purlins and girts to structural framing and hold rigidly to straight line with temporary shoring until secured by exterior sheeting.
- E. Make adequate provisions for all erection loads, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing. Provide all temporary bracing to assure a safe and stable framework. Additional or temporary bracing shall be provided wherever design loads may be exceeded during erection or placing of equipment.
- F. Provide all barricades, scaffolding and other means of protection as may be required to comply with State Laws and municipal ordinances and to adequately safeguard persons

and property.

- G. Only light drifting will be permitted to draw parts together. Drift punching to match unaligned holes will not be permitted. Enlargement of holes necessary to make connections resulting from misfit shall be done by reaming or drilling, and the proper size bolt shall then be used.
- H. Field welding will be permitted only as indicated on the approved shop drawings. Welds exposed to the weather in the completed structure shall be continuous and made watertight by the welding.
- I. Flame cutting shall not be permitted.
- J. Final field welding and bolting up shall not be done until the structure has been properly aligned, plumbed, and squared up.
- K. After erection, wire brush, solvent wipe, and prime all welds, abrasions and surfaces not galvanized, except surfaces to be in contact with concrete. Use a primer consistent with shop coat. No steel member shall have any visible rust.
- L. Prime all welds on galvanized surfaces, etc. with "Z.R.C." or equal.
- M. Erection Tolerances: Erection tolerances shall be in accordance with AISC "Code," except as follows:
  1. Individual members shall be considered plumb or level where the error does not exceed 1:750.
  2. Vertical dimensions shown as story height measured from the top of the beams at their connections at any one column shall not vary by more than  $\pm 1/4$  inch per story exclusive of column shortening due to dead load.
  3. Plumb displacement of the center line of columns from the established column line shall be no more than 1/2 inch toward or away from the established center line. Plumb all columns and maintain columns in a vertical position.
  4. Horizontal dimension shall not vary by more than  $\pm 1:2,000$  for the length or width of the structure.

### 3.03 CLEANING AND FIELD PAINTING

- A. Clean all components free of dirt, dust, grease, oil and all other contaminants.
- A. Immediately upon detection, abraded or corroded areas on shop-painted surfaces shall be wire brushed (and other required surface preparations) and touched up with the same coating material used for the shop coat. Factory color finished surfaces shall be touched up as necessary with the manufacturer's recommended touch-up paint.

### 3.04 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that the structure will be without damage or deterioration at the time of acceptance.

### 3.05 REPAIRING

- A. Repair or replace all damaged Work

END OF SECTION