

## SECTION 05400 – LIGHT METAL FRAMING

### PART 1 - GENERAL

#### 1.01 THE REQUIREMENT:

- A. The Contractor shall furnish and construct all light metal framing and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Miscellaneous Metalwork. Section 05500

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS:

A. Codes:

The Building Code, as referenced herein, shall be the Uniform Building Code (UBC), as specified in Section 01090 entitled, "Reference Standards".

B. Commercial Standards:

ANSI/ASTM A 446/5/446M-83                      Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

ASTM A 570-84a                                      Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.

ASTM C 645    Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.

Metal Lath Association                              Specifications for Metal Lathing and Furring.

Gypsum Association                                      Specifications for Installation of Screw-Type Steel Framing Member to Receive Gypsum Board, GA-203.

### PART 2 - PRODUCTS

#### 2.01 METAL STUDS:

- A. Non-Load Bearing: Metal studs shall be of the non-load-bearing channel type, roll-formed from 18-gage and 20-gage electro-galvanized steel. Tracks and erection accessories shall be standard products of an established metal stud manufacturer unless otherwise specified or shown. Metal studs depth shall be 3-5/8 inch deep unless otherwise shown on the Drawings.

- B. Height Limits and Schedule: Maximum height limits for non-load-bearing studs shall be as follows, unless otherwise shown:

<u>Gage</u>	<u>Stud Schedule Spacing Ctr. to Ctr. (Inches)</u>	<u>2-1/2 Inch</u>
20	12	24-ft. 10-in.
20	16	23-ft. 7-in.
20	24	20-ft. 8-in.

- C. 18-gage studs shall be used at non-load bearing walls having a lath and plaster condition.

## 2.02 MISCELLANEOUS MATERIALS:

- A. Hanger Wire: Hanger wire for suspended ceiling board shall be of soft-temper, annealed and galvanized steel wire. Hanger wire size shall be not less than that required by governing code.
- B. Runner Channels: Runner channels shall be 1-1/2 inch cold-rolled channels and 3/4-inch stiffener channels, galvanized or factory-coated with rust-inhibitive paint. Channels shall have minimum weight of 475 and 300 lbs./1000 L.F., respectively.
- C. Furring Channels: Furring channels shall be designed for screw attachment of 5/8-inch scheduled wallboard. They shall be roll-formed, galvanized Grade "A" steel conforming to ANSI/ASTM A 446, with a metal thickness of 0.035-inch minimum, 7/8-inch depth and 1-3/8 inch web.
- D. Tie Wire: Tie wire shall be galvanized, 16-gage, annealed steel wire.
- E. Fasteners: Fasteners shall be as required and as recommended by the stud manufacturers.
- F. Welding Materials: Welding materials shall be as recommended in the published standards of the structural stud manufacturer.
- G. Power-Driven Pins: Power-driven pins to be installed in concrete or steel shall be of heat-treated steel alloy. If the pins are not sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded heads capable of transmitting the loads the shanks are required to support. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank. Complete information describing pin capacity, connections and proposed area of use shall be submitted to the Engineer.

## PART 3 - EXECUTION

### 3.01 INSTALLATION REQUIREMENTS:

- A. All work shall be installed in conformance with the manufacturer's recommendations and per the applicable requirements of IBC, ANSI and other referenced standards as specified or shown.

### 3.02 CEILING SUSPENSION SYSTEM:

- A. Components: All necessary items for a complete installation, where required, shall be provided, including devices for attachment to overhead construction, hanger wires, main

runners, splines, splicers, connecting clips, wall connectors, hold-down clips, edge moldings and other appurtenances.

- B. Hanger Wires: Hanger wires shall be spaced along the main runner so that each hanger supports a minimum area of 16 square feet.
- C. Runner Channels: Main runners shall be 1/2-inch channels spaced at 4-feet on centers. Hanger wires shall be saddle-tied along runners. Cross furring channels shall be spaced at 16-inches on centers, maximum, and shall be saddle-tied to main runner channel.
- D. Interruptions: At any openings that interrupt the continuity of furring channels, additional cross reinforcing shall be provided to restore lateral stability or grillage.

### 3.03 METAL STUDS, FURRING AND FRAMING (For Non-Bearing Walls):

- A. Runner Track Attachment: Floor and ceiling runner tracks shall be securely fastened to floor (or floor plate if required) and overhead construction as shown and as required.
- B. Stud Attachment: Studs shall be securely fastened to tracks and spaced in accordance with the stud schedule. Each stud shall be crimped into runner tracks at the top, bottom and both sides for friction fit 1/4-inch deflection clearance on top.
- C. Wall Stiffening: Walls shall be stiffened with 3/4-inch channels placed horizontally at not more than 4-1/2 foot vertical spacing.
- D. Stud Requirements: Metal stud installation shall conform to the following requirements:
  - 1. Studs shall be located at all door jambs, at abutting construction, intersecting walls and corners. Each corner and intersection of walls and partitions shall be formed with not less than three (3) studs.
  - 2. Double 20-gage studs shall be installed at all door jamb and header locations as shown on the Drawings and shall be secured to the jamb anchors of each door frame by bolt or screw attachment.
  - 3. Studs extending from door frame header to ceiling runner over door frames shall be positioned at wall board joints. Stud walls which do not extend to the structures above the ceiling shall be braced to the structure at every 6-feet and at door jamb locations.
  - 4. The Contractor shall install 20-gage studs at wall-mounted fixtures and at a maximum of 12-inches on centers at walls having a lath and plaster condition or receiving ceramic tile.
  - 5. Stud walls shall be braced as necessary to provide rigid construction. Double row of studs for chase walls shall be braced with cross ties of 5/8-inch thick gypsum board, 12-inches wide, installed at quarter points of studs.
  - 6. Parapet walls and hung exterior walls and soffits shall be framed as shown with not less than 18-gage studs.
  - 7. Double 20-gage studs shall be installed at all window jamb, sills and headers as shown on the Drawings.

- E. Openings: Openings shall conform to the following requirements:
1. Channels shall be provided around openings for attachment of metal frames, dampers, grilles and ductwork in connection with metal studs and shall be securely fastened to studs.
  2. Headers, sills and jack studs shall be provided as required at openings. Headers shall overlap adjacent vertical studs and shall be securely screw-attached to adjacent studs.
  3. A 1-1/2 inch channel stiffener shall be installed 6-inches above all door openings. Stiffeners shall extend past the second single stud on each side of the opening and shall be saddle-tied to the structure.
- F. Lintels: Trussed or box-framed lintel members designed to resist applied loads without excessive deflection shall be provided and shall be secured together by screws or other approved means.
- G. Support for Wall-Mounted Items: Solid blocking, 1-1/2 inch channels, horizontal studding or other members within walls shall be provided as required and/or shown to provide secure and adjacent support for wall-mounted or wall-braced items. Galvanized plates shall be provide as backing for handrail brackets, 16-gage by 8-inch by 16-inch.
- H. Horizontal Stiffeners: Ends of horizontal stiffeners shall be securely fastened to abutting construction.
- I. Furring Channels: Furring channels shall be spaced 16-inches on centers, maximum, unless shown otherwise. Spans shall not exceed manufacturer's published recommendations and governing code requirements.

#### 3.04 WORKMANSHIP:

- A. Alignment: All metal studs shall be installed rigid, in line, level and plumb and shall be suitable for the application of the intended succeeding contiguous materials. The maximum allowable deviation in any plane shall be 1/8-inch from an 8-foot straight line and 1/4-inch maximum in a surface having a total length in excess of 8-feet.
- B. Component Fit: All framing members and tracks shall meet the following requirements:
1. All framing components shall be cut squarely or on an angle, as in bracing, to fit squarely against abutting members.
  2. Tracks shall be securely anchored to the floor and overhead structure or other members.
  3. Studs shall be seated squarely in the track with the stud web and flanges abutting the track web, shall be plumbed, aligned and shall be adequately attached to the flanges or web of both the upper and lower tracks.

END OF SECTION 05400

## SECTION 05500 - MISCELLANEOUS METALWORK

### PART 1 - GENERAL

#### 1.01 THE REQUIREMENT:

- A. The Contractor shall furnish, fabricate and install miscellaneous metalwork and appurtenances, complete and in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Aluminum Railings. Section 05521

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS:

- A. All work specified herein shall conform to or exceed the requirements of the Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.
- B. Products and their delivery, handling and installation shall be in accordance with the following trade standards, codes or specifications.

#### C. Commercial Standards:

Aluminum Assn. AA-M32	C22A41
AISC	Specifications and Commentary
AISI	Specifications and Commentary
ASTM A 36/A36M	Specification for Structural Steel
ASTM A 48	Specification for Gray Iron Castings
ASTM A 53	Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless
ASTM A 123	Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip
ASTM A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	Specification for Carbon Steel Externally Threaded Standard Fasteners
ASTM A 563	Specification for Carbon and Alloy Steel Nuts
ASTM A 575	Specifications for Steel Bars, Carbon, Merchant Quality, M-Grades
ANSI/AWS D1.1	Structural Welding Code - Steel

NFPA 101

Life Safety Code

NAAMM

Metal Stairs Manual

1.04 **CONTRACTOR SUBMITTALS:**

- A. **Shop Drawings:** Shop drawings of all miscellaneous metalwork shall be submitted to the Engineer for review in accordance with Section 01300 entitled, "Contractor Submittals".
- B. **Welders Qualifications:** Welders shall submit certified qualifications for the type of welding being performed.

**PART 2 - PRODUCTS**

2.01 **GENERAL REQUIREMENTS:**

- A. **Standard:** All structural steel shapes, plates, bars and their products shall conform to the requirements of ASTM A 36.
- B. **Corrosion Protection:** Unless otherwise shown, miscellaneous metalwork of fabricated steel, which will be used in a corrosive environment and/or will be submerged in water/wastewater shall be coated in accordance with Section 09900 entitled, "Architectural Paint Finishes", and shall not be galvanized prior to coating. All other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication as specified herein.
- C. **Stainless Steel:** Stainless steel metalwork shall be of Type 316 stainless steel.

2.02 **STEEL PIPE HANDRAILS:**

- A. Steel pipe handrails which may be partially or wholly submerged or which are located inside a hydraulic structure shall be entirely of Type 316 stainless steel. All other steel pipe handrails shall be standard 1-1/2 inch black steel pipe made up by welding and hot-dip galvanized after fabrication.

2.03 **STEEL STAIRS AND ALUMINUM SAFETY TREADS:**

- A. **Steel Stairs:** Steel stairs shall be fabricated in accordance with standard practice of the National Association of Ornamental Metal Manufacturers, and as shown. Steel stairs shall be hot-dip galvanized after fabrication.
- B. **Safety Treads:** Safety stair treads shall be provided on all stairs and elsewhere where shown. The safety treads shall be 4-inches wide, shall be of aluminum and shall be American Metals Company, Style A; American Mason Safety Tread Company; or equal.

2.04 **LADDERS:**

- A. Ladders which may be partially or wholly submerged or which are located inside a hydraulic structure shall be entirely of Type 316 stainless steel. All other ladders shall be of carbon steel, hot-dip galvanized after fabrication.

2.05 **METAL GRATING AND FLOOR HATCHES:**

- A. **General:** Metal grating and floor hatches shall be of the design, sizes and types shown. Aluminum in contact with other metal or concrete shall have the contact surface shop-painted per System 10 specified under Section 09800 entitled, "Protective Coatings".

- B. Metal Grating: Metal grating shall be of aluminum or stainless steel as shown. No single piece of grating shall weigh more than 80-lbs. unless specifically detailed otherwise. Aluminum shall be 6061T6 Alloy Bearing Bars and 6063T5 Alloy Cross Bars. Stainless steel shall be Type 316. All grating shall be completely banded. Grating shall be rated at 150 lb/sq. ft.
- C. Floor Hatches: Floor hatches shall be of steel or aluminum as shown. Hatches shall be double-swing and shall be furnished with two (2) stay bars designed to hold the cover in an open position and provide a railing around the opening. The hatch shall be designed to provide storage for the stay bars when the hatch is closed. The hatch shall have four (4) flush handles and a gutter or moat-type edge drain complete with drain connection. Steel hatches shall be hot-dip galvanized after fabrication.

#### 2.06 SEAT ANGLES AND SUPPORTS:

- A. Seat angles for grating shall be aluminum or stainless steel. All support angles buried, submerged or below top of hydraulic structures shall be stainless steel.

#### 2.07 BOLTS AND ANCHORS:

- A. Galvanized Bolts: Except where otherwise shown or specified, all bolts, anchor bolts and nuts shall be steel, galvanized after fabrication as specified herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing.
- B. Steel for Bolts: Except as otherwise specified herein, steel for bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A 307 Grade B, or threaded parts of ASTM A 36 and shall meet the following additional requirements:
  - 1. The nut material shall be free-cutting steel.
  - 2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.
  - 3. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2-inch beyond the nut.
- C. Stainless Steel Bolts: Unless otherwise shown, all bolts, anchor bolts, washers and nuts which are buried, submerged or below the top of the wall inside any hydraulic structure shall be of Type 316 stainless steel.
- D. Unless otherwise shown, expanding-type anchors shall be steel expansion type Phillips Drill Company "Red Head" anchors; McCulloch Industries "Kwick-Bolt"; or equal. Lead caulking anchors will not be permitted. Size shall be as shown. Expansion type anchors which are to be embedded in grout may be steel. Non-embedded buried, submerged or below top of hydraulic structure anchors shall be entirely stainless steel.

#### 2.12 POWER-DRIVEN PINS:

- A. Power-driven pins shall not be used unless specifically approved by the Engineer.

## PART 3 - EXECUTION

### 3.01 FABRICATION AND INSTALLATION REQUIREMENTS:

- A. Fabrication and Erection: Except as otherwise shown, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction".
- B. Aluminum Railings: Aluminum railing is specified in Section 05521.
- C. Steel Railings: Field welding of steel pipe handrail joints will be permitted only if approved by the Engineer.

### 3.02 WELDING:

- A. Method: All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.
- B. Quality: In assembly and during welding, the component parts shall be adequately damped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified for the AWS Code. Upon completion of welding, all weld splatter, flux, slag and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. All burrs, spatter and sharp corners of material shall be ground smooth prior to coating.

### 3.03 GALVANIZING:

- A. All structural steel plates, shapes, bars and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153. Field repairs to galvanizing shall be made using "Galvinox", "Galvo-Weld", or approved equal.

END OF SECTION 05500

## SECTION 05521 - ALUMINUM RAILINGS

### PART 1 - GENERAL

#### 1.01 THE REQUIREMENT:

- A. The Contractor shall furnish and install all aluminum railings complete and in accordance the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Cast-In-Place Concrete. Section 03300.
- B. Miscellaneous Metalwork. Section 05500.
- C. Protective Coatings. Section 09800.

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS:

##### A. Codes:

The Building Code, as referenced herein, shall be the International Building Code (IBC), as specified in Section 01090 entitled, "Reference Standards".

##### B. Commercial Standards:

Aluminum Assn. (AA) publications as cited herein.

#### 1.04 CONTRACTOR SUBMITTALS:

- A. The railing manufacturer's shop drawings, technical data and engineering calculations shall be submitted for review in accordance with Section 01300 entitled, "Contractor Submittals". Engineering calculations shall include, but not be limited to, railings, brackets, support flanges and fasteners or anchors.

### PART 2 - PRODUCTS

#### 2.01 SUPPLIERS:

- A. Pipe railings and pipe handrails shall be "Reyno-Rail II" as manufactured by Reynolds Aluminum Co.; "C-V Pipe Rail" as manufactured by CraneVevor Corp., South El Monte, California; "Connectorail" as manufactured by Julius Blum & Co.; or equal.

#### 2.02 STRUCTURAL PERFORMANCE OF RAILING COMPONENTS:

- A. Railings and handrail brackets shall be capable of withstanding either of the following loading conditions without exceeding the allowable working stress of the material and without permanent deformation:
  - 1. A 200-lb. concentrated load applied to any point in any direction.
  - 2. A 50-lb. per linear foot loading applied perpendicular to the top rail.

### 2.03 MATERIALS:

- A. Rail, Post and Toeboard Materials: Railings and handrails shall be round pipe design railing system unless specified or shown otherwise. Aluminum shall be U.S. Alloy 6061 or 6063, T-5 or T-6. Aluminum pipe rail and posts shall be not less than 1-1/2 inch diameter, Schedule 40 pipe.
- B. Welding Rods: Aluminum welding rods shall be of type recommended by the aluminum manufacturer for anodized finished products.
- C. Fasteners: Fasteners, screws and bolts shall be concealed and shall be of stainless steel or aluminum. Handrail bracket fasteners and fasteners over water basins shall be of stainless steel.
- D. Support Brackets: Handrail support brackets shall be aluminum with a finish that matches the handrail or railing of which they are a part.
- E. Toeboards: Toeboard for pipe railing shall be as shown on the Drawings.
- F. Socket Grout: Non-shrink grout for handrail post sockets shall consist of an inorganic, non-metallic, pre-mixed grout with a minimum 28-day compressive strength of 4,000 psi.

### 2.04 FINISHES:

- A. Pipe Railing System: Pipe railing system including posts, railings, tube caps, support brackets and other miscellaneous parts shall be provided with a 0.7-mil clear anodized finish, AA-M32 C22A41.

### 2.05 ASSEMBLIES:

- A. Height and Spacing Requirements: Railing shall be a three (3) rail system with equal open spaces between rails (and toeboard when required). Whenever the UBC requirements are not specified and only Utah OSHA requirements are specified the open spaces between rails need only conform to Utah OSHA requirements and may be spaced 21-inches apart. Top of upper railing shall be 42-inches above the working surface. Toeboards shall be not less than 4-inches in height nor more than 1/4-inch off the working surface and shall be provided where indicated and/or required. Railings shall be mounted as shown on the Drawings. The posts shall be evenly spaced at not less than 4-feet nor more than 6-feet on centers. Field conditions may require some adjustment of spacing. The top railings shall be as long as possible and the post shall not project through the top rails.

## PART 3 - EXECUTION

### 3.01 GENERAL:

- A. Unless specified or shown otherwise, all handrails and railings shall be component systems, installed complete and ready for use with all anchors, attachments, balusters, brackets, caps, fasteners, gates, posts, sleeves, trim and all other related items required or necessary for the complete installation.
- B. All installation work hereunder shall be performed by craftsmen experienced in the fabrication or architectural metal work. Exposed surfaces shall be free from defects or other surface blemishes. All dimensions and conditions shall be verified in the field in advance. All joints, junctions, miters and butting sections shall be precision-fitted with no gaps occurring between sections and all surfaces shall be flush and aligned.

3.02 WELD FINISH:

- A. All exposed welds shall be ground smooth and flush and shall be polished and anodized. Discoloration of exposed aluminum surfaces, whether or not due to welding, shall constitute a basis for rejection of the entire assembly.

3.03 EXPANSION/CONTRACTION:

- A. Exterior railing systems shall provide for 1/4-inch expansion and contraction per 20 linear feet of railing. Interior railing systems shall provide for 1/8-inch expansion or contraction per 20 linear feet of railing.

3.04 RAILING CONTINUITY AND END TREATMENT:

- A. Handrails and railings shall be designed to form a continuous run system with elbow turns and bends that do not have interferences with hand movement. Handrails shall be continuous for the full length of the stairs and landings. The handrails shall extend not less than 6-inches beyond the top and bottom risers. Whenever possible, the extension shall be at least 18-inches for the possible use by handicapped people. The ends of handrails shall be returned to wall or shall be terminated in newel posts or safety terminals. Newel posts and safety terminals may be used only when approved by the Engineer.

3.05 INSTALLATIONS WITH DISSIMILAR MATERIALS IN CONTACT WITH ALUMINUM:

- A. Special care shall be exercised to prevent aluminum components from coming in contact with steel, galvanized steel and concrete or dissimilar metals or materials. Proper coatings shall be applied to protect the aluminum surface in contact with dissimilar materials. See Section 09800-4. Only stainless steel bolts or components shall be used to connect isolated dissimilar materials.

END OF SECTION 05521



## SECTION 05600 – PRE-ENGINEERED METAL BUILDING

### PART 1 - GENERAL

#### 1.01 THE REQUIREMENT

- A. The Contractor shall furnish and erect a pre-engineered metal building and associated accessories complete and in accordance with the requirements of the Contract Documents.

#### 1.02 REFERENCES

- A. AISI - Specification for the Design of Cold-Formed Steel Structural Members - 1986 Edition with 1989 Addendum.
- B. AISC - Specification for Structural Steel Buildings - 1989.
- C. AISC - Steel Design Guide Series 3 - Serviceability Design Considerations for Low-Rise Building - 1990.
- D. ASTM A36 - Specification for Structural Steel.
- E. ASTM A 53 - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- G. ASTM A325-04b - Specification for High Strength Bolts for Structural Steel Joints.
- H. ASTM A123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- I. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical Quality).
- J. ASTM A463 - Specification for Steel Sheet Cold Rolled Aluminum Coated Type 1 and Type 2.
- K. ASTM A490 - Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.
- L. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- M. ASTM A501 - Hot Formed Welded and Seamless Carbon Steel Structural Tubing.
- N. ASTM A529 - Structural Steel with 50,000 psi Minimum Yield Point.
- O. ASTM A570 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
- P. ASTM A572 - Specification for High Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
- Q. ASTM A792 - Specification for Steel Sheet Aluminum Zinc Alloy Coated by the Hot Dip Process, General Requirements.
- R. ASTM E1514 - Specification for Structural Standing Seam Steel Roof Panel Systems.

- S. AWS A2.4-93 - Standard Welding Symbols.
- T. AWS D1.1-96 - Structural Welding Code - Steel.
- U. AWS D1.3-89 - Structural Welding Code - Sheet Steel.
- V. MBMA Low Rise Building Systems Manual - 2002 Edition.

### 1.03 SYSTEM DESCRIPTION

The building shall include all primary and secondary structural framing members, connection bolts, canopies, roof extensions, covering, windows, doors, flashing, trim, fasteners, closures, sealer, insulation, gutters, downspouts, framed openings for louvers, and conveyors, and other miscellaneous items as stated in the specifications and/or shown or called for on the Drawings.

- A. The Framing system shall be clear span.
- B. Primary Framing: Rigid frame of rafter beams and columns, end wall columns.
- C. Secondary Framing: Purlins, girts, eave struts, flange bracing, and other items detailed.
- D. Lateral Bracing: Horizontal loads not resisted by main frame action may be resisted by cable, rod and/or diaphragm, portal frames, fixed base columns in the sidewall. Diaphragm and/or cable, rod, portal frame, and fixed base columns in the endwall. Cable, rod, and/or diaphragm in the roof.
- E. Wall and Roof System: Preformed steel panels, insulation, and accessory components.
- F. Roof Slope: 2/12
- G. Dimensional Terminology:
  - 1. The building "Width" shall be the measurement from outside face to peak of roof.
  - 2. The building "Length" shall be the measurement from outside face to outside face of the endwall girts.
  - 3. Eave" to be determined as the line along the sidewall formed by the intersection of the planes of the roof and sidewall.
  - 4. "Eave Height is defined as the vertical dimensions as measured from the finished floor to the top of the eave strut.
  - 5. The "Bay Spacing" shall be the measurement as follows:
    - a. Interior Bay Spacing: The distance between the centerlines of interior frames.
    - b. End Bay Spacing: The distance from the outside face of endwall girt to the centerline of the adjacent interior frame.
- H. Building Type:
  - 1. Clear Span Building - The building shall be of the single-gable, rigid frame type with vertical columns (uniform depth) located at the building sidewalls only. The transverse rigid frame shall be fabricated of shop-welded steel plate and designed for erection by field bolting.

#### 1.04 DESIGN REQUIREMENTS

##### Standard Design Criteria

- A. The buildings shall be designed in accordance to the latest editions of the IBC and all applicable City and State Codes.
- B. All loads shall be proportioned and applied in accordance with MBMA Low Rise Building Systems Manual.
- C. Deflection requirements shall be in accordance with the applicable provisions of the AISC Steel Design Guide Series 3 - Serviceability Design Considerations for Low-Rise Buildings.
- D. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 100 degrees F.
- E. Roof drainage system to withstand rainfall intensity of 2 inches per hour with 15-minute duration.

#### 1.05 SUBMITTALS

- A. Contractor shall submit building drawings and calculations in accordance with Section 01300 Contractor Submittals. The drawings shall provide details describing footings and foundation support. The Contractor is responsible for providing sufficient building support for both seismic or wind loading whichever is greater in their design of the footings and stem wall.

#### 1.06 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with MBMA Low Rise Building systems Manual, and, for items not covered, AISC - Specification for Structural Steel for Buildings. Metal Building Manufacturer shall be AISC Certified Category MB.

#### 1.07 QUALIFICATIONS

- A. Manufacturer: The company manufacturing the products specified in this Section shall be a member of MBMA and shall have a minimum of 10 years experience in the manufacture of steel building systems.
- B. Structural framing and covering shall be the design of a licensed Professional Engineer experienced in design of this work.

#### 1.08 FIELD MEASUREMENTS

- A. Metal building contractor shall verify that field measurements are as indicated on erection drawings.

#### 1.09 WARRANTY

- A. Building manufacturer shall provide a Standard Limited Warranty of five (5) years.
- B. Building manufacturer shall provide a aluminum-zinc alloy Coated Steel Panel Limited Warranty of twenty (20) years.
- C. Building manufacturer shall provide a Panel Finish Limited Warranty of twenty (20) years.

- D. Building manufacturer shall provide a Roof System Weather tightness Limited Warranty of (20) twenty years.

## PART 2 - PRODUCTS

### 2.01 MATERIALS - STRUCTURAL FRAMING

A. Primary Framing Members:

1. Rigid frames, tapered beams, sidewall columns, and rafter beams shall be classified as primary structural framing.
2. Secondary structural framing shall include endwall columns, and canopy beams, purlins, girts, eave struts, headers, jambs, flange bracing, clips and other miscellaneous structural framing.
3. Primary Framing: Steel used to fabricate built up framing members shall be 50,000 PSI minimum yield point material and shall conform to the physical characteristics of one of the following:  
ASTM 607 Grade 50  
ASTM A570 Grade 50  
ASTM A572 Grade 50  
ASTM A529 Grade 50
4. Steel used for cold-formed members shall be 55,000 PSI minimum yield point material and shall conform to the physical characteristics of ASTM A570 Grade 55.
5. Steel used for interior pipe columns shall be 36,000 PSI minimum yield point material and shall conform to ASTM A53 Grade B (with Hydrostatic Test requirements excluded), ASTM A-501 straightness tolerance.
6. The building manufacturer shall have on file certified mill test reports, which verify that these requirements have been met.
7. Purlins and Girts: Steel used to form purlins and girts shall be hot rolled steel sheet with a guaranteed minimum yield point of 55,000 PSI and shall conform to the physical characteristics of ASTM A570 Grade 55.
8. Cable used for diagonal bracing shall be extra high strength Grade-7 wire Class A coating, left hand lay, galvanized steel strand, conforming to the provisions of ASTM Specification A-475.
9. Structural steel members shall be sheared, formed, punched, welded and painted in the plant of the manufacturer. All shop connections shall be welded in accordance with the AWS "Standard Code for Welding in Building Construction" and CWB "General Specifications for Welding of Steel Structures."
10. Field connections shall be bolted with high strength bolts and nuts (ASTM A325 or SAE J429 Grade 5). Bolts and nuts shall be Hot-Dip Galvanized in accordance with ASTM A153.
11. Light-gauge cold-formed sections shall be manufactured by precision roll or brake forming. All dimensions shall be true, and the formed member shall be free of fluting, buckling or waviness.
12. Protective Coatings - **All framing members shall be hot-dip galvanized in accordance with specification 09800.**

B. Secondary Structural Members:

1. Purlins and girts shall be precision roll-formed "C" sections or "Z" sections of adequate size and thickness as determined by the design criteria. Purlins shall be either simple span or continuous span members.
2. Eave struts shall be precision roll-formed and/or press broke "C" sections. The upper flange shall slope with the normal roof slope, and the web shall be vertical and free to receive the sidewall covering.
3. Wind bracing shall be accomplished by diagonal cable bracing, rod bracing, portal frames, and/or diaphragm action of the roof and wall covering. All cables for diagonal bracing shall be fabricated from extra high strength strand. Adjustment shall be provided by an eyebolt assemble.
4. Flange bracing shall consist of angle or tubular bracing connected to the web of the purlin or girt and to the compression flange of the primary structural member.
5. Base support shall consist of a continuous base angle, base "C", or paneledge to which the base of the wall covering shall be attached. The base support shall be securely fastened into the concrete by the erector.
6. **All secondary members must be rolled from galvanized material or be Hot Dip Galvanized.**

C. Structural Member Fabrication:

1. **Framing Members: All framing members must be Hot Dip Galvanized.**
2. Hot rolled members shall be fabricated in accordance with AISC Specification for pipe, tube, and rolled structural shapes.
3. Fabricate built-up members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

2.02 MATERIALS - ROOF SYSTEM

A. Roof Panel Description:

1. Roof panels shall have 1-1/4 inch trapezoidal ribs spaced 12 inches on center and two stiffener ribs. Each panel shall provide 36" net coverage in width.
2. The panels shall be joined to the roof purlins per the manufacturer's recommendations
3. All roof panels shall be continuous from eave to ridge except where lengths become prohibitive for handling purposes. All end-laps shall be at least 6".

B. Panel Material: Sheet Steel Stock: Panel material shall be aluminum-zinc alloy-coated steel conforming to ASTM A792 for coating AZ50 or AZ55.

1. 26-gauge or 24-gauge coated steel shall have a minimum yield strength of 80,000 PSI in accordance with ASTM A-792.

C. Roof Insulation: Roll glass fiber type, faced with reinforced white vinyl UL flame spread classification of 25 or less where exposed, R-30.

- D. Closures: The corrugations of the roof panels shall be filled with a preformed closed cell, laminated polyethylene foam closure along the eaves and ridge for weather tightness.
- E. Fasteners self-drilling, self tapping, HWH 410 stainless steel screws with sealing washers through flat of panel if "R" type panel. Size to maintain load and weather tightness requirements.
- F. Sealants: Mastic for roof side-laps, end-laps and flashing shall be sealed with a mastic sealer 3/16" dia. For roof slopes of 1:12 or greater, and 1/2" x 1/8" tape for roof slopes of less than 1:12. The material shall be a butyl base elastic compound with a minimum solid content of 99%, Chemseco Sealum TC95 or equal. The sealer shall have good adhesion to metal and be non-staining, non-corrosive, non-shrinking, non-oxidizing, non-toxic, at temperatures from -60 degrees F to 212 degrees F (-51 degrees C to -100 degrees C). The material shall meet or surpass the requirements of Federal Specifications TT-C-1796A Type II, Class B and NAAMM SS-1C-68.

### 2.03 MATERIALS - WALL SYSTEMS

- A. Wall Panels Description:
  - 1. Wall panels shall have 1-1/4 inch trapezoidal ribs spaced 12 inches on center and two stiffener ribs. Each panel shall provide 36" net coverage in width.
  - 2. The panels shall be attached to the girts per the manufacturer's recommendations
  - 3. All wall panels shall be continuous from sill to roof line except where lengths become prohibitive for handling purposes. All end-laps shall be at least 4".
- B. Wall Panel Material: Sheet Steel Stock: Panel material shall be aluminum-zinc alloy-coated steel conforming to ASTM A792 for coating AZ50 or AZ55.
  - 1. 26-gauge or 24-gauge coated steel shall have a minimum yield strength of 80,000 PSI in accordance with ASTM A-792.
- C. Closures at the eaves and rake and where panels end over or under a door, window, louver or other such wall openings, the wall panel corrugations shall be filled with preformed closed cell, laminated polyethylene foam closure when required for weather tightness.
- D. Fasteners self-drilling, self tapping, HWH 410 stainless steel screws with sealing washers through flat of panel if "R" type panel or through rib if "A" type panel. Size to maintain load and weather tightness requirements.

### 2.04 MATERIALS – FOUNDATION

- A. All building foundations shall be designed in accordance with local codes. Seismic and wind loading shall be considered. The Contractor shall reference the site specific soils report as described in Section 02900 in developing the design for the foundation.
- B. Concrete shall be a minimum of 4000 psi strength and provided in accordance with Section 03300 "Cast-In Place Concrete".
- C. Reinforcing steel shall be provided utilizing Grade 60 steel. All steel provided for reinforcement in concrete shall be in accordance with Section 03200 Reinforcement Steel.

## 2.05 PANEL FINISH

- A. Exterior Finish: panels shall be finished to meet or exceed the following criteria:
1. Prime coat: The base metal shall be pretreated and primed with epoxy or urethane type primer for superior adhesion and superior resistance to corrosion. The dry film thickness shall be 0.2 mils.
  2. Exterior Coat: After priming, the exterior side shall be given a 20 year life coating baked in excess of 500 degrees F. to a controlled dry film thickness of 0.7 to 0.8 mills.
  3. Excellent weatherability and resistance to coating deterioration shall be evident when subjected to the following tests:
    - a. Humidity Resistance: Immediately after removal from cabinet, the exposed area shall contain less than 5% No. 8 blisters, after 1000 hours when tested according to ASTM D-2247.
    - b. Salt Spray Resistance: Immediately after removal from cabinet, the exposed area shall contain less than 5% No. 8 blisters, after 750 hours when tested according to ASTM B-117.
    - c. Specular Gloss: The gloss rating shall be 25-35 degrees on a Gardner 60 degree gloss meter when tested in accordance with ASTM 523.
    - d. Hardness: The coating shall have a minimum paint hardness of F-2H using Eagle Turquoise drawing pencils.
    - e. Q.U.V. Weatherometer: There shall be no objectionable color change, chalking or blistering after 300 hours when tested in accordance with ASTM G-53
- B. Interior Finish: The interior finish shall have a parchment polyester top coat over an epoxy or urethane primer. The dry film thickness shall be 0.3 to 0.5 mils.
- C. Color Selection: Exterior panel and trim colors will be selected from the Building Manufacturer's standard colors. Submit two (2) color charts with the proposal.

## 2.06 MATERIALS - TRIM

- A. Exterior gutters shall be 24-gauge, G90 galvanized or aluminum-zinc alloy coated steel with the same finish as the wall panels. Color to be chosen by Owner from manufacturer provided color charts.
- B. Downspouts shall be 28-gauge galvanized or aluminum-zinc alloy coated steel with a color coordinated, pre-painted finish. Color to be chosen by Owner from manufacturer provided color charts.
- C. Standard rake trim shall be 26-gauge, G90 galvanized or aluminum-zinc alloy coated steel with the same finish as the wall panels. Color to be chosen by Owner from manufacturer provided color charts. If the roof is a Standing Seam or Loc-Seam system, the rake shall be attached to the endwall material with a slip joint, allowing the rake to expand and contract with the roof system.
- D. Wall trim shall be 26-gauge, G90 galvanized or aluminum-zinc alloy coated steel with the same finish as the wall panels. Color to be chosen by Owner from manufacturer provided color charts.
- E. All gutter and downspout joints, rake flashing laps, ridge flashing laps doors, windows and louvers shall be sealed with Sika Sikaflex 201 caulk or equal. The caulk shall meet or exceed the requirements of Federal Specification TT-S-00230C, Type II, Class A.

## PART 3 - EXECUTION

### 3.01 RECEIVING, STORAGE AND HANDLING OF MATERIALS ON JOBSITE

- A. All materials shall be unloaded, handled, hauled and delivered to storage by competent workmen in a manner, which will prevent bends, dents, scratches and other damage. Damaged materials shall be rejected and promptly replaced. All materials shall be properly stored and protected from weather damage by the Contractor. All shipments will be thoroughly checked by the project Contractor.
- B. Primed Materials: Upon receipt, all bundles of primed material shall be stored on blocking at an angle sufficient to allow any trapped water to drain and should be protected from the weather by covers allowing air circulation. Water, ice and snow should not be allowed to collect and remain thereon.
- C. Roof and Wall Panels: Bundles of panels shall be inspected for moisture upon receipt. If moisture is present, dry the panels and, if possible, store them in a warm, dry place. The panel bundles shall be elevated and sloped in a manner to allow moisture to drain. Cover all bundles with a tarp or plastic, leaving airspaces for adequate air circulation.

### 3.02 ERECTION – GENERAL

- A. The erection of the metal building and the installation of accessories will be performed in accordance with the Building Manufacturer's erection drawings and erection manuals by a qualified erector using proper tools, equipment and safety practices.

### 3.03 ERECTION – FRAMING

- A. Erect framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.
- B. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection equipment and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection. The temporary guys, braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.
- C. Do not field cut or alter structural members without approval of the metal building manufacturer. After erection, prime, weld abrasions, and surfaces not shop primed.

### 3.04 ERECTION - WALL AND ROOFING SYSTEMS

- A. Install in accordance with manufacturer's instructions
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.

### 3.05 TOLERANCES

- A. All work shall be performed in a workmanlike manner.

- B. Install Framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

END OF SECTION 05600

