

Standard Specifications METAL BUILDING SYSTEMS

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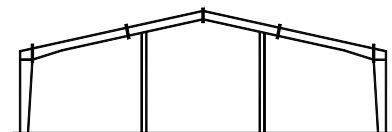
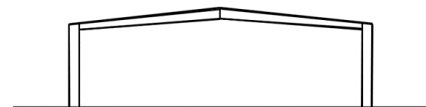
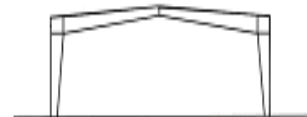
SECTION 1: GENERAL

1.1 SCOPE

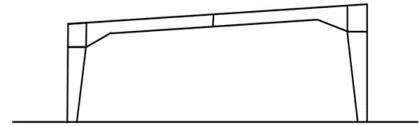
- 1.1.1** These specifications cover the materials and the fabrication of building materials manufactured by Sunward (The Company), which shall be designed and erected in accordance with these specifications and accompanying drawings supplied with building materials. Erection by others.
- 1.1.2** The material furnished shall include the structural framing, roof panels, wall panels, bracing, fasteners, sealants, flashing, and all other parts for a complete building system (except anchor bolts and all items imbedded in the concrete.) Overhead doors, insulation, etc., are not considered part of the building system and should be supplied by others.

1.2 BUILDING DESCRIPTION

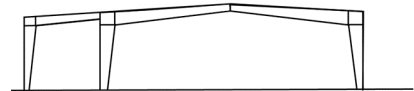
- 1.2.1 RIGID FRAME:** A structural frame consisting of members joined together with moment connections so as to render the frame stable with respect to the design load, without the need for bracing in its plane. The columns are typically tapered.
- 1.2.2 STRAIGHT COLUMN FRAME:** They are identical to the Rigid frame as defined in section 1.2.1 except the columns are straight, not tapered.
- 1.2.3 MULTI-SPAN BUILDING:** Buildings consisting of more than one span across the width of the building. Multi-span is a rigid frame as defined in section 1.2.1.



- 1.2.4 SINGLE SLOPE:** Rigid frame is continuous transverse frame building with a roof that slopes in one direction. Can be clear span or multi-span.

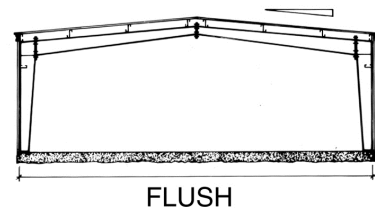


- 1.2.5 LEAN-TO:** A building extension with a roof that slopes in one direction, getting support from the structure to which it attaches. Main structure must be designed to handle extra load of lean-to.



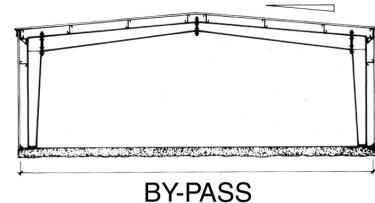
1.3 BUILDING TERMINOLOGY

- 1.3.1 BUILDING WIDTH:** The dimension of the building measured parallel to the main framing from sidewall to sidewall, outside of by-pass or flush mounted girts.



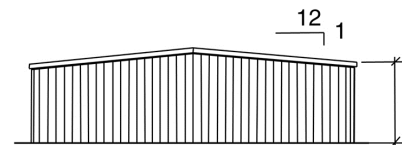
- 1.3.2 BUILDING EAVE HEIGHT:** is a nominal dimension measured from bottom of the column base plate to the intersection of the roof and sidewall sheets at the eave strut.

- 1.3.3 BUILDING LENGTH:** The dimension of the building measured perpendicular to the main framing from endwall to endwall, outside of by-pass or flush mounted girts.



- 1.3.4 BAY:** The space between the main frames measured normal to the frame.

- 1.3.5 ROOF SLOPE:** The tangent of the angle that a roof surface makes with the horizontal, usually expressed in units of vertical rise to 12 units of horizontal run.



1.4 DRAWINGS AND CERTIFICATION

- 1.4.1** The Company shall furnish approval erection drawings which include anchor bolts plans, wall and roof elevations for framing and sheeting, frame cross sections and general details to show clearly the proper assembly for all building components. Final erection drawings and shipping list are delivered with the building, and these drawings are to be used to erect the building.

- 1.4.2** A qualified professional engineer shall certify that the building design meets the requirements of the specifications and conforms to good engineering practices for the loading conditions requested.

- 1.4.3** Engineer letter of certification and engineer stamped drawings supplied for each job.

- 1.4.4 CERTIFICATIONS:** The Company is an approved fabricator with the following certifications:

IAS AC472, CSA A660, CSA W47.1, City of Houston, City of Seattle, City of Los Angeles: Type I Fabricator, Miami Dade County, Clark County Nevada

SECTION 2: DESIGN

2.1 DESIGN STANDARDS, SPECIFICATIONS AND CODES

The following standards, specifications and codes are used in designing metal buildings at the Company.

2.1.1 STANDARDS:

ASCE 7 Standard: American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures, Latest Edition.

MBMA: Metal Building Manufacturers Association, Metal Building Systems Manual, Latest Edition.

2.1.2 SPECIFICATIONS:



Structural Steel: AISC Manual of Steel Construction, Allowable Stress Design, Latest Edition.

Structural Joints: AISC specification for structural joints using ASTM A325 or ASTM A490 Bolts

Cold-Formed Steel: AISI Cold-Formed Steel Design Manual, Latest Edition.

Welding: AWS (American Welding Society) D1.1 for Structural Steel, AWS D1.3 for Sheet Steel. CSA (Canadian Standard Association) W59 & W47.1

2.1.3 CODES: All model codes, namely IBC and NBC and other applicable state building Codes. (As outlined in Section 2.2 code interpretation.)

2.1.4 BOLTS: As a standard, ASTM A325 (type N) bolts are used as bearing type connections. Occasionally, it may be necessary to use (Type X) bolts. It is ensured that proper checking is done for this condition. ASTM 307 bolts are used for secondary member connections.

2.1.5 HIGH STRENGTH BOLTS: ASTM A325 Bolts used on rigid frame moments connections are designed as bearing type connections, and threads are included in the shear plane. Turn-of-the-nut method is to be used in tightening the high strength moment connection bolts. Special inspection of the tightening of these bolts is required as specified in building codes.

2.1.6 WELDING: Welds joining flanges to splice plates, flange to flange, and web butt joints are full penetration welds with effective weld throat equal to or exceeding the required strength of the joint.

2.1.7 BUILDING WITH OPENINGS: Door and window frames (jambs and headers) are structurally designed to replace the wall panels. As per Building Codes %all windows or doors or other openings shall be considered as openings unless such openings and their frames are specially detailed and designed to resist the loads on elements and components in accordance with the provisions of this section.+ The same assumption is also true for buildings with bi-fold doors and sliding doors provided the manufacturers of these door frames specially design and detail to resist the loads on elements and components for the design wind load.

Due to the above assumptions, buildings with truly partial open conditions are designed as partially enclosed and all other buildings are designed as enclosed or open depending on the %open condition+as defined in the code.

2.2 CODE INTERPRETATION: Model Code Interpretation and the development of the code compliance document will be the responsibility of the Engineering Department. All the buildings are designed per the latest ASCE and MBMA standards. The Company uses the following model codes (latest edition or the year applicable for any particular jurisdiction) in designing the buildings, by using their applicable load combinations:

- 1) International Building Code (IBC)
- 2) National Building Code of Canada (NBC)

Any other codes specified for custom designed buildings.

SECTION 3: BASIC MATERIAL SPECIFICATIONS

3.1 MATERIAL SPECIFICATIONS

General: All materials shall be new and free from defects that would impair their strength or durability.

Scope: This specification applies only to Company supplied building materials including framing and bracing, wall and roof cover, connectors and fasteners required for attaching various parts to each other and to the foundation.

The following is a list of materials used in fabrication of the Company's pre-engineered steel buildings:

3.1.2 ROOF AND WALL PANELS:

26 & 29 GA:	Galvalume Painted	ASTM A792, SS Grade 80, AZ55 Aluminum-Zinc alloy coated ASTM A792, SS Grade 80, AZ50 Aluminum-Zinc alloy coated
24 GA :	Galvalume Painted	ASTM A792, SS Grade 50, AZ55 Aluminum-Zinc alloy coated ASTM A792, SS Grade 50, AZ50 Aluminum-Zinc alloy coated
Liner Panels (29 GA):	Galvalume Painted	ASTM A792, SS Grade 80, AZ55 Aluminum-Zinc alloy coated ASTM A653, SS Grade 80, Galvanized G40
Trim material:		ASTM A792, SS Grade 50, AZ50 Aluminum-Zinc alloy coated

3.1.3 PURLINS, GIRTS, AND EAVE STRUTS:

ASTM A1011 SS or HSLAS, CLASS 1, Grade 55



3.1.4 BUILT-UP SECTIONS:

Plate: ASTM A529 SS, Grade 50 or ASTM A572 HSLA, Type 1 or 2, Grade 50
 Sheet: ASTM A1011 HSLAS, Class 1, Grade 50
 Bar: ASTM A529 SS Grade 50 or 55 or ASTM A572 HSLA Type 1 Grade 50

3.1.5 HOT ROLLED SECTIONS:

ASTM A36, Grade 36 (Channels)
 ASTM A992, Grade 50 (Wide Flange Shapes)

3.1.6 STRUCTURAL (ROUND) TUBE:

ASTM A500B ($F_y = 42ksi$)

3.1.7 STRUCTURAL (SQUARE, RECTANGULAR) TUBE:

ASTM A500B ($F_y = 46ksi$)

3.1.8 BOLTS:

ASTM A325, Type 1 heavy hex bolt with heavy hex nut
 ASTM A563, Grade C
 ASTM A307, Grade A hex bolt with hex nut, ASTM A563 Grade A
 (All the above items are plain finish)

WASHERS:

Type 1 ASTM F436 (If Required)

3.1.9 ANCHOR BOLTS:

$\frac{1}{2}$ +DIAM. = ASTM A307
 $\frac{3}{4}$ +Thru 1 $\frac{1}{4}$ +DIAM. = ASTM F1554 GR. 6

3.1.10 FASTENERS: All self-drilling and self-tapping sheet metal screws will conform to the following:

- #12-14 x 1-1/4+Tek 2 or Tek 3 self-drill screw conforms to SAE J78-98 with sealing washer
- #12-14 x 1-1/2+Tek 2 or Tek 3 self-drill screw conforms to SAE J78-98 with sealing washer
- #12-14 x 1-1/4+#5 Tek 5 self-drill screw conforms to SAE J78-98 with sealing washer

- ¼+. 7/8+TAE1 Self-drilling screw conforms to SAE J78-98 with sealing washer
- #17 x 3/4+Type AB tapping screw conforms to ANSI standard B18.6.4 with sealing washer
- #10 x 1-1/2+woodgrip screw with sealing washer

3.1.11 BRACING:

- **CABLE:** EHS (extra high strength) 7-wire Class A galvanized steel strand conforming to ASTM A475
- **HILLSIDE WASHER / BRACER:** ASTM A48, CL-30 / ASTM 536-84 Grade 65
- **EYEBOLTS:** ASTM A572 Grade 55 Rod, Zinc Coated ASTM B633 turned and welded with ASTM A563 Grade A nut and ASTM F844 Washer
- **ROD:** ASTM A36
- **ANGLES:** ASTM A36

3.1.12 WELDING SUPPLIES:

- FILLER METAL:** EM12K Lincoln Weld L-61 (5/64)
FLUX: F7A2 Lincoln Weld 780
FILLER METAL: ER70S-6 Lincoln Weld L-56 (0.045)
SHIELDING GAS: 95 Ar 5 O₂ / CO₂

3.1.13 PRIMER PAINT:

Water-Based Red Oxide

3.2 STRUCTURAL PAINTING

- 3.2.1** All structural framing members that are not galvanized shall be cleaned to remove all dirt, grease, oil, and loose mill scale and shall be given one coat of red shop primer.
- 3.2.2** The primer coat thickness shall be a minimum of one mil on primary framing and 0.5 mil on secondary framing.

3.3 PANEL PAINTING

- 3.3.1** The finish coat for painted panels, when required, shall be minimum 1 mil thickness silicone film and baked to a minimum temperature of 435 degrees F. The silicone polyester panels (except white) shall be pigmented with color pigments of a fade resistant type to help ensure long color life. The painted panels shall not show excessive chalking, cracking or loss of adhesion during its warranty period.
- 3.3.2** Pre-treating and color coating process shall be applied by a reputable coating firm prior to roll forming. Warranty shall be provided upon request.
- 3.3.3** Colors shall be selected from The Company's Standard Colors.

SECTION 4: STRUCTURAL

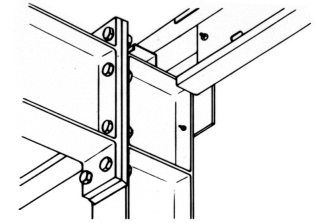
4.1. GENERAL

4.1.1 All shop welding shall conform to the requirements of the AWS D1.1, and D1.3. Welders shall be fully approved by the proper authorities in both Canada and the United States. Flange to web welds shall be continuous on one side of web using automatic submerged arc-welding process. All butt welds shall be full penetration welds.

4.1.2 All framing members shall be shop fabricated for bolted held assembly. Bolts shall meet the requirements of the following ASTM Standards, latest issue:

A-325 for quenched and tempered steel bolts
 A-307 for steel machine bolts

4.1.3 All framing members, where necessary, shall be identified with a piece mark corresponding to the erection drawings.



4.1.2

4.2.2. PRIMARY FRAMING

4.2.1 All rigid frames shall be welded, built-up $\frac{1}{2}$ " sections.

4.2.2 All endwall frames and columns shall be either cold-formed, mill rolled, or built up $\frac{1}{2}$ " sections, depending on design requirements.

4.2.3 All main frame webs, base-plates, splice plates and flanges shall be shop fabricated to include holes for installation of bolts and slots for bracing.

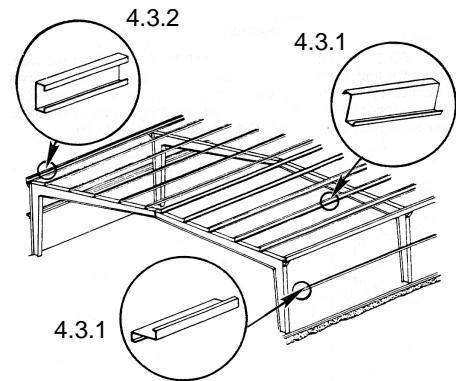
4.3. SECONDARY FRAMING

4.3.1 Purlins and girts shall be $\frac{1}{2}$ "-shaped cold-formed sections or $\frac{3}{4}$ "-shaped cold-formed sections with flanges of no less than 2-1/2" and stiffener lips. Purlins shall be considered as continuous beams, lapping each other at each interior main frame. The girts shall be either continuous or simple span (flush mounted), depending on type of framing. Purlin and girt overlap shall be 24" to 48" (full lap) depending on design requirements.

4.3.2 Eave strut shall be cold-formed $\frac{3}{4}$ " section, formed to appropriate roof pitch (on greater than 1:12).

4.3.3. Framed openings shall be made from sections adequate for the specified design loads.

4.3.4. A continuous 16 gauge galvanized base angle will be supplied for attachment of the base of the sheeting to the concrete. The base angle will be attached to the concrete slab with ramsets or equivalent anchors (fasteners to concrete not supplied by The Company)



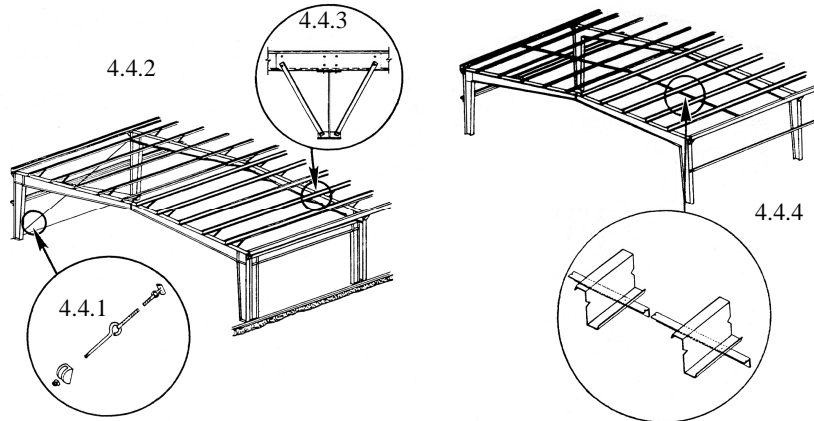
4.4. BRACING

4.4.1 Diagonal cable bracing (galvanized) or rod bracing shall be used in the roof and walls to remove longitudinal loads from the structure.

4.4.2 Portal frames: When special conditions exist so that cable bracing/or rod bracing cannot be used, a portal frame or other type of bracing will be used between frames to remove longitudinal loads.

4.4.3 Flange bracing: The inside flange of all main frames shall be braced by angles connecting to the flange and web of the frame and to the web of the purlin or girt so that allowable compression is adequate for any combination of loadings.

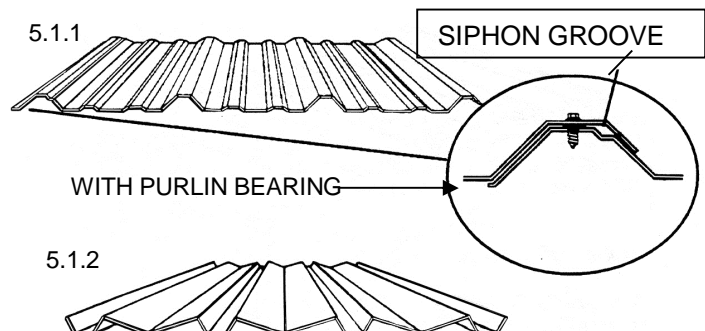
- 4.4.4** To assure consistent purlin spacing and stiffening, purlin bridging angles shall be provided. (1- \times 1- \times 16 gauge min).



SECTION 5: ROOF AND WALL COVERING

5.1 PANEL DESCRIPTION

- 5.1.1** The Company commercial hi-rib panels shall provide 36+net coverage on walls and roof with lengths up to 34q. The panels shall have 4 major ribs, 12+on center, 1 $\frac{1}{4}$ +deep. Trapezoidal return ribs to taper from 1+to 3-15/16+with intermediate shoulders and an anti-capillary flute (Siphon Groove) at the last rib with purlin bearing leg. Two secondary ribs shall be formed between the major ribs. Panels shall be overlapped one major rib at the sides. End laps shall be a minimum of six inches. Mastic sealant shall be provided at all side laps and end laps on roof. **Note:** Roof standard is Galvalume. If colored roof panels are specified there will be an additional charge.
- 5.1.2** Architectural commercial wall panel shall provide 36+net coverage for walls, in lengths up to 34q. Ribs are 1-1/8+deep and spaced 12+on center. Panel design semi-conceals fasteners, while providing a shadow line appearance. Side laps shall be on full major corrugation.
- 5.1.3** Concealed fastener standing seam roof systems are available upon request.
- 5.1.4** Concealed fastener wall panels are available upon request.



SECTION 6: MISCELLANEOUS MATERIAL SPECIFICATIONS

6.1. FASTENERS

- 6.1.1.** Structural bolts shall meet the requirements of the latest issue of ASTM standards:

A-325 for Primary Framing
 A-307 For Secondary Framing

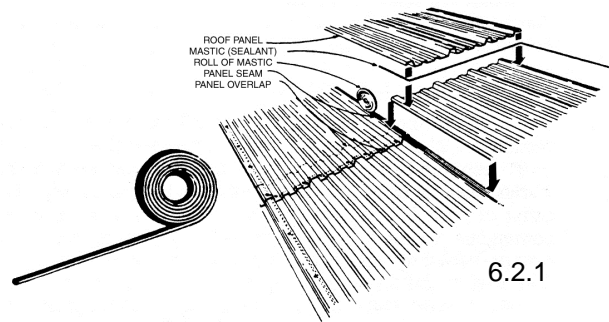
- 6.1.2** Panel fasteners: See specification section 3.1.10. Heads shall be long life coating or color coated to match sidewall or roof panel. Aluminum coated fasteners supplied with galvalume panels. Lifetime Guaranteed Fasteners (optional) also available upon request.



6.1.2

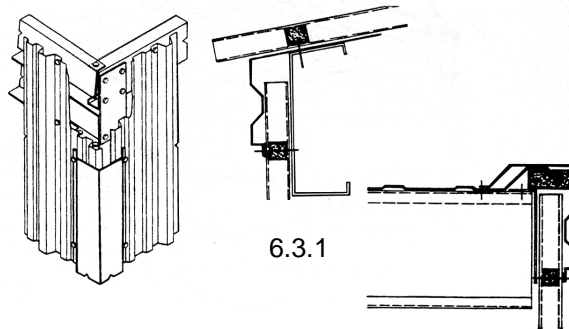
6.2 SEALANTS

- 6.2.1** Sealant for sidelaps, endlaps and flashing shall be a nominal 1/2" wide by 1/8" thick, gray Polysobutylene (butyl) Polymers pressure sensitive tape. The material shall be non-asphaltic, non-shrinking, non-drying, and non-toxic, at temperatures from 10 degrees to 140 degrees F. Sealant shall adhere to metals, plastics and painted surfaces. The material shall have a flash point of at least 300 degrees F, and shall not flow at 275 degrees F.



6.2.1

- 6.2.2** Solid or closed cell, pre-formed polyethylene foam closures, with self-adhesive backing on one side, matching the profile of the roof and wall panel, shall be included at the base, gable and eave, to help assure seal for weather protection or resistance and provide air infiltration stop on blanket insulated buildings.



6.3.1

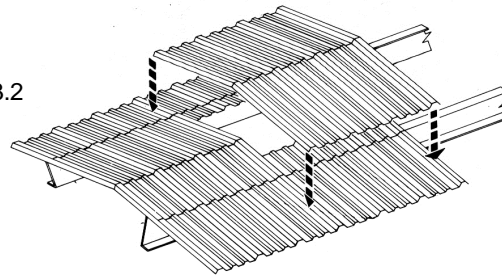
6.3 FLASHING, CLOSURE AND TRIM

- 6.3.1** Flashing and/or trim shall be furnished at the rake, corners base and eaves; also at framed openings and wherever

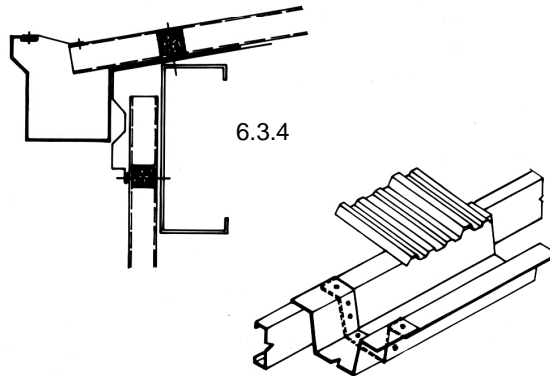
necessary to provide weather protection and a finished appearance. Flashing on framed openings shall conceal all exposed red iron or be of matching trim type.

- 6.3.2** A preformed ridge panel matching the slope and profile of adjoining roof panels shall be provided along the building ridge for all roof slopes up to 4:12. Over 4:12 pitch, a special ridge cap shall be provided.
- 6.3.3** Wall panels will be seated in a notch in the concrete with base trim (optional) and inside closure to close off lower end panels and for weather seal.
- 6.3.4** Optional eave gutter shall be fabricated from galvalume coated steel available in standard trim colors (baked on paint) and supported by a gutter hanging bracket spaced at 36" on center for rain, 24" on center for snow. The gutter shall be 4", 6", or 8" box type and shall conceal the flutes of the roof panels. Downspouts shall be spaced as required for the building size and expected rainfall in area.
- 6.3.5** Valley gutter, if required for multiple span building, regular parapet or mansard condition shall be 24 gauge minimum. Downspouts, outlets and elbows to be furnished by others.

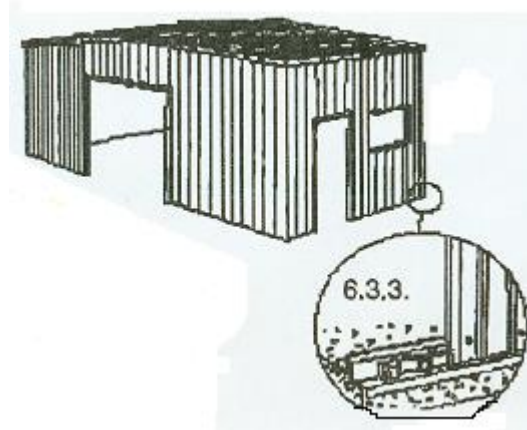
6.3.2



6.3.4



6.3.3



SECTION 7: ACCESSORIES

7.1. PERSONNEL DOORS

- 7.1.1** Personnel doors shall be insulated standard 1-3/4+full flush 20 gauge swing doors, complete with a standard duty cylindrical lock. All doors shall also include flush hinges, door sweep, threshold and structural sub-jambs of Cee sections to ensure rigid placement. (First girt usually acts as door header.) Flashing to close off panel edges included. Door sizes are standard 3070, 4070, 6070. Other sizes available upon request. Glazing not by The Company. All personnel doors are to be field located.

7.2. TRANSLUCENT PANELS

- 7.2.1** Translucent panels shall have the same configuration as the specified covering with an embossed finish exposed to the weather. Translucent panels shall be of translucent polyester resin reinforced glass fiber. The polyester used shall be specially formulated to produce a weather resistant, sun resistant, stabilized product.

7.3. OVERHEAD DOOR FRAMING

- 7.3.1** Overhead door framing shall be designed to resist applicable wind loads and shall consist of Cee section jambs and header.
- 7.3.2** Flashing painted with standard trim colors shall be provided to conceal and close off panel edges around openings when steel siding is utilized. The flashing shall be of a type to completely conceal the grey iron door framing. Partial flashing available at reduced cost.
- 7.3.3** Special flashing available to close off framed openings, if required, when other than steel siding is utilized. Details and shipping list must be supplied.
- 7.3.4** Overhead doors not by The Company.

7.4. WINDOW FRAMING

- 7.4.1** Window framing shall consist of Cee section for jambs, header and sill to ensure rigidity. Flashing included to close off panel edges and conceal the grey iron window framing. Special flashing available, if required, to seal off window framed opening when other than steel siding is utilized. Details and shipping list must be supplied. Glazing not by The Company

7.5. VENTILATORS

- 7.5.1** Stationary roof ventilators are gravity type, manufactured from 24 gauge galvanized steel in which all welds, soldered seams, rivets and fasteners are clean, tight, and secure. Ventilators feature seamless spun caps which are leak proof. Straight through drainage eliminates clogging by airborne debris. Mounting jack matches roof slope. Vents utilize negative air pressure through a 14+throat as an operating principle. Overall width of vent is 22+and height 10-1/2+, not including mounting jack dimension. Power ventilation can be added before or after installation by adding fan section.
- 7.5.2** Spinning turbine vents use pre-lubricated ball bearing action for easy operation of rotor head. Suction is maintained through 12+throat even at low wind velocities. 360° operating surface assures access to wind currents regardless of direction. The vents rotor shaft and bearing assembly are manufactured in galvanized steel and are encased in a corrosion resistant housing to assure long operational life. Mounting jacks matches roof slope.
- 7.5.3** Ridge ventilators come in 10qsections with 9+or 12+throat (specify which), damper and 15qchain loop, controlled by a worm gear operator to adjust damper (longer chain available as option).

SECTION 8: ERECTION BY OTHERS – NOT THE RESPONSIBILITY OF THE COMPANY

8.1. ERECTION

- 8.1.1** The erection of the building system shall be in accordance with the appropriate erection drawings, erection guides and/or other documents furnished by manufacturer. It shall be the erector's responsibility to comply with all appropriate legal and safety requirements. It shall be the erector's responsibility to determine and provide any and all temporary bracing, shoring, blocking, bridging, and/or securing of components, etc., as required during erection of the building.
- 8.1.2** The Company is not responsible for erection.
- 8.1.3** Upon request, the Manufacturer or its Marketing Service may supply the name(s) of potential contractors to install concrete and erect the building components or to perform other work pertaining to the installation and erection of the building components. Buyer acknowledges that neither the Manufacturer nor its Marketing Service have investigated such contractors, and that the provision of the name(s) does not constitute a recommendation of the skill or competence of any contractor. Buyer agrees to rely solely on his own investigation of such matters when selecting contractor. The Manufacturer and its Marketing Service are not involved in construction; any representation or agreement between Dealer or Contractor and Buyer concerning delivery, construction, modifications or other items are between the parties thereto, and do not bind the Manufacturer or its Marketing Service in any way.

8.2. FIELD MODIFICATION

- 8.2.1** Field design modifications will not be made to any structural member except as authorized and specified by the building manufacturer and approved and certified by the Manufacturer's Engineer.

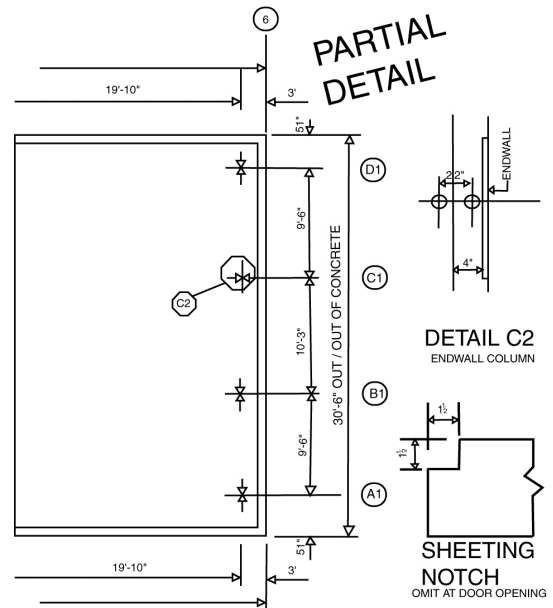
SECTION 9: ANCHORAGE AND FOUNDATIONS

9.1. ANCHOR BOLTS

- 9.1.1** The building anchor bolts shall be designed to resist the column reaction. The sizes and quantity shall be as specified by The Company. The building manufacturer shall furnish anchor bolt setting plans. The anchor bolt sizes, gages, and spacing shown on the anchor setting plan are for cast in place anchor rod or stud anchors.

9.2. FOUNDATIONS

- 9.2.1** The building foundations and anchor bolt embedment depth shall be designed by a qualified engineer and support the building reactions and other loads required by the occupants' usage. The foundation plans and anchor rods shall not be furnished by The Company.



Suggested specifications subject to change to equal or better without notice, due to our policy of continuous product improvements, fluctuations in material supply and market conditions. The Company reserves the right to assign funds to others or to substitute manufacturing, engineering and raw materials, so long as the design, certified loadings and material specifications are equal to or exceed order requirements.