Metal Buildings
Structural Technical Guideline

ISSUE DATE	Revised March, 2012
CODE/SECTION	2006 IBC, Section 106.1
APPROVED	Technical Review Team
REFERENCES	2006 IBC

CODE REQUIREMENTS:

The Code covers requirements for data submitted for review prior to issuance of a permit for a building or structure (Section 106.1). These provisions are as applicable to metal buildings as any other type of building construction.

However, due to the different method used in the contracting and supplying of metal buildings (manufacturers vs. site contractors, lack of architect, out-of-state interests, etc.), a specific list of data requirements is usually helpful. Most will recognize that these requirements are what would normally be produced by the professional architect or professional engineer charged with the design of a building.

GUIDELINES:

1. DRAWINGS

   Minimum submission must include foundation plan, roof framing plan, wall elevations, cross section and framing details. All drawings and calculations must be signed and sealed by an Arizona registered professional engineer or architect.

   a. Foundation plan must show size of footing, size and extent of the steel and dimensions of all concrete. Anchor bolt locations and column reactions may be on an additional sheet prepared by the building manufacturer. If not, they must be shown on the foundation plan.

   b. Roof framing plan line diagram must show all structural framing, beams, columns, purlins, struts, X-bracing, and other secondary framing required to provide a complete structure. Members may be called out by shop piece mark rather than by structural size. However, if this is done a cross-reference table must be provided on the same sheet so that the dimensions and properties of all load-bearing members can be located easily and identified.

   c. Wall framing elevation line diagrams similar to the roof framing plan that call out or reference the size of all structural wall framing.

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d. A cross section must show clearly the primary structural frame actually to be used on the submitted building, including base, haunch, and ridge plate connections. The size of all web and flange members must be noted as well as all bolts and welding. Height, width and depth of all members must be dimensioned clearly. Any clips or connections welded to the frame at the manufacturer's plant must be shown. The ASTM designations and yield stress of material used must be indicated.

e. Framing details should include details and connections of all other load-bearing structural members, including end walls, canopy beams, lean-tos, crane brackets, etc.

2. STRUCTURAL CALCULATIONS

The minimum submission must include analysis and design of the roof and wall sheeting, secondary framing, primary rigid framing, endwall or wind column design, and longitudinal wind load design. Design dead load must be broken down to components, such as roofing, deck, purlins, ceiling, allowance for sprinklers, mechanical systems, if any, and shown on plans. Design live**,** wind and seismic loads must conform to Chapter 16 of the city of Phoenix Building Construction Code.

a. Roof and wall sheathing design must show the shape, dimensions, section properties and yield stress of the particular decking being used. If standard sheets are submitted, the particular gage must be identified as well as figures showing that the load carrying capabilities exceed the actual vertical or horizontal loads.

b. Secondary framing design must indicate the size, shape, and section properties of all light gage purlins and girts. Standard sheets may be utilized if the actual loading and span of the submitted members are indicated and calculations show that the standard members are adequate to support the loads.

c. Primary rigid framing design may be a hand analysis or a computer programmed design based on virtual work, slope deflection, energy equations, column analogy (elastic weights), or finite element analysis. Other recognized methods of analysis may be accepted at the discretion of the Building Official. All computer printouts must be for the particular building submitted and must indicate all dimensions, loading and loading combinations as well as size and geometrical and section properties of members designed. Both vertical and horizontal reactions at base must be diagrammatically shown, or clearly identified. Calculations must be provided for all base, haunch and ridge plate connections as well as canopy beams, lean-tos, portal bents and other special structural members.

d. Endwall design must be complete and include beams, columns and bracing. Calculations on columns must include combined axial and bending stresses. Where a full frame is used in the endwall, columns may be designed for wind load only. Design shall include calculations on endwall rod bracing.

e. Longitudinal wind load design must indicate method of transferring endwall wind load to sidewall foundations. Either rod bracing or portal bracing methods are acceptable. Vertical diaphragm method may be used if substantiating data, either calculation or test, is submitted, together with proper diaphragm detailing. Calculations must show how wind load is transferred to the eave strut. Design of all portal connections must be clearly indicated.