ICC 2019 LAS VEGAS NEVADA

IAS INTERNATIONAL ACCREDITATION SERVICE®

MBMA METAL BUILDING MANUFACTURERS ASSOCIATION®
Research • Leadership • Education

The Building Official's Role in a Metal Building System Project

From Plan Review to Special Inspection and IAS AC472

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Tony Bouquot-MBMA
Sandi McCracken-IAS

ICC INTERNATIONAL CODE COUNCIL®

Learning Objectives

After this presentation, attendees will be able to:

- Understand the roles and responsibilities of the individuals in a project utilizing a metal building system.
- Describe the building official's role and identify any differences with a metal building project.
- Utilize the IAS Accreditation Program for metal building manufacturers to your advantage.
- Identify the inspection requirements and what inspections are important for a metal building project.

Presentation Outline

- Organizations Serving the Metal Building Industry
- Metal Building Systems Market
- Defining a Metal Building System
- Professional Design Responsibilities
- IAS AC472 Accreditation Program
- Inspection Requirements and Guidance
- Case Study
- Resources

Organizations Serving the Metal Building Industry

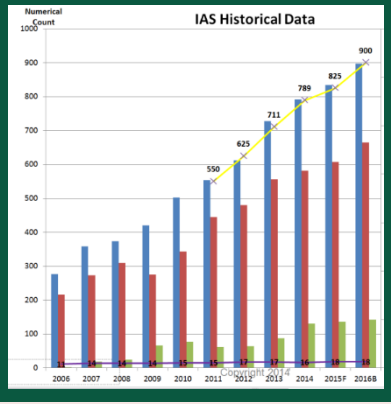
International Accreditation Service

ICC INTERNATIONAL CODE COUNCIL®

MBI
MBMA
MBCEA
IMPACT

Serving Membership Organizations

MBMA
METAL BUILDING MANUFACTURERS ASSOCIATION®
Research | Leadership | Education



Continuous Growth

International Accreditation Service

- A subsidiary of the International Code Council (ICC)
- A non-profit accreditation body
- Providing accreditation services since 1975
- Headquartered in Brea, California
- Accredits product certification agencies, testing laboratories and inspection agencies and fabricator inspection programs, among others

Accreditation vs. Certification

Accreditation

Focus is on an Organization's Management System

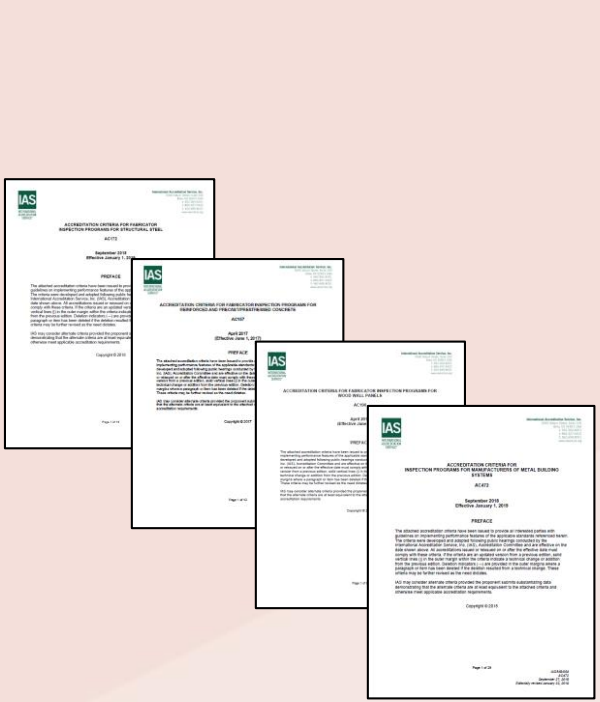
AC472 is the IAS criteria to accredit the ***MBS Inspection Program***

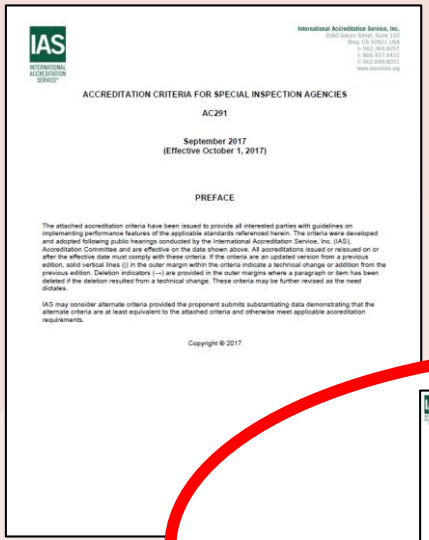
Certification

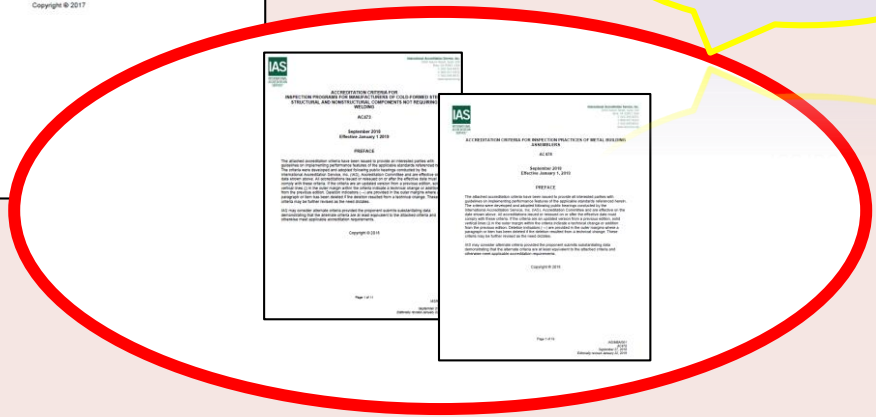
Focus is on products, individuals, or systems

IAS Accreditation Programs

Supporting Building Industry – IBC Chapter 17







Two Accreditation Criteria
to *Support AC472*
Not Currently Referenced in
ICC IBC

Who Approves Accreditation Bodies?

International Accreditation Forum & International Laboratory Accreditation Cooperation (IAF & ILAC)

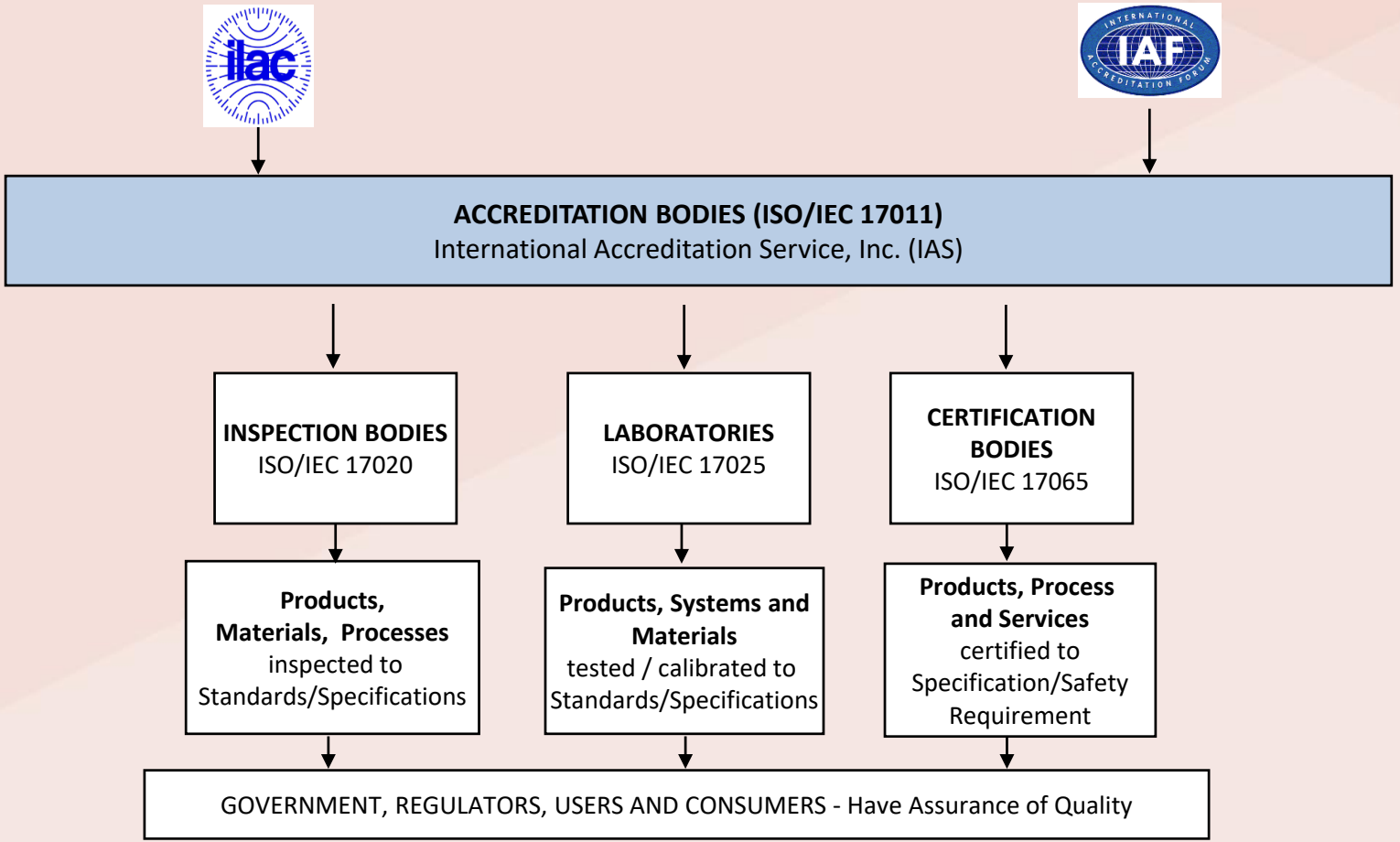
- An association of accreditation bodies around the world
- Evaluations based on ISO/IEC 17021 to ensure accreditation bodies are competent and have no conflict of interest
- ILAC and IAF conduct periodic peer evaluations
- Provides mutual recognition of approved accreditation bodies

Regulators – Federal, State, County, City

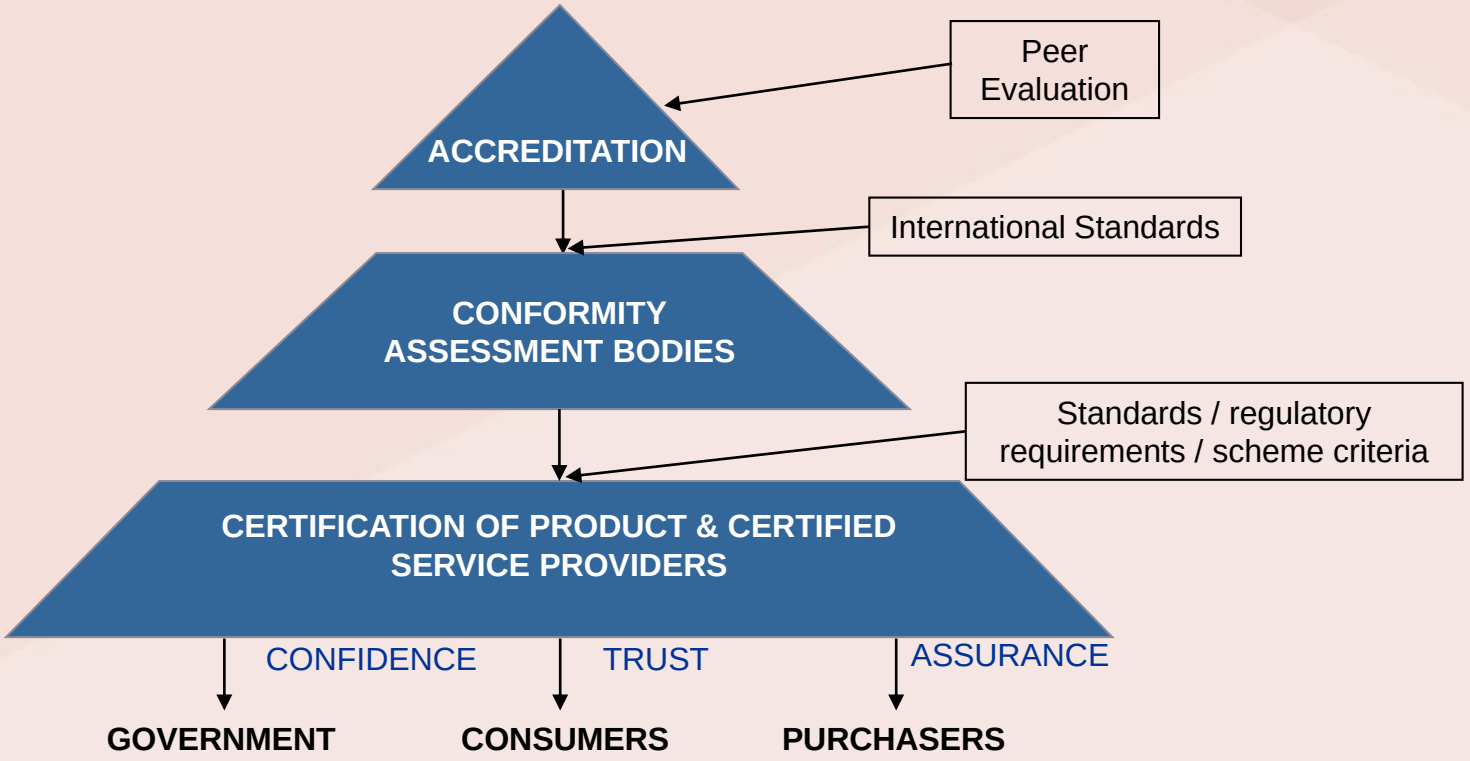
Accreditation Community

- **IAF** and **ILAC** are **global networks** of accreditation bodies and organizations involved in **conformity assessment activities**
- Development and harmonization of accreditation practices across the globe
- Provides for recognition of competent conformity assessment bodies through **Multi-Lateral Mutual Recognition Arrangements**
- Promotion of accreditation as **an effective mechanism for providing confidence in goods and services**, essential for global trade facilitation and socio-economic issues

Accreditation & Conformity Assessment Structure

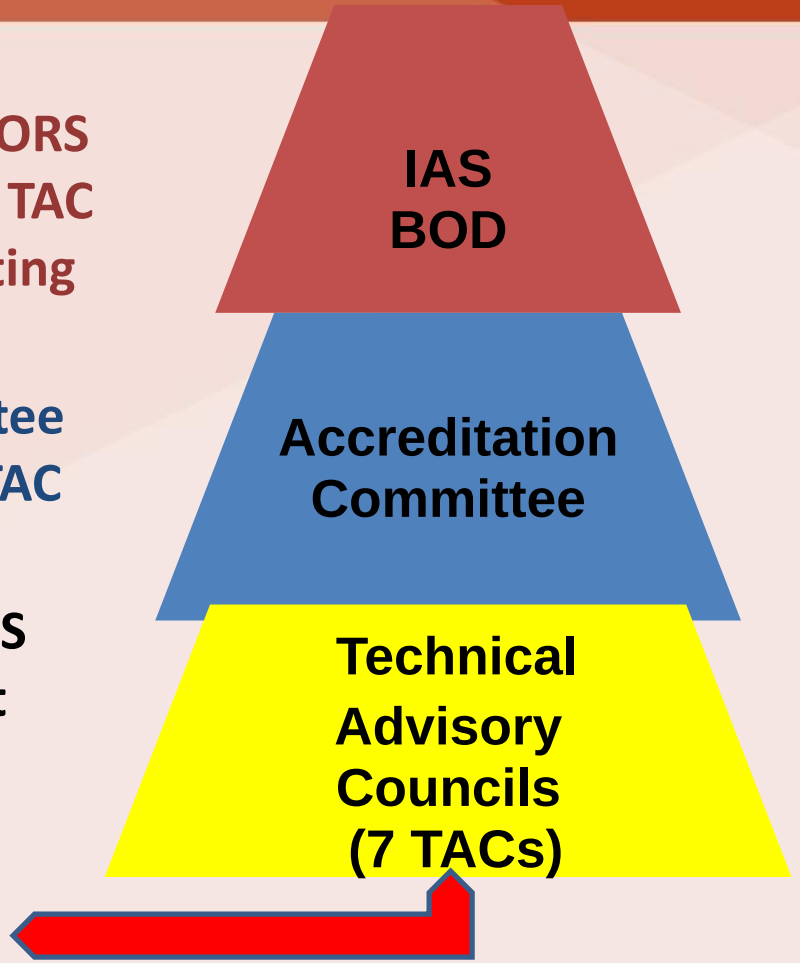


Accreditation & Certification Working Together



IAS Accreditation Infrastructure

- IAS BOARD OF DIRECTORS (BOD) appoints all AC, TAC and staff members sitting on these committees
- Accreditation Committee (AC) is supported by TAC and IAS staff
- TAC is supported by IAS staff and management team
- IAS Staff / Assessors / Experts



IAS Board of Directors

Purpose and Function:

- 8 members
- Composed of
  - Code Regulators
  - Institutional/Academic
  - Industry Group
  - Regulatory Officials
  - Accredited Organizations
- Handle all nominations and strategic planning

IAS Board of Directors

8 Technical Advisory Councils

- Testing Laboratory TAC
- Calibration Laboratory
- Inspection and Special Inspection Agencies TAC
- Product Certification TAC
- Management System Certification TAC
- Personnel Certification TAC
- Regulatory Code TAC
- Food Safety TAC

IAS Accreditation Committee

Appointed by Board of Directors
Monitors Accreditation Programs
Public Hearing Process Provides Transparency

IAS Accreditation Programs

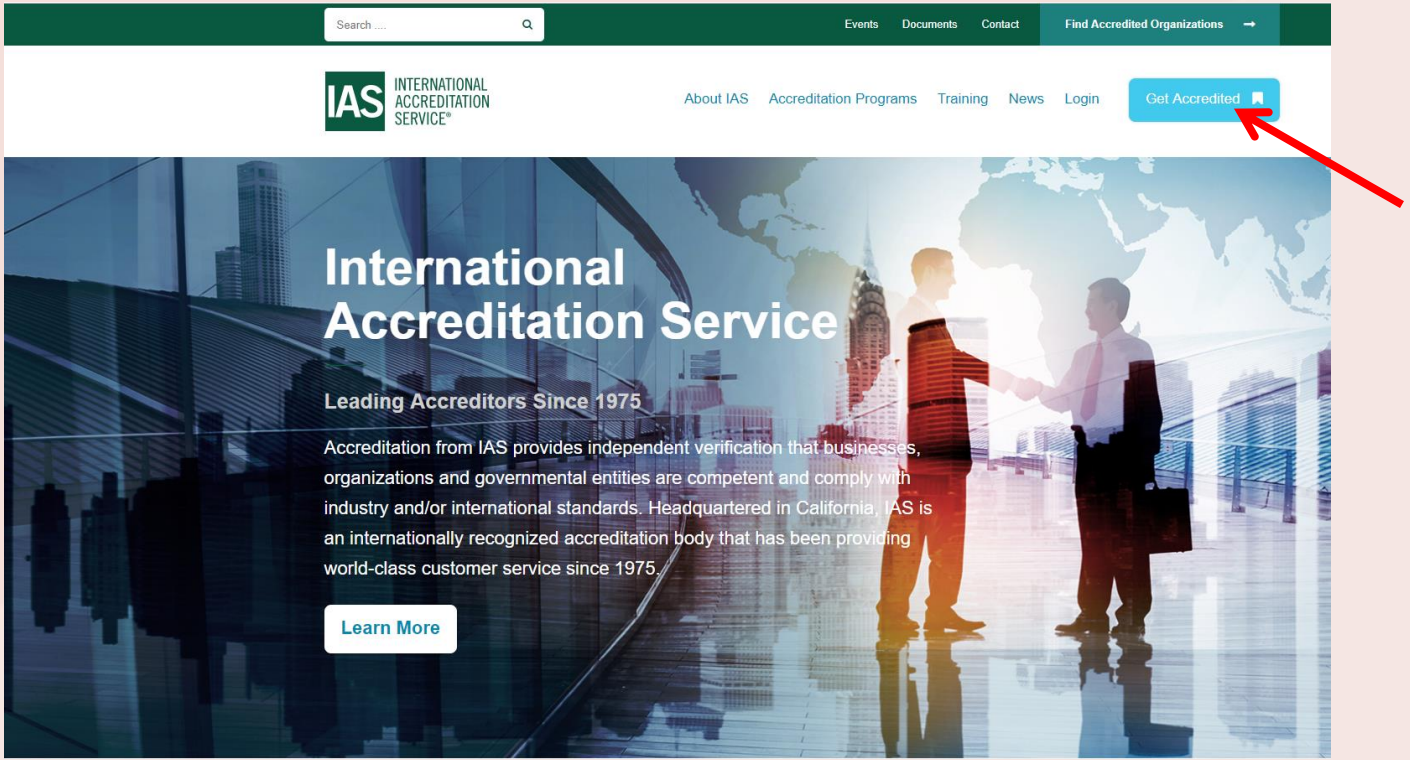
- Building Department Accreditation
- Building Department Service Providers
- Calibration Laboratories
- Commissioning Training and Certification Agencies
- Curriculum Development
- Fabricator Inspection Programs
- Field Evaluation Bodies
- Fire Prevention and Life Safety Departments
- Inspection Agencies
- Management System Certification Bodies
- Manufacturers of Cold-Formed Steel Components
- Metal Building Inspection Programs
- Metal Building Assemblers Inspection Program
- Personnel Certification Bodies
- Product Certification Agencies
- Special Inspection Agencies
- Testing Laboratories
- Training Agencies

IAS Recognitions

Sample of Recognitions

- Air Force Civil Engineer Support Agency
- Consumer Product Safety Commission
- General Services Administration
- U.S. Army Core of Engineers
- U.S. Coast Guard
- U.S. Environmental Protection Agency
- U.S. Federal Emergency Management Agency
- U.S. Federal Highway Administration (FHWA)
- U.S. Food & Drug Administration
- U.S. Marines
- U.S. Navy
- Metal Building Manufacturers Association
- National Aeronautics and Space Administration
- Nuclear Regulatory Commission
- Fire Stop Manufacturers Association

Finding IAS Accredited Organizations – www.iasonline.org



Who is MBMA?

- Founded in 1956 – Cleveland Based
- Building Systems Manufacturers + Associate Members
- Roughly 9,000 contractors affiliated with member companies
- ≈30,000 buildings each year
- IAS 472 Accreditation is required for membership!

MBMA's Mission

MBMA provides research, leadership and education that increases the prominence and use of metal building systems as a premier solution for performance, aesthetics and sustainability in non-residential building construction.

MBMA Members

43 Building Systems Members

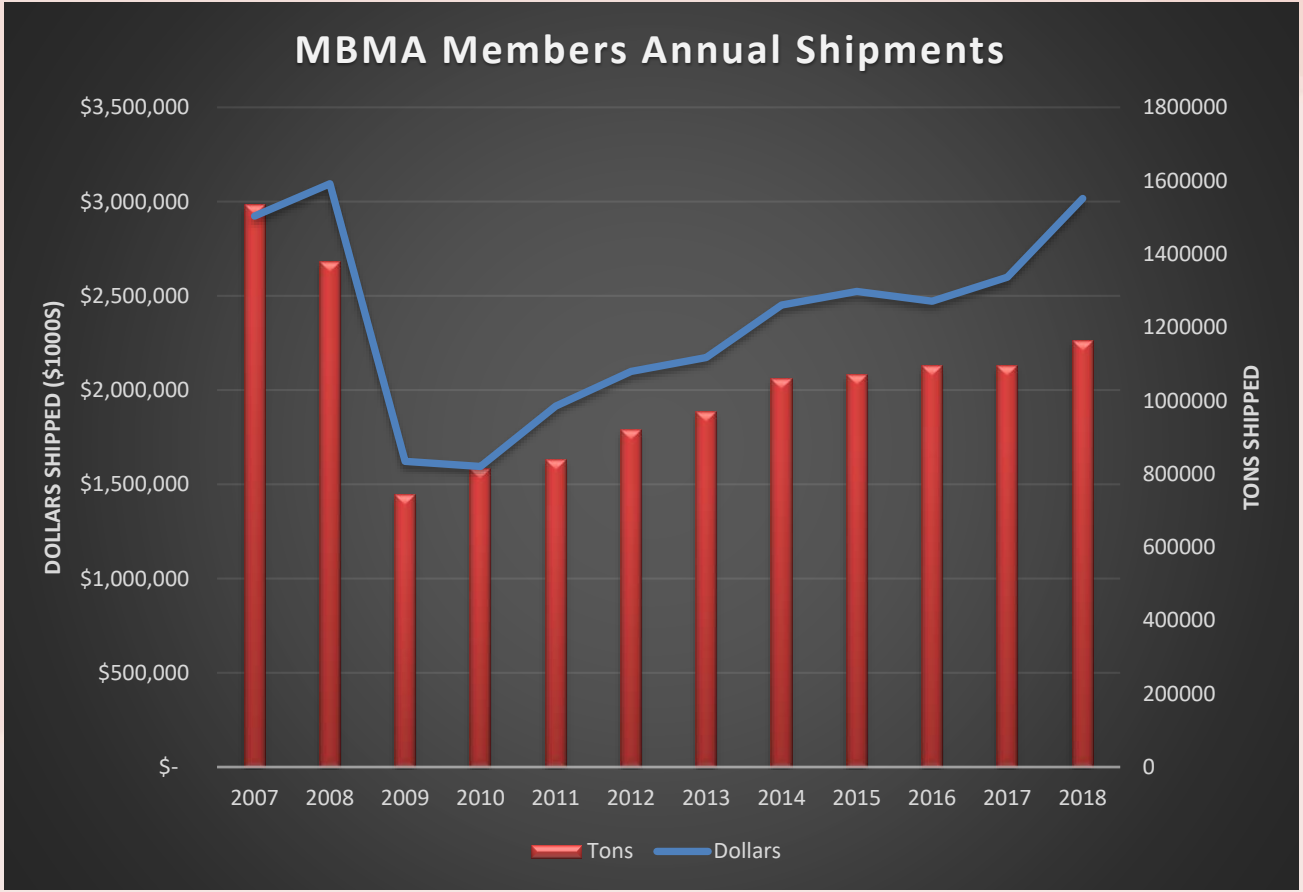
- A&S Building Systems
- ACI Building Systems
- All American Systems
- Alliance Steel, Inc.
- American Buildings Company
- Associated Steel Group, LLC
- BC Steel Buildings, Inc.
- Behlen Building Systems
- Bigbee Steel Buildings, Inc.
- BlueScope Buildings N.A.
- Butler Manufacturing
- CBC Steel Buildings
- Ceco Building Systems
- Chief Buildings
- CO Building Systems
- Dean Steel Buildings, Inc.
- Garco Building Systems, Inc
- Golden Giant, Inc.
- Heritage Building Systems
- Inland Buildings
- Kirby Building Systems, Inc.
- Ludwig Buildings Enterprises
- Mesco Building Solutions
- Metallic Building Company
- Mid-West Steel Buildings
- NCI Building Systems, Inc.
- Nucor Building Systems
- Oakland Metal Buildings, Inc
- Package Steel Systems
- Pinnacle Structures, Inc
- Red Dot Buildings
- Robertson Building Systems
- Schulte Building Systems
- Spirco Manufacturing
- Star Building Systems
- Sukup Manufacturing Co.
- Sukup Steel Structures, LLC
- Trident Building Systems, Inc.
- Tyler Building Systems, L.P.
- United Structures of America
- Varco Pruden Buildings
- Vulcan Steel Structures, Inc.
- Whirlwind Steel Buildings, Inc.

+ 74 Associate Members

MBMA Building Systems Members

Metal Building Systems Market

Domestic Shipments



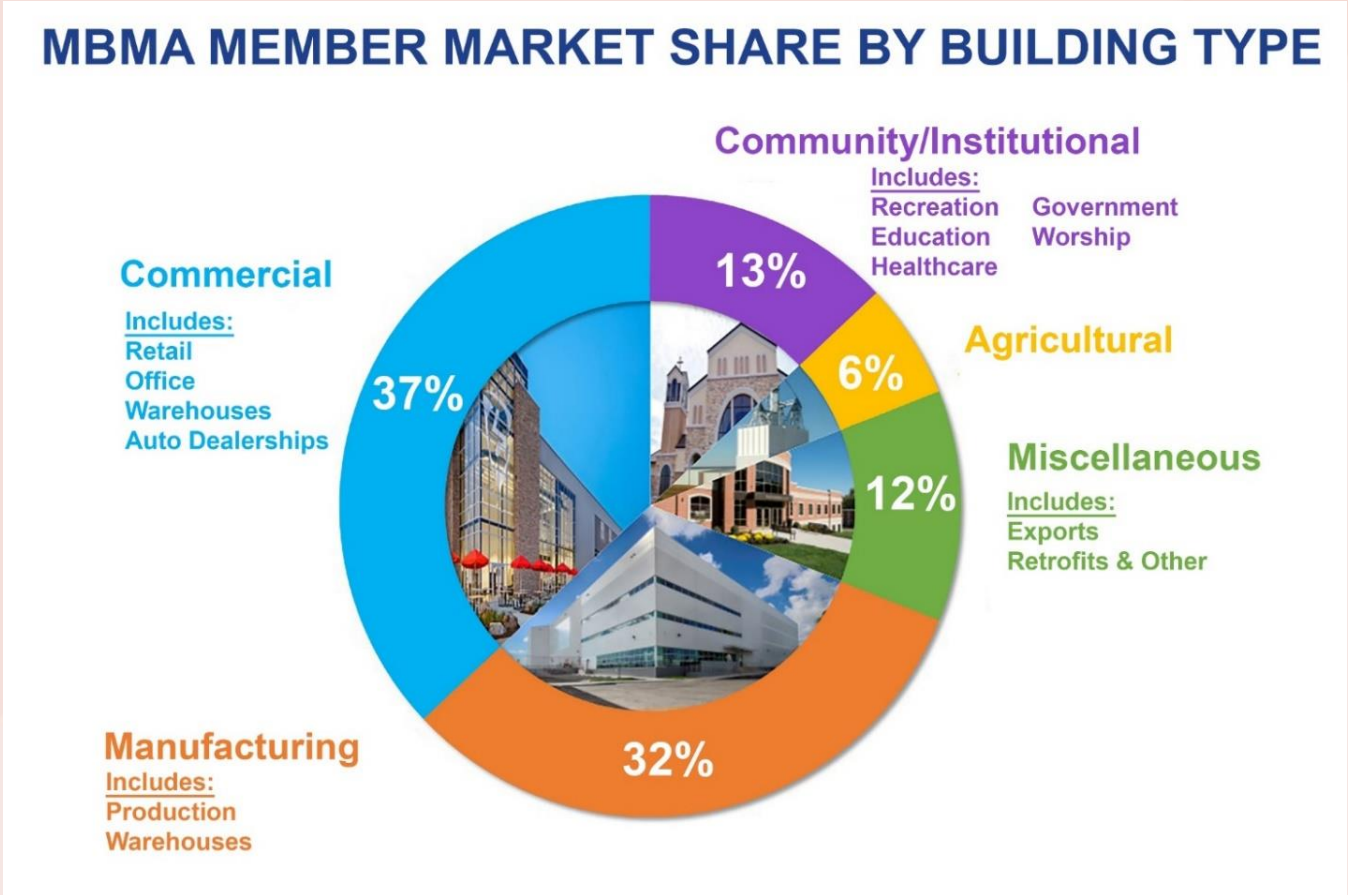
Market Share

Percentage of total market per F.W. Dodge statistics

Metal Building Applications

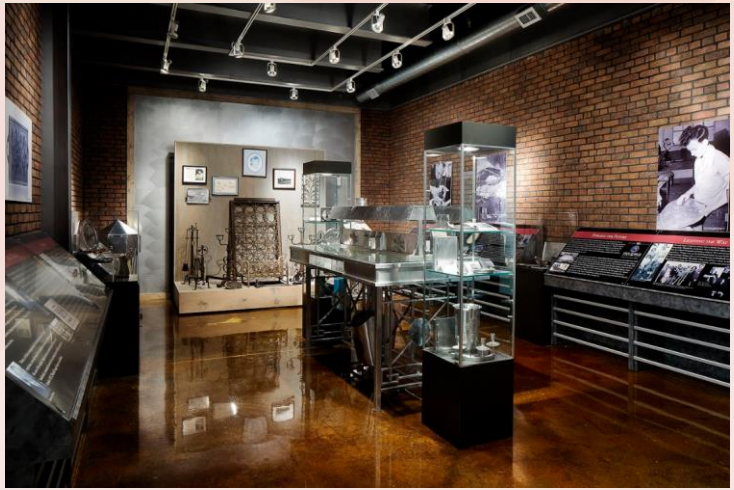
- Offices
- Retail Stores
- Shopping Centers
- Auto Show Rooms
- Churches
- Schools
- Recreation Facilities
- Agricultural
- Aircraft Hangars
- Factories
- Distribution Centers
- Auto Repair Shops
- Warehouses
- Military
- Manufacturing

Metal Building Applications

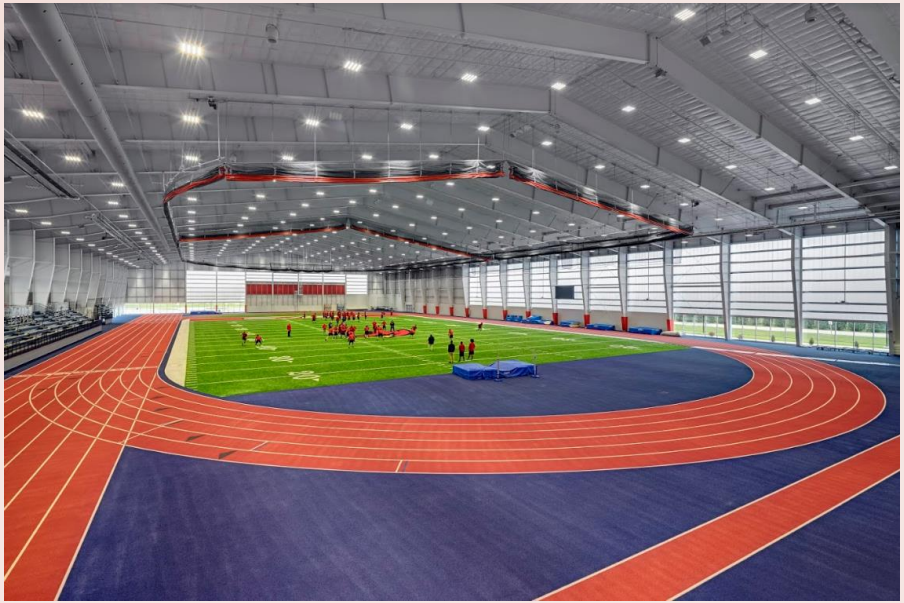


Examples of Metal Buildings

Examples of Metal Buildings



Examples of Metal Buildings



Examples of Metal Buildings

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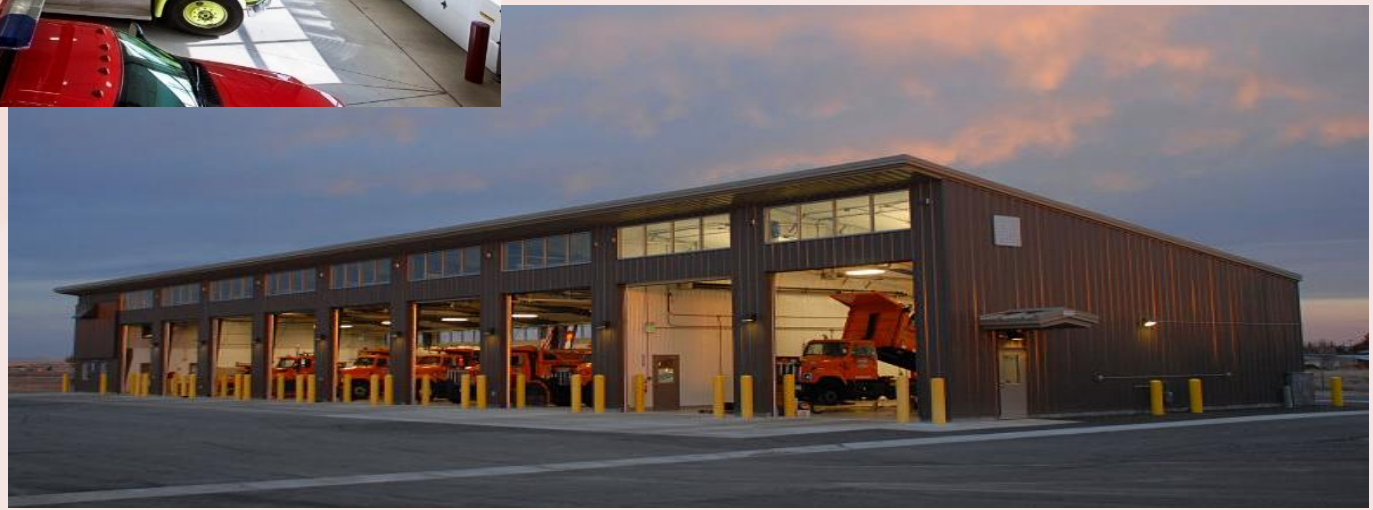
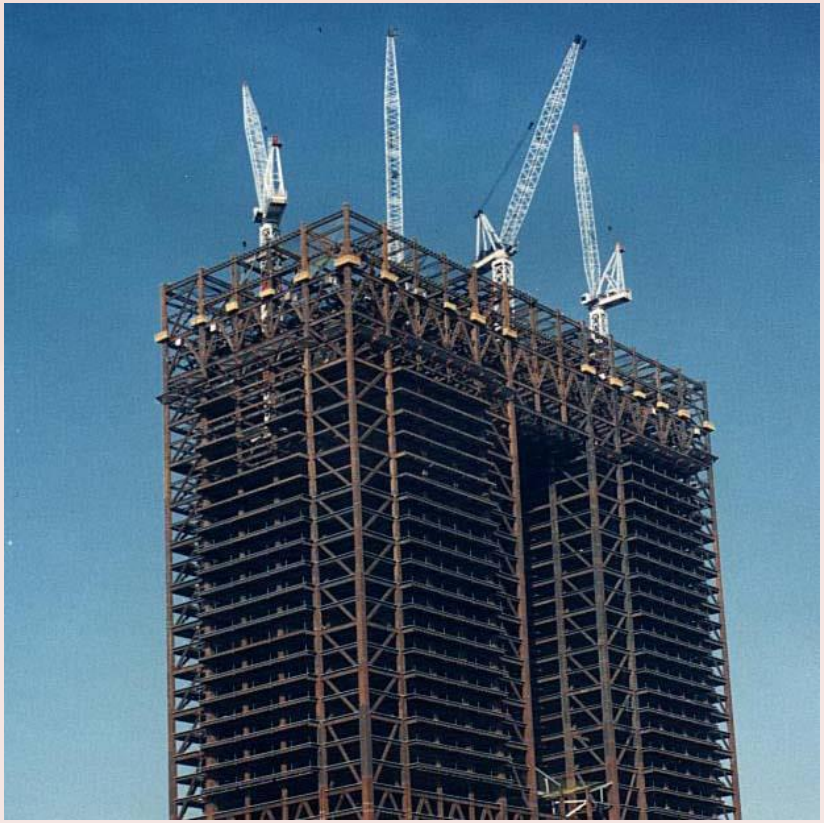


Examples of Metal Buildings

Defining a Metal Building System

What is Not a Metal Building?



Attributes of a Metal Building System

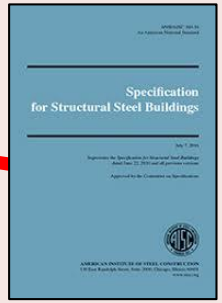
- Custom engineered, Site-specific
- One- and two-story non-residential buildings
- Metal roof: standing seam or through-fastened
- Wall materials: steel cladding, glass, aluminum, masonry, or concrete
- Fast Construction
- Energy Efficient
- Sustainable
- Flexible
- Economical
- Durable

Pre-engineered?

- Metal Building Systems are NOT Pre-Fabricated Modular Buildings, nor are they Pre-Engineered.
- Metal Building Systems are designed using the systems approach, in which standard components are used to fit customized applications. Each building system is custom engineered to meet customer needs and for the particular application

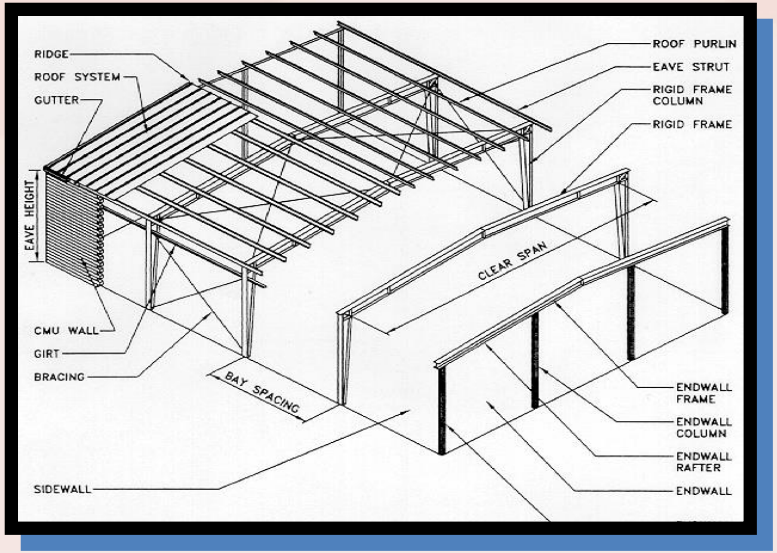
Design – Standards & Codes

- IBC
  - Adopted Legal Document
- ASCE 7
  - Minimum Loads
- AISC 360
  - Design of Primary Frames
- AISI S100
  - Design of Secondary Members



Metal Building Components

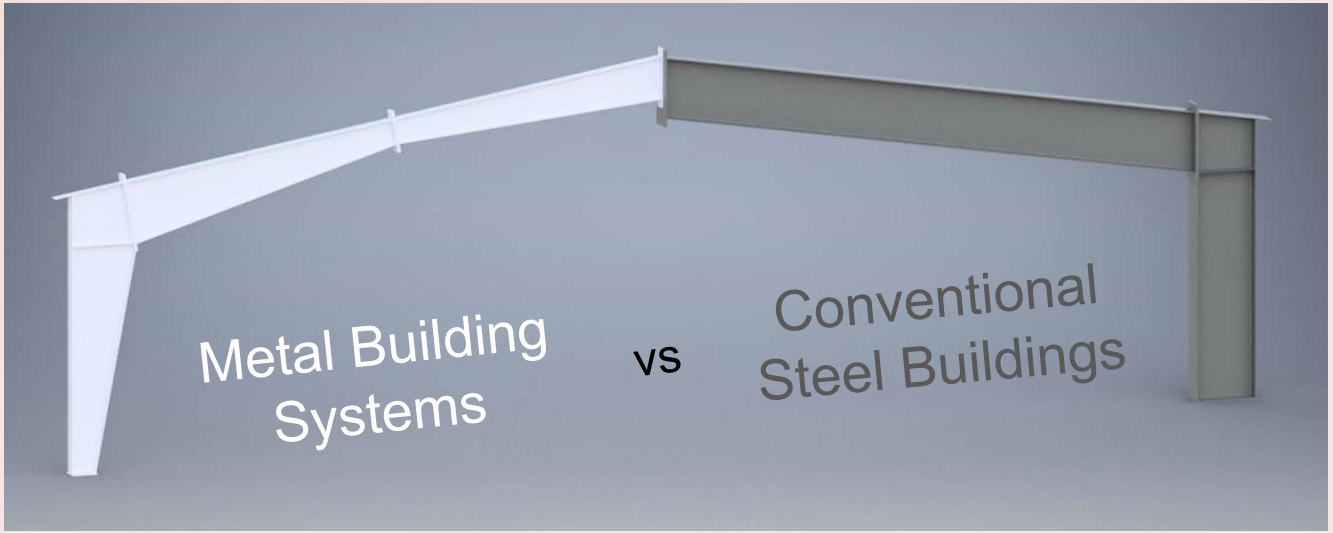
- Main Frames
- Secondary Framing
  - Purlins
  - Girts
- Cladding
  - Metal Roof Sheeting
  - Wall Sheeting or Finish
- End Wall Beams and Columns
- Bracing
  - Lateral Bracing
  - Stability Bracing
- Connections
- Screws and Bolts
- Non-Structural Parts



Primary Frames

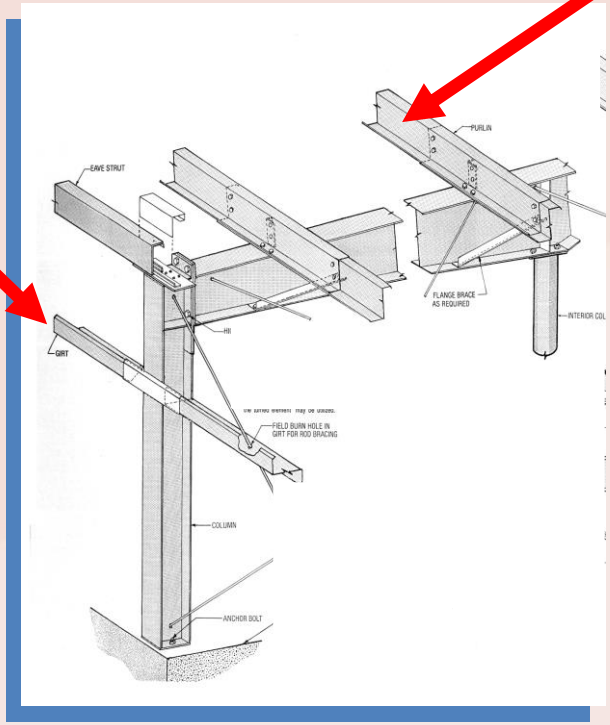
- Tapered
- Built-Up
- Bolted End-Plates

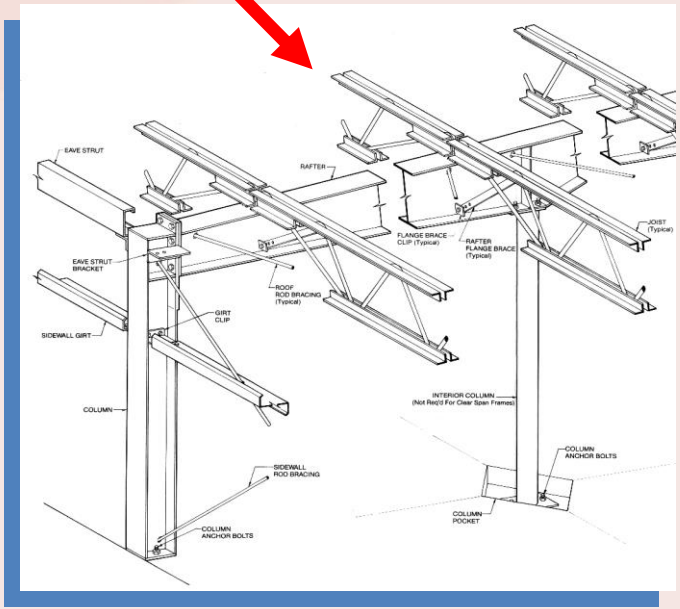
- Prismatic
- Rolled Shapes
- Field Welded or Bolted



Secondary Members

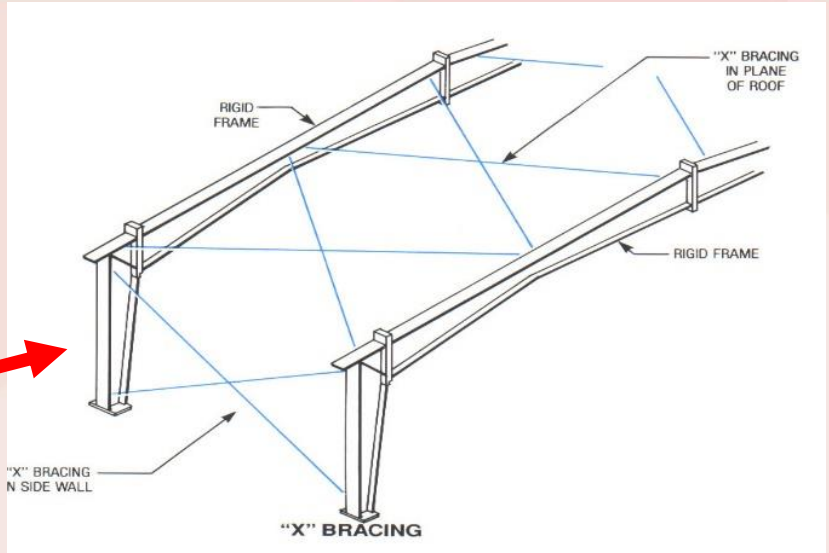
- **Wall**
  - Z girts
- **Roof**
  - Z purlins
  - Bar Joists

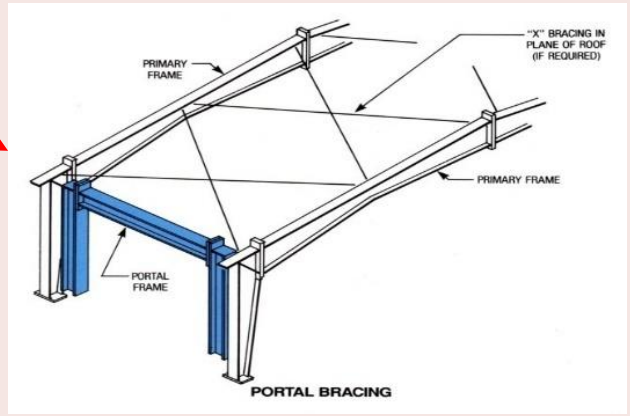




Longitudinal Lateral Bracing

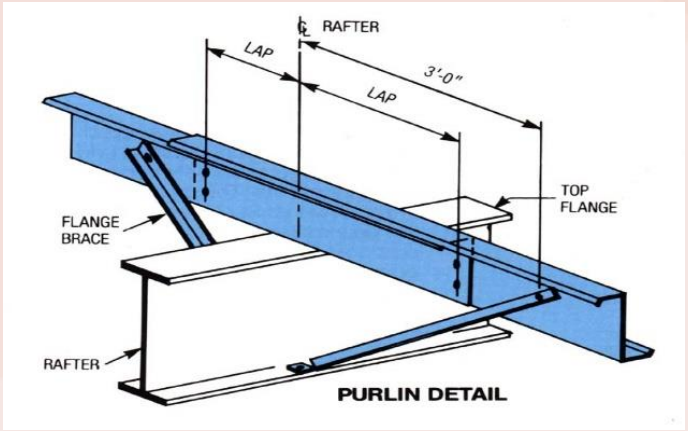
- Rods
- Cables
- Portal Frames

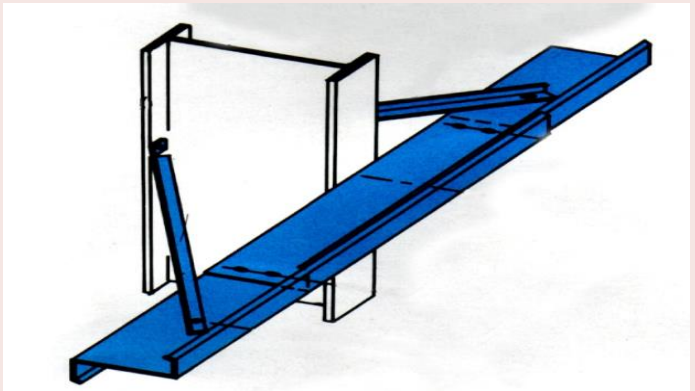




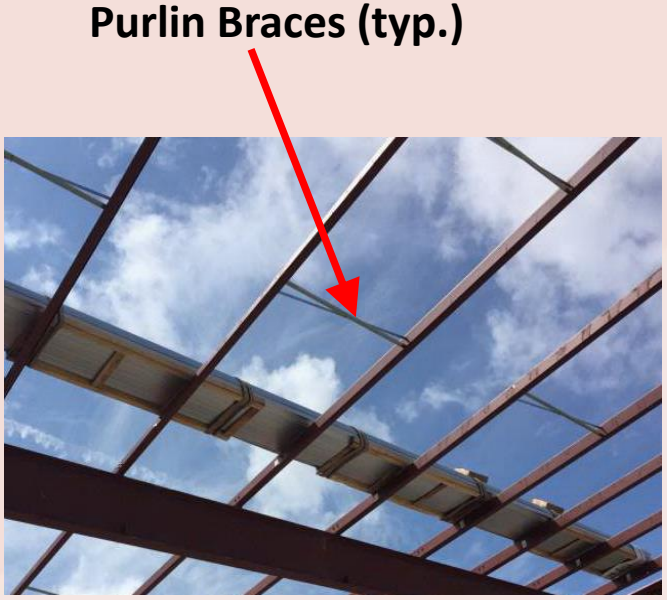
Member Bracing

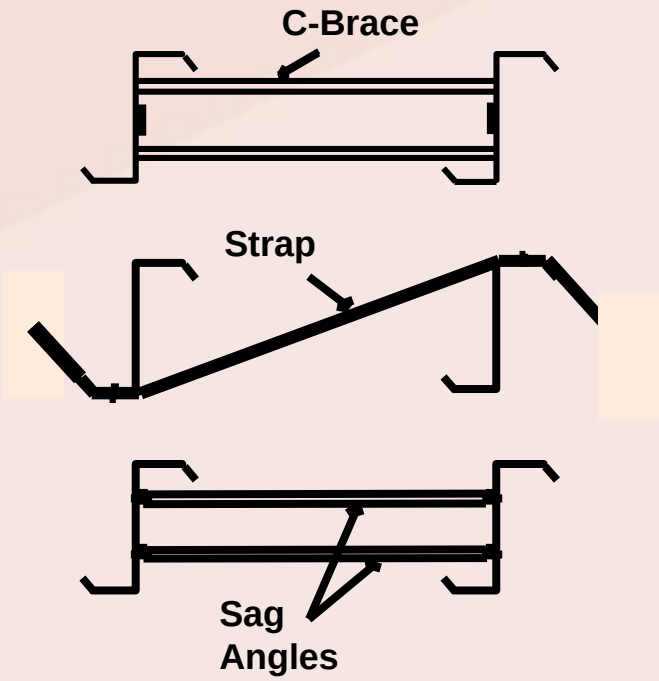
- Stability Bracing
  - Flange Braces
- Critical to Unbraced Length Assumption



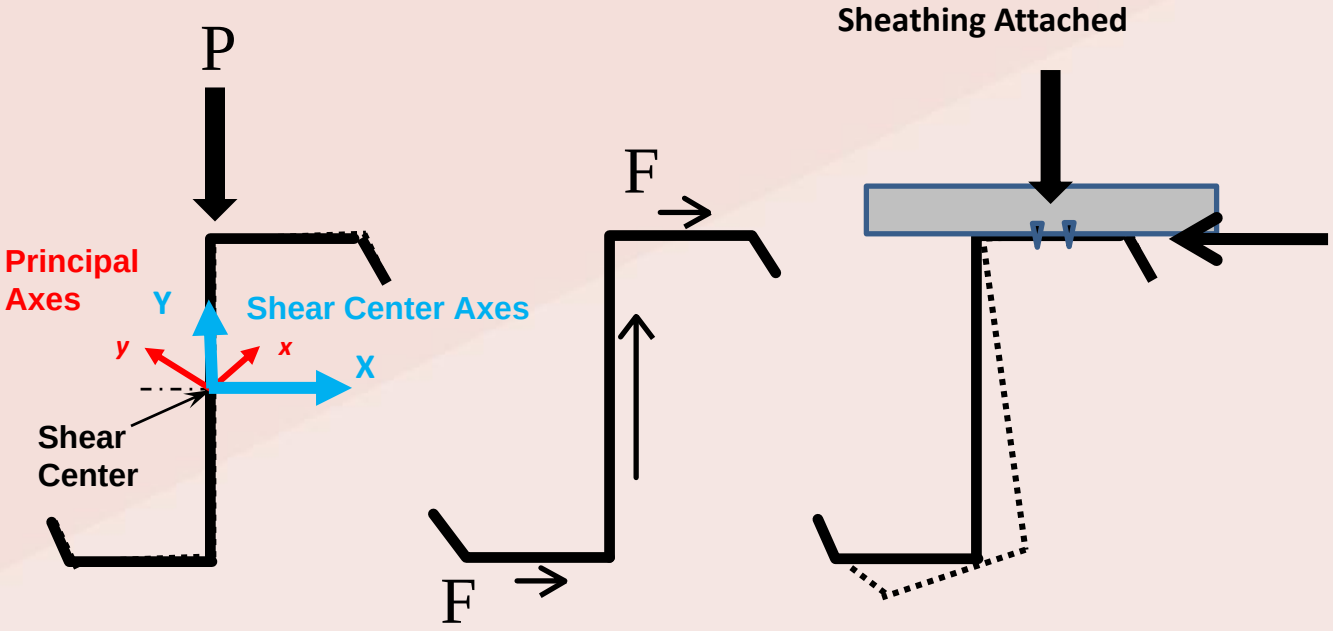


Purlin Anchorage



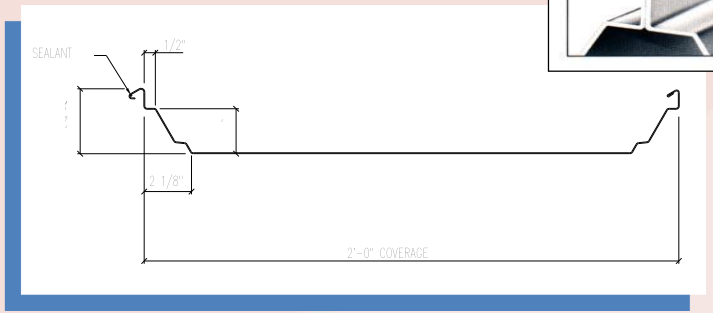


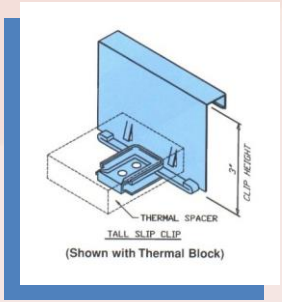
Z-Purlin Behavior



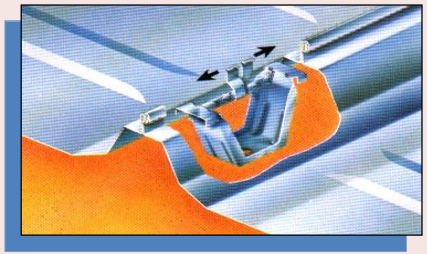
Metal Roof Systems

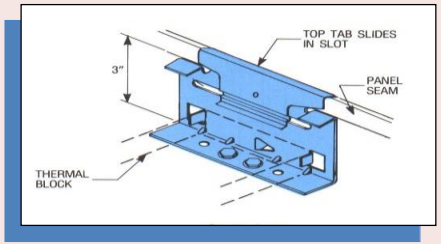
Standing Seam Roof (SSR)





Fixed Clip

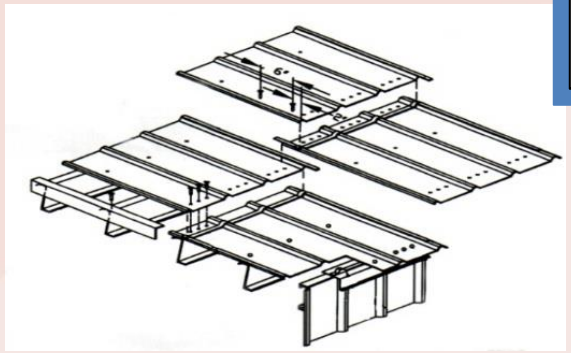


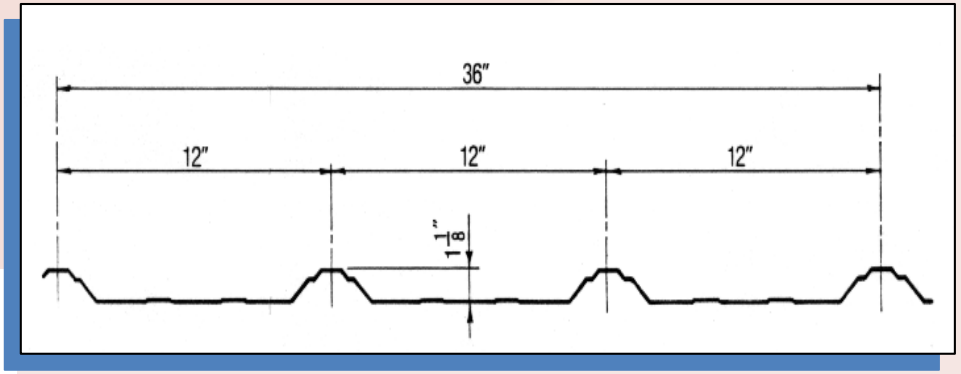


Sliding Clips

Metal Roof Systems

Through Fastened Roof (TFR)





Professional Design Responsibilities

Professionals and Their Roles

- **Owner** - End Customer of the project
- **Design Professional** - an architect or engineer retained by the owner or builder, to assist with preparation of specifications, foundation design, and design and interface of components not provided by manufacturer
- **Builder** - serves as contractor (many are design-build firms), orders and purchases the metal building system from manufacturer
- **Manufacturer** - designs and fabricates the metal building system

Shared Design Responsibility

Design Professional (EOR or Architect)

- Prepare complete specifications
- Provide builder with the following:
  - Geometric requirements
  - Applicable codes and/or design loads
  - Site and construction conditions that affect design criteria
  - Serviceability criteria, especially for compatibility of materials not supplied by building manufacturer
  - Foundation Design
  - Design of Components not Supplied by Metal Building Manufacturer

Shared Design Responsibility

Metal Building Manufacturer

- Design of Metal Building System
- Not Engineer of Record
- Provide Evidence of Compliance/Deliverables
- (As Specified in the Order Documents)
  - Approval Documents
  - Engineering Data
  - Plans

Metal Building Manufacturer

- Party that designs and fabricates the materials included in the metal building system
- All MBMA members are IAS AC472 accredited.

The manufacturer is responsible for the quality control of the work they produce. Enforcement of a quality control program, which is verified by an outside inspection agency, similar to the IAS AC 472 accreditation program described in the MBSM Section VI, is one primary indication of the manufacturer's due care in satisfying this responsibility.

It is essential that the components of a metal building system are fabricated and assembled (erected) as required by the approved construction documents. To achieve this goal, the manufacturer and erector provide their own quality control inspections and the owner employs third party special inspectors to perform quality assurance inspections, when required by the authority having jurisdiction. These third party special inspections, when required, are performed in the shop to review the manufacturer's work and in the field to focus on the erector's work.

Shared Design Responsibility

- Design Professional
- Manufacturer's Engineer
- Engineer/Architect of Record

One of the roles of the registered design professional in responsible charge is set forth in the IBC, Section 107.1. This individual prepares the documents that are submitted with the building permit application, including the statement of special inspections, and he or she receives reports of special inspections. According to IBC Section 107.3.4, the registered design professional in responsible charge must review and coordinate any submittal documents prepared by others for compatibility with the design of the building.

The registered design professional in responsible charge is almost never the manufacturer's engineer of the metal building system. If on a particular project, the manufacturer's engineer of the metal building is to function as the registered design professional in responsible charge for the project, this should be clearly set forth in the contract with the manufacturer.

Professionals and Their Roles

- **Owners 3rd Party (Special) Inspector –** Examines work, provides reports to Building Official and Design Professional in Charge.
- **Building Official or AHJ –** Enforces the building code and receives inspection reports by others, etc.

Building Official

Administers and enforces the building code, issues permits, receives inspection reports and other certifications required by the building code, and issues certificates of occupancy.

Additionally, as noted in the definition in IBC Section 202 and as required in Section 1704.2.5.2, the building official approves a fabricator, "based on a review of the fabricator's written procedures and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency." For a metal building manufacturer, a building official typically utilizes the International Accreditation Services' (IAS) Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems (AC 472) criteria as a means of approving a metal building fabricator. For more information on the AC 472 program, refer to Section 3.3.

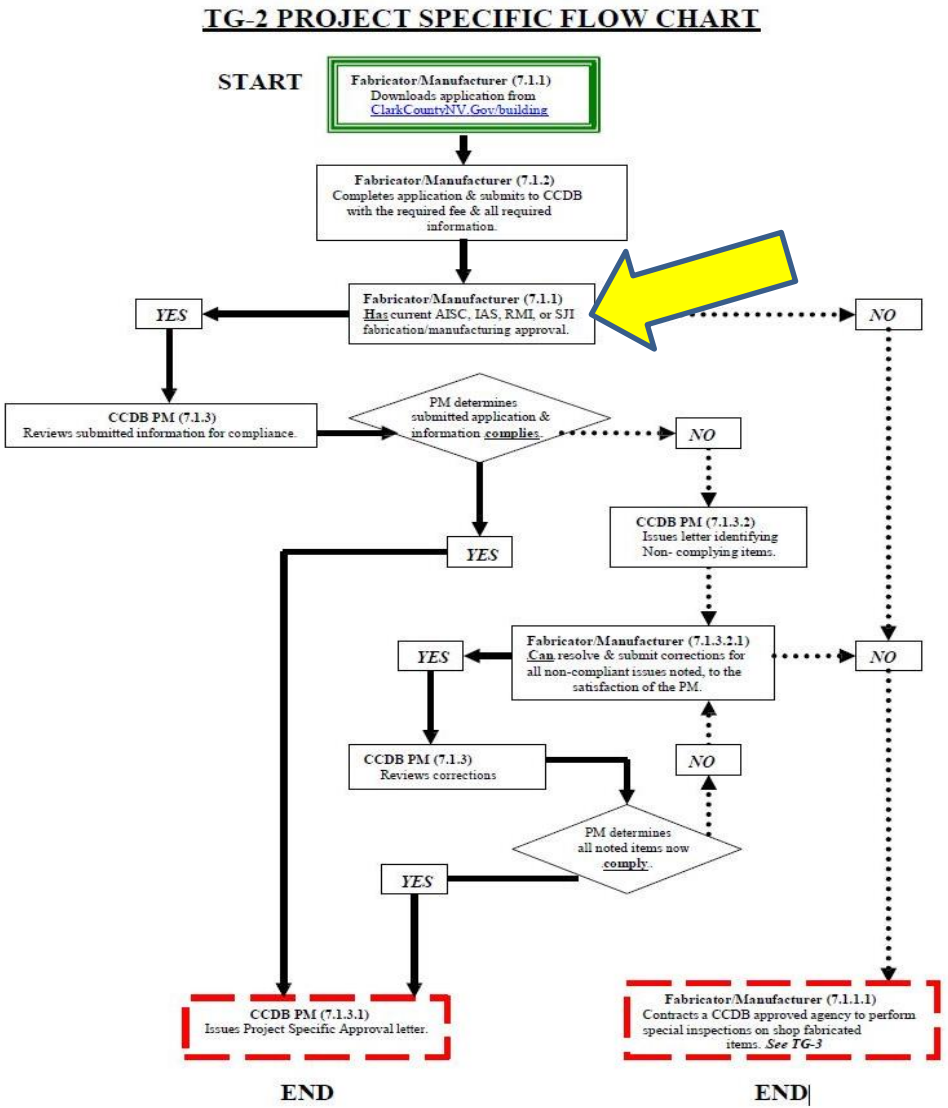
CLARK COUNTY DEPARTMENT OF BUILDING & FIRE PREVENTION
Technical Guidelines

- ***TG-1-06a*** - PREPARATION OF A QUALITY SYSTEMS MANUAL FOR STRUCTURAL STEEL FABRICATORS

- ***TG-2-09*** REQUIREMENTS FOR APPROVAL AS A CLARK COUNTY BUILDING DIVISION STRUCTURAL STEEL FABRICATOR/MANUFACTURER

- ***TG-3-09*** REQUIREMENTS FOR PERFORMING CLARK COUNTY BUILDING DIVISION REQUIRED FABRICATION FACILITY AUDITS, INSPECTIONS AND NONDESTRUCTIVE TESTING OF STRUCTURAL STEEL

BUILDING OFFICIAL



BUILDING OFFICIAL

- **Review fabricator's/manufacturer's submitted application package for Initial Listing Approval, Annual Renewal Listing Approval, or Project Specific Listing Approval application documentation. (All fabricator/manufacturer listing approval types)**
- **Determine if the fabricators/manufacturer's submitted application package for Initial Listing Approval, Annual Renewal Listing Approval, or Project Specific Listing Approval application documentation complies with CCDB TG requirements.**
- **Determine if the fabricators/manufacturers submitted QSM complies with CCDB TG-1. (Initial Listing Approval or *Project Specific listing Approval only) (*When Required by CCDB PM)**
- **Notify fabricator/manufacturer in writing of any QSM items that do not comply with CCDB TG-1.**
- **Perform CCDB Initial Audit of fabricator's/manufacturer's Quality System. (Initial Listing Approval only)**
- **Notify fabricator/manufacturer in writing of Initial Audit results noting any Quality System items that do not comply with the fabricator/manufacturer's QSM and/or CCDB TG requirements.**
- **Review CCDB approved quality assurance agency submitted fabricator/manufacturer annual in-plant audit.**
- **Notify fabricator/manufacturer in writing of annual in-plant audit results noting any Quality System items that do not comply with the fabricator/manufacturer's QSM and/or CCDB approval requirements.**
- **Notify fabricator/manufacturer in writing of approval status.**
- **Maintain an Approved Fabricator/Manufacturer listing.**
- **Maintain an Approved Quality Assurance Agency listing.**

IAS Accreditation Program

Inspection of MB Fabricators

- What does AC 472 cover?
  - Structural Welding (modeled after AC172)
  - Cold Formed Steel Fabrication
  - Engineering
- What are the benefits of AC 472?
  - Compliance with inspection requirements in Chapter 17
  - Assurance that MBS manufacturer has qualified staff and well managed quality system
  - Fabricators are knowledgeable about code requirements
  - Confidence in dealing with trusted source
  - May be specified by an owner/EOR as project requirement

IAS AC472 Accreditation

- Mandatory for MBMA Members!
- Why is this important?
  - AC 472 focuses on
    - Order documents – clear and concise
    - Design & Detailing – code compliant engineering
    - Raw material usage – high-quality traceable materials
    - Quality assurance and qualified staff – licensed engineers, certified welders and inspectors
  - AC 472 requires
    - Two annual on-site plant inspections

Part C – Design of Metal Buildings

- Engineer in Responsible Charge
  - PE w/Experience Designing Metal Buildings
  - Have full authority and control
  - Conduct annual management review
- Written Procedures
  - Contract document evaluation
  - Preparation and checking of design calculations that are in conformance with specified codes/standards
  - Detail drawing preparation
  - Approval of revisions/change orders
  - Letter of Certification

Inspection of Fabricators

Chapter 17 – 2015 IBC

1704.2.5.1 Fabricator approval. *Special inspections* during fabrication are not required where the work is done on the premises of a fabricator registered and approved to perform such work without *special inspection*. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an *approved agency*. At completion of fabrication, the *approved* fabricator shall submit a *certificate of compliance* to the owner or the owner's authorized agent for submittal to the *building official* as specified in Section 1704.5 stating that the work was performed in accordance with the *approved construction documents*.

IAS AC472 Does This For You!

Fabricator Approval IBC Chapter 17

Building Codes require **Code Officials** to ***approve*** **fabricators** as well as **agencies** engaged in conducting **tests** or furnishing **inspection services**

- ✓ Many departments may lack the **resources** to review and approve fabricators, inspection agencies, etc.
- ✓ Specialized accreditation agencies like IAS provide specific accreditation programs **based on code requirements**
- ✓ Regulators can turn to accreditation listings which are **freely available** for reference

Enforcement of IBC Chapter 17 Through Conformity Assessment

Good Conformity Assessment Practices, including **Product Evaluation** and **Fabricator Accreditation** support **effective enforcement** of building codes and standards by **providing regulators** with:

- ✓ Independent confirmation that building products are safe and compliant with codes and standards
- ✓ Independent assurance of an organization's competence to perform certain activities
- ✓ Unique solutions to particular regulatory concerns
- ✓ Lists of accredited organizations to assist regulators in the approval process
- ✓ Lists of metal building systems manufacturer's for easy referral by architects, engineers, and code officials

2018 International Building Code

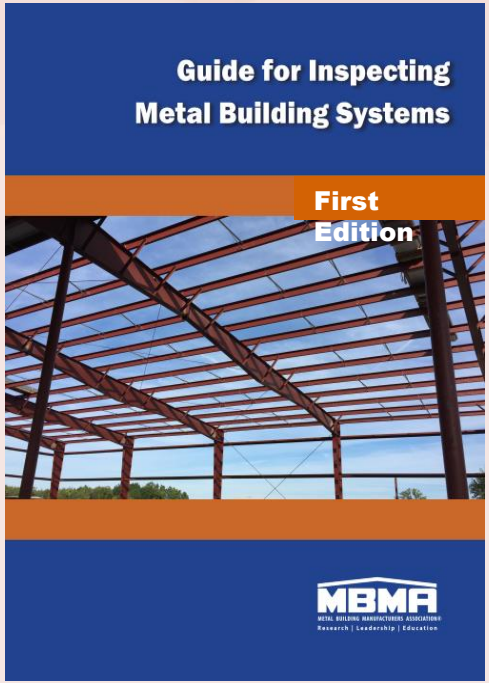
Chapter 2 Definitions

- **Approved Agency.** An established and recognized agency that is regularly engaged in conducting test, furnishing inspection services or furnishing product certification where such agency has been *approved* by the building official.
- **Approved Source.** An independent person, firm or corporation, ***approved by the building official***, who is competent and experienced in the application principles to materials, methods or systems analyses.

Inspection Requirements and Guidance

Based on MBMA Guide for Inspecting Metal Building Systems

Table of Contents



Intended Audience

- Individuals who are responsible for contracting, performing, and reporting inspection tasks
  - Representatives of the Owner
  - Design Professionals
  - General Contractor
  - Erector
  - Building Official
- Inspections
  - Building code requirement
  - Contract requirement
  - Optional (owner acceptance, insurance, etc.)
- Useful resource when inspecting a metal building

Scope

- Primarily focus on inspecting newly constructed metal building systems
  - Primary Framing
  - Secondary Framing
  - Metal roof and wall cladding
- Additional materials briefly discussed
  - Windows
  - Doors
  - Skylights
  - Insulation
- Not discussed
  - Erection
  - Lighting and Mechanical Systems
  - Soil conditions, veneers
  - Existing buildings

Chapter 1 Introduction

- 1.1 What is a Metal Building System?
- 1.2 Overview of Inspection Requirements and Responsibilities
  - 1.2.1 IBC Inspection Requirements
  - 1.2.2 Inspection Requirements per Contract and Order Documents
  - 1.2.3 Involved Parties

Introduction

- 1.2.3.2 Owner/End Customer
  - Party who will be the initial owner of the construction project
- 1.2.3.3 Third Party Inspector
  - Employed by the owner to perform the special inspections and tests identified in and required by the statement of special inspections prepared by the registered design professional in responsible charge.

Introduction

- 1.2.3.5 Building Official
- Building Official
  - Administers and enforces the building code, issues permits, receives inspection reports and other certifications required by the building code, and issues certificates of occupancy.

Additionally, as noted in the definition in IBC Section 202 and as required in Section 1704.2.5.2, the building official approves a fabricator, "based on a review of the fabricator's written procedures and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency." For a metal building manufacturer, a building official typically utilizes the International Accreditation Services' (IAS) Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems (AC 472) criteria as a means of approving a metal building fabricator. For more information on the AC 472 program, refer to Section 3.3.

Introduction

- 1.2.3.6 Metal Building Manufacturer
  - Party that designs and fabricates the materials included in the metal building system
    - All MBMA members are IAS AC472 accredited.

> The manufacturer is responsible for the quality control of the work they produce. Enforcement of a quality control program, which is verified by an outside inspection agency, similar to the IAS AC 472 accreditation program described in the MBSM Section VI, is one primary indication of the manufacturer's due care in satisfying this responsibility.
>
> It is essential that the components of a metal building system are fabricated and assembled (erected) as required by the approved construction documents. To achieve this goal, the manufacturer and erector provide their own quality control inspections and the owner employs third party special inspectors to perform quality assurance inspections, when required by the authority having jurisdiction. These third party special inspections, when required, are performed in the shop to review the manufacturer's work and in the field to focus on the erector's work.

Chapter 2 Foundations

- 2.1 Foundation Checking
  - 2.1.1 Base Plates
  - 2.1.2 Grouting
  - 2.1.3 Anchor Rod Connection to Base Plate

Figure 4.1-3: Hillside Washer

Foundations

- 2.1.1 Base Plates
  - Holes do not align with anchor rod locations

2.1.1 Base Plates

Base plates are included with the columns that have been included with the proper sized holes at the metal building manufacturer's plant to allow the anchor rods to pass through and be secured to the framing system. Typically, holes in the base plates are slightly oversized to accommodate variations in the field locations of the anchor rods. If it is necessary to enlarge or slot a hole in the base plate to accommodate poorly located anchor rods, the registered design professional or the manufacturer's engineer must approve such action and provide any necessary remediation. Column base plates should come in full contact with the concrete slab or pedestal, otherwise grouting may be necessary.

Foundations

- 2.1.1 Grouting

Base plates for metal building columns most often simply rest on the slab or concrete pedestal. The use of grout pads between the slab (or pedestal) is not a common practice in the metal building industry. However, if the base plate cannot sit flush on top of the concrete, then grouting is warranted, as shown in Figure 2.1-1. Prior to grouting, column bases may be elevated by utilizing nuts on the anchor rods on the underside of the column base, or using shims to hold the base at the proper elevation. In either case the column base must be fully grouted utilizing non-shrink grout. Grout must be forced completely under the base plate to eliminate any voids so the column has uniform bearing on the entire grout bed. Grouting is not the responsibility of the metal building manufacturer or the erector, unless called out on the approved construction documents.

Figure 2.1-1: Base Plate with Grout

Chapter 3 Primary Rigid Frames

- 3.1 Rigid Frames
- 3.2 Tolerances
- 3.3 IBC Special Inspection Requirements for Fabricated Steel
- 3.4 Inspection of Welding
- 3.5 Inspection of High Strength Bolted Connections
- 3.6 Inspection of Erection Drawing Details
- 3.7 Mezzanine Structures
- 3.8 Crane Runway Beams

Primary Rigid Frames

- 3.2 Tolerances

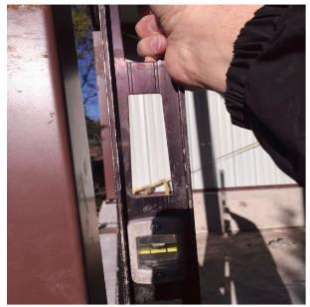


Figure 3.2-1: Non-Acceptable Vertical Tolerance

3.2 Tolerances

Variations are to be expected in the finished overall dimensions of structural steel rigid frames. Such variations are deemed to be within the limits of good practice if they do not exceed the cumulative effect of rolling, fabricating, and erection tolerances.

Inspection for conformity to fabrication and erection tolerances is performed by visual observations and measurements using tools such as rulers, tape measures, squares, calipers, string lines, and in the case of erection tolerances, surveying instruments. See Appendix A for the fabrication tolerances associated with built-up structural members. The construction documents will specify the tolerances permitted for a given project, which may differ from those referenced in this Guide.

Erection tolerances are those set forth in the AISC Code of Standard Practice (AISC 303) Section 7. Individual structural members are considered plumb, level, and aligned if the deviation from plumb does not exceed 1:500 (See Figure 3.2-1). Additional tolerances are recommended for crane support systems in metal building system projects. Erection tolerances for crane runway

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections

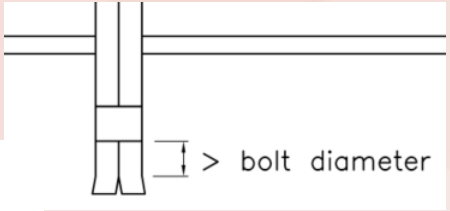
3.5.1 Snug-Tightened Joints

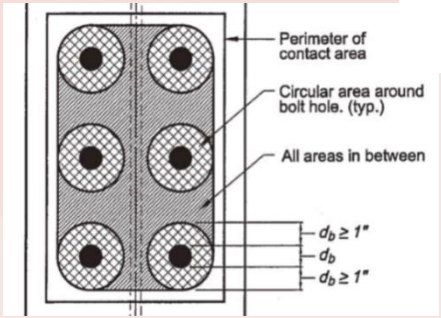
Snug-tightened joints are one of the most common connection methods used in a metal building system, as illustrated in Figure 3.5-3. The approved construction documents will specify when this type of joint is to be used. 1As defined in RCSC Specification Section 8.1, "the snug tightened condition is the tightness that is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench to bring the plies into firm contact." The inspection of snug-tightened joints, thus, involves the visual examination of the work to ensure that the proper fastener components have been used, including washers where required, the connected plies are clean, the bolt holes meet the diameter and quality requirements, and the plies of the connected elements have been brought into firm contact.

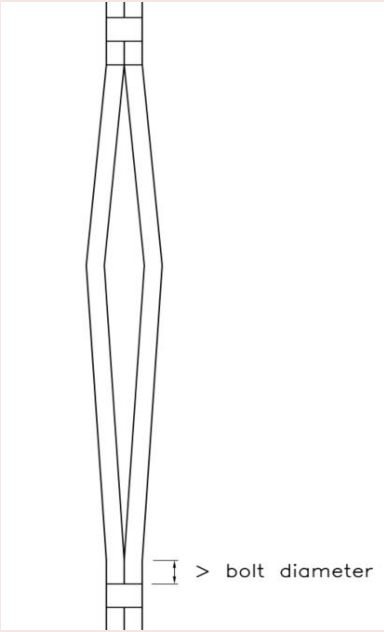
Figure 3.5-3: Snug Tightened Joint

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections







Connection plates that are bolted together, such as those in a bolted end-plate connection (see Figure 3.5-1), should have no spaces between them within a circle three times the nominal diameter of the bolt (d_b) as illustrated in Figure 3.5-2. Gaps in excess of $^1/_{16}$ inch in these areas should be shimmed. Gaps outside of these areas need no corrective action. Although Figure 3.5-2 was derived from the RCSC Specification Bolted Parts (Section 3) that illustrates the minimum unpainted area of the plane of contact between two plies of a joint (a.k.a. faying surface), it has been interpreted by the RCSC Committee to be an appropriate zone for considering gaps between the two plates. Gaps at the outer extremities of the plates due to plate warpage caused by welding do not generally have to be filled to achieve appropriate performance of that joint.

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections

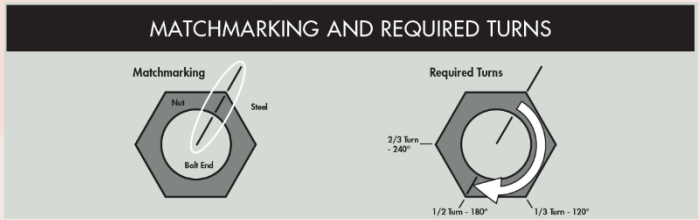
3.5.2 Pre-Tensioned Joints and Slip-Critical Joints

The joints that are designated as pre-tensioned joints and slip-critical joints in the approved construction documents need to be addressed by the erector and the inspector as it relates to the installation and inspection technique. The selection of an installation method is not made by the metal building manufacturer. RCSC Specification Section 8.2 identifies four techniques for installation and pre-tensioning for these types of joints, while Section 9 provides inspection requirements.

The pre-installation test in RCSC Specification Section 7 is required for all four pre-tensioning techniques. For all methods other than calibrated wrench tensioning, the test must be run against each lot of bolts. For calibrated wrench tensioning, in addition to the above requirement, the test is required at the start of each work shift. The test is used to prove the installation procedure, i.e., amount of turn required, torque required, etc. The inspector should observe the test to verify conformance to the specification.

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections



3.5.2.1 Turn-of-Nut Pre-Tensioning

There are two approaches to turn-of-nut pre-tensioning: match-marked and non-matched-marked. When the bolt and nut are properly match-marked, the offset between the marks is evidence of the required installation rotation of the turned element. The offset between the marks can be observed by the inspector after installation. When the bolts are not match-marked, the inspector must confirm by "routine observation" during installation that the installation is in conformity with specified requirements.

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections

3.5.2.2 Calibrated Wrench Pre-Tensioning

When calibrated wrench pre-tensioning is used, the inspector confirms by "routine observation" that the calibrated wrench is properly applied to the turned element, and that the work conforms to the specified requirements. Wrenches are calibrated daily using a hydraulic load cell. One device that is commonly used in the industry is manufactured by the Skidmore-Wilhelm Manufacturing Company.

Note: This technique is used during installation. Use of “torque” wrench after installation is not appropriate.

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections

3.5.2.3 Twist-Off-Type Tension-Control Bolt Pre-tensioning

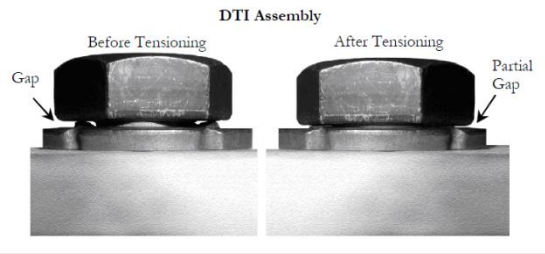
Twist-off-type tension-control bolt pre-tensioning involves the use of bolts that are manufactured with splined ends that are engaged by the chuck of the installation wrench. These splined ends are twisted off from the bolt shank at pre-determined levels of force that indicate that the required pretension has been achieved. The inspector observes by "routine observation" that the splined ends have been severed from the bolts at the appropriate time to establish that the installation conforms to the specified requirements.

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections

3.5.2.4 Direct-Tension-Indicator Pre-Tensioning

Direct-tension-indicator pre-tensioning uses washer-like elements that are placed under the nut or bolt head. These washer-like elements have projections that are compressed in the pre-tensioning process. The success of the pre-tensioning is indicated by refusal when the inspector attempts to insert an appropriately sized feeler gage. The inspector also visually checks that the tension indicator washer is installed in the correct orientation with the protrusions away from the work. In RCSC Specification Section 9.2.4, after the snug tight operation and prior to the pre-tensioning operation, the inspector must confirm by routine observation during installation that the appropriate feeler gage is accepted in at least half of the spaces between the protrusions of



Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections
  - Inspection of bolting depends on the type of joint and the installation technique

Type of Joints		Installation Technique	
Specified on erection drawings	Snug-Tightened Joints	Snug Tight	
	Pre-tensioned Joints and Slip Critical Joints	Turn of the Nut	Addressed by erector and inspector
		Calibrated Wrench	
		Twist Off Type	
		Direct Tension Indicator	

Primary Rigid Frames

- 3.5 Inspection of High Strength Bolted Connections
  - Inspector presence/interaction

	Installation Technique	Inspection
	Snug Tight	After installation
Pre-installation	Turn of the Nut – match marked	After installation
	Turn of the Nut – non match marked	Routine observation
	Calibrated Wrench	Routine observation
	Twist Off Type	Routine observation
	Direct Tension Indicator	Routine observation

Chapter 4 Bracing

- 4.1 Roof and Wall X-Bracing
- 4.2 Flange Braces

Bracing

- 4.1.1 Installation of Roof and Wall Bracing

4.1.1 Installation of Roof and Wall Bracing

Rods and wire strand of the X-bracing terminates with threaded ends or eyebolts. These ends typically pass through slots in the web of the column or rafter and utilize a hillside washer, standard wrought washer, and nut (see Figure 4.1-3). The hillside washer is essential to provide proper bearing and load transfer from the rod to the primary structural member. Larger rods may utilize a clevis/pin arrangement attached to a gusset in the primary structural member.

Figure 4.1-3: Hillside Washer

Bracing

- 4.1.1 Installation of Roof and Wall Bracing

The nut(s) on the end and/or turnbuckles are used to tension the rod or cable. The bracing members should be tightened as snugly as possible without creating distress in the connections to the framing members, or distorting purlins or girts that are acting as compression struts.

Matching members should always be equally tensioned in each bay. Although there are no specific tension requirements when tightening the member, the rule of thumb is to remove the sag, as shown in Figure 4.1-4. However, some sag may still be present, but not to the extent shown in Figure 4.1-5.

Figure 4.1-4: X-Bracing without Sag

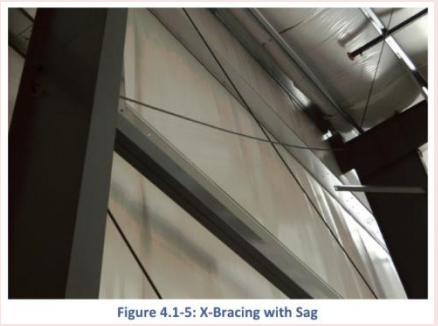


Figure 4.1-5: X-Bracing with Sag

Bracing

- 4.1.1 Installation of Roof and Wall Bracing

Wall X-bracing is occasionally installed in the plane of the girts. When this occurs, it is typical for the erector to field cut slots in the webs of the girts for the bracing member to pass through (see Figure 4.1-6). However, this example illustrates an improper slot through the web of the girt, causing the rod not to tension properly. These slots should be of the minimal size necessary to allow the passage of the member – typically no more than 1.5 to 2 times the member diameter. It is not acceptable for the flange of the girt to be notched for bracing installation.

Figure 4.1-6: X-Bracing Through Web (Improper)

Bracing

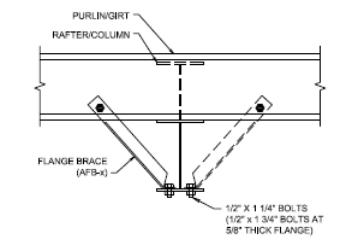
- 4.2 Flange, Purlin, Girt Bracing
  - Flange bracing – angles attaching purlins/girts to rafters/columns

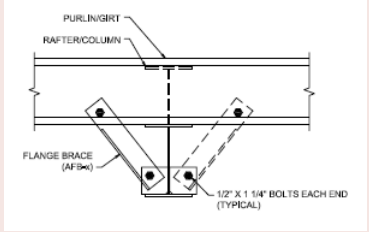
Flange braces are typically angles that attach the purlins, girts, and eave struts to the columns and rafters, as shown in Figure 4.2-1. When visually inspecting a metal building there will be a pattern of where the braces are installed, as provided in Figure 4.2-2. If the pattern is broken up, such as shown in Figure 4.2-3, then the manufacturer should be consulted to ensure that no braces are missing. The primary purpose of flange bracing is to prevent the inside flange of columns and rafters from buckling or twisting. All flange braces must be installed in accordance with the erection drawings and are not removed or modified without prior written approval of the metal building manufacturer, because they are essential for the structural stability of the metal building system. They may be located on one side or both sides of the column or rafter.

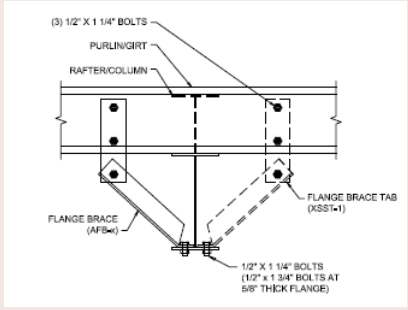
Figure 4.2-1: Flange Brace Examples

Bracing

- 4.2 Flange, Purlin, Girt Bracing
  - Flange bracing – angles attaching purlins/girts to rafters/columns
  - Manufacturer's Erection Drawings will specify if:
    - Flange braces are to be installed one side or both sides
    - Holes/tabs may be present on both sides of rafter/column though brace is only required on one side.
    - If one side, same side or alternating side
    - Attachment to purlin/girt
    - Optional attachment when liner or insulation vapor barrier is present







Chapter 5 Secondary Structural Members

- 5.1 Girts
- 5.2 Purlins
- 5.3 Eave Struts
- 5.4 Adding Framed Openings
- 5.5 Endwall Framing

Secondary Structural Members

- Number of Holes
- Holes or Slots
- Washers
- Vary by Manufacturer and Location

The zee-shaped members are designed to lap over the rafter/column to develop continuity resulting in more strength and stiffness. The lap length may vary from 12 to 60 inches. Bolts are provided at the ends of the laps. Depending upon the manufacturer, the number of holes in the web of the secondary members could be the exact number of bolt holes needed for the specific connection. Alternatively, the manufacturer may provide standard holes to address the many possibilities of where bolts could be used, which could result in some holes not needing bolts. Oversized holes or slots may be provided in the lap areas. Washers are not needed at these locations as the slots are provided as an erection aid and evidence shows that washers are not needed for the members to behave as expected.

Secondary Structural Members

- 5.1 Girts
  - Sag rods or discrete bracing
- Type of Bracing
  - Channel, Strap, Knock-in
  - Varies by manufacturer
  - Not always required
- 5.2 Purlins
  - Sag angles or discrete bracing
  - Prevent “roll”

Figure 5.1-1: Girt Discrete Bracing

Figure 5.2-1: Purlin Bracing

Secondary Structural Members

- 5.2.1 Hanging Loads on Purlins
  - Loads of “any significance” – vary by manufacturer

It is common to hang or suspend loads from purlins. These loads may be due to a suspended ceiling, lights, fire sprinkler system, heaters, or other equipment. While very light loads may be attached to the bottom flange, loads of any significance must be attached to the purlin web, as shown in Figure 5.2-2. In no case should loads be attached to the purlin "lip", as shown in Figure 5.2-3. If the purlins have been designed to support hanging loads, the magnitude of a specific load or a collateral load in pounds per square foot must be noted on the drawings. The capacity of the purlins to support roof live and snow loading will decrease if the hanging loads exceed these values or when no collateral load was included in the design.

Secondary Structural Members

- 5.2.1 Hanging Loads on Purlins

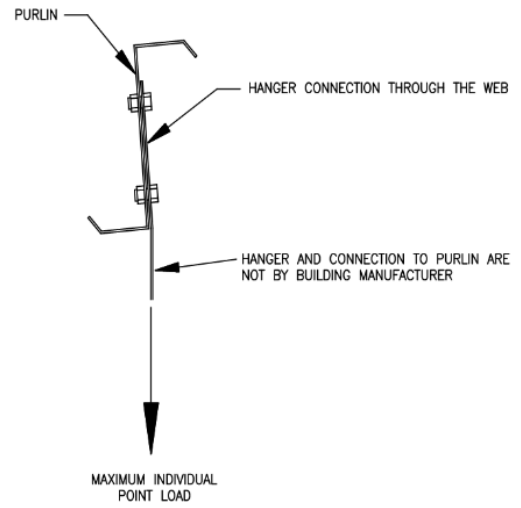


Figure 5.2-2: Hanging Loads - Recommended Method

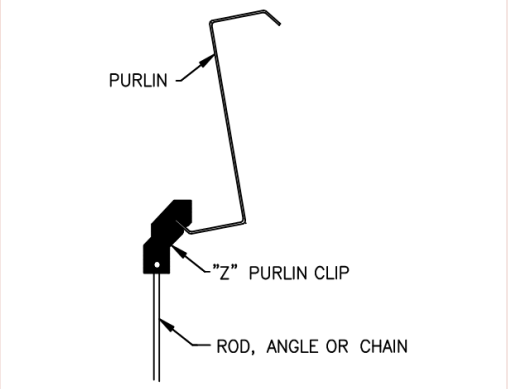


Figure 5.2-3: Hanging Loads - Incorrect Method

Chapter 6 Metal Roof and Wall Systems

- 6.1 Standing Seam and Through Fastened Metal Roofs
- 6.2 Metal Wall Panels
- 6.3 Fasteners for Metal Roofs and Walls
- 6.4 Oil Canning
- 6.5 Metal Decking
- 6.6 Other Wall Materials
- 6.7 Roof and Wall Insulation
- 6.8 Inspection of Surface Preparation and Application of Coatings

Safety Precautions

The inspector must be aware of the following safety precautions when walking or handling metal panels:

- Metal panels may contain a manufacturing lubricant that can be extremely slippery. A Voluntary Lubricant Compliance Program for Steel Deck and Roofing provides guidelines with manufacturing metal panels to reduce the level of lubricant. For more information, refer to the MBMA Metal Building Systems MBSM, Appendix A13.
- Never step or walk on the major rib of a panel. Always walk in the panel flat.
- Never step, stand, sit, or place material/equipment on skylights.
- Never walk, stand, or sit on an unsecured roof panel. Panel may buckle or collapse causing serious or critical injury.
- Appropriate fall protection procedures must be followed.

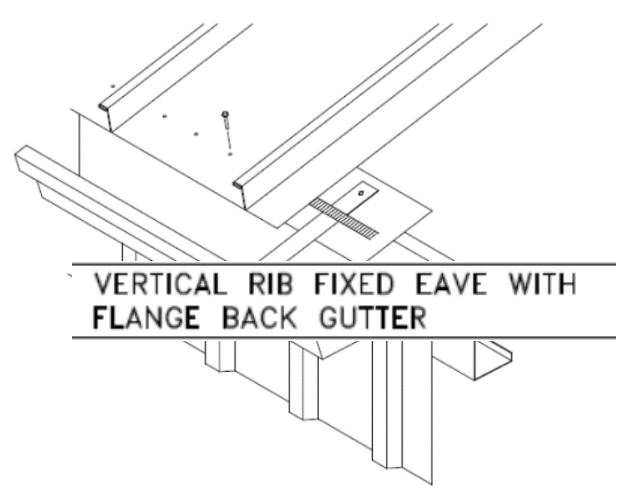
Rooftop Accessories – Seam Clamps

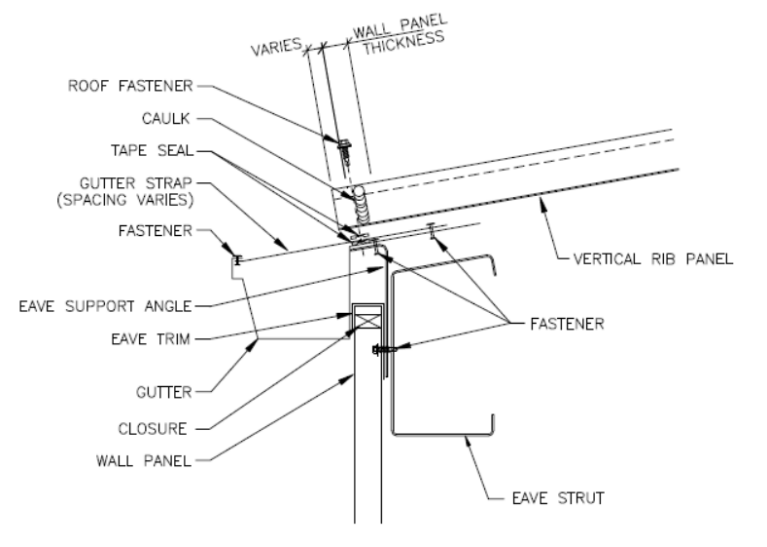
- Be sure that the clamps are of non-corrosive metals that are compatible with the roof. Aluminum clamps with stainless hardware are preferred and compatible with Galvalume® coated steel.
- Any setscrews that secure the clamp to the seam should have a rounded point (not a cup point) so that gouging, or breaching of the metallic coating is avoided.
- Be sure that the holding strength of the clamp is third-party lab tested for the specific gauge and panel seam profile and gauge being used. Holding strength is seam profile- and gauge-specific.
- Loads introduced into the clamp will be transferred to the panels. Panels must be adequately secured to the structure and have sufficient flexural strength to resist these loads.
- Ideally, clamps should be located at the panel clip locations at a purlin, in order to minimize localized loads on the panel seam.

Critical Sealant Applications

Eave:

- Panel to eave flashing or gutter
- Panel rib closure to eave flashing or gutter
- Panel to rib closure
- Panel seam end

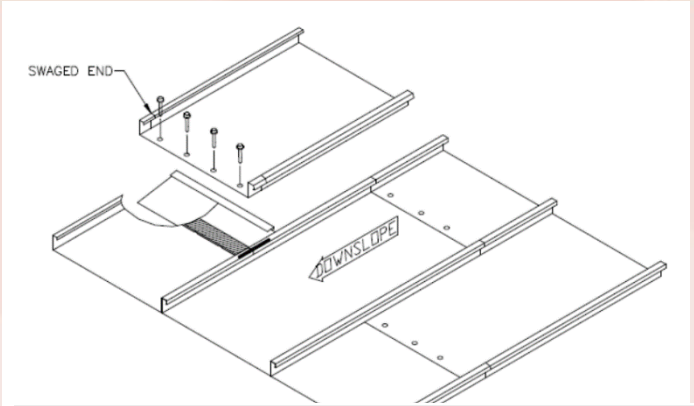




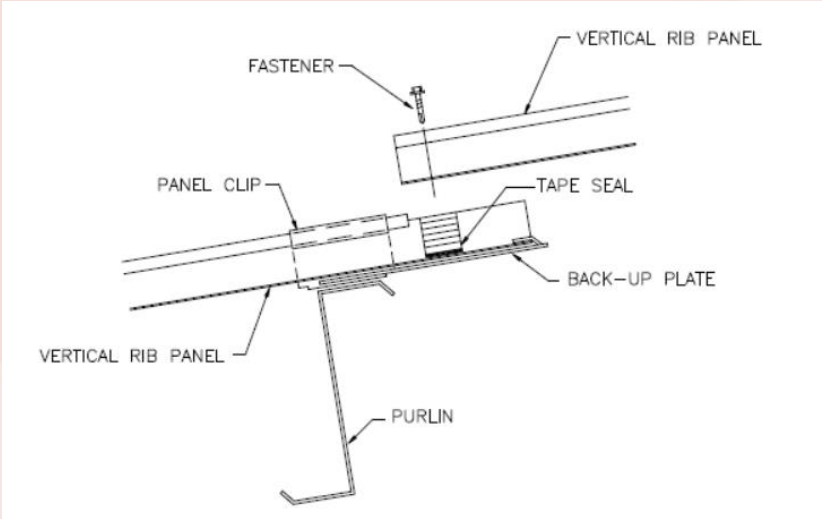
Critical Sealant Applications

Endlap:

- Panel flat to panel flat
- Panel rib area to panel rib area (and into seam)



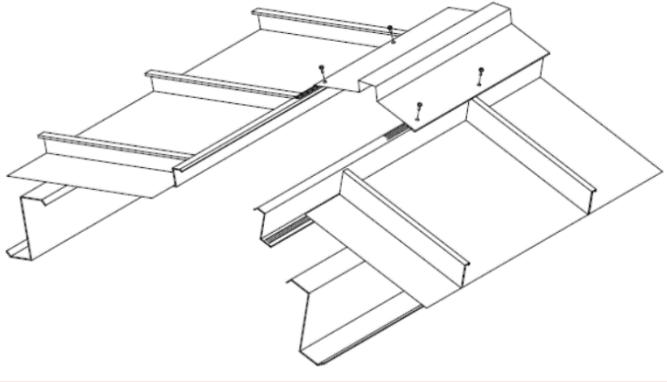
VERTICAL RIB WITH STAGGERED END LAPS



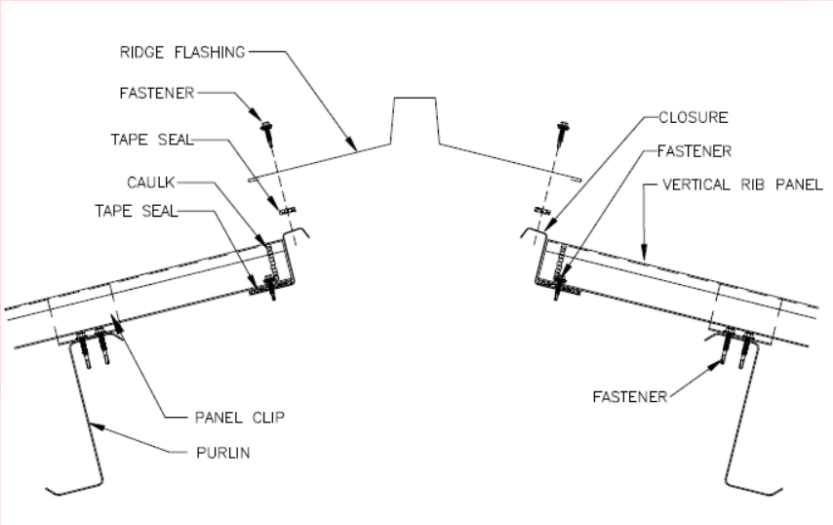
Critical Sealant Applications

Ridge:

- Panel to closure components
- Closure components to ridge flashings



VERTICAL RIB NON–VENTED FLOATING RIDGE



Critical Sealant Applications

Terminations:

- Panel to flashing at rakes or gables
- Panel to flashing at longitudinal expansion joints
- Panel to flashing at parapet conditions

Penetrations:

- Panel and ribs to preformed curbs
- Panel and ribs to other roof penetrations

Flashings and Trim:

- Laps of adjacent flashing segments
- Flashings to panels

Metal Roof/Wall Fasteners

The fasteners should be installed securely and installed in accordance with the locations called out on the approved construction documents. The following is a brief list of common fastener connection details for the inspector to make note of and contact the appropriate party for a repair according to manufacturer's recommendations:

- Correct fastener style, size, and finish. Note that a larger size is acceptable as discussed below.
- Verify the fasteners penetrate individual components intended to be secured.
- Missing fastener heads.
- Stripped fasteners that turn freely.
- Improper fastener spacing and edge distances not according to the construction drawings.
- Over driven, under driven, or loose fasteners.

Oil Canning

6.4 Oil Canning

Oil canning is defined as a waviness that may occur in the flat areas of thin gauge, formed metal roof and wall panels, as shown in Figure 6.4-1. This oil canning is sometimes temporary but could be permanent depending on the situation. Structural integrity is not normally affected by this inherent characteristic. Oil canning is generally an aesthetic issue and not cause for roof or wall panel rejection. For a detailed discussion on oil canning, refer to the Metal Construction Association (MCA) Technical Bulletin, *Oil Canning in Metal Roof and Metal Wall Systems*.

Chapter 7 Inspections Related to Maintenance

- 7.1 Ice and Snow Buildup
- 7.2 General Maintenance
- 7.3 Condensation Control

General Maintenance

7.2 General Maintenance

The following components that are a part of a building envelope may need periodic maintenance to ensure proper working conditions and the avoidance of water penetrating into the building interior. Installation of these materials should have originally been in accordance with the approved construction documents.

Gutters and Downspouts - Clear all debris (leaves, dirt, etc.) from gutters and downspouts as required. Local conditions govern the frequency of these cleanings. However, it is recommended that an inspection for damage and a cleaning be made at least once a year.

Walk Doors - Walk doors should be checked periodically to assure tightness of locksets, closure hardware, and door hinges. Any loose bolts or fasteners should be tightened. Any moving parts that start to stick or squeak should be properly lubricated.

General Maintenance (Cont'd)

Windows - Caulking in windows will deteriorate over time, usually resulting in window leakage. If this happens, remove the old caulk and apply new caulk in its place. Windows that become hard to slide should have the track area thoroughly cleaned and a light coat of grease applied to the tracks. Check yearly for loose fasteners and tighten as required.

Overhead Doors - Periodically check the attachment bolts around an overhead door and tighten as required. The door manufacturer should be contacted if the door gets out of alignment or the mechanical parts within the door become hard to operate.

Loose Fasteners - Windows, doors, vents, and louvers should be checked yearly for loose fasteners and tighten as required, and lubricate any moving parts as necessary.

General Maintenance (Cont'd)

Insulation - Any holes or tears in the facing should be repaired with patch tape as supplied by the insulation supplier. Insulation tearing loose at various locations within the building (particularly at the eave or base) might not be the result of poor installation, but rather a strong negative pressure inside the building resulting from an improperly balanced HVAC system or an extra exhaust fan added after the erection of the structure. This, combined with a strong wind outside the building will often result in the insulation coming loose in these areas.

Loose Structural Bolts and Bracing - Structural bolts and bracing normally require no maintenance except in instances where the structure is exposed to vibration, such as a building with an overhead crane. Bolts, including those in crane building connections, should be inspected at least once a year and in accordance with OSHA requirements. Any loose connections should immediately be brought to the tightened condition specified by the building manufacturer.

Appendix D Inspection Checklists

DESCRIPTION	ITEM	CONDITION[1]					ACTIONS TAKEN OR RECOMMENDED
		G	F	P	Y	N	
Safety First	Extreme caution used when:						
	Walking on or handling panels. New panels contain slippery lubricant						
	Near major rib. Avoiding stepping on a major rib of a panel. Always walk on panel flat.						
	Near skylights. Never step, stand, sit or place material/equipment on skylight.						
	Near rigid board insulation. Never step, stand, or sit on. May be unsupported with liner panel.						
	Near unsecured roof panel. Panel may buckle/collapse.						
	Erection bracing properly installed to avoid collapse of rigid frames during construction.						

Appendix D Inspection Checklists

Main Frames Columns and Rafters	Any modifications to shape						
	Check the primer						
	Base plate sitting flush on top of concrete						
	If not, non-shrink grout installed						
	Holes in base plate within tolerance						
	Loose bolts						
	Any missing or mislocated anchor rods / bolts						
	Correct length anchor rods						
	Bolt tightening per specifications						
	Field welding						
	Erection and fabrication tolerances not exceeded						
	Flange braces - "all" installed per drawings						
	Other						

Appendix D Inspection Checklists

Secondary Framing	Any modifications to shape						
	Any additional collateral loads						
	Missing bolts						
	Missing roof clips						
	Erection tolerances met						
	Fabrication tolerances not exceeded						
	Hanging loads on purlin - through web and not on purlin lip						
	Flange and Purlin and girt bracing - All installed per locations on drawings						
	Other						

Appendix D Inspection Checklists

Bracing Rods / Cables	X-bracing - installed per locations on dwgs						
	X-bracing - rods/cables - Limited amount of sag						
	Other						
Building Evolution	Any openings been relocated / modified						
	Any secondary framing been altered						
	Any additions to existing building						
	Other						

Appendix D Inspection Checklists

Walls & Roofs Panels	Damaged panels						
	Drill or other metal shavings removed						
	Fasteners installed properly						
	Any roof ponding						
	Any debris/vegetation growth						
	Displaced closures						
	Sealants installed per drawing locations						
	Other						
Roof Curbs and Hatches	Fasteners installed						
	Condensation lines draining properly						
	Loose or displaced closures						
	Sealants displaying signs of cracking						
	Other						

Appendix D Inspection Checklists

Other Roof Penetrations	Flashed properly						
	Weathertight seal						
	Secured and not prone to movement						
	Deterioration of skylight/panels						
	Sealant displaying signs of cracking						
	Does not impede the flow of water						
	Other						
Flashings	Roof to wall flashing						
	Coping						
	Ridge and Hip caps						
	Corner trim attached properly						
	Gutters and downspouts installed properly						
	Windows and doors						
	Other						

Appendix D Inspection Checklists

Insulation	All seams in vapor retarder sealed						
	Vapor retarder sealed properly around bracing						
	Tears and rips have been sealed						
	Proper drape of insulation between secondary framing members						
	No air cavity between insulation and cladding						
	Other						
Other							

Case Study

Note – Plan is to substitute O'Reilly Auto Parts Store as Case Study

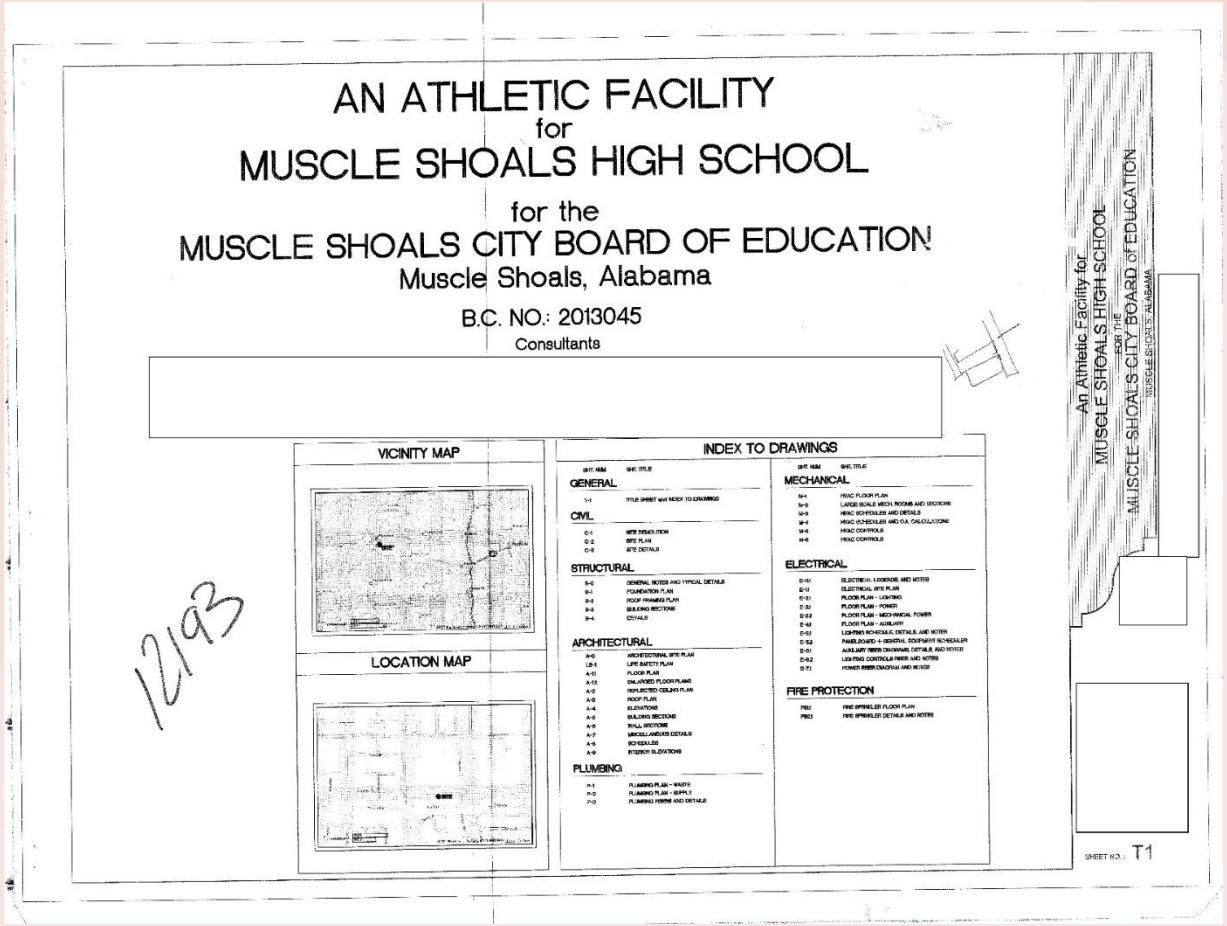
3451 S. Decatur Blvd., Las Vegas

But, heavier on Building Official Role through the process

Project Details

- Muscle Shoals High School Athletic Training Facility
- Size: 135.375 ft x 186.083 ft x 26 ft Eave Ht.
- Description: Gable Building to House High School Athletic Training
- Bigbee Start Date: April 16, 2013
- Planned Bigbee Delivery Date: June, 3 2013
- Actual Bigbee Delivery Date: June 3, 2013

Customer Contacts Bigbee to Begin Metal Building Quote (1)



AN ATHLETIC FACILITY
for
MUSCLE SHOALS HIGH SCHOOL
for the
MUSCLE SHOALS CITY BOARD OF EDUCATION
Muscle Shoals, Alabama
B.C. NO.: 2013045
Consultants

VICINITY MAP

LOCATION MAP

INDEX TO DRAWINGS

GENERAL
T-1 TITLE SHEET and INDEX TO DRAWINGS

CIVIL
C-1 SITE DEMOLITION
C-2 SITE PLAN
C-3 SITE DETAILS

STRUCTURAL
S-0 GENERAL NOTES AND TYPICAL DETAILS
S-1 FOUNDATION PLAN
S-2 ROOF FRAMING PLAN
S-3 BUILDING SECTIONS
S-4 DETAILS

ARCHITECTURAL
A-0 ARCHITECTURAL SITE PLAN
LS-1 LIFE SAFETY PLAN
A-1 FLOOR PLAN
A-1.1 ENLARGED FLOOR PLANS
A-2 REFLECTED CEILING PLAN
A-3 ROOF PLAN
A-4 ELEVATIONS
A-5 BUILDING SECTIONS
A-6 WALL SECTIONS
A-7 MISCELLANEOUS DETAILS
A-8 SCHEDULES
A-9 INTERIOR ELEVATIONS

PLUMBING
P-1 PLUMBING PLAN - WASTE
P-2 PLUMBING PLAN - SUPPLY
P-3 PLUMBING RISERS AND DETAILS

MECHANICAL
M-1 HVAC FLOOR PLAN
M-2 LARGE SCALE MECH. ROOMS AND SECTIONS
M-3 HVAC SCHEDULES AND DETAILS
M-4 HVAC SCHEDULES AND O.A. CALCULATIONS
M-5 HVAC CONTROLS
M-6 HVAC CONTROLS

ELECTRICAL
E-0.0 ELECTRICAL LEGENDS AND NOTES
E-0.1 ELECTRICAL SITE PLAN
E-0.2 FLOOR PLAN - LIGHTING
E-0.3 FLOOR PLAN - POWER
E-0.4 FLOOR PLAN - MECHANICAL POWER
E-0.5 FLOOR PLAN - AUXILIARY
E-0.6 LIGHTING SCHEDULE, DETAILS, AND NOTES
E-0.7 PANELBOARD + GENERAL EQUIPMENT SCHEDULES
E-0.8 AUXILIARY RISER DIAGRAMS, DETAILS AND NOTES
E-0.9 LIGHTING CONTROLS RISER AND NOTES
E-0.10 POWER RISER DIAGRAM AND NOTES

FIRE PROTECTION
FP0.0 FIRE SPRINKLER FLOOR PLAN
FP0.1 FIRE SPRINKLER DETAILS AND NOTES

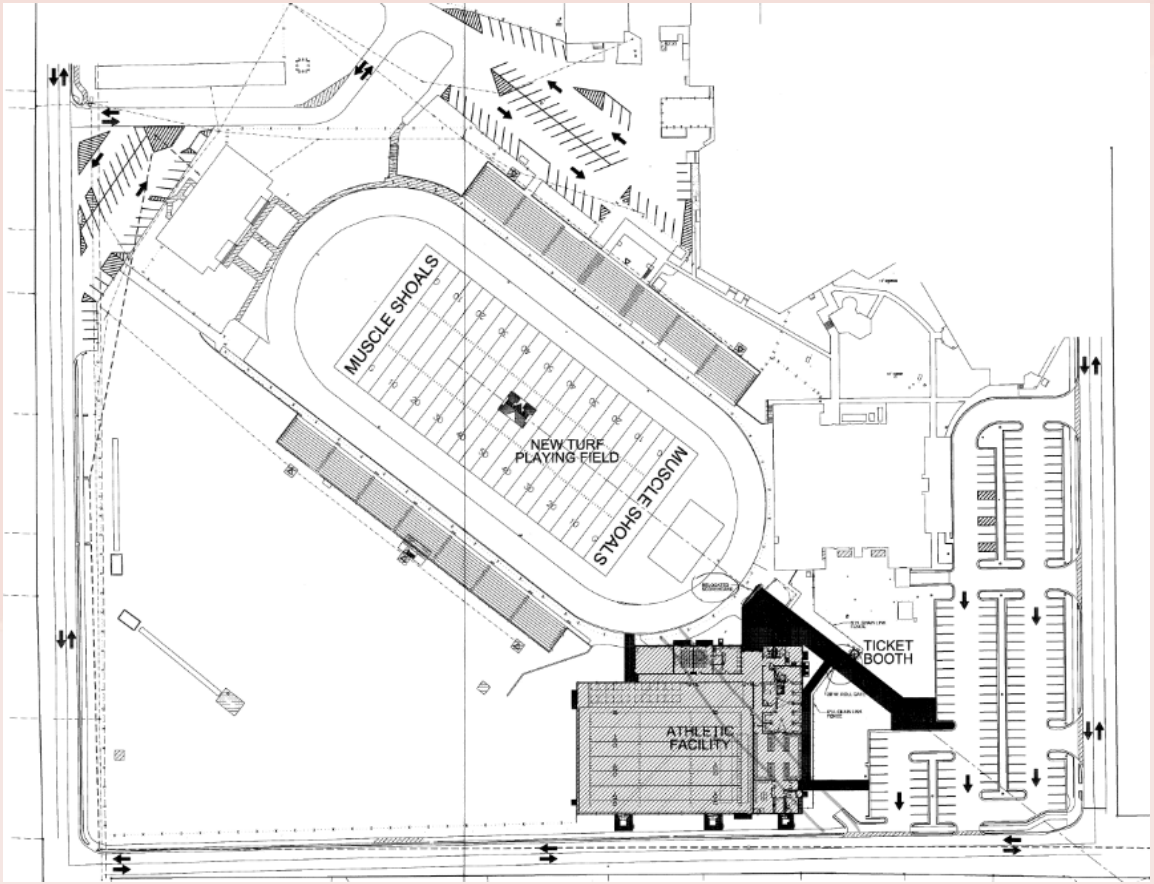
An Athletic Facility for
MUSCLE SHOALS HIGH SCHOOL
for the
MUSCLE SHOALS CITY BOARD of EDUCATION
MUSCLE SHOALS, ALABAMA

SHEET NO.: T1

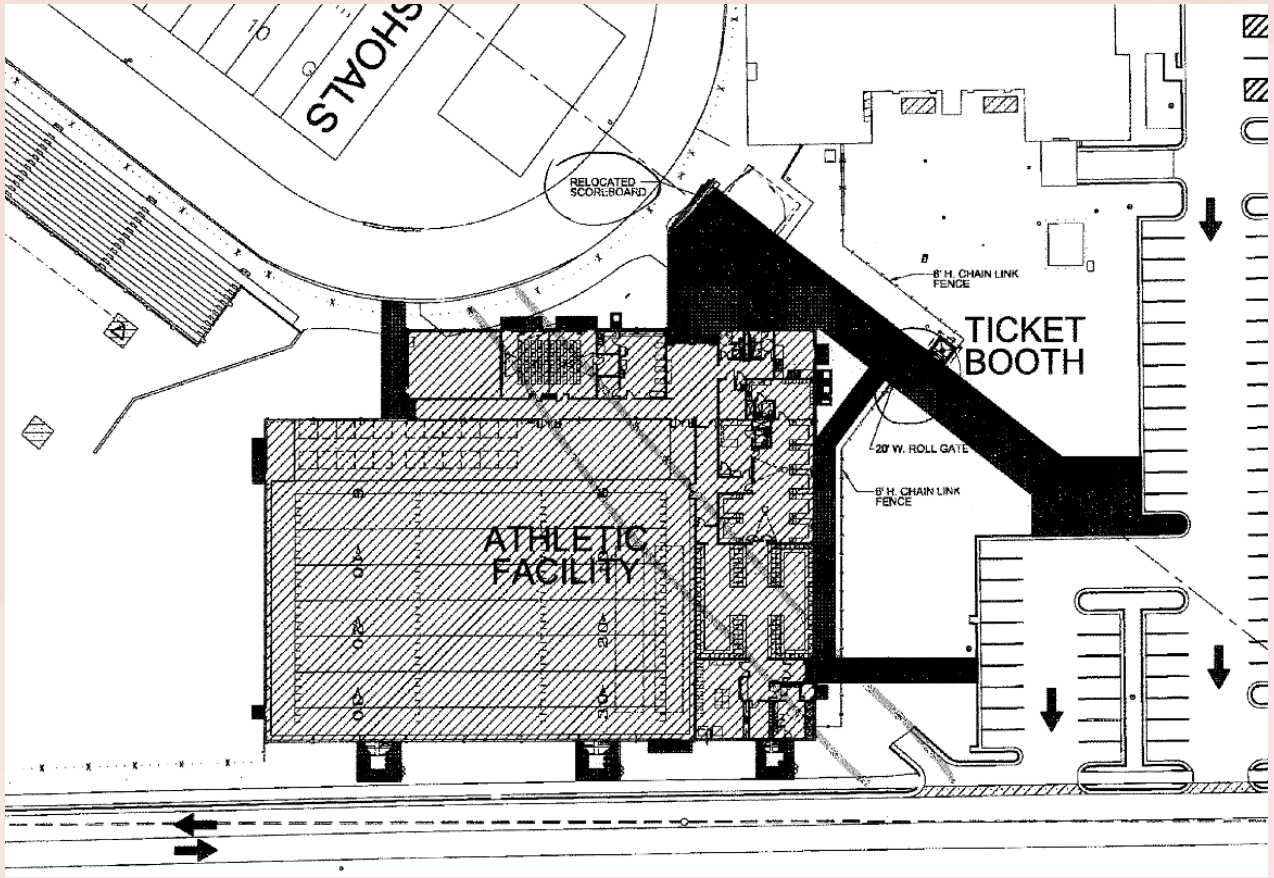
12193

Customer Contacts Bigbee to Begin Metal Building Quote (2)

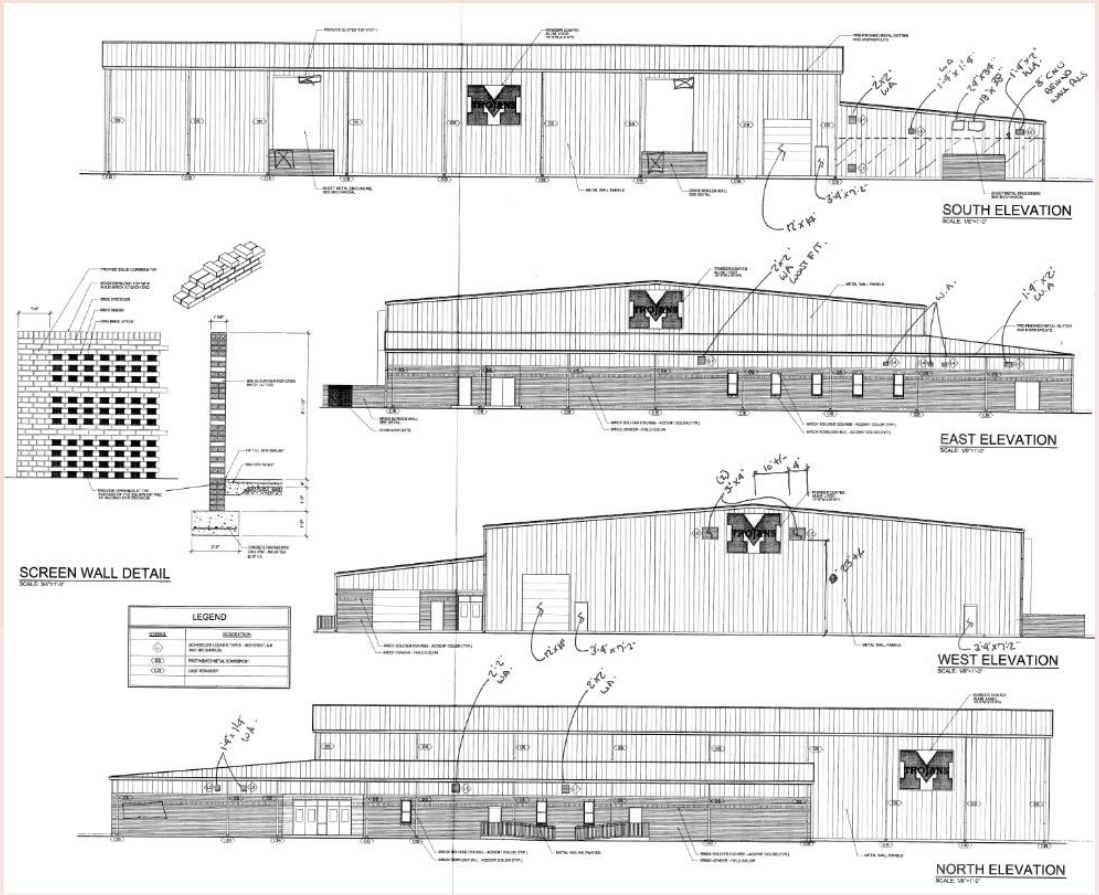
Customer Contacts Bigbee to Begin Metal Building Quote (3)



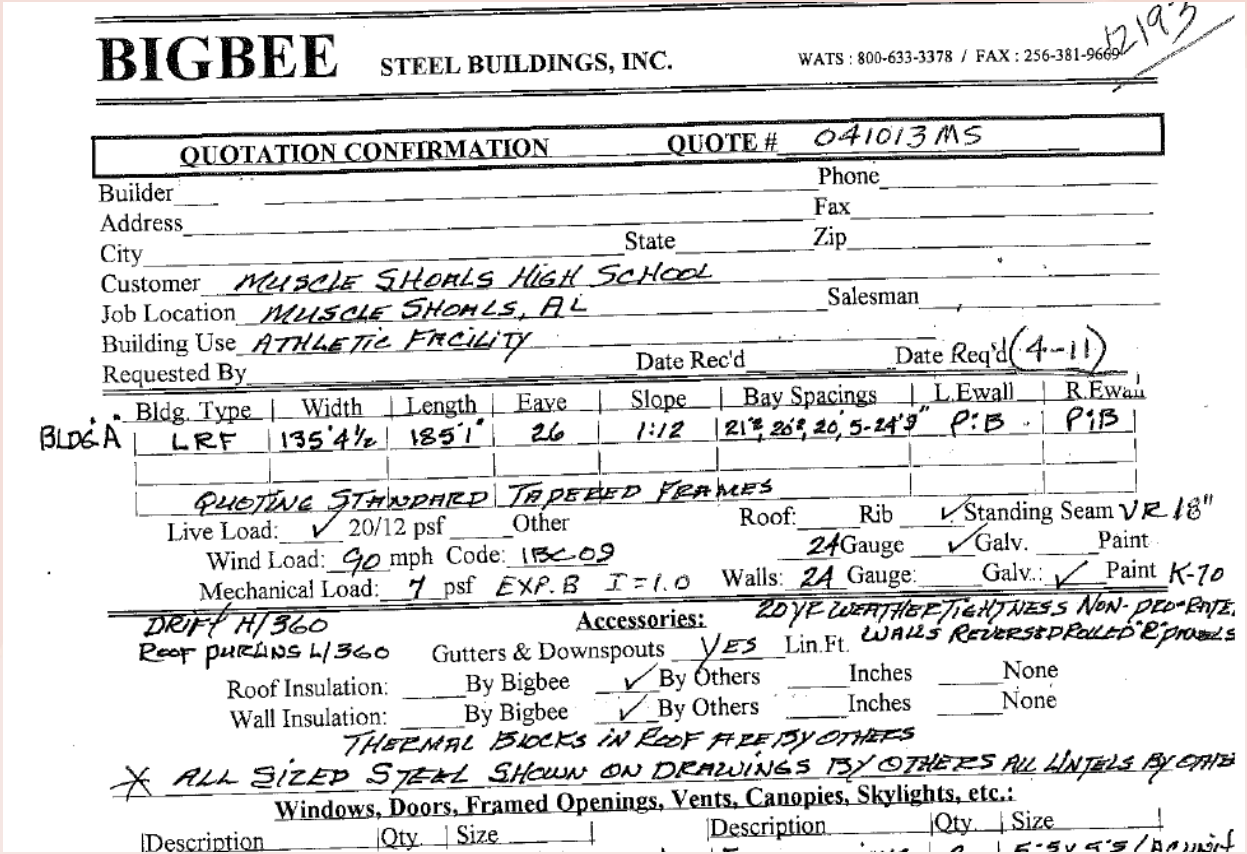
Customer Contacts Bigbee to Begin Metal Building Quote (4)



Customer Contacts Bigbee to Begin Metal Building Quote (5)



Customer Contacts Bigbee to Begin Metal Building Quote (6)



BIGBEE STEEL BUILDINGS, INC. WATS : 800-633-3378 / FAX : 256-381-9669 12193

QUOTATION CONFIRMATION QUOTE # 041013MS

Builder ___ Phone ___
Address ___ Fax ___
City ___ State ___ Zip ___
Customer MUSCLE SHOALS HIGH SCHOOL
Job Location MUSCLE SHOALS, AL Salesman ___
Building Use ATHLETIC FACILITY
Requested By ___ Date Rec'd ___ Date Req'd (4-11)

	Bldg. Type	Width	Length	Eave	Slope	Bay Spacings	L.Ewall	R.Ewall
BLDG A	LRF	135'4½	185'1"	26	1:12	21'8", 26', 20', 5-24'9"	P:B	P:B

QUOTING STANDARD TAPERED FRAMES

Live Load: ✓ 20/12 psf ___ Other
Wind Load: 90 mph Code: IBC 09
Mechanical Load: 7 psf EXP. B I=1.0

Roof: ___ Rib ✓ Standing Seam VR 18"
24 Gauge ✓ Galv. ___ Paint
Walls: 24 Gauge: ___ Galv.: ✓ Paint K-70

DRIFT H/360
Roof purlins L/360

Accessories:
Gutters & Downspouts YES Lin.Ft.
20YR WEATHERTIGHTNESS NON-DEGRADE WALLS REVERSED ROLLED "B" PANELS

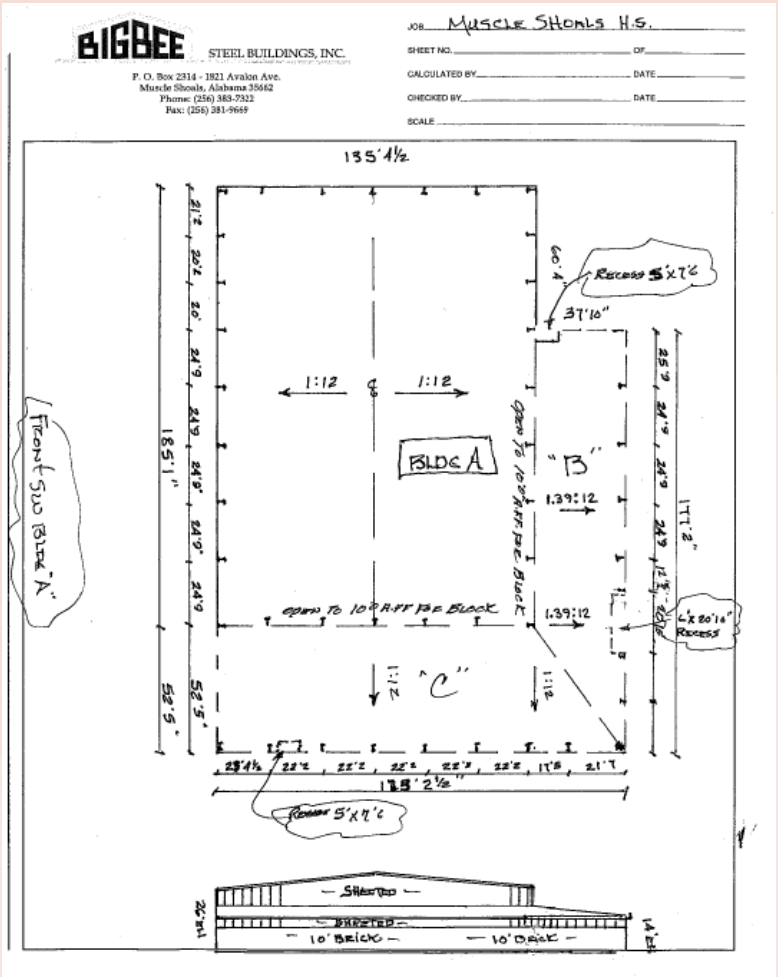
Roof Insulation: ___ By Bigbee ✓ By Others ___ Inches ___ None
Wall Insulation: ___ By Bigbee ✓ By Others ___ Inches ___ None
THERMAL BLOCKS IN ROOF ARE BY OTHERS

X ALL SIZED STEEL SHOWN ON DRAWINGS BY OTHERS ALL LINTELS BY OTHE

Windows, Doors, Framed Openings, Vents, Canopies, Skylights, etc.:

Description	Qty.	Size	Description	Qty.	Size

Quote Negotiations Continue (1)



Quote Negotiations Continue (2)

Specifications From Authoritative Agency

SECTION 05120 - STRUCTURAL STEEL

PART 1 – GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

DESCRIPTION OF WORK:

Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.

Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.

QUALITY ASSURANCE:

Codes and Standards: Comply with provisions of following, except as otherwise indicated.

1. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.
2. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
3. AWS D1.1 "Structural Welding Code".
4. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.

Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

1. If re-certification of welders is required, retesting will be Contractor's responsibility.

SECTION 13120 - PRE-ENGINEERED BUILDINGS

PART 1 – GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specifications sections apply to work specified in this Section.

SUMMARY:

Extent of pre-engineered buildings work is shown on drawings.

Building Type: The pre-engineered building system shown is a single story, rigid frame type metal building of the nominal length, width, eave height and roof pitch indicated. Provide standard metal building blanket insulation with vinyl facing under roof and inside walls as indicated on drawings.

1. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements.
2. Concrete floor and foundations and installation of anchor bolts are specified in a Division-3 section. Provide anchor bolts (including sizes and lengths) and anchor bolt plan to Contractor for work by others.
3. Sealants and caulking are specified in a Division-7 section.

Description

Provide all materials, labor, equipment and services, and perform all operations in connection with the furnishing and installing of roofing complete, in accordance with the drawings and specifications, and including, but not limited to, the following:

1. A pre-formed and pre-finished metal roofing panel, complete with roof and wall insulation, SPECS SAY GALVALUME

Include perimeter flashing, trim, ridge and gable closures and flashing as applicable, fasteners, supplementary furring and supports and sealants required for complete roofing system, including the following:

1. Roof and Exterior Wall Panels
2. Soffit and Fascia Panels
3. Roof and Wall Insulation
4. Gutters and Downspouts
5. Ridge Vent
6. Roof Curbs

Quote Negotiations Continue

Specifications From Authoritative Agency

SUBMITTALS:

Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories. Submitt sample warranty.

Shop Drawings: Submit complete erection drawings showing anchor bolts settings, sidewall, endwall, and roof framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.

Samples: The contractor shall submit two (2) samples each of the following for Architects's review. Samples will be used to evaluate the quality of the finished roofing system.

1. 12-inch long by actual width of roofing with required finish.
2. Fasteners for application of roofing, deck, siding, and soffit panels.
3. Sealants, closures and clips.
4. 12-inch long minimum by 12-inch wide minimum of actual standing seam sidelap seams for both sides of a typical panel.
5. Length and width as required for actual standing seam roof panel and lap seam including stiffeners and fasteners and side lap seams for both sides of a typical panel.

Manufacturer's Qualifications: Provide pre-engineered metal buildings as produced by a manufacturer with not less than 5 years successful experience in the fabrication of pre-engineered metal buildings of the type and quality required. Manufacturer will be a member of the MBMA.

Erector's Qualifications: Pre-engineered building shall be erected by a firm that has not less than 5 years successful experience in the erection of pre-engineered buildings similar to those required for this project, and that has been licensed by the manufacturer of the building system.

The Contractor will provide an approved and certified independent third party inspection firm. The inspection firm will provide a certificate of compliance in a start up, in progress and final inspection mode, certifying that the roof system will be approved to receive a 20 year manufacturers warranty. Recognized approved independent firms will consist of:

Quote Negotiations Continue

Specifications From Authoritative Agency

MATERIALS:

Metals:

1. Hot-Rolled Structural Shapes: Comply with requirements of ASTM A36 or A529.
2. Tubing or Pipe: Comply with requirements of ASTM A500, Grade B, ASTM A501, or A53.
3. Members Fabricated from Plate or Bar Stock: Provide 42,000 psi minimum yield strength. Comply with requirements of ASTM A529, A570 or A572.
4. Members Fabricated by Cold Forming: Comply with requirements of ASTM A607, Grade 50.
5. Bolts for Structural Framing: Comply with requirements of ASTM A307 or A325 as necessary for design loads and connection details.

Insulation

Blanket Insulation: Provide glass fiber blanket insulation, of density and thickness required to obtain R-factors as follows:

1. Walls R-10
2. Ceiling R-19

1.	Test:	Film Thickness
	Test Method	ASTM D-1005
	Performance	0.2 mil primer 0.8-0.9 mil topcoat.
2.	Test	60° @ under 10 low gloss
	Test Method	ASTM D-523
	Performance	25-35
3.	Test	IR Reflectivity
	Test Method	ASTM D-4803-97
	Performance	Must meet 25% Minimum (exceeds)
4.	Test	Pencil Hardness
	Test Method	ASTM D-3363
	Performance	HB-H
5.	Test	Flexibility, T-Bend
	Test Method	ASTM D-4145
	Performance	2-T Galvalume Steel

Accessories: Provide the following sheet metal accessories factory formed of the same material and finish as the roofing and siding.

1. Flashings.
2. Fillers.
3. Metal expansion joints.
4. Ridge covers.
5. Cover exposed structural and secondary members at exterior.

Flexible Closure Strips: Provide closed-cell, expanded cellular rubber, self-extinguishing flexible closure strips. Cut or premold closure strips to match corrugation configuration of roofing and siding sheets. Provide closure strips where indicated or necessary to ensure weathertight construction.

Sealing Tape: Provide pressure sensitive 100 percent solids grey polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape not less than 1/2" wide and 1/8" thick.

Secondary Framing:

The spacing of all purlins as shown on the drawings is diagrammatic, the Registered Professional Engineer for the Pre-Engineered Building shall be responsible for the design of the roof structure to support the framing to meet all state, federal and local code restrictions and structural requirements set forth by the structural engineer. It shall be the responsibility of the Pre-Engineered Building manufacture to coordinate with the Bidding Contractor the amount of erection required for the roof framing before bidding.

Provide not less than 16-ga. shop painted rolled formed sections for the following secondary framing members unless shown otherwise on structural contract drawings.

1. Purlins.
2. Eave struts.
3. Endwall rafters.
4. Flange bracing.
5. Sag bracing.

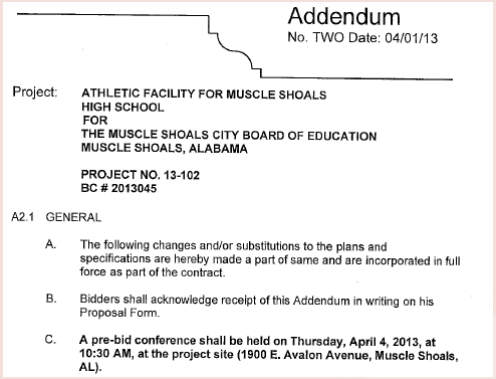
Provide not less than 14-ga. cold-formed galvanized steel sections for the following secondary framing members:

1. Base channels.
2. Sill angles.
3. Endwall structural members (except columns and beams).
4. Purlin spacers.

Bolts: Provide ASTM A307 bolts, at secondary structural connections. Provide zinc-plated or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels. Primary structural connections to be made with ASTM A325 bolts.

Quote Negotiations Continue

Specifications From Authoritative Agency (W/Addendums and more Addendums…)



Addendum
No. TWO Date: 04/01/13

Project: **ATHLETIC FACILITY FOR MUSCLE SHOALS HIGH SCHOOL FOR THE MUSCLE SHOALS CITY BOARD OF EDUCATION MUSCLE SHOALS, ALABAMA**

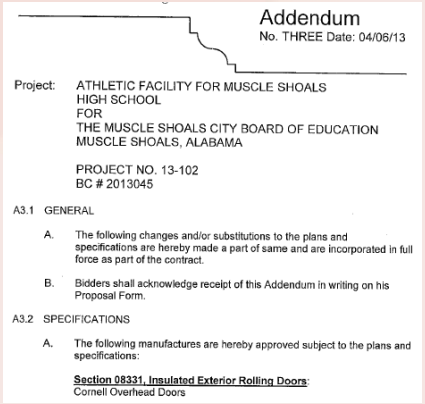
PROJECT NO. 13-102
BC # 2013045

A2.1 GENERAL

A. The following changes and/or substitutions to the plans and specifications are hereby made a part of same and are incorporated in full force as part of the contract.

B. Bidders shall acknowledge receipt of this Addendum in writing on his Proposal Form.

C. **A pre-bid conference shall be held on Thursday, April 4, 2013, at 10:30 AM, at the project site (1900 E. Avalon Avenue, Muscle Shoals, AL).**



Addendum
No. THREE Date: 04/06/13

Project: ATHLETIC FACILITY FOR MUSCLE SHOALS HIGH SCHOOL FOR THE MUSCLE SHOALS CITY BOARD OF EDUCATION MUSCLE SHOALS, ALABAMA

PROJECT NO. 13-102
BC # 2013045

A3.1 GENERAL

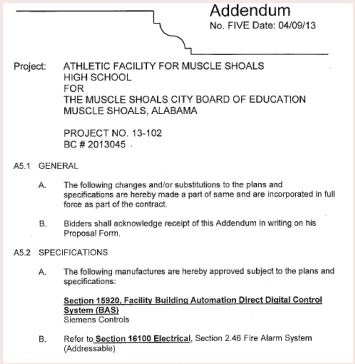
A. The following changes and/or substitutions to the plans and specifications are hereby made a part of same and are incorporated in full force as part of the contract.

B. Bidders shall acknowledge receipt of this Addendum in writing on his Proposal Form.

A3.2 SPECIFICATIONS

A. The following manufactures are hereby approved subject to the plans and specifications:

Section 08331, Insulated Exterior Rolling Doors:
Cornell Overhead Doors



Addendum
No. FIVE Date: 04/09/13

Project: ATHLETIC FACILITY FOR MUSCLE SHOALS HIGH SCHOOL FOR THE MUSCLE SHOALS CITY BOARD OF EDUCATION MUSCLE SHOALS, ALABAMA

PROJECT NO. 13-102
BC # 2013045

A5.1 GENERAL

A. The following changes and/or substitutions to the plans and specifications are hereby made a part of same and are incorporated in full force as part of the contract.

B. Bidders shall acknowledge receipt of this Addendum in writing on his Proposal Form.

A5.2 SPECIFICATIONS

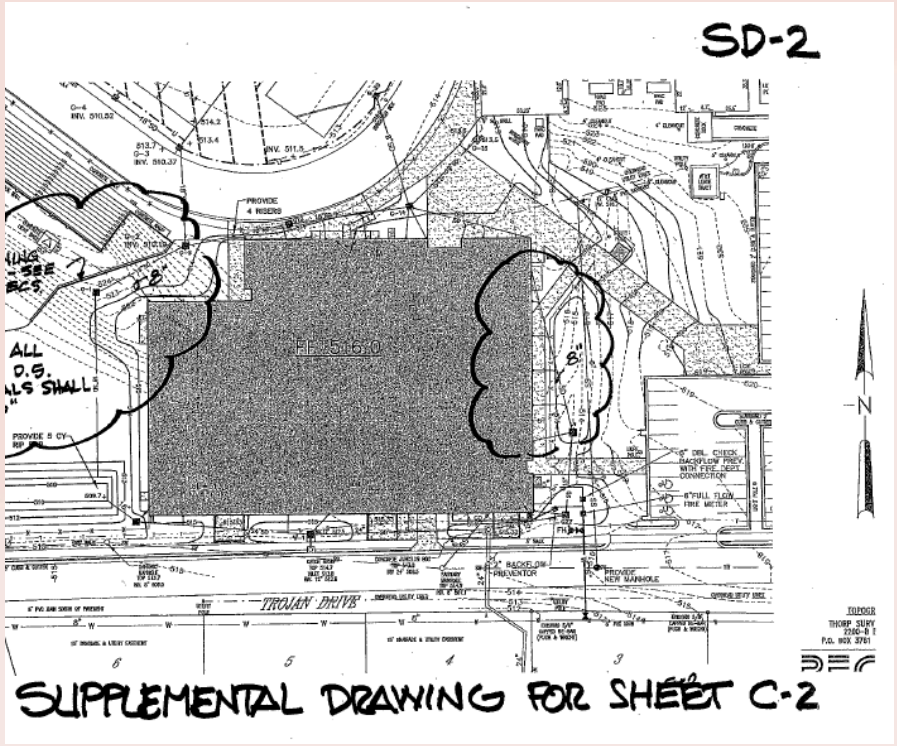
A. The following manufactures are hereby approved subject to the plans and specifications:

Section 15920, Facility Building Automation Direct Digital Control System (BAS)
Siemens Controls

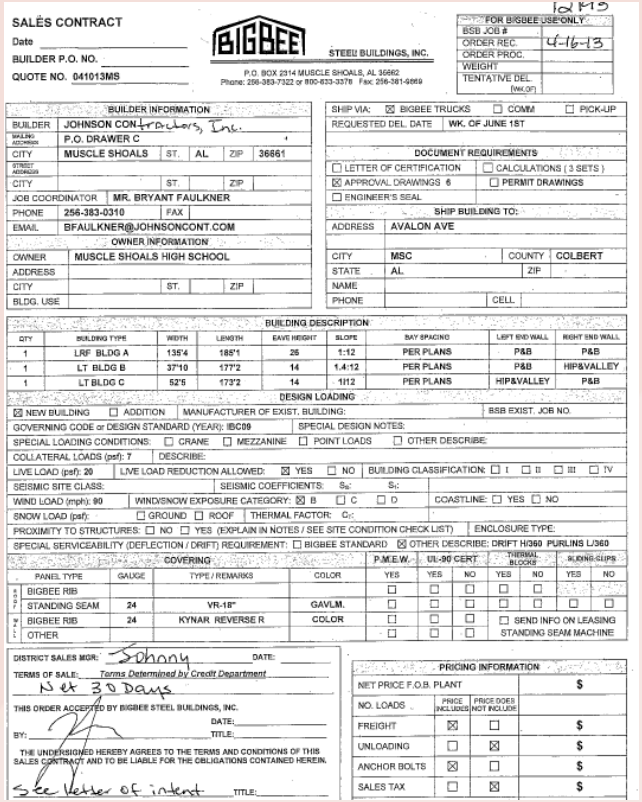
B. Refer to **Section 16100 Electrical**, Section 2.46 Fire Alarm System (Addressable)

Quote Negotiations Continue

Specifications From Authoritative Agency
(W/Supplemental Drawings and Sketches)



Metal Building Sales Contract Completed and Signed



SALES CONTRACT

Date

BUILDER P.O. NO.

QUOTE NO. 041013MS

BIGBEE STEEL BUILDINGS, INC.

P.O. BOX 2314 MUSCLE SHOALS, AL 35662
Phone: 256-383-7322 or 800-633-3378 Fax: 256-381-9669

FOR BIGBEE USE ONLY

BSB JOB #	
ORDER REC.	4-16-13
ORDER PROC.	
WEIGHT	
TENTATIVE DEL. (WK.OF)	

BUILDER INFORMATION

BUILDER	JOHNSON CONTractors, Inc.				
MAILING ADDRESS	P.O. DRAWER C				
CITY	MUSCLE SHOALS	ST.	AL	ZIP	36661
STREET ADDRESS					
CITY		ST.		ZIP	
JOB COORDINATOR	MR. BRYANT FAULKNER				
PHONE	256-383-0310	FAX			
EMAIL	BFAULKNER@JOHNSONCONT.COM				

OWNER INFORMATION

OWNER	MUSCLE SHOALS HIGH SCHOOL				
ADDRESS					
CITY		ST.		ZIP	
BLDG. USE					

SHIP VIA: ☒ BIGBEE TRUCKS ☐ COMM ☐ PICK-UP

REQUESTED DEL. DATE: WK. OF JUNE 1ST

DOCUMENT REQUIREMENTS

☐ LETTER OF CERTIFICATION ☐ CALCULATIONS (3 SETS)
☒ APPROVAL DRAWINGS 6 ☐ PERMIT DRAWINGS
☐ ENGINEER'S SEAL

SHIP BUILDING TO:

ADDRESS	AVALON AVE		
CITY	MSC	COUNTY	COLBERT
STATE	AL	ZIP	
NAME			
PHONE		CELL	

BUILDING DESCRIPTION

QTY	BUILDING TYPE	WIDTH	LENGTH	EAVE HEIGHT	SLOPE	BAY SPACING	LEFT END WALL	RIGHT END WALL
1	LRF BLDG A	135'4	185'1	25	1:12	PER PLANS	P&B	P&B
1	LT BLDG B	37'10	177'2	14	1.4:12	PER PLANS	P&B	HIP&VALLEY
1	LT BLDG C	52'6	173'2	14	1/12	PER PLANS	HIP&VALLEY	P&B

DESIGN LOADING

☒ NEW BUILDING ☐ ADDITION MANUFACTURER OF EXIST. BUILDING: BSB EXIST. JOB NO.

GOVERNING CODE or DESIGN STANDARD (YEAR): IBC09 SPECIAL DESIGN NOTES:

SPECIAL LOADING CONDITIONS: ☐ CRANE ☐ MEZZANINE ☐ POINT LOADS ☐ OTHER DESCRIBE:

COLLATERAL LOADS (psf): 7 DESCRIBE:

LIVE LOAD (psf): 20 LIVE LOAD REDUCTION ALLOWED: ☒ YES ☐ NO BUILDING CLASSIFICATION: ☐ I ☐ II ☐ III ☐ IV

SEISMIC SITE CLASS: SEISMIC COEFFICIENTS: S_s: S_1:

WIND LOAD (mph): 90 WIND/SNOW EXPOSURE CATEGORY: ☒ B ☐ C ☐ D COASTLINE: ☐ YES ☐ NO

SNOW LOAD (psf): ☐ GROUND ☐ ROOF THERMAL FACTOR: C_T:

PROXIMITY TO STRUCTURES: ☐ NO ☐ YES (EXPLAIN IN NOTES / SEE SITE CONDITION CHECK LIST) ENCLOSURE TYPE:

SPECIAL SERVICEABILITY (DEFLECTION / DRIFT) REQUIREMENT: ☐ BIGBEE STANDARD ☒ OTHER DESCRIBE: DRIFT H/360 PURLINS L/360

COVERING

	PANEL TYPE	GAUGE	TYPE / REMARKS	COLOR	P.M.E.W. YES	UL-90 CERT YES	UL-90 CERT NO	THERMAL BLOCKS YES	THERMAL BLOCKS NO	SLIDING CLIPS YES	SLIDING CLIPS NO
ROOF	BIGBEE RIB				☐	☐	☐	☐	☐		
	STANDING SEAM	24	VR-18"	GAVLM.	☐	☐	☐	☐	☐	☐	☐
WALL	BIGBEE RIB	24	KYNAR REVERSE R	COLOR	☐	☐	☐	☐ SEND INFO ON LEASING STANDING SEAM MACHINE			
	OTHER				☐	☐	☐				

DISTRICT SALES MGR: Johnny DATE:

TERMS OF SALE: *Terms Determined by Credit Department*
Net 30 Days

THIS ORDER ACCEPTED BY BIGBEE STEEL BUILDINGS, INC.

DATE:

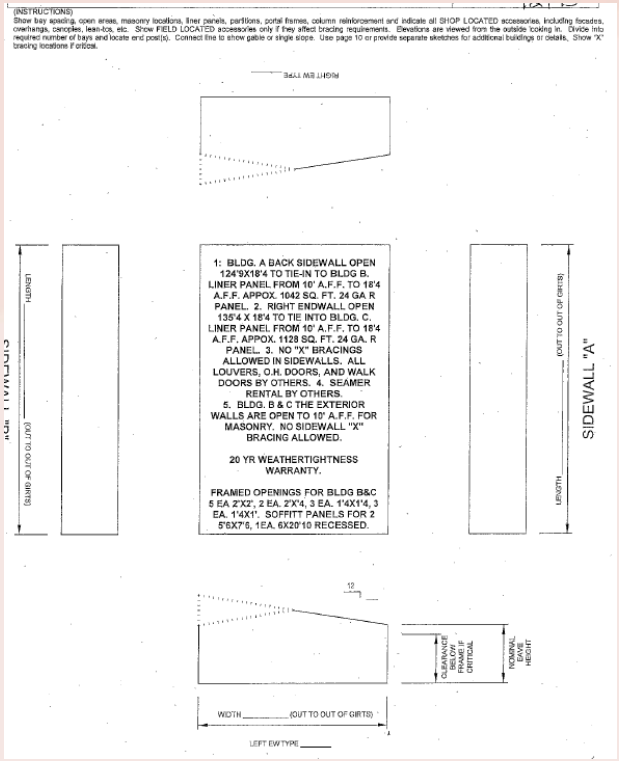
BY: TITLE:

THE UNDERSIGNED HEREBY AGREES TO THE TERMS AND CONDITIONS OF THIS SALES CONTRACT AND TO BE LIABLE FOR THE OBLIGATIONS CONTAINED HEREIN.

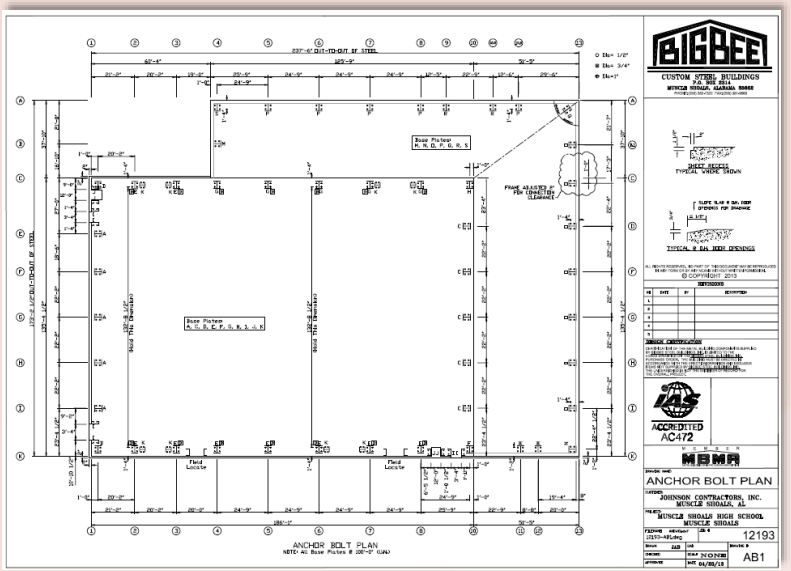
See letter of intent TITLE:

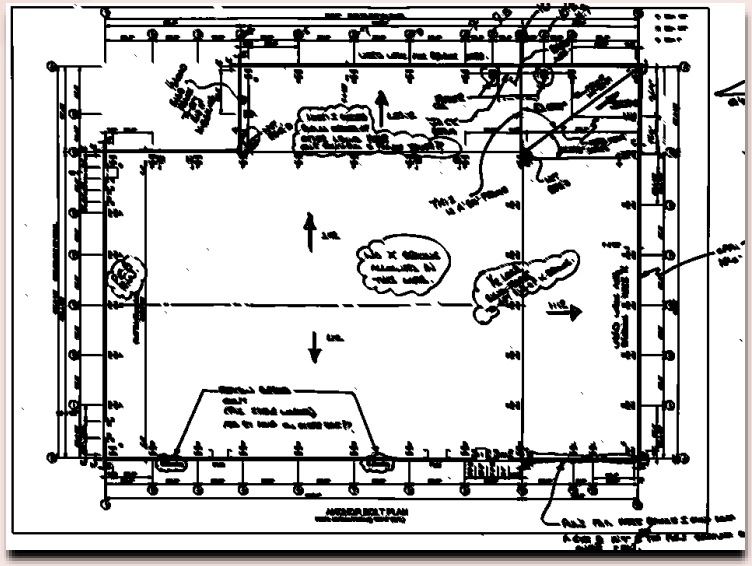
PRICING INFORMATION

NET PRICE F.O.B. PLANT			$
NO. LOADS	PRICE INCLUDES	PRICE DOES NOT INCLUDE	
FREIGHT	☒	☐	$
UNLOADING	☐	☒	$
ANCHOR BOLTS	☒	☐	$
SALES TAX	☐	☒	$

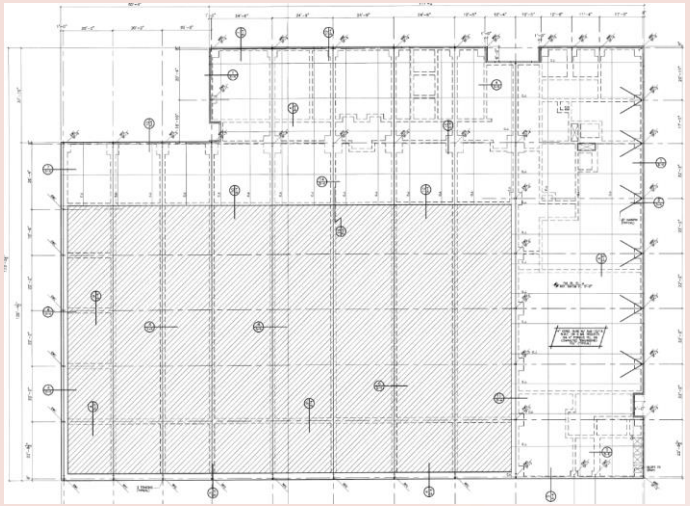


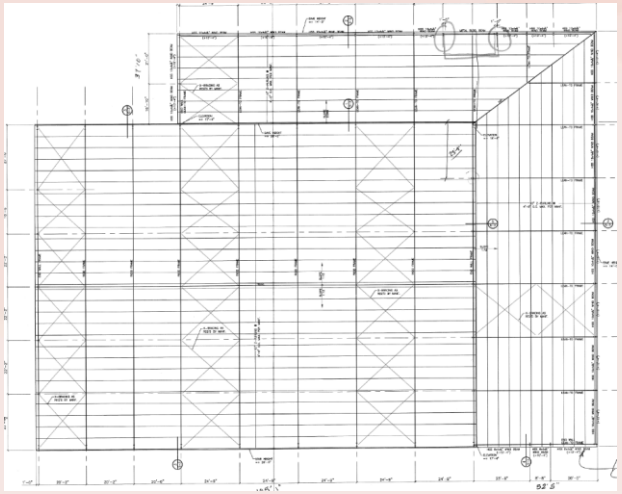
Metal Building Design Begins within Engineering Department

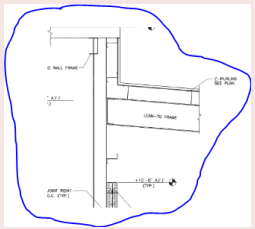


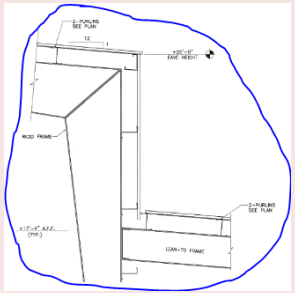


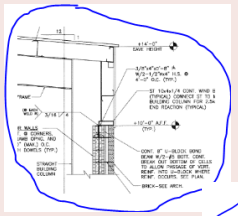
Job Coordinator Assembles Design File Including Pertinent Design Information

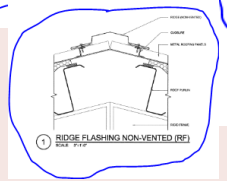


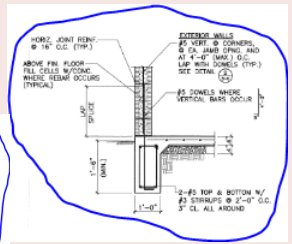




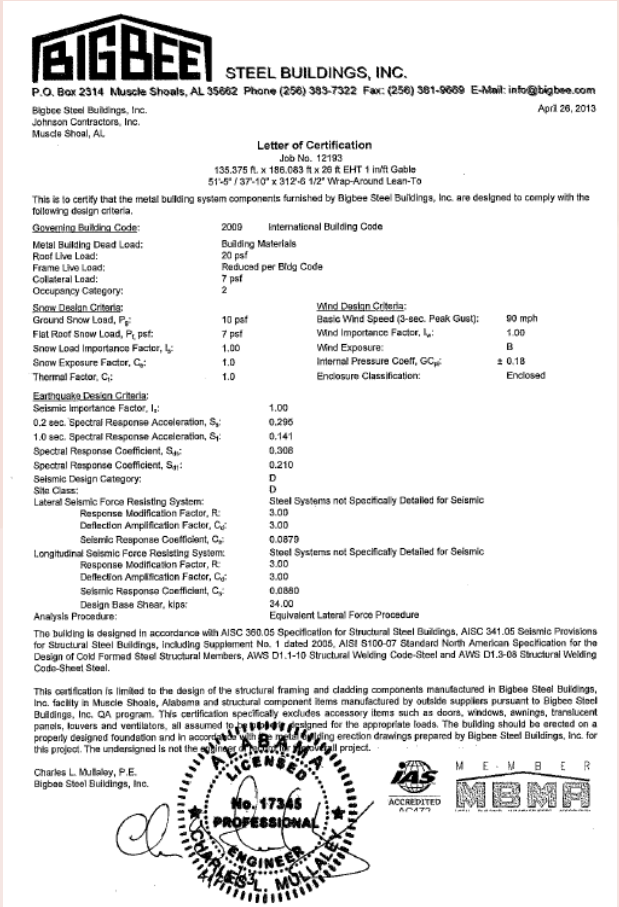








Engineer Completes Certification Letter



BIGBEE STEEL BUILDINGS, INC.

P.O. Box 2314 Muscle Shoals, AL 35662 Phone (256) 383-7322 Fax: (256) 381-9689 E-Mail: info@bigbee.com

Bigbee Steel Buildings, Inc.
Johnson Contractors, Inc.
Muscle Shoal, AL

April 26, 2013

Letter of Certification

Job No. 12193
135.375 ft. x 186.083 ft x 26 ft EHT 1 in/ft Gable
51'-5" / 37'-10" x 312'-6 1/2" Wrap-Around Lean-To

This is to certify that the metal building system components furnished by Bigbee Steel Buildings, Inc. are designed to comply with the following design criteria.

Governing Building Code: 2009 International Building Code

Metal Building Dead Load:	Building Materials
Roof Live Load:	20 psf
Frame Live Load:	Reduced per Bldg Code
Collateral Load:	7 psf
Occupancy Category:	2

Snow Design Criteria:		Wind Design Criteria:	
Ground Snow Load, P_g:	10 psf	Basic Wind Speed (3-sec. Peak Gust):	90 mph
Flat Roof Snow Load, P_f psf:	7 psf	Wind Importance Factor, I_w:	1.00
Snow Load Importance Factor, I_s:	1.00	Wind Exposure:	B
Snow Exposure Factor, C_e:	1.0	Internal Pressure Coeff, GC_{pi}:	± 0.18
Thermal Factor, C_t:	1.0	Enclosure Classification:	Enclosed

Earthquake Design Criteria:	
Seismic Importance Factor, I_e:	1.00
0.2 sec. Spectral Response Acceleration, S_s:	0.295
1.0 sec. Spectral Response Acceleration, S_1:	0.141
Spectral Response Coefficient, S_{ds}:	0.308
Spectral Response Coefficient, S_{d1}:	0.210
Seismic Design Category:	D
Site Class:	D
Lateral Seismic Force Resisting System:	Steel Systems not Specifically Detailed for Seismic
Response Modification Factor, R:	3.00
Deflection Amplification Factor, C_d:	3.00
Seismic Response Coefficient, C_s:	0.0879
Longitudinal Seismic Force Resisting System:	Steel Systems not Specifically Detailed for Seismic
Response Modification Factor, R:	3.00
Deflection Amplification Factor, C_d:	3.00
Seismic Response Coefficient, C_s:	0.0880
Design Base Shear, kips:	34.00
Analysis Procedure:	Equivalent Lateral Force Procedure

The building is designed in accordance with AISC 360.05 Specification for Structural Steel Buildings, AISC 341.05 Seismic Provisions for Structural Steel Buildings, including Supplement No. 1 dated 2005, AISI S100-07 Standard North American Specification for the Design of Cold Formed Steel Structural Members, AWS D1.1-10 Structural Welding Code-Steel and AWS D1.3-08 Structural Welding Code-Sheet Steel.

This certification is limited to the design of the structural framing and cladding components manufactured in Bigbee Steel Buildings, Inc. facility in Muscle Shoals, Alabama and structural component items manufactured by outside suppliers pursuant to Bigbee Steel Buildings, Inc. QA program. This certification specifically excludes accessory items such as doors, windows, awnings, translucent panels, louvers and ventilators, all assumed to be designed for the appropriate loads. The building should be erected on a properly designed foundation and in accordance with the metal building erection drawings prepared by Bigbee Steel Buildings, Inc. for this project. The undersigned is not the engineer of record for the overall project.

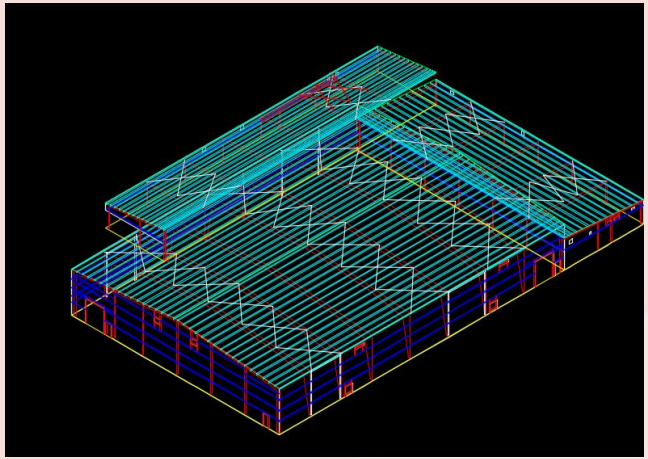
Charles L. Mullaley, P.E.
Bigbee Steel Buildings, Inc.

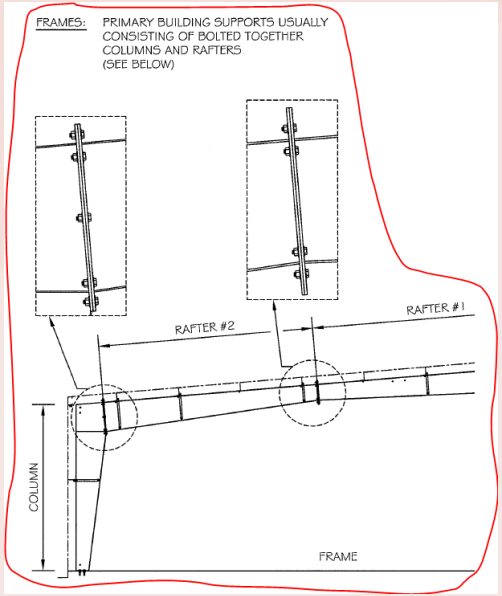
COMMONWEALTH OF KENTUCKY LICENSED No. 17345 PROFESSIONAL ENGINEER CHARLES L. MULLALEY

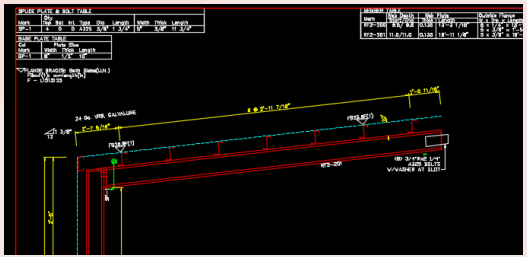
ACCREDITED

MEMBER MBMA

Engineer Designs Primary (Frames) and Secondary Steel (Purlins & Girts) for Building



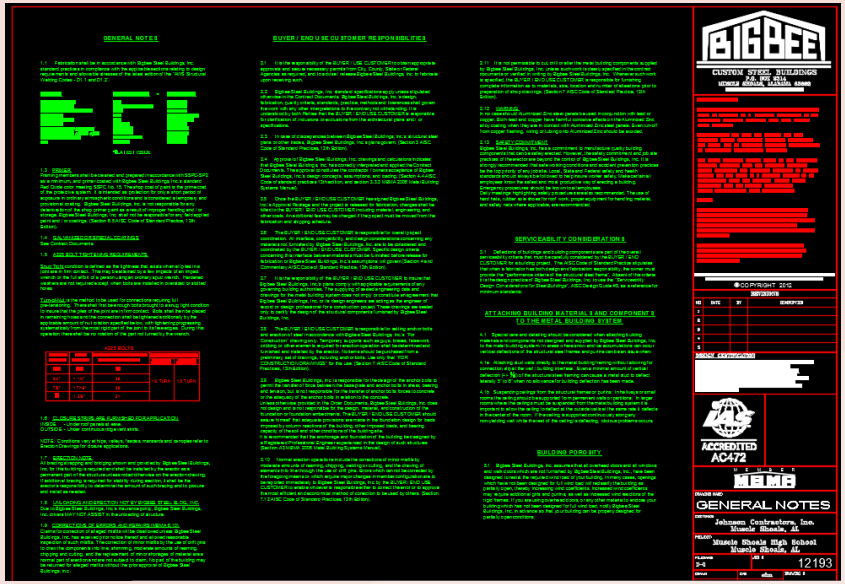


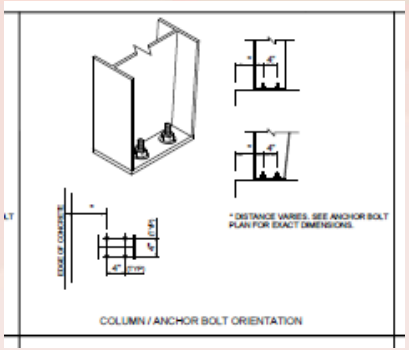


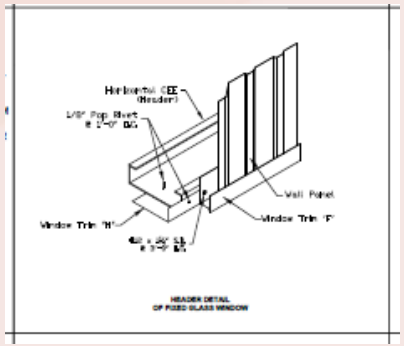
GIRT: SECONDARY WALL SUPPORT MEMBER. USUALLY IN THE SHAPE OF A "ZEE". (TYPICAL GIRT)

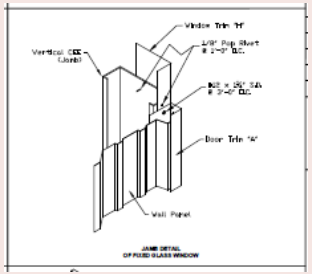
PURLIN: SECONDARY ROOF SUPPORT MEMBER. USUALLY IN THE SHAPE OF A "ZEE". (TYPICAL PURLIN)

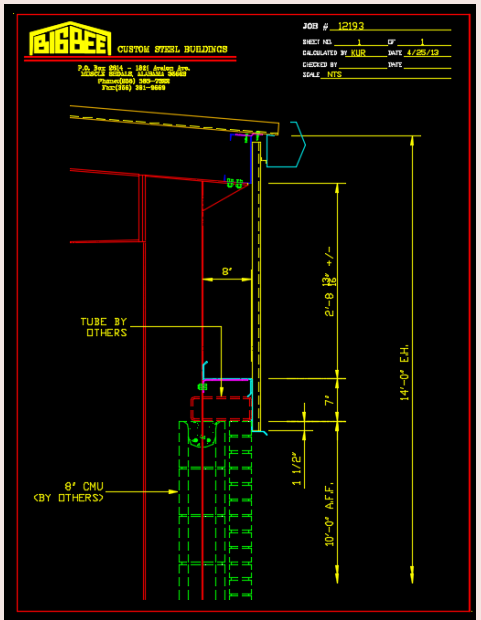
Engineer Designs the Building



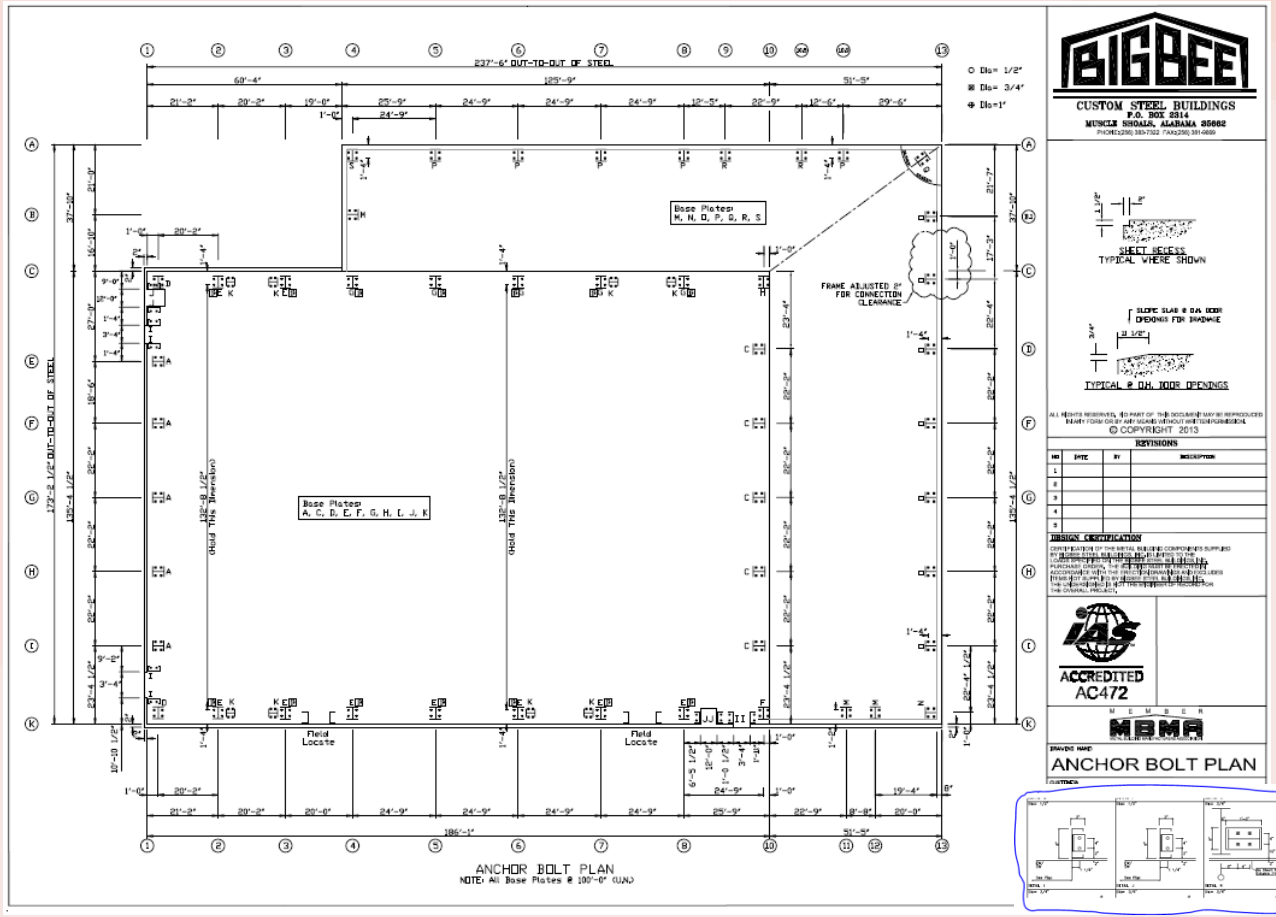




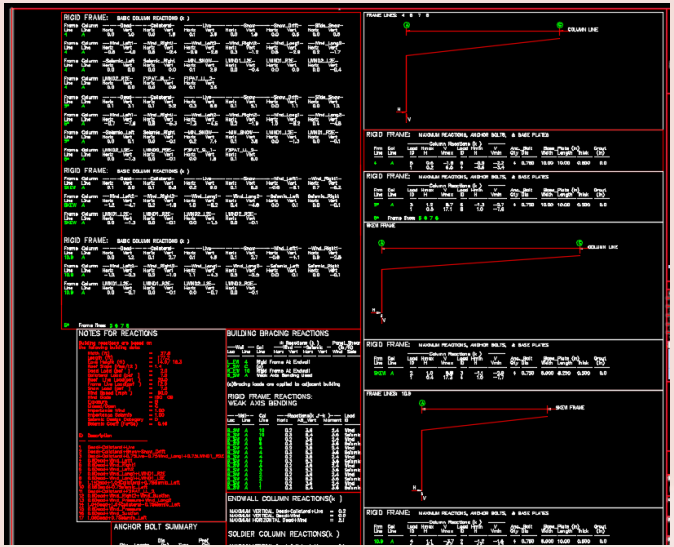


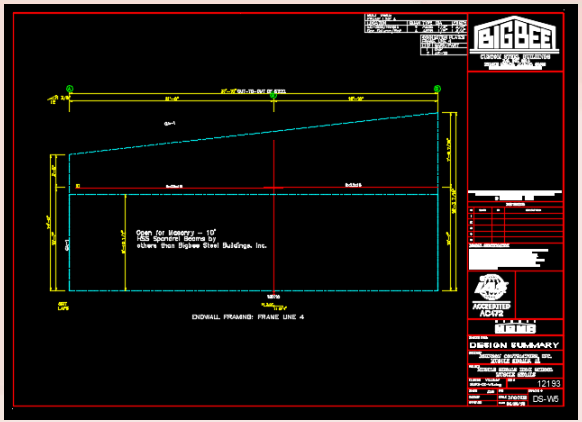


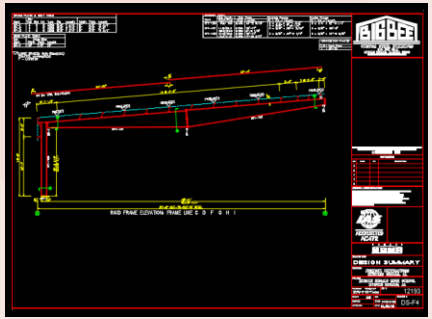
Engineer Completes Anchor Bolt Plan

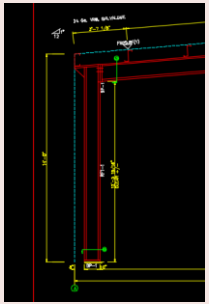


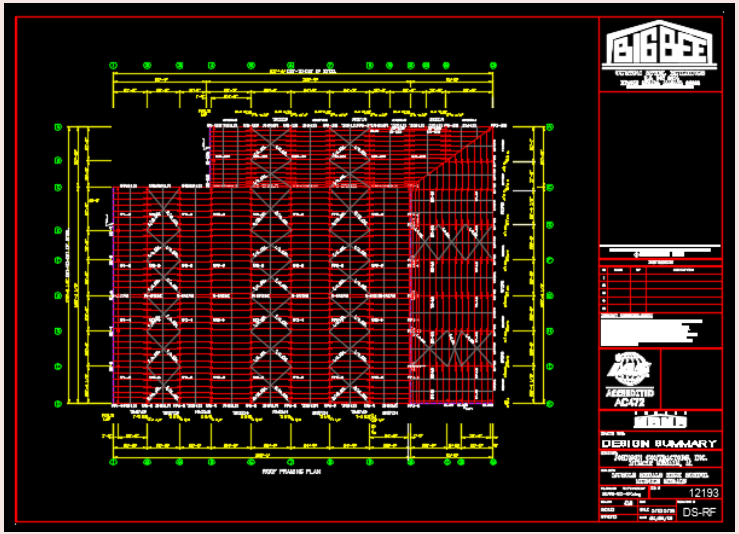
Engineer Completes Design Package











Job Coordinator Assembles Permit/Approval Drawing Package

Job Coordinator Sends Permit/Approval Package to Customer Project Coordinator

Job Coordinator Receives Approval Package Back from Customer and Makes Any Needed Changes for Resubmission

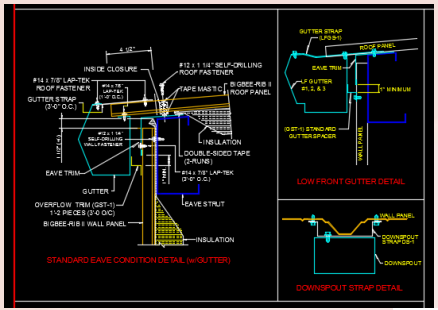
Production Engineering Detailer Completes all Detail Drawings

BIGBEE STEEL BUILDINGS. INC.
PO BOX 2314
MUSCLE SHOALS, AL. 35662
PHONE: (256) 383-7322 WATTS: (800) 633-3378 FAX: (256) 381-9669
Web Site: www.bigbee.com Email: info@bigbee.com

SHIPPING LIST

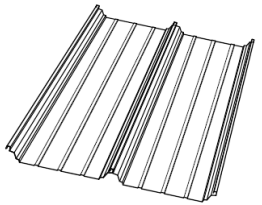
JOB NUMBER: XXXX

CUSTOMER: _____
PROJECT NAME: _____
LOCATION: _____
BUILDING SIZE: _____
_____
_____
DETAILER: _____ CHECKER: _____
DATE DTD: _____ DATE CKD: _____
COMMENTS: _____



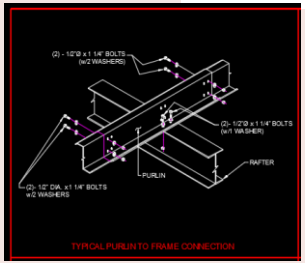
BigbeeLok-324
Standing Seam Roof System

PRODUCT APPLICATION GUIDE

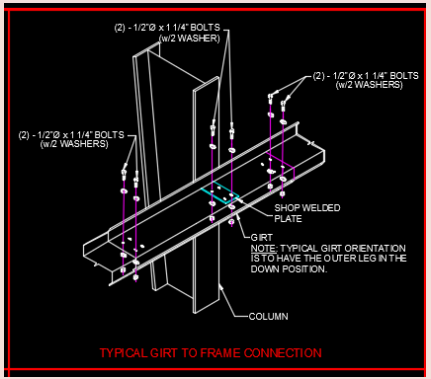


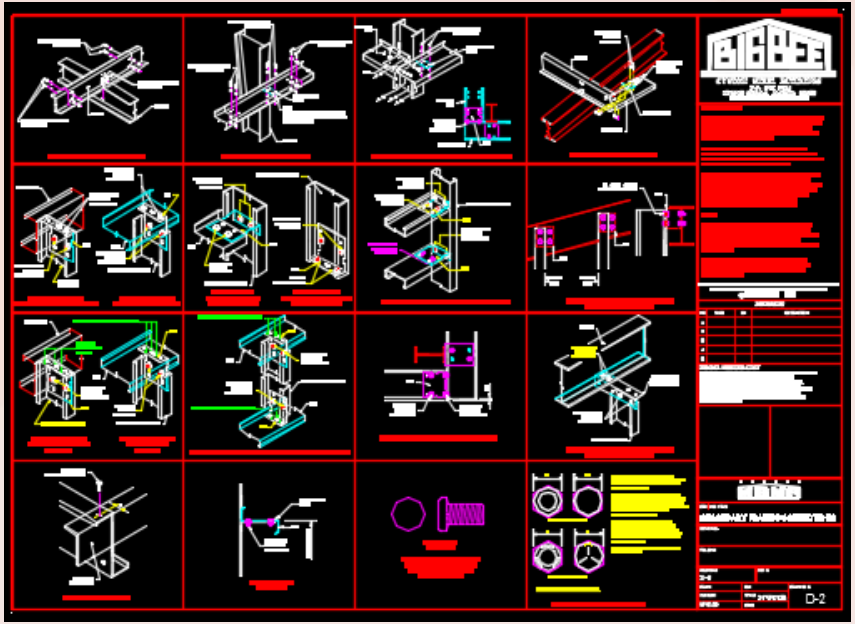
Blank - Shipper (BOM).xls JOB NO: XXXX

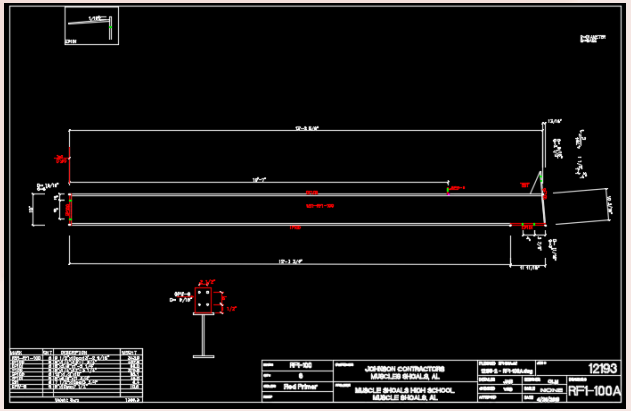
ITEM DESCRIPTION	MARK NO.	COLOR	QTY.	UOM	LENGTH (ft & in)	LENGTH (in)	UNIT WT.	TOTAL WT.	REMARKS
COLUMNS									
STUB COLUMNS									
SLIP COLUMNS									
PORTAL COLUMNS & BRKTS									
RAFTERS									
PORTAL BEAMS									
2ND FLOOR BEAMS									
HIP BEAMS									
VALLEY BEAMS									
SPANDREL BEAMS									
LINTEL BEAMS									
STUB BRKTS									
MANSARD BEAMS & BRKTS									
CANOPY BEAMS									
OVERHANG BEAMS									
PIPE STRUTS									
HEAVY CHANNELS									
CLIPS (STD)									
CLIPS (SPECIAL)									
PLATES (SHIP LOOSE)									



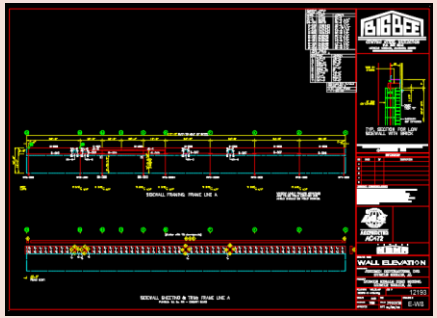
Production Engineering Detailer Completes all Detail Drawings

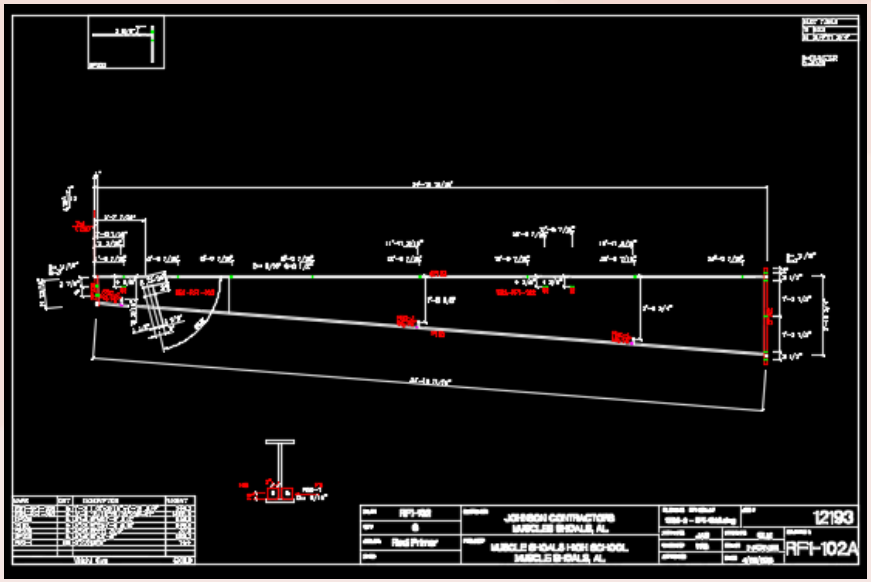


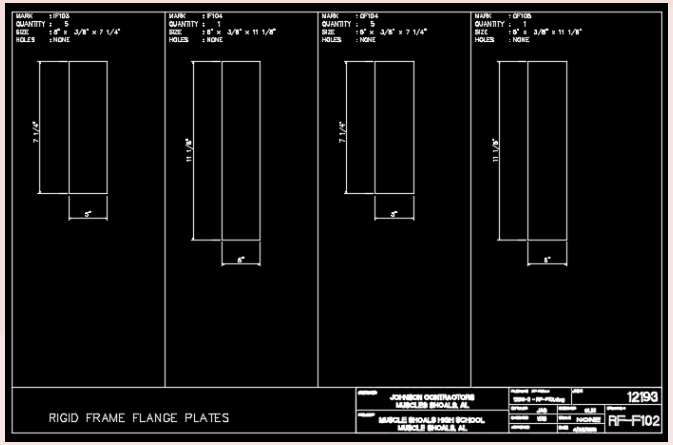


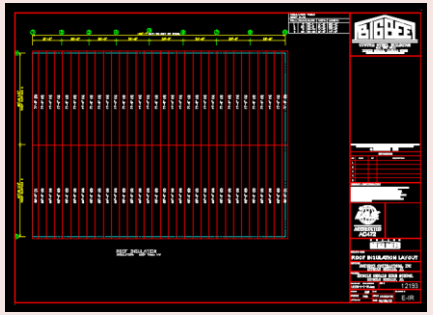


Production Engineering Detailer Completes all Detail Drawings









Job Detailing Completed, Checked, and Back Checked (by Engineer)

Job Released by Production Engineering Coordinator to Production Shop for Manufacturing

Production of Metal Building

- All Production is Accomplished According to Bigbee's Quality Program
- Bigbee's Quality Program Includes a Quality Procedure Manual and Participation in Accreditation Programs (AC472, IAS, etc)


International Accreditation Service

CERTIFICATE OF ACCREDITATION

BIGBEE STEEL BUILDINGS, INC.

2705 AVALON AVENUE

MUSCLE SHOALS, ALABAMA 35661

Inspection Program for the Manufacture of Metal Building Systems MB-191

ACCREDITED

Vice President/Chief Technical Officer

President

Post Date: 10/01/2014

BIGBEE

BIGBEE

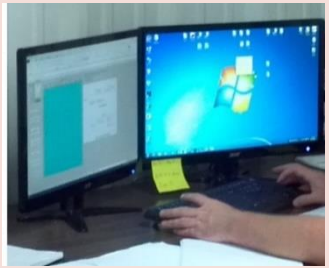
ACCREDITED
AC472

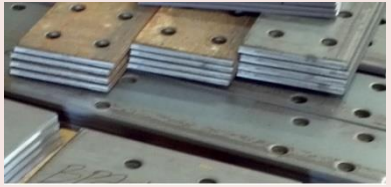
MBMA
METAL BUILDING MANUFACTURERS ASSOCIATION®

ACCREDITED BUSINESS
BBB.

FM Approvals
UL

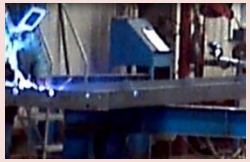
Components Produced for Frames





Frames Assembled (Welded)









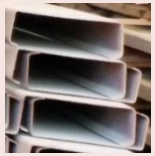


Secondary Steel (Purlins, Girts, Struts, Zees, Columns, Channels, etc.) Produced

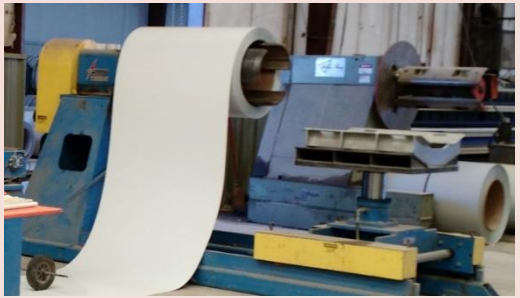







Panels (Roof and Wall) and Trim Produced



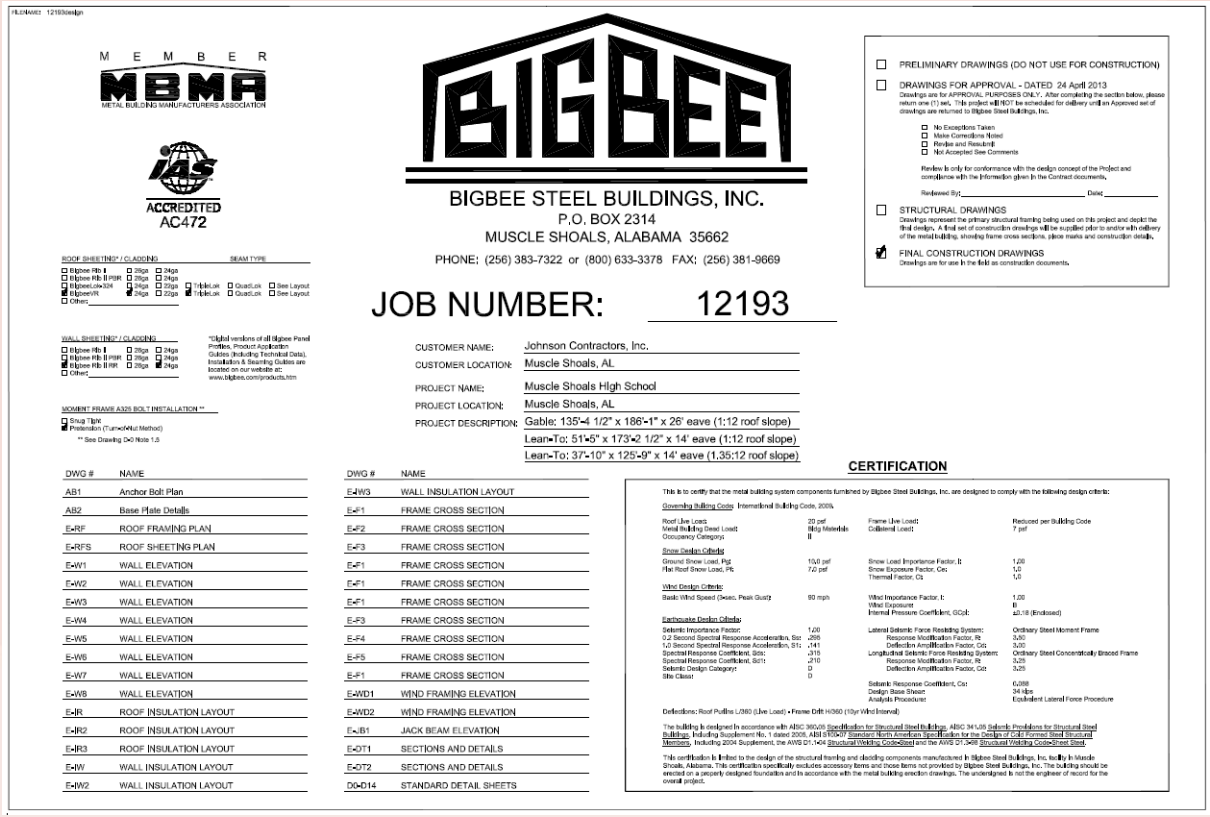
Additional Components Selected from Warehouse

All Components Loaded for Delivery According to the Shipper (BOM)

Metal Building Delivered on Flatbed Trailers

Contractor / Developer / Erector Unloads Metal Building at Jobsite and Stages Materials for Building Erection

Bigbee's Part of Project Completed with Delivery of Building and Erection Plans



FILENAME: 12193design

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ROOF SHEETING* / CLADDING — SEAM TYPE

☐ Bigbee Rib I	☐ 26ga	☐ 24ga					
☐ Bigbee Rib II PBR	☐ 26ga	☐ 24ga					
☐ BigbeeLow-324	☐ 24ga	☐ 22ga	☐ TripleLok	☐ QuadLok	☐ See Layout		
☑ BigbeeVR	☑ 24ga	☐ 22ga	☑ TripleLok	☐ QuadLok	☐ See Layout		
☐ Other:							

WALL SHEETING* / CLADDING

☐ Bigbee Rib I	☐ 26ga	☐ 24ga
☐ Bigbee Rib II PBR	☐ 26ga	☐ 24ga
☑ Bigbee Rib II RR	☐ 26ga	☑ 24ga
☐ Other:		

*Digital versions of all Bigbee Panel Profiles, Product Application Guides (including Technical Data), Installation & Sealing Guides are located on our website at: www.bigbee.com/products.htm

MOMENT FRAME A325 BOLT INSTALLATION **
☐ Snug Tight
☑ Pretension (Turn-of-Nut Method)
** See Drawing D-0 Note 1.5

BIGBEE STEEL BUILDINGS, INC.
P.O. BOX 2314
MUSCLE SHOALS, ALABAMA 35662
PHONE: (256) 383-7322 or (800) 633-3378 FAX: (256) 381-9669

JOB NUMBER: 12193

CUSTOMER NAME: Johnson Contractors, Inc.
CUSTOMER LOCATION: Muscle Shoals, AL
PROJECT NAME: Muscle Shoals High School
PROJECT LOCATION: Muscle Shoals, AL
PROJECT DESCRIPTION: Gable: 135'-4 1/2" x 186'-1" x 26' eave (1:12 roof slope)
Lean-To: 51'-5" x 173'-2 1/2" x 14' eave (1:12 roof slope)
Lean-To: 37'-10" x 125'-9" x 14' eave (1.35:12 roof slope)

☐ PRELIMINARY DRAWINGS (DO NOT USE FOR CONSTRUCTION)
☐ DRAWINGS FOR APPROVAL - DATED 24 April 2013
Drawings are for APPROVAL PURPOSES ONLY. After completing the section below, please return one (1) set. This project will NOT be scheduled for delivery until an Approved set of drawings are returned to Bigbee Steel Buildings, Inc.
☐ No Exceptions Taken
☐ Make Corrections Noted
☐ Revise and Resubmit
☐ Not Accepted See Comments
Review is only for conformance with the design concept of the Project and compliance with the information given in the Contract documents.
Reviewed By:_____ Date:_____
☐ STRUCTURAL DRAWINGS
Drawings represent the primary structural framing being used on this project and depict the final design. A final set of construction drawings will be supplied prior to and/or with delivery of the metal building, showing frame cross sections, plate marks and construction details.
☑ FINAL CONSTRUCTION DRAWINGS
Drawings are for use in the field as construction documents.

DWG #	NAME
AB1	Anchor Bolt Plan
AB2	Base Plate Details
E-RF	ROOF FRAMING PLAN
E-RFS	ROOF SHEETING PLAN
E-W1	WALL ELEVATION
E-W2	WALL ELEVATION
E-W3	WALL ELEVATION
E-W4	WALL ELEVATION
E-W5	WALL ELEVATION
E-W6	WALL ELEVATION
E-W7	WALL ELEVATION
E-W8	WALL ELEVATION
E-IR	ROOF INSULATION LAYOUT
E-IR2	ROOF INSULATION LAYOUT
E-IR3	ROOF INSULATION LAYOUT
E-IW	WALL INSULATION LAYOUT
E-IW2	WALL INSULATION LAYOUT

DWG #	NAME
E-IW3	WALL INSULATION LAYOUT
E-F1	FRAME CROSS SECTION
E-F2	FRAME CROSS SECTION
E-F3	FRAME CROSS SECTION
E-F1	FRAME CROSS SECTION
E-F1	FRAME CROSS SECTION
E-F1	FRAME CROSS SECTION
E-F3	FRAME CROSS SECTION
E-F4	FRAME CROSS SECTION
E-F5	FRAME CROSS SECTION
E-F1	FRAME CROSS SECTION
E-WD1	WIND FRAMING ELEVATION
E-WD2	WIND FRAMING ELEVATION
E-JB1	JACK BEAM ELEVATION
E-DT1	SECTIONS AND DETAILS
E-DT2	SECTIONS AND DETAILS
D0-D14	STANDARD DETAIL SHEETS

CERTIFICATION

This is to certify that the metal building system components furnished by Bigbee Steel Buildings, Inc. are designed to comply with the following design criteria:

Governing Building Codes: International Building Code, 2009

Roof Live Load:	20 psf	Frame Live Load:	Reduced per Building Code
Metal Building Dead Load:	Mfg Materials	Collateral Load:	7 psf
Occupancy Category:	II		
Snow Design Criteria:			
Ground Snow Load, Pg:	10.0 psf	Snow Load Importance Factor, Is:	1.00
Flat Roof Snow Load, Pf:	7.0 psf	Snow Exposure Factor, Ce:	1.0
		Thermal Factor, Ct:	1.0
Wind Design Criteria:			
Basic Wind Speed (3-sec. Peak Gust):	90 mph	Wind Importance Factor, I:	1.00
		Wind Exposure:	B
		Internal Pressure Coefficient, GCpi:	±0.18 (Enclosed)
Earthquake Design Criteria:			
Seismic Importance Factor:	1.00	Lateral Seismic Force Resisting System:	Ordinary Steel Moment Frame
0.2 Second Spectral Response Acceleration, Sxs:	.266	Response Modification Factor, R:	3.50
1.0 Second Spectral Response Acceleration, Sx1:	.141	Deflection Amplification Factor, Cd:	3.00
Spectral Response Coefficient, Sds:	.310	Longitudinal Seismic Force Resisting System:	Ordinary Steel Concentrically Braced Frame
Spectral Response Coefficient, Sd1:	.210	Response Modification Factor, R:	3.25
Seismic Design Category:	D	Deflection Amplification Factor, Cd:	3.25
Site Class:	D		
		Seismic Response Coefficient, Cs:	0.088
		Design Base Shear:	34 kips
		Analysis Procedure:	Equivalent Lateral Force Procedure

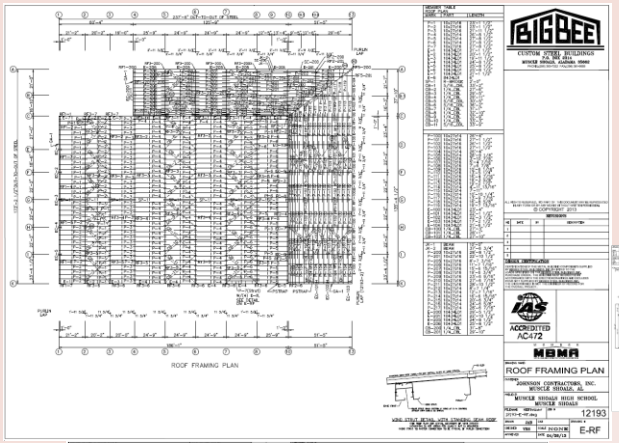
Deflections: Roof Purlins L/360 (Live Load) • Frame Drift H/360 (10yr Wind Interval)

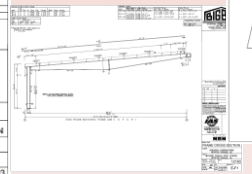
The building is designed in accordance with AISC 360-05 Specification for Structural Steel Buildings, AISC 341-05 Seismic Provisions for Structural Steel Buildings, including Supplement No. 1 dated 2006, AISI S100-07 Standard North American Specification for the Design of Cold-Formed Steel Structural Members, including 2004 Supplement, the AWS D1.1-04 Structural Welding Code-Steel and the AWS D1.3-98 Structural Welding Code-Sheet Steel.

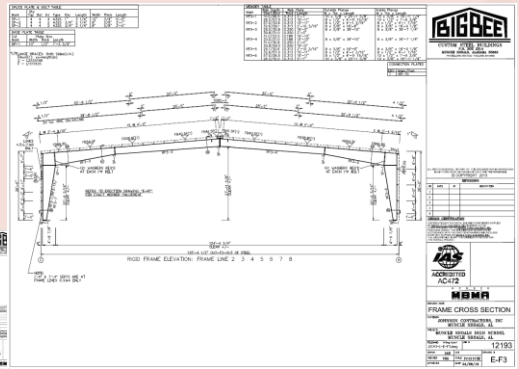
This certification is limited to the design of the structural framing and cladding components manufactured in Bigbee Steel Buildings, Inc. facility in Muscle Shoals, Alabama. This certification specifically excludes accessory items and those items not provided by Bigbee Steel Buildings, Inc. The building should be erected on a properly designed foundation and in accordance with the metal building erection drawings. The undersigned is not the engineer of record for the overall project.

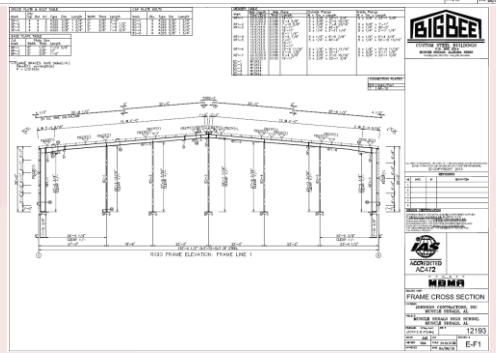
ICC INTERNATIONAL CODE COUNCIL®

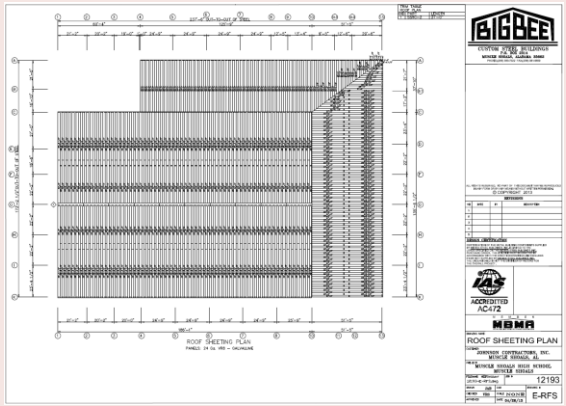
Bigbee's Part of Project Completed with Delivery of Building and Erection Plans



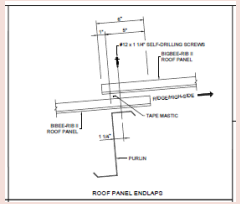


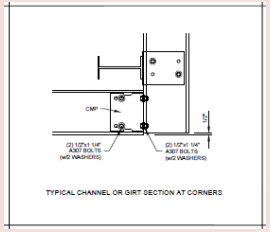


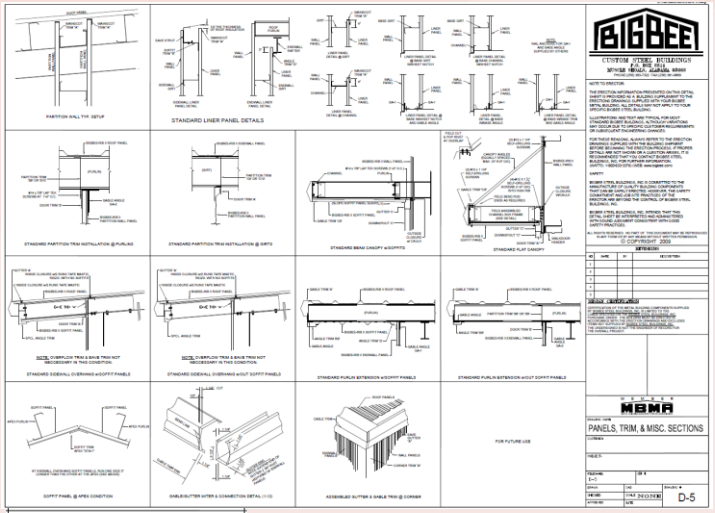


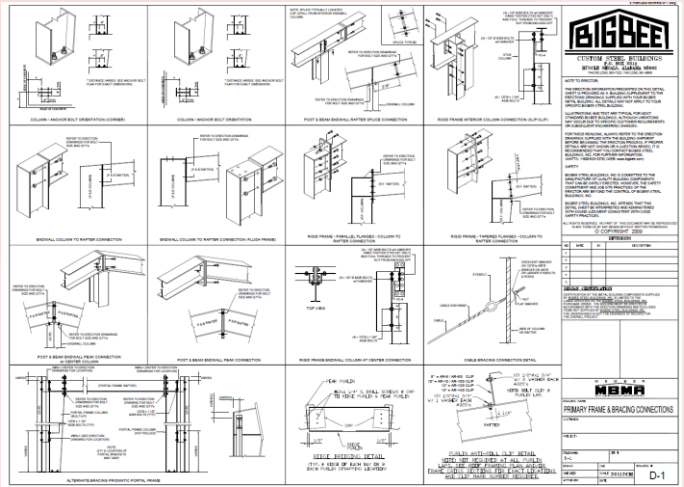


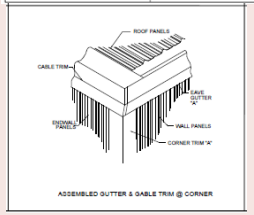
Bigbee's Part of Project Completed with Delivery of Building and Erection Plans

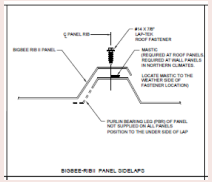






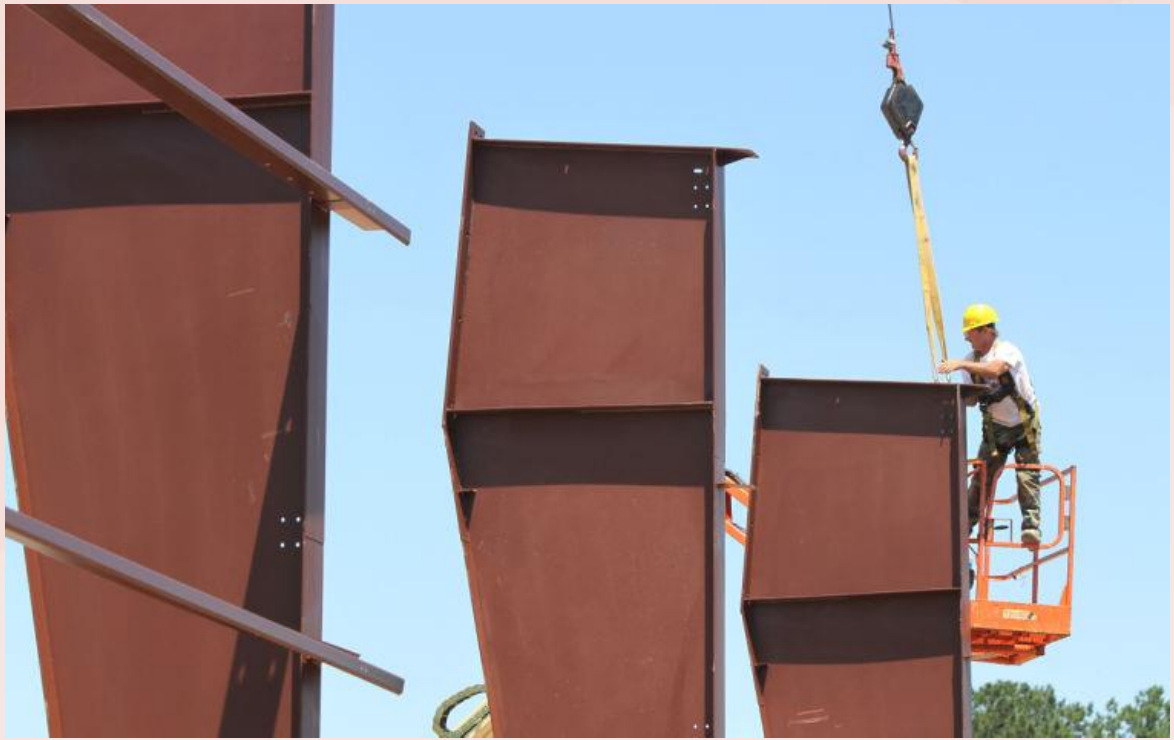






Building Erection

Building Erection

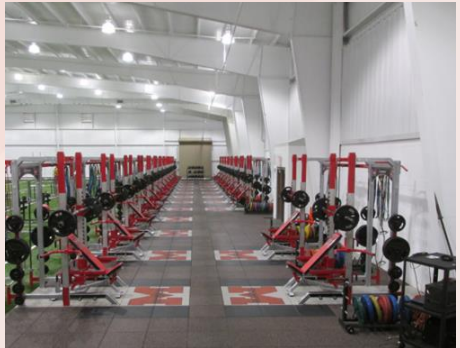


Building Erection

Building Erection

Completed Project

Completed Project



Completed Project


IAS
INTERNATIONAL
ACCREDITATION
SERVICE®


MBMA
METAL BUILDING MANUFACTURERS ASSOCIATION®
Research • Leadership • Education

Resources


ICC
INTERNATIONAL
CODE
COUNCIL®

Additional Resource

ICC INTERNATIONAL CODE COUNCIL®

THE AC472 ACCREDITATION PROGRAM
BUILDING OFFICIALS

MBMA METAL BUILDING MANUFACTURERS ASSOCIATION

IAS ACCREDITED AC472

What is AC472 Accreditation Program?

The AC472 Accreditation Program is the most comprehensive quality assurance accreditation program of its kind. A unique characteristic of the AC472 Accreditation Program is that it audits the integrity of design engineering and manufacturing processes. It focuses on several key areas:

- Audit of order documents providing the customer with clear information on what he/she has ordered.
- Audit of the design/detailing process to assure adherence to requested codes and to confirm that the project requirements are met in a rational engineering manner. This audit not only covers the building-code applications but also the proper use of design standards such as AISC, AISI, etc.
- Audit of raw material usages including proper ASTM standards, ordering practices, tracking of mill certifications, product traceability, etc.
- Audits assure comprehensive traceability of materials and workmanship.
- Audit of manufacturing practices including machinery calibrations, measuring tools, weld certifications, etc.
- Audits to ensure the metal building manufacturer has a well-managed quality assurance system and a qualified staff. This includes verification of licensed professional engineers who design and detail the metal building system, and certified weld inspectors.

This is all verified annually through two on-site inspections of the firm's design and manufacturing facilities and of representative projects to confirm that the appropriate standards are in place and being applied.

This assures building officials that the manufacturer has comprehensive quality assurance processes in place that provide high-quality, reliable buildings.

Why require an accredited manufacturer?

Requiring an AC472-accredited manufacturer provides an extra level of assurance that the building supplier's engineering/order/design/fabrication processes all conform to high-quality standards and are evaluated by a respected independent third party.

Other advantages, which expedite the building approval process, include: building officials can deem AC472-accredited manufacturers as approved fabricators as defined in Chapter 17 of the International Building Code; elimination of additional inspections; cost savings to verify code compliance of metal building fabrication; and assurance the metal building manufacturer's staff has a well-qualified quality system in place.

Benefits to the Building Official

Benefits to the building official include:

- By requiring IAS AC472 accreditation, the building official can easily confirm the manufacturer is in compliance with the requirements in Chapter 17 of the International Building Code®.
- The building official can be assured that suppliers have passed the stringent audit requirements of the IAS AC472 Accreditation Program.
- Allowing only accredited suppliers helps protect the building official's goal of guaranteeing that a committed, audited supplier is on the project.
- Since the building supplier is doing the structural design, accreditation assures that the product is being designed by professional engineers who have demonstrated knowledge of building systems and applicable codes.
- Accreditation requires that the manufacturer only use raw materials meeting applicable ASTM specifications.
- Accreditation requires that all Letters of Certification, design calculations and drawings be clearly communicated and stamped by a fully qualified design professional.

How will you know if a building has been supplied from an AC472-accredited manufacturer?

Make sure the contractor tells you the brand of building he is supplying. Then check the complete list of accredited companies and facilities (http://www.iasonline.org/Metal_Building_ Systems/MB.html). If the brand is not listed on that website, you should ask why the manufacturer has not been accredited.

And last!

Do not be confused by other certification programs such as ISO or the AISC Fabricators Program. These programs are valuable for some forms of construction, but only the IAS AC472 Accreditation Program addresses all aspects of a metal building system manufacturer's operation, including design engineering.

Q. What is the International Accreditation Service, Inc.?

A. The International Accreditation Service (IAS) is a wholly-owned subsidiary of the International Code Council, which evaluates and accredits building departments, special inspection agencies, testing and calibration laboratories, fabricator inspection programs, and oversees the AC472 Accreditation Program for Metal Building Systems Manufacturers.

Q. What do they do?

A. IAS measures a manufacturer's ability to conform to documents and standards referenced in building codes through onsite assessment and periodic monitoring by IAS-accredited third-party inspection agencies. It also scrutinizes a manufacturer's quality assurance program.

Q. Why was the AC472 Accreditation Program developed?

A. As industry products and design programs advanced, metal building systems became very successful in entering new markets involving larger buildings with high human occupancy. Thus, the members of the Metal Building Manufacturers Association (MBMA), who developed this expanding technology, felt a responsibility to work with IAS to develop an accreditation program to critically evaluate the sales, engineering and manufacturing functions in the metal building systems industry and to comply with the special inspection requirements in Chapter 17 of the International Building Code®.

Q. There are other accreditation and certification programs like ISO and the AISC heavy fabrication programs. Don't these accomplish the same things as AC472?

A. No. Those programs only address the manufacturing process--not the unique needs of building systems.

Q. Why are those needs unique?

A. Since the design, detailing and manufacturing is done by the same company, these processes are mutually dependent and need to be evaluated together.

Q. With conventional construction, I receive a set of design calculations and drawings stamped by a registered professional engineer. Why isn't that adequate for metal building systems?

A. When a conventional designer selects standard beam sizes off of AISC tables or out of SJI manuals, those sections are then manufactured by a fabricator. In the case of metal building systems, the design and fabricating processes are customized and require ongoing communications between the engineering and fabricating teams. The only way to be assured that these functions are being properly integrated is to require that the supplier have AC472 accreditation.

Q. If I require that only AC472-accredited companies can bid projects in my jurisdiction, will I be restricting competition such that construction costs unfairly rise?

A. No. There are a significant number of companies with multiple accredited facilities throughout the U.S. who can provide you with competitive choices. A list of accredited firms, along with certificates, can be seen on http://www.iasonline.org/Metal_Building_Systems/MB.html.

Q. Are there areas in the country where building codes have adopted criteria requiring AC472 accreditation on building systems projects?

A. Yes. Most jurisdictions throughout the country have adopted the International Building Code® or an amended version of the code and enforce Chapter 17 special inspection requirements and rely on the AC472 Accreditation Program for Metal Building Systems Manufacturers to designate approved fabricators..

Q. Why is the AC472 Accreditation Program a principal focus of the MBMA?

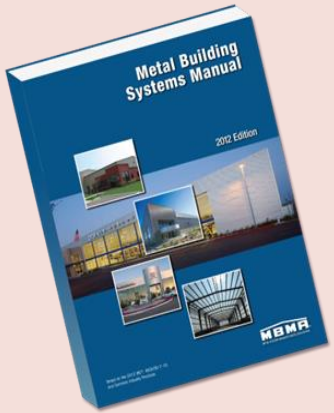
A. The members of the MBMA sponsor and conduct much of the research targeted on improving building systems technology. Accreditation reinforces the technical efforts of the MBMA in the marketplace and the quality level in the industry.

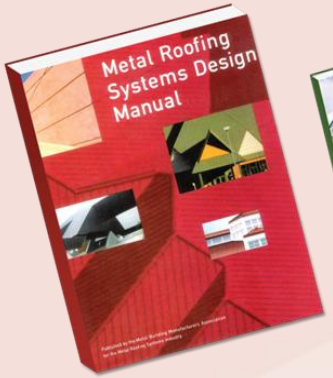
Q. So if accreditation provides real value, and there are many companies who have subjected themselves to the standards of accreditation, why would anyone not demand an accredited building?

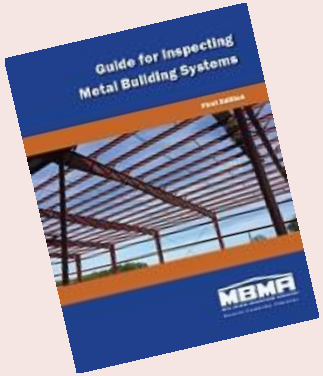
A. We don't know!

MBMA METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Ave. • Cleveland, Ohio 44115 • (216) 241-7333 • www.mbma.com

Other Resources Available







Thank You!

www.iccsafe.org/conference

#ICCAC19

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