Introduction:

ABOUT THIS MANUAL

The purpose of this manual is to acquaint you with the basics of metal building system terminology and products of the building system industry in general. Furthermore, it is designed to familiarize you with VP Building systems in particular and to give you the basic knowledge. If you already have a good working knowledge of these items this manual should serve as an excellent refresher course.
Basic Terminology

Basic metal building systems typically have four outside walls. Two of these walls are located where the roof meets the walls in a line parallel to the ground without any increase in the height of these walls. The other two walls show a rising line where the walls meet the roof and the height of the wall changes.

The line where the sidewalls meet the roof is called the **eave line or eave**. It often has trim to enhance appearance or gutter for removal of rain water from the roof. The distance from the bottom of the base plate to the point where the roof meets the wall, or the eave, is called the **eave height**, measured at the back side of the wall panels and underside of roof panels.

The line where the endwall meets the roof is finished with a piece of trim known as **rake fascia**. The line where the sidewall s meet the endwall s is usually finished out with a piece of trim known as the **corner trim**. The peak receives a plastic or metal cap know as a **peak cap**. The peak cap includes the VP logo.
The roof pitch or slope is usually shown as 1-in-12, 1/2-in-12, and 4-in-12 etc. When inches are used as the basic unit, for example 2-in-12 roof pitch means that the roof that rises vertically 2 inches for every 12 inches measured horizontally.

VP buildings are dimensioned from the outside edge of the girt, to the outside edge of the girt. The outside edge of the girt is known as the **building line**.

VP building systems have **three** basic dimensions: width, length, and eave height. The **width** is the distance from the outside of the sidewall girt on one side to the outside of the sidewall girt on the other side. The **length** is the distance from the outside of the outside of the endwall girt to the outside of the endwall girt on the other end. The **eave height** is the distance from the **Finish Floor** to the point where the roof meets the wall.
VP building systems are built on top of a foundation. The foundation is generally a concrete slab with concrete footings. The footing is extra concrete, usually rectangular in shape, poured and formed under a column or some other structural support member of the building. A footing distributes the load carried by the VP building system support members into the supporting soil. Anchor bolts are set in the footing to "anchor" the column or structural members.

A pre-punched metal plate is welded to the base of the column or structural to fit over the anchor bolts.
Primary Structural Support Systems

Primary structural support systems furnish the main support of a building. The primary structural support systems are more often called the main framing system and can be divided into two basic types, modular (Continuous Beam - CB) and clear span (Rigid Frame - RF). Modular frames have one or more interior columns between the exterior columns, supporting some of the vertical load carried by the frame.

On modular frames, Continuous Beams (CB) and Continuous Trusses (CT), the dimensions between interior columns are measured from the outside of the sidewall girt to the centerline of the first interior column. On all other interior columns the column spacing dimension is measured from the centerline of one column to the centerline of the next column until the last interior column is reached. The column spacing on the last interior column is again measured centerline of column to the outside of the sidewall girt.

Interior column spacing may vary.
Solid Web Primary Frames

The rigid frame is probably the most commonly used clear span frame. Clear span frames have no interior columns or vertical support between the exterior columns. The rigid frame has as a standard tapered vertical columns and a tapered rafter section. A cross-section through either a column or rafter section would show an I-shape. Typically, the rigid frame is deepest in the knee or haunch area where the column is connected to the rafter beam.

Open Web Primary Frames

The Rigid Frame Truss (RFT or Wind Bent) is another type of clear span frame. The RFT has tapered exterior columns, but unlike the rigid frame, the web of the truss beam has open area. The RFT rafter is made up of angles welded in a specially designed pattern between the flanges.
Bay Spacing

Frames are placed in a pattern to provide the primary support for the building, the distance between the centerline of each frame is called a Bay.

Spacing for the End Frame is measured from the building (girt) line to the centerline of the End Frame.
When a frame is located on the interior of the building, it is called an interior frame. When a frame is at an endwall, it is called an Endwall Frame or End frame.

**Endwall Frames**

The most common endwall frame is called a Post and Beam. Post and Beam frames are comprised of Corner Posts, End Posts and Rake Beams. They are designed to support half a bay of roof.
Secondary Structural Support Systems

Purlins

The principal segments of the roof secondary support system spanning from frame line to frame line are known as purlins. The purlins transfer roof loads to the primary structural support system, which in turn transfers the loads to the foundation.

VP building system purlins come in a variety of material thickness and depths. VP offers two basic types of purlins: simple and continuous. The basic structural shapes used in VP building systems are 7”, 8 1/2”, 10”, and 11 1/2” deep.

Continuous purlins overlap at frame lines making the connection stronger. The continuous purlin overlap, which can vary according to conditions, often allows the use of a lighter gage (i.e., more economical) purlin, saving the customer money while providing better structural integrity.

Simple purlins provide lap connection for alignment only. It is not a structural lap.
Eave Strut

A “C” channel used as purlin, known as an eave strut, is located at the building eaves. Steep slopes (>4:12) will use additional new solution with a field attached gage angle.

![Diagram of Eave Strut](image)

**Low Eave Strut Shown – High Eave Strut Similar**

- **1/4” x 1 1/4” STRUT FS#5 (555907) AT EACH END OF GA—— REMOVE DURING ROOF PANEL INSTALLATION**
- **3 1/2” ZEE PURLIN**
- **GAGE ANGLE (GA——)**
- **FRAME MEMBER**
- **INSET GRTS**

**Section A-A**

**Over 4:12 Roof Pitch**
Truss Purlin (TP)
Truss purlins (TP) are economical for use when bay spacing exceeds the limits of standard purlins. Span range for use of truss purlins are typically 11 to 60 feet. Overall depths are from: 18” to 40” in 2” increments with a standard 5” seat depth. The members will bolt to the primary frames using pre-punched holes and ½” bolts. The members are lighter than traditional bar joists and easier to erect.

A floating roof system (SSR or SLR) must be used with trus purlins; a screw down roof (Panel Rib) is not permitted.

Standard WideBay members are stopped ¼” short of the frame centerline. Non-strut members have 9/16” x 7/8” slots in the seats and are connected with (2) 1/2” A325 bolts (49080) with hardened washers.
## Product Applications
### Basic System Concepts

<table>
<thead>
<tr>
<th>WideBay Depth</th>
<th>Minimum Bay Space</th>
<th>Maximum Bay Space</th>
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<tbody>
<tr>
<td>18&quot;</td>
<td>11.08 ft.</td>
<td>32 ft.</td>
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<tr>
<td>20&quot;</td>
<td>12.08 ft.</td>
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<tr>
<td>40&quot;</td>
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Girts

In the wall areas, attached to the columns, are 7", 8 ½", 10", or 11 1/2" Zee or Cee shaped members - similar to the purlins on the roof. These are the principal segments of the wall secondary support framing system and are called girts. The girts take the loads imposed on the covering system and transfer them to the frames, which in turn transfer them to the foundation.

The spacing of VP girts, like the material thickness of girts, varies with the load imposed on them. VP offers two basic girt connections - continuous and simple.

The most economical girt system furnished by VP Buildings is continuous outset girt.

The advantage of inset girts is an increase usable space inside the building at the column location for the same size building. It should be remembered that by definition, the building width is measured from outside of sidewall girt to outside of sidewall girt. Therefore, when using the inset girt condition the building frames are moving out into the girt line. The building does not get wider.
Diagonal Bracing

Wind exerts a force on all buildings. One of the primary design features used to resist this force is bracing. Bracing consists of sets of rods in the roof, between the rafters, and in the walls, between the columns.

The specific design criteria (wind and seismic) that will govern a particular building will determine the quantity and location of bracing rods. Bracing rods are often called "X" rods, wind bracing, roof rods, wall rods, or "X" bracing.

Other Bracing options are discussed in the Wind Bracing section.
Covering Systems

VP Buildings offers a variety of covering systems available for both the roof and walls to match an owner’s needs and budget. The gauge, finish, configuration, width, and fastening systems can all vary.

Primary Wall Panel Types

Panel Rib

Vee Rib

Stran Loc

Reverse Roll Panel Rib

Primary Roof Panel Types

Standing Seam

Panel Rib

16" NOMINAL WIDTH
24 GAGE ONLY
Other components such as insulation, trim and accessories will be discussed later in this manual.

**Basic System Tips**

It is usually most economical to make *least* dimension the *width*. Gable buildings usually *more economical* than single-sloped buildings.