



March 14, 2007

Re: ***Installation of Bay, Bow and Garden Windows***

Attached are the Atrium Companies, Inc recommendation for the installation of bay, bow and garden windows. These instructions were developed by AAMA for the *Installation Masters*[®] program and based on the ASTM E 2112 standard. These instructions are intended to be a supplement to the instructions provided on the window. For further information, please refer to the installation instructions label on the window.

Installation Masters[®] is a program where installers are certified in proper window and door installation. For more information go to their website (<http://www.installationmastersusa.com/>) or call ATI at (717) 764-6400

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17. BAY, BOW, AND GARDEN WINDOW INSTALLATION

Bay, bow, and garden windows are usually pre-assembled and installed as a single unit. They are rarely installed against blindstops, and the entire existing window and frame are usually removed.

17.1 MEASURING BAY WINDOWS

Bay windows utilize a center section with an attached panel on each side, fixed at 45° or 30° (and sometimes 90°) angles. The center panel is typically parallel with the wall and is often larger than the two operable side panels that project from the wall. The operable side panels can be casements, single or double hung, or awning-type windows. A bay window is usually built with a weathertight seatboard, headboard, and sideboards, which extend into the rough opening.

If the existing unit is not a bay window, and the existing frame will be removed, measure net height and width inside the existing frame, then add the thickness of the frame and the space between it and the rough opening (see Figure 17-1). If necessary, remove trim to determine the:

1. Location of structural framing, and the
2. Actual size of the rough opening.

17.1.1 Depth and Projection Measurements

Determine the minimum jamb depth for the replacement unit. A standard depth is 6"; however, 2 x 6 studs or thick veneers (e.g., bricks) could necessitate ordering a replacement with deeper (custom) sideboards (see Figure 17-2).

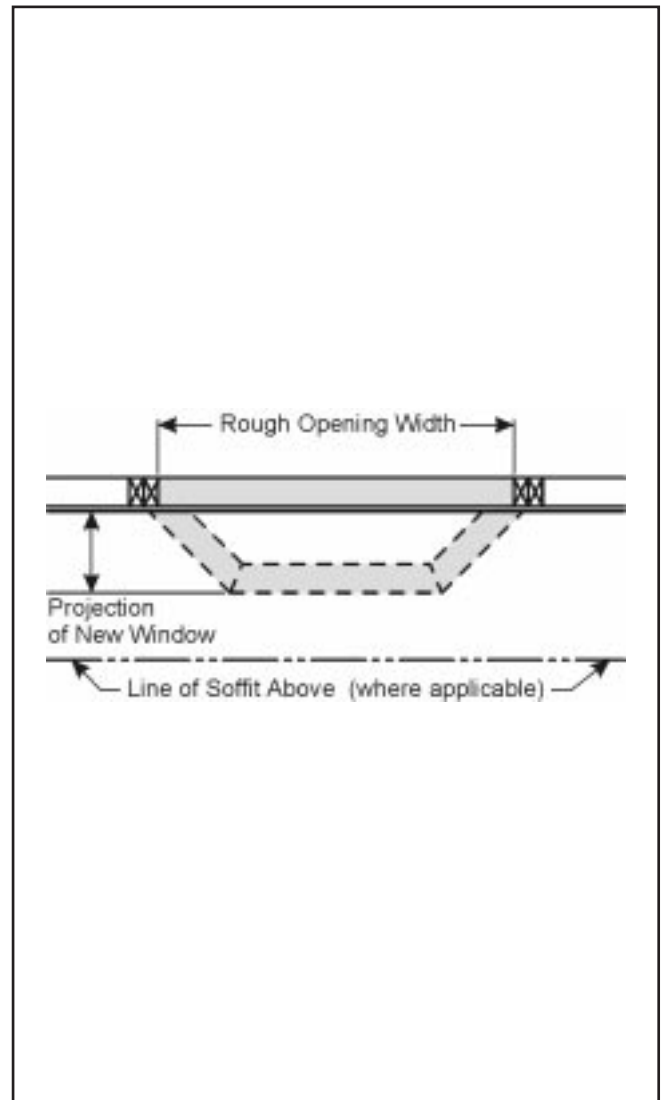


Figure 17-1 Measuring Bay and Bow Windows

When measuring for a new bay or bow window always consider the "Projection" or the amount the new window assembly will project beyond the face of the existing building. The projection is important when considering the roof to be added above or the structure to be added below the bay or bow window.

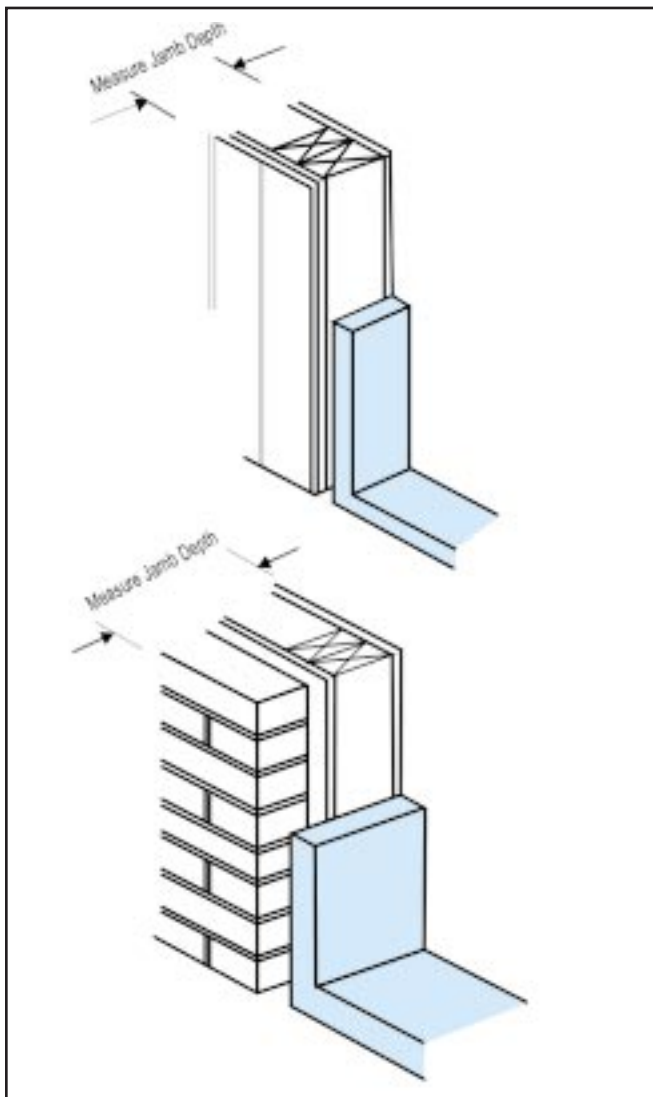


Figure 17-2 Measuring Jamb Depth

17.1.2 Above the Window

A roof system is usually needed for the replacement window. However, construction of a roof may not be necessary if the top of the new window is close to an overhang (e.g., a soffit or cantilevered upper floor). Capping or siding can be installed above the new window to tie it into the overhang and blend with the surroundings materials (see *Figure 17-3*). To determine if an existing overhang is adequate:

1. Measure the depth of the useable portion of the overhang, excluding trim. If it is greater than the projection of the

new window, it may be possible to use the overhang instead of building a roof.

2. Measure the distance from the top of the rough opening to the overhang. If it is within 24", it may be feasible to span the gap with siding or capping, as long as the finished appearance is aesthetically pleasing.

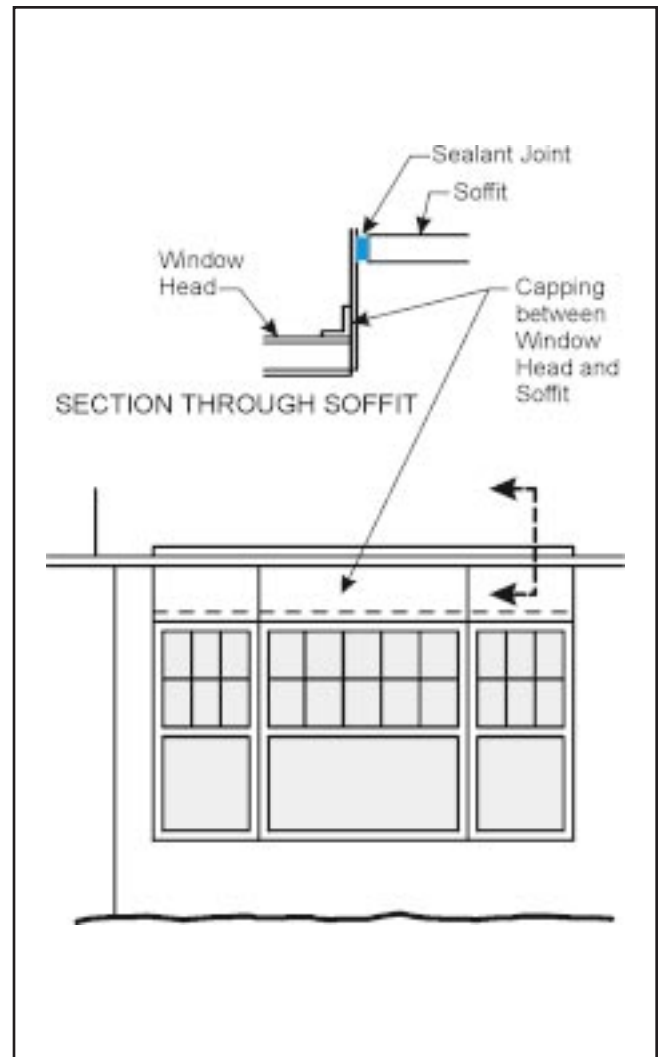


Figure 17-3 Utilizing Existing Overhang

17.2 MEASURING BOW WINDOWS

Bow windows incorporate three or more panels which join at an angle for a gently bowed-out appearance. Measuring for a bow window is essentially the same as for a bay window.

17.3 MEASURING GARDEN WINDOWS

Garden windows are sometimes referred to as greenhouse windows because there are panels of glass on all surfaces, with the exception of the bottom panel. The sloped glass roof allows for maximum daylight. The side panels are typically perpendicular to the wall at 90 degrees. Any or all of the three glazed units, as well as the glass roof, can be operable. A garden window has a weathertight bottom panel (seatboard) but no headboard because of its glass roof.

Measure the overall wall depth (D) from the interior surface (e.g., drywall) to the finished exterior surface (e.g., wood siding, stucco, brick veneer). That is the minimum sideboard depth of the new garden window (see Figure 17-4).

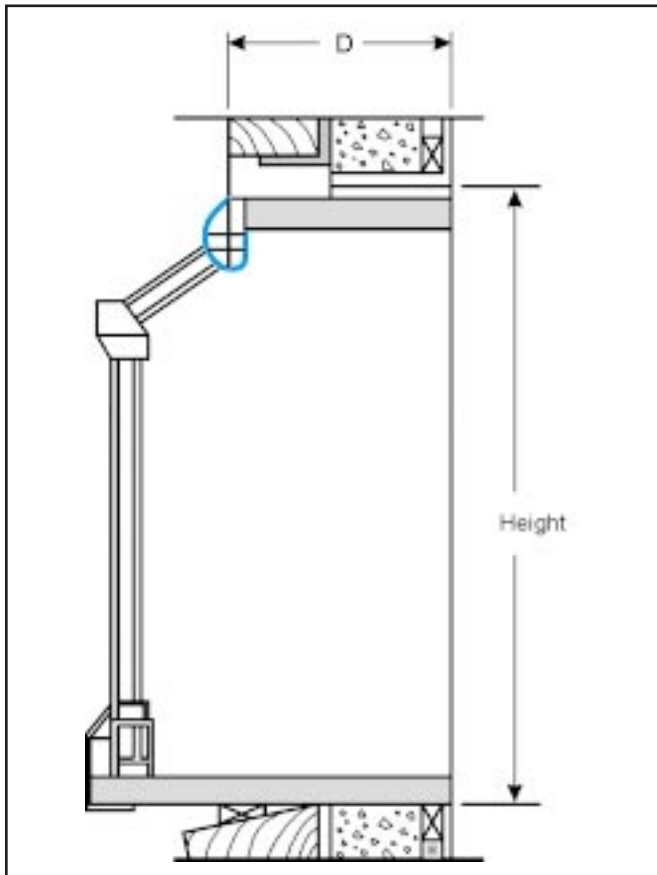


Figure 17-4 Garden and Green House Window – Side View

17.4 REMOVAL OF EXISTING WINDOWS

See *Chapter 14* for guidelines on removing the existing window and preparing the opening. However, when reusing existing framing such as the lower support structure or roof, always inspect the existing components to determine if they will be adequate to support the new window assembly. To accomplish this, remove the exterior façade and examine the existing structural support to determine if additional framing is necessary.

17.5 INSTALLATION OF BAY, BOW, AND GARDEN WINDOWS

Always follow manufacturer's instructions. This section provides only some general guidelines. It does not cover all guidelines or applications.

1. If the top and bottom were not factory weatherproofed, waterproofing should be done prior to installation to prevent moisture damage and deterioration. Consult with the manufacturer about weatherproofing.
2. A prefabricated bay or bow window unit is heavy and bulky. It is recommended that at least one person per three feet of width should be available to position it in the opening (see Figure 17-5).
3. It may be easier and safer to install a bay or bow unit from inside the house. Turn the bow unit sideways, insert it through the opening, rotate it to its "normal" position, and begin sliding it back through the opening.
4. The unit should be flashed and sealed, similar to new construction windows. *For mounting flange windows, see Chapter 16, Sections 16.3 through 16.6. For block frame windows, see Chapter 16, Section 16.7.*

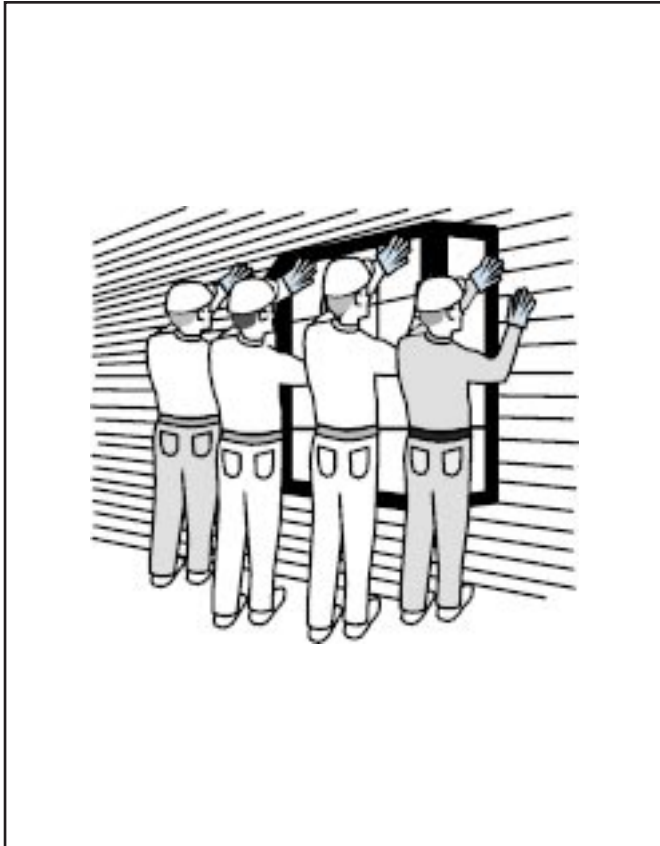


Figure 17-5 Use an Adequate Number of Persons

5. If a bottom support structure is not present, use temporary braces or a saw horse under the outer edge of the projection to stabilize the unit. It must hold the unit in a plumb position until it is fully secured (see Figure 17-6).

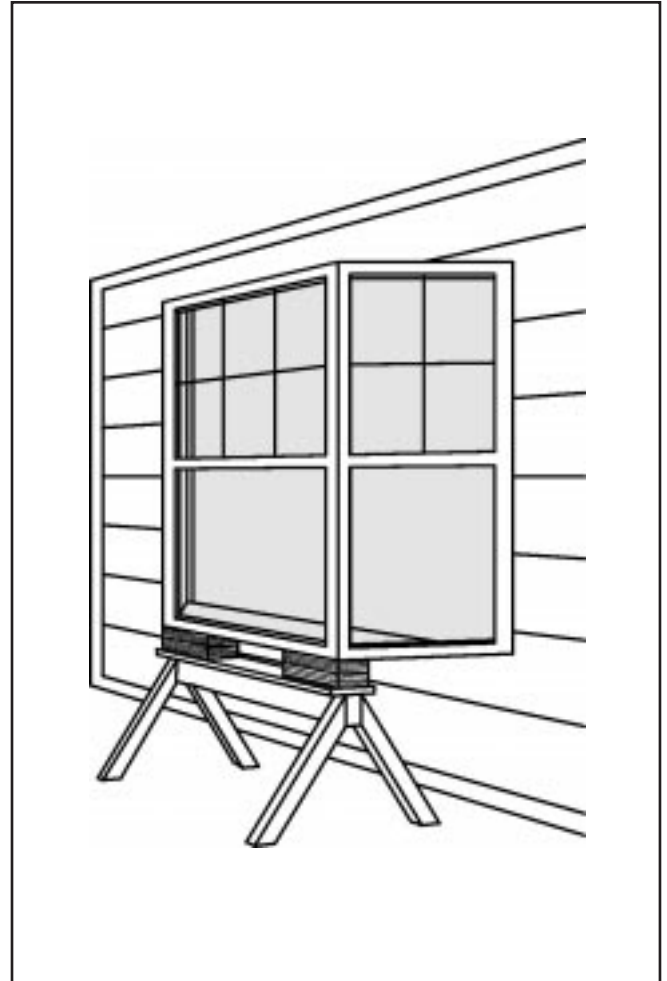


Figure 17-6 Bay Window with Temporary Support

17.5.1 Proper Shimming and Insulation

Install shims as needed on all four sides to center and level the unit (see Figure 17-7).

1. Install shims at all anchor points.
2. Place bottom shims within 6" of each sideboard and at least every 12" O.C.
3. Insulate the space between the window unit and the rough opening.

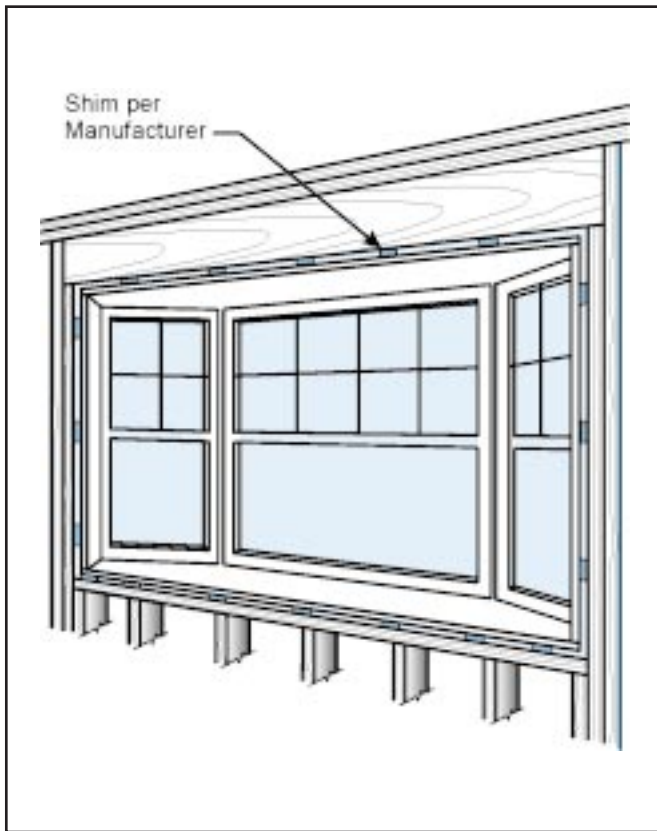


Figure 17-7 Shimming a Bay Window

17.5.2 Selection and Use of Fasteners for Attachment

Secure the headboard, sideboards, and seatboard of the bay or bow window to the rough opening per manufacturer's instructions and local codes. When instructions are not available or when special circumstances arise, consult with a licensed engineer to determine the proper method of attachment. The following are general guidelines (*also see Chapter 13, Section 13.4*):

1. Insert screws to penetrate solid wood at least 1".
2. Do not fully tighten screws until the unit is rechecked for proper positioning.

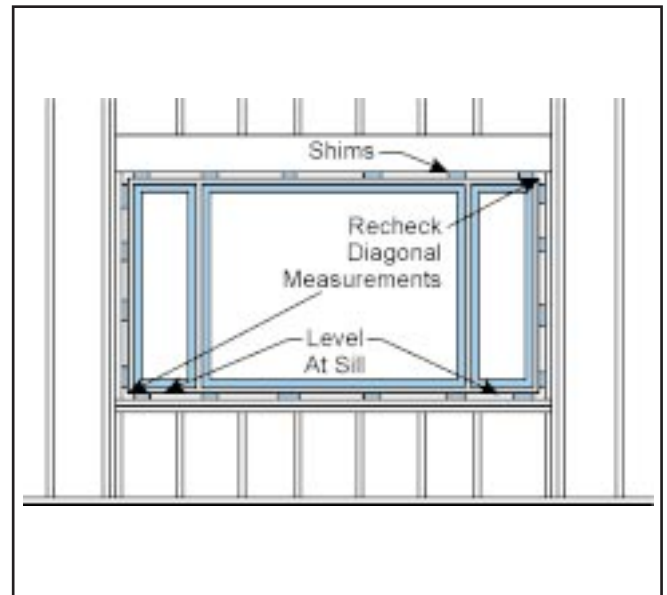


Figure 17-8 Verify Level, Square and Plumb

17.5.3 Verify Level, Square and Plumb

Check to determine whether the unit is level, square, plumb, and true (*see Figure 17-8*).

1. Use a square and level to check the sides, top, and bottom.
2. Check diagonal measurements, which should be equal. If not equal, make necessary adjustments.
3. When the unit is properly positioned, tighten all attachment screws.
4. Stretch two strings from corner to corner to determine if the unit is set true. If the strings touch, the window is true and not racked in the opening.

17.6 ADDING STRUCTURAL SUPPORT

A bay or bow window which projects more than 12" beyond the exterior siding may require support from below and/or above. Garden windows usually do not require external support, although it may be specified for some models. Use the support system supplied by the window manufacturer. Otherwise, purchase a kit or materials from a building supply store/yard.

17.6.1 Bottom Support System

If a bottom support system will be installed, keep the following points in mind.

1. For a site-built bottom support system:
 - Craft braces from pressure-treated lumber, as directed by the manufacturer.
 - Purchase ready-made braces made of wood or metal.
2. Wooden support braces can be covered with capping stock. Wooden or metal support braces can be hidden by an enclosure fashioned from siding or capping material.
3. Place a brace under each mullion, or as close as feasible. Anchor braces to the structural framing.
 - If braces will be exposed, keep symmetry in mind, for sake of appearance.
 - If stud locations do not facilitate proper brace placement, a ledger board (or boards) can be mounted on the wall. Braces can then be attached to the ledger board. Check with manufacturer for support technique.
4. If wooden braces are used:
 - Place the long edge against the wall and drill pilot holes through the brace and into the stud.
 - Attach braces with appropriate lag bolts.
 - Attach the brace to the seatboard with screws.
5. Attach ledger boards with required lag bolts.
6. For garden windows, provide bottom support when and as prescribed by the manufacturer.

17.6.2 Cable Support System without a Roof

When an overhang is present and a new roof will not be built over the bay or bow window, use a cable support system.

Some cable support systems attach at the headboard; others run down through hollow mullions to the seatboard. Cable support systems are usually attached to the headboard and run diagonally from 15° to 45° to a wall bracket (*see Figure 17-9*). A turnbuckle allows vertical adjustments to compensate for changes in the structure caused by weather or settling.

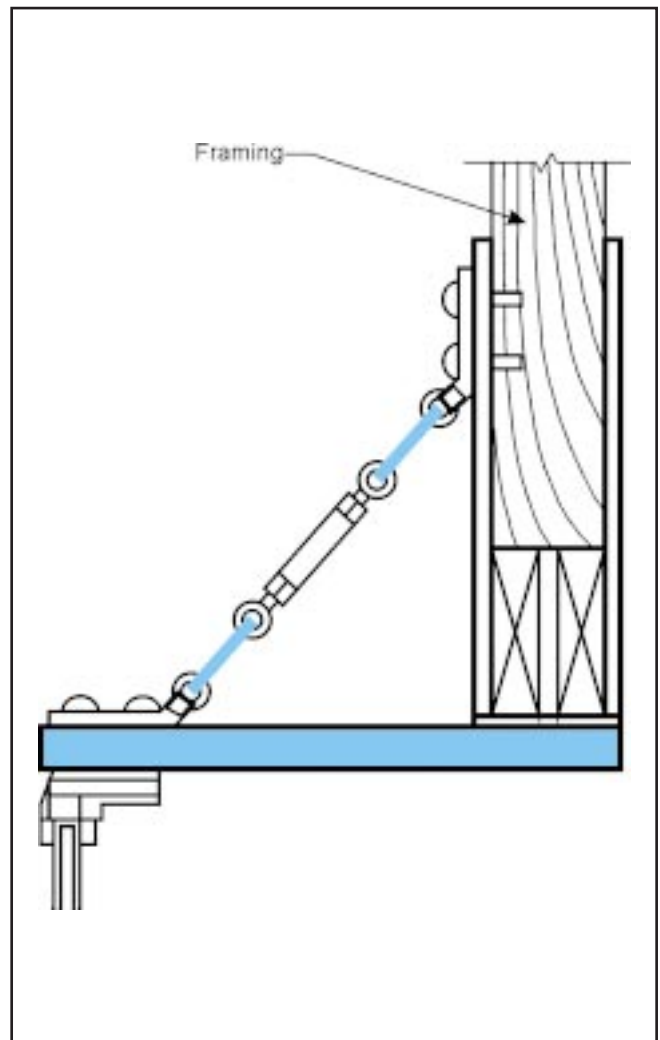


Figure 17-9 Top-Mount Cable Support System

To install a cable support system:

1. Attach one end of the support cable to the wall. It is also possible to attach it to the existing header, top plate, or stud wall.
2. Run the other end down through hollow mullions, and secure it under the seatboard with a washer and nut.
3. Turn the nuts to adjust the support system until the projection is square and level.

17.7 ADDING THE ROOF STRUCTURE

When a roof will be installed over a bay or bow window, a cable system or other overhead support mechanism is often used. (This method does not apply to garden windows, which have integral glass roofs.)

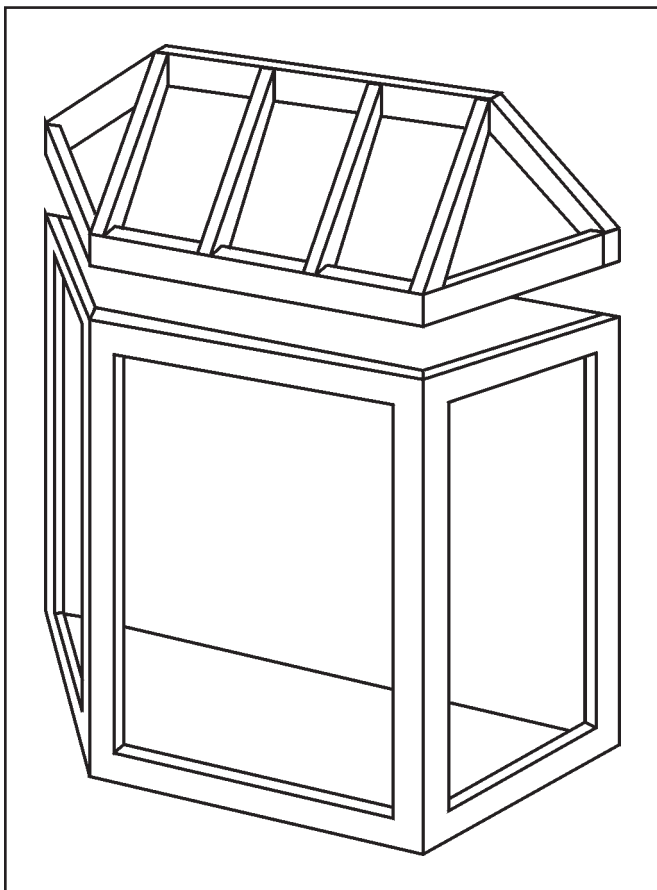


Figure 17-10 Framing for Roof Structure

Prefabricated roof kits are available from the window manufacturer. They usually save time and labor. If a roof will be built on site, use the following guidelines:

17.7.1 Provide Top Support

1. Mark the siding above the window unit where the new window hip roof will join the wall.
 - The top of the new roof should be at least 12" above the window unit.
 - The roof outline should be the shape of a trapezoid (see *Figure 17-10*).
2. Cut through the siding to the sheathing along the marked outline, and remove the siding.
3. Make sure the replacement window unit is solidly supported at the bottom, shimmed, and securely fastened in a square, plumb, and level position.
4. Attach nailing blocks to the wall along the angled ends of the cutaway.
 - Install rafters in two places.
 - Install rafters that extend from the outer corner of the headboard to the top of the nailing block.
5. At each end of the unit, angle the strap down to the headboard at the corner or hollow mullion (adjacent to where the roof rafter will be installed). With the strap pulled taught, attach it to the headboard with one or more screws (see *Figure 17-11*).
6. If a cable support system which is recommended will be utilized, install it instead of metal straps (see *Figure 17-9*).

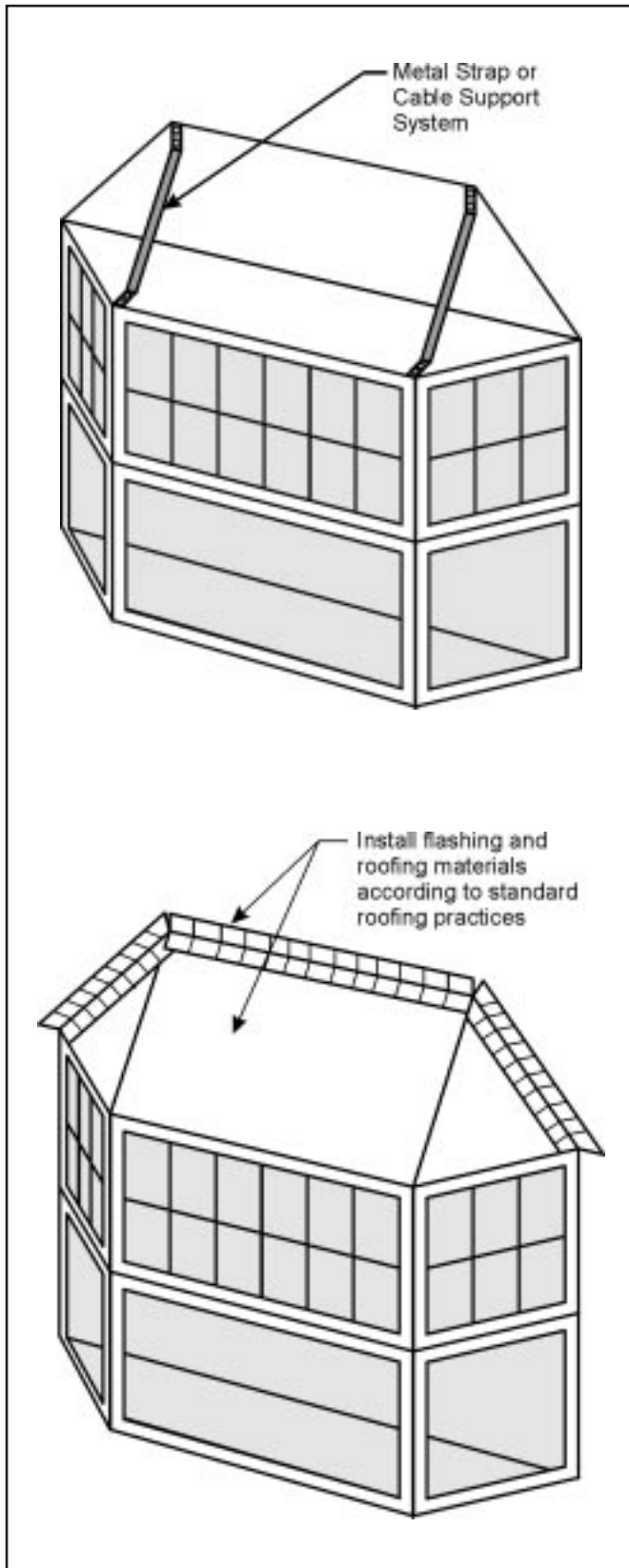


Figure 17-11 Metal Support Strap and Roof Structure

17.7.2 Frame the Roof

Use the following points as a guide for building a hip roof over a bay window. Make applicable modifications to the procedure for a bow window.

1. At each end of the window unit, attach an end rafter to the wall along the angled edge of the cutout (see Figure 17-10).
2. Cut a hip rafter to extend from the outer corner of the window unit, where the support strap is attached, to the top of the hip (see Figure 17-10).
3. Attach the bottom end of the hip rafter to the headboard with screws or lag bolts.
4. Attach the top of the hip rafter to the wall, securing it to a stud with nails or screws.
5. After installing hip and end rafters at each end, install additional rafters as needed at a maximum of 16" centers.

17.7.3 Finish the Roof System

1. Lay batt insulation over the headboard (minimum R-19 or as required by local code for ceilings, as space permits).
2. Sheath the roof with exterior grade plywood or other material allowed by local code.
3. Slip metal base flashing behind the siding along the entire roof/wall junction in a weather-board fashion.
4. Install roofing materials, skip flashing, and other roofing materials as needed.

