

C.9. DOOR AND WINDOW OPENINGS

Openings for doors and windows are formed with “bucks”, or frames, which are constructed to the rough opening dimensions required for the doors and windows to be installed. These bucks are installed in the wall, at the designed locations, and PolySteel Forms are easily placed up to and around the openings to form the entire wall. The bucks also provide the structural attachment points for securing the door frames and/or windows to the wall system. We recommend the use of a vinyl material, called VBuck®, for the construction of these bucks, which is a product manufactured specifically for this purpose. You may also construct bucks from wood, either pressure-treated or felt-protected may be required. In all cases, window and door openings have special reinforcement requirements, which should be considered before placing the bucks in the PolySteel walls. Refer to the Design Section of this manual for specific design considerations for openings. **There will always be horizontal rebar required within 12” of the bottom of all window openings 2’ or larger, which must extend 24” beyond each side of the opening. You may also be required to install vertical rebar below the opening, so be sure to understand these reinforcing requirements before putting window bucks in place.**

C.9.1 PREPARE IN ADVANCE.

In order to speed the installation of the entire wall, it is recommended that you build your window bucks in advance and have them on the job site ready for installation when the PolySteel Forms are being put in place. All bucks should be constructed so that the inside dimension of the openings match the required rough openings (“R/O”) specified for the doors and windows to be used.

- ✓ Mark the footing or slab for the locations of window and door openings, and height of the bottom of the window buck to be installed, so that all bucks can be placed, and any necessary adjustment cuts can be made, on the proper course of forms.

C.9.2 VBUCK CONSTRUCTION.

VBuck is manufactured to match the width of the PolySteel Forms you are using. If you are using the 6” Forms (PS•4600), you would use the 11” VBuck. The 8” Forms (PS•4800) require the 13” VBuck material. VBuck is also constructed with hollow channels that are designed to receive a patented corner connector, extension splines, and reinforcement sleeves and provide for a secure attachment for windows and doors. VBuck also provides complete instructions on how to construct bucks with their product in all shapes and sizes you may require. The basic steps of assembly are:

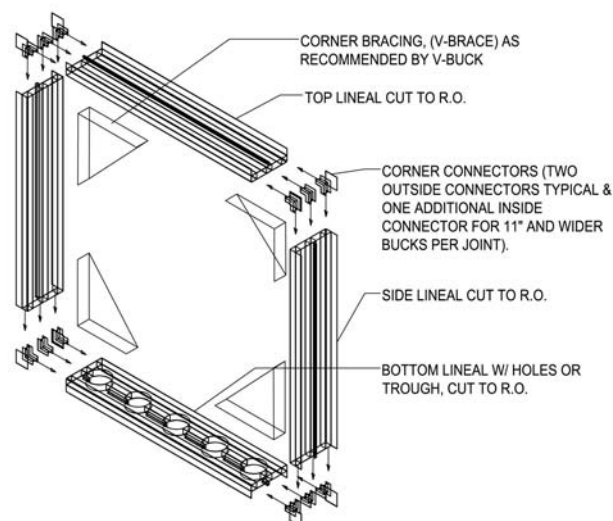
1. Cut the material to the desired length and to the overall dimensions of the R/O required for the windows you have selected. Insert the corner connectors into the channels on the outside of all four corners. The 11” material, and wider, also requires the insertion of a center connector for reinforcement.
2. Square and brace the corners with VBuck’s steel bracing, “VBrace”, and secure with self-drilling fasteners.

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C.9.2 VBUCK CONSTRUCTION (continued)

3. Drill or cut ports or slots into the bottom of the window buck to allow the placement of concrete below the window. VBuck will provide pre-drilled lengths of product, however, it is often more advantageous to drill or cut the buck yourself on site to meet the specific needs of the job.
4. Install in the PolySteel wall at the proper height, as previously marked on the slab or footing. It is a snug fit. You might find it useful to use the flat edge of a corner connector to slip between the VBuck and the PolySteel and slide the VBuck onto the PolySteel wall.
5. For openings over three feet wide, add additional vertical and horizontal bracing to support the VBuck during the concrete pour. You may use lumber or VBuck's Power Brace for this purpose. See the illustration below. Vertical braces should be installed every 18".
6. For door openings, horizontal bracing should also be installed every 24" and at the bottom of the opening to keep the buck square and secure to the dimensions specified.
7. To reduce and/or eliminate the horizontal bracing for VBuck, you can drill a hole in the side of the buck and insert tie wire or an electrical zip tie (e.g., 1/2", 250 lb. rated) through the sides every 24" and secure the wire or tie to a PolySteel Form tie inside the wall. You might also ask your PolySteel Dealer about the Yoke and Tie fastening system from Vinyl Technologies developed specifically for this purpose..
8. Consult with your PolySteel Dealer for more detailed instructions and for custom shapes and designs.

Figure 3.8 TYPICAL WINDOW BUCK WITH V-BUCK



C.9. DOOR AND WINDOW OPENINGS

C.9.2 VBUCK CONSTRUCTION (continued)



INSERT CORNER CONNECTORS



ASSEMBLE BUCK



INSTALL BRACING



TAPE ENDS TO PREVENT CONCRETE INTRUSION



ASSEMBLE IN ADVANCE



INSTALL BUCK



DRILL OR CUT PORTS OR SLOTS



VBUCK PORTS

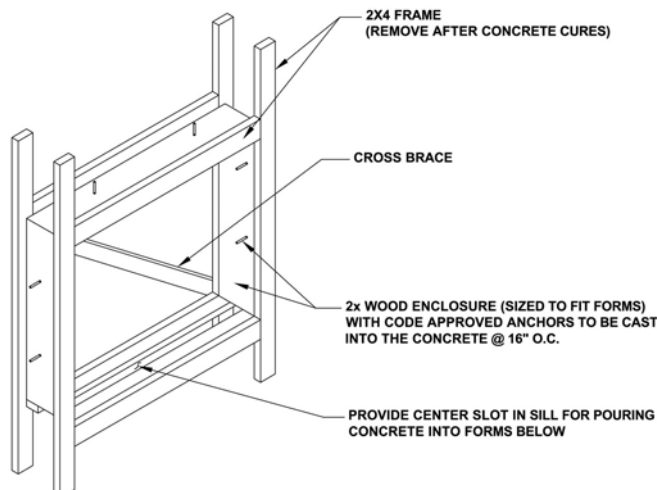
C.9. DOOR AND WINDOW OPENINGS

C.9.3 WOOD BUCK CONSTRUCTION

A common method of constructing bucks for windows and doors is to use dimensional lumber. **If required by the building official, wood bucks may need to be protected from direct contact with concrete that is in direct contact with the soil.** This can be achieved by using pressure-treated lumber or a waterproof material (such as roofing felt) wrapped around and secured to the lumber wherever concrete will come in contact with the buck.

1. Cut the framing material to the desired length and to the overall dimensions of the R/O required for the windows you have selected. Remember that the thickness of the lumber used needs to be taken into account when cutting the formwork to size for the buck.
2. For the bottom plate of the window buck, use a 2x6 piece of lumber cut to the dimension of the rough opening and rip it into two pieces. This will provide the opening necessary in the bottom of the buck to receive concrete.
3. It is necessary to frame the buck on each side to provide support for the PolySteel Forms fit into place around the opening (See Figure 3.9). Cut 2x4's to match the inside horizontal dimension of the buck and screw to the outside edges of the top and bottom of the buck every 18". Full-size framing lumber can be used for the vertical portion of this frame and minimize the waste created by cutting lumber to size. These vertical pieces can be attached after setting the buck in place.
4. Square the buck and attach a diagonal cross brace to keep it square.
5. For window openings larger than two feet, install vertical and horizontal bracing every 24".
6. Once in place, at the proper height, as previously marked on the slab or footing, install Ringed Shank nails, large screws, or anchor bolts every 16" to ensure a secure attachment to the concrete.
7. It is also possible to utilize an **Inset Window Buck**, as illustrated below, using dimensional lumber, and securing it to the form with wire (back to the ties) and glue (as shown), and/or nail through the foam on both sides using plastic cap nails to minimize the compression of the foam insulation.

Figure 3.9 TYPICAL WINDOW BUCK WITH WOOD



INSET WOOD BUCK

C.9. DOOR AND WINDOW OPENINGS (continued)

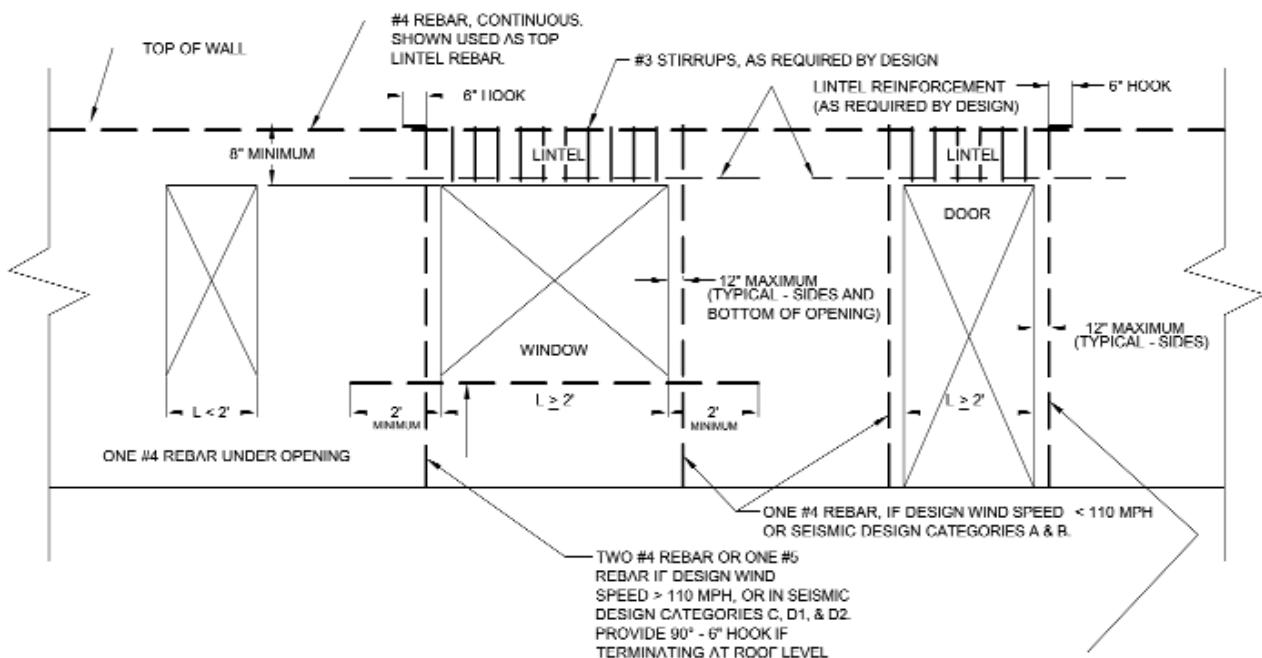
C.9.4 MAKE IT LARGER – NOT SMALLER.

It is always possible to shim a door or window to make it fit in a rough opening that is oversized. It is much more difficult to cut, shave, chisel, or saw the buck or the concrete out to make up for a buck that is built too tight, or has swelled with moisture. Keep this in mind while constructing a buck of any material.

C.9.5 REINFORCEMENT.

The Figure below provides a general illustration of the reinforcement that is required around openings in a PolySteel wall. It is important to note the key reinforcement elements required so that you can plan your installation accordingly. The Design Tables for Lintels will provide you with details for the variety of load requirements that may apply to your project.

Figure 3.10 REINFORCEMENT AROUND OPENINGS



NOTES:

1. Typical wall reinforcement not shown for clarity.
2. If design wind speed > 110 MPH, or if seismic design categories are C, D1, & D2, all vertical wall reinforcement in the top-most ICF story shall be terminated with a 90° hook. The bend shall result in a minimum hook length of 6" and lie within 4" of the top surface of the wall.
3. The hook requirement assumes the design is based on the PCA "Prescriptive Method"; see Section 4.1 of the Prescriptive Method. The commentary section C4.1 provides the rationale for the hook. **The designer may determine the hook is not required based on specific project load requirements, roof system attachment details, and/or analysis and design in accordance with ACI-318.**
4. Wall reinforcement below openings shall be as required for the entire wall.
5. One vertical rebar (#4 minimum) is required within 12" of each side of the opening. Two are required if the opening is over 4 feet or the design calls for wind speeds in excess of 110 MPH.
6. One #4 rebar is required under all openings over 2' and shall extend 24" beyond each side of the opening. This can be achieved by bending the rebar around a tight corner, if necessary.
7. Horizontal rebar above all openings shall extend 24" beyond each side of the opening.
8. One continuous #4 rebar is required in the bond beam at the top of the wall. This rebar may be used as lintel reinforcement if applicable in the design.
9. Refer to the Design Tables for Lintels for proper reinforcement and the use of stirrups, as required.
10. If stirrups are required, see Section 9.5a Lintels and be sure to review the option of using a continuous stirrup, as described in Section D.8 of the Tips & Techniques section of the Manual.

C.9. DOOR AND WINDOW OPENINGS (continued)

C.9.5a STIRRUPS AND LINTELS.

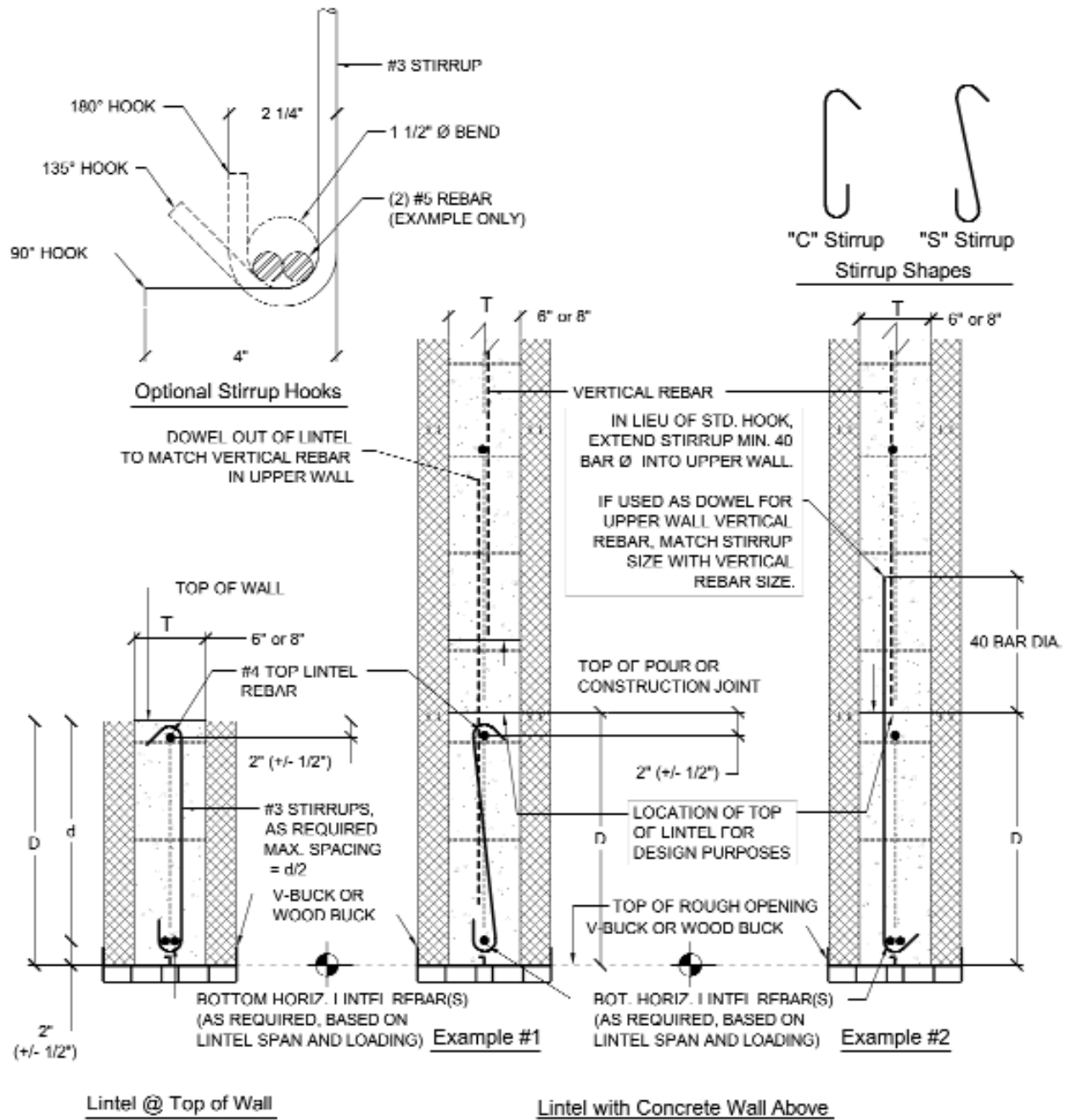
Lintels (headers) over doors, windows, garage doors, and/or other openings in a PolySteel wall require additional steel reinforcement, depending on the load to be carried and the span of the opening. This is a critical area in the overall design of the wall and should be carefully designed, installed, and consolidated with concrete to ensure that the openings remain strong, stable, and true to their original form for the life of the building. The Tables for Lintels in Section E will help ensure a proper design.

- ✓ Stirrups fabricated from #3 rebar may be required to reinforce the lintel, in addition to the horizontal reinforcement specified. These stirrups may be fabricated in the shape of an "S" or a "C," as illustrated below. [Figure 3.11](#) illustrates the key design and installation features for these lintels, which should be used in conjunction with the Lintel Tables in the Design Section of this Manual. You should also consider using the Continuous Stirrup discussed in Detail in Section D.8.

C.9. DOOR AND WINDOW OPENINGS (continued)

C.9.5a STIRRUPS AND LINTELS (continued).

FIGURE 3.11 LINTELS



C.9. DOOR AND WINDOW OPENINGS (continued)

C.9.5.b DOOR BUCKS.

Place the buck in its identified location and brace it plumb and square to ensure that it is installed with the proper dimensions. Cut a piece of lumber the width of the interior dimension and secure it in place at the bottom of the buck to maintain its stability. You can keep the buck open during the remainder of construction, however, prior to placing concrete, be sure to add additional interior vertical and horizontal bracing every 24" to support the buck.

- ✓ Install anchor bolts as required for wood bucks.
- ✓ Cut forms to fit opening as you progress up the wall.

C.9.5.c WINDOW BUCKS.

Be sure that the all required rebar is in place below where the buck is to be installed. Place the buck in its proper location and brace it for plumb and square.

- ✓ Install supplemental internal support bracing, as required.
- ✓ Install nails, lag screws, or anchor bolts required for wood bucks.
- ✓ Make sure there is sufficient access in the bottom of the buck to allow the placement of concrete.
- ✓ Cut forms to fit opening as you progress up the wall.



DOOR BUCK
INSTALLATION



BRACE LARGE
OPENINGS



ARCHED WINDOWS



WOOD BUCK
INSTALLATION



WOOD BUCKS
INSTALLED & BRACED