# 9.0
# Implementation:
# Wall-to-Wall Connections for Frame Walls Below

Hurricanes have demonstrated that many walls below gable end walls move in or out under the pressures created by hurricane winds. Unless your house meets the requirements of the 2001 or later Florida Building Code or your community was enforcing the high wind provisions of building codes, then it is highly likely the wall is inadequately restrained.

Strengthening the wall-to-wall connection keeps the lower wall from moving in or out by tying the top of the lower wall to the strengthened gable end wall above. In other words the goal is keep the gable end wall on the house. It may seem strange that the upper wall could help hold the lower one. However, the strengthening occurs because the upper retrofitted gable wall is tied back at least 6' into the interior roof structure where forces can be dissipated over the roof and ceiling planes. To a lay person this may not seem significant, but engineers readily understand its effectiveness.

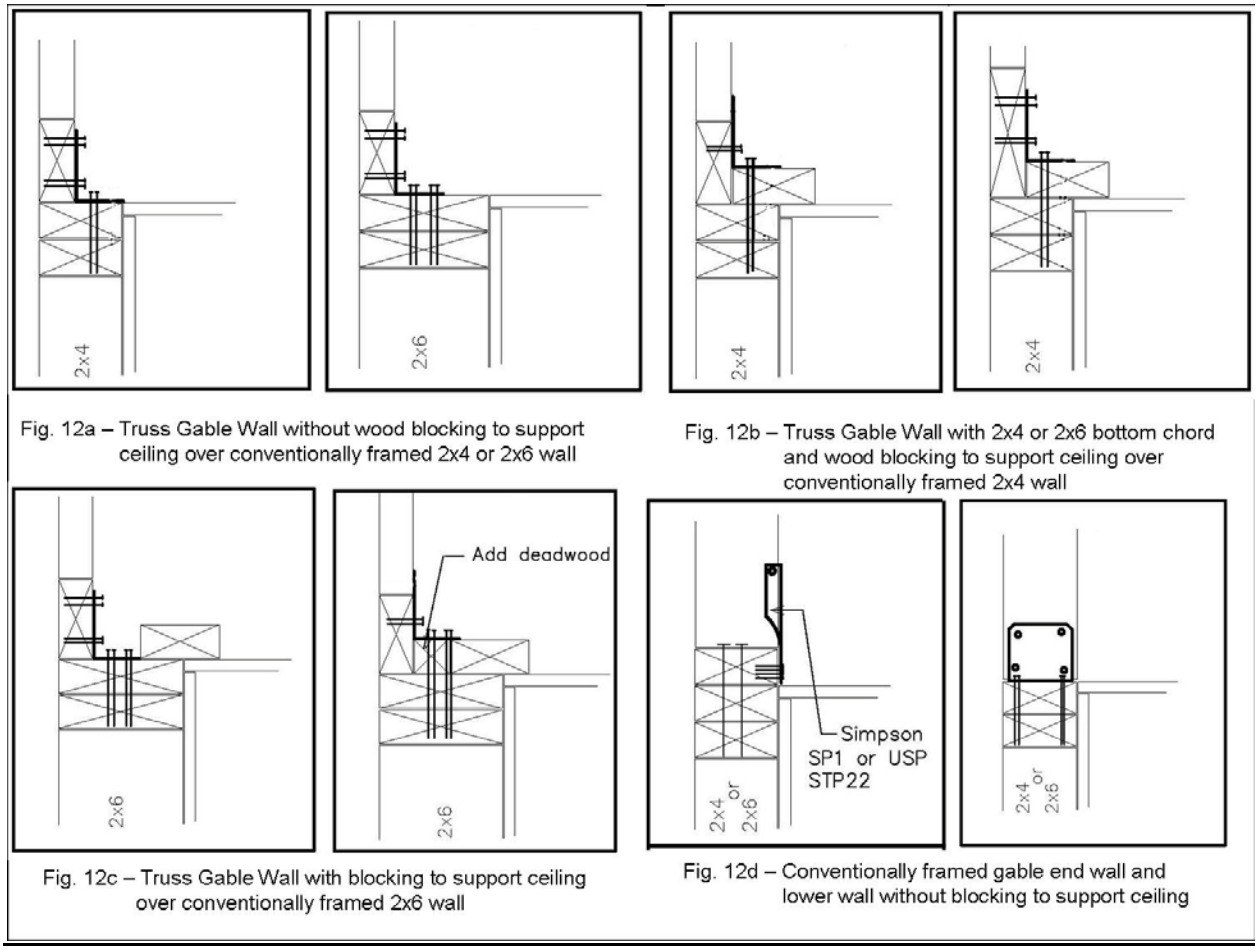


**Figure 9.1. These drawings show just some of the methods of making Wall-to-Wall connections on frame walls. Ignore the `12' shown in the Fig identifications.**

**Figure 9.2. This shows an HGA installed on top of deadwood for the ceiling drywall below. It can be seen that if the HGA had not been installed on the stud of the truss, the top two screws would have missed penetrating the bottom chord. Sometimes one can drive the quarter inch screw though plates because they just happen to hit a hole in the plate. Otherwise, one needs to drill a starter hole. Doing this does not compromise the truss or the plate. From the other figures, you can see that the two outer vertical screws really are not doing much because they only penetrate the deadwood. 1-1/2" screws were used here so they did not penetrate the deadwood and the ceiling drywall. 4-1/2" screws were used for the other two so that they would penetrate the deadwood and the two top plates to make a much better connection.**

**In Figure 9.1** Figures 12a through 12c show truss type gable end walls resting on conventional wood frame lower walls. Figure 12d shows conventionally framed gable end walls resting on conventional wood frame lower walls. If your initial inspection of your roof framing led you to brace your gable end, it is a safe and reasonable assumption that the two walls are also not sufficiently connected together. This means that you should connect them. You just need to select the appropriate method. There are two methods. The one covered specifically in the building code is the one that uses HGA connectors as shown in a), b) and c). The method for case d) is covered in the code by the requirement that the connectors must have at least 175 pounds of uplift capacity.

***Wall-to-Wall Connection for drawings a), b) and c) by use of right angle brackets, HGA.*** These $6 brackets are easy to install and are highly effective. **Tables 5.1** and **5.2** in column 3 rows 1 to 10 give the maximum spacing of brackets along the wall. They are not needed where the studs are less than 3' though if you can reach out another foot closer to the corner, it would be best to install one there because it is corners of houses that experience some of the greatest roof uplift forces. These connectors will help hold the walls together and that is most important in the middle of the wall. The building code requires that only two fasteners need to be placed horizontally through the vertical leg of the bracket into the gable end wall, but all four through the horizontal leg. Of course four into the gable wall is better than two.

Impediment and solution: The right angle bracket is so high that only two screws can be driven through the top leg of the bracket. The best solution is to move the bracket to

where a truss plate is on the bottom chord because the wood is high enough that all four screws can be installed. You can install brackets through truss plates without compromising anything. You may be lucky when starting a screw to find it hits a hole in the plate. Otherwise, you can drill a 3/16” or 1/4" hole starter hole through the plate. Although the code specifies a maximum spacing, it is perfectly reasonable to make that the average spacing along the wall if a truss plate exceeds that distance a bit. Another code acceptable solution is to use only 2 screws.

Screws closer than about 3/4" from either the top or bottom edge of the bottom chord are ineffective because they split the lumber. If these close fasteners also penetrate a truss plate, then the closer spacing is fine because the effective part of the fastener connection will be made to the plate which distributes the load over the larger area of the plate.

Impediment and solution: The outer two screws on the horizontal leg are too long: This is the case where deadwood is on the top of the top plate where the supplied 3” screws would stick through the ceiling. You can use 1-1/2” screws here. To compensate for using the shorter screws, use 4-1/2” screws for the other two holes. That helps make up for the shorter ones ties the gable end wall to the bottom top plate. The reason that is important is that exterior plywood may not extend above that plate so screwing to that plate makes a good connection from the gable end wall down to the bottom plate of the wall below. Another advantage of using 4-1/2” long screws is that it is highly unlikely that the deadwood is attached to the top plate very well. The longer screw will sandwich the deadwood between the bracket and the top plate while connecting through both top plates. This is a great solution that solves all problems.

The gable end wall is conventionally framed: No problem. By using Simpson SP1 or USP TP22 connectors one meets the 175 pound uplift requirement of building codes. These connectors are readily available at home supply stores. Other kinds of connectors might work as well. HRG right angle brackets attached to the face of studs work well too, but cost more than SP1 or TP22 connectors. SP1 or TP22 connectors must be used at every existing stud or retrofit stud location that is over 3’ long. For these connectors simply follow the fastening instructions provided by the manufacturer. You can substitute #8x1-1/4” screws for 1-1/2” nails; and #8x3” screws for 10d nails.

***Final check:*** Before you leave the gable end it would be a good idea to make sure that you did not forget to install some fasteners. Ones that sometimes get overlooked are those in horizontal braces so check each brace to make sure that you did not skip attaching it to a framing member. Check that you have not left any tools or stashes of parts such as fasteners. Then reset batt or blown insulation and fluff up blown insulation. When you have finished retrofitting the gable end you should be pleased with yourself for having strengthened your house in a permanent and effective way that makes your house both stronger and safer.