

10.0 Implementation: Wall-to-Wall Connections for Masonry 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.

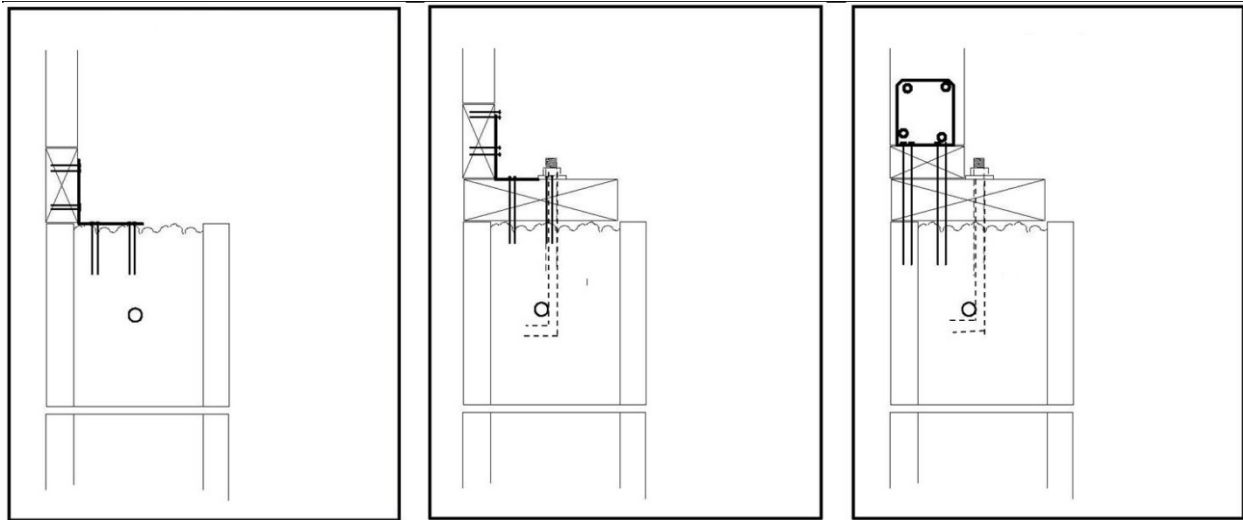


Fig. 13a – Truss gable wall over masonry wall

Fig. 13b – Truss gable wall with wood plate anchored to masonry wall below

Fig. 13c – Conventionally framed gable wall with wood plate anchored to masonry wall below

Figure 10.1. These drawings show the most common situations where the lower wall is made of masonry. Ignore the '12' shown in the Fig identifications.

Figure 13a shows the case of a gable end truss bearing directly on the masonry wall. Figures 13b and 13c show the gable end wall, truss or conventionally framed wall, bearing on a plate that is usually a 2x8.

Wall-to-Wall Connection for HGAM connected directly to masonry wall:

This connection method uses HGAM connectors. 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 the corners of houses experience the greatest roof uplift forces. These connectors will help hold the roof down. The building code requires that two fasteners 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. HGAM should be installed according to the manufacturer's instructions.



Figure 10.2. This shows an HGAM being installed directly to the top of the masonry wall. Here the elevation of the bottom chord was just fine as well as the grout in the concrete block being fine too.

Impediment and solution: When drilling into the wall for concrete screws, the drill bit hits steel (rebar): This is a relatively common problem with an easy solution. Typically, two screws will hit rebar. That leaves the other two just fine but inadequate in number. Moving the HGAM along the wall is not likely to solve the problem because the rebar runs parallel to the wall. The solution is to add another HGAM nearby and rely on two of its screws to not hit steel. That way there is at least four good screws and maybe six. If the drill bit does not hit steel until the hole is drilled to nearly its full depth, a shorter concrete screw can be used. Of course the HGAM is not as effective so the spacing will have to be proportionally adjusted.

Impediment and solution: The grout is so low that the top two screws miss hitting the top chord of the truss or are too close to the bottom edge of the truss bottom chord: This is a common problem. One solution is to accept that the building code requires only two of those four are necessary. Another solution is to place a block under the HGAM to raise it. That would require using longer concrete screws in order that they penetrate the concrete the distance the manufacturer specifies.

Impediment and solution: The truss is floating above the wall so the bottom screws miss hitting the bottom of the bottom chord of the truss or are too close to the bottom edge of the truss bottom chord: This condition is caused by the presence of grout that spilled out when the blocks were filled. The solution is the same as the situation addressed immediately above.

Impediment and solution: The grout is so high that the top two screws miss hitting the top chord of the truss or are too close to the top edge of the truss bottom chord: One solution is to try to knock off some of the excess grout. It may only be few pebbles that are causing the problem, or it may be the spill of concrete on top of the partitions of the block. Another solution is to accept that the building code requires that only two of those four are necessary.

Impediment and solution: The grout is so rough that the HGAM does not rest flat on the top of the wall, tilts, is unstable or some fasteners into the wall have air between the HGAM and the wall: A hammer to chisel away some of the bumps might take care of the problem. It may well be that moving the connector over a few inches solves the problem. Bear in mind that it is the average spacing along a wall that is important. Otherwise, you may just have to live with the condition and install the HGAM as best you can and if you are uncomfortable you can decrease the spacing between HGAM.

Wall-to-Wall Connection for HGAM connected to 2x8 plate:

See drawings b) and c) in **Figure 10.1**. This is a straightforward installation if the 2x8 plate is adequately connected to the wall by anchor bolts or straps that are effective and spaced close enough together. The 2x8 can be regarded as adequately connected if all of the following conditions are met:

- 1) If it has 1/2" diameter anchor bolts less than 48" apart and the 2x8 has not been gouged or chiseled out so the washer and nut could be installed,
- 2) If the bolt does not protrude more than 1-1/2" above the top of the 2x8,
- 3) If there is an anchor bolt within 12" of the end of the 2x8 and there is an anchor bolt within 12" of an existing or retrofit stud, and
- 4) If a washer is in place.

If all of these conditions are not met, the 2x8 should be considered inadequately anchored.

Impediment and solution: The 2x8 plate is inadequately connected: In this case there are two solutions. The first is to disregard the connection between the 2x8 and the wall by making your retrofit connections through it and directly into the concrete below. You do that by using concrete screws that are long enough to penetrate the 1-1/2" thickness of the 2x8 plate, and penetrate the concrete to the depth specified by the HGAM manufacturer. That is the easy and perfectly good solution., Another solution is to anchor the 2x8 to the wall better independent of HGAM connectors. You can pretty easily anchor it better simply by adding 1/4" diameter masonry screws that penetrate at least 1-3/4" into the top of the concrete block wall. One such fastener should be placed within 12" of each existing or retrofit stud.

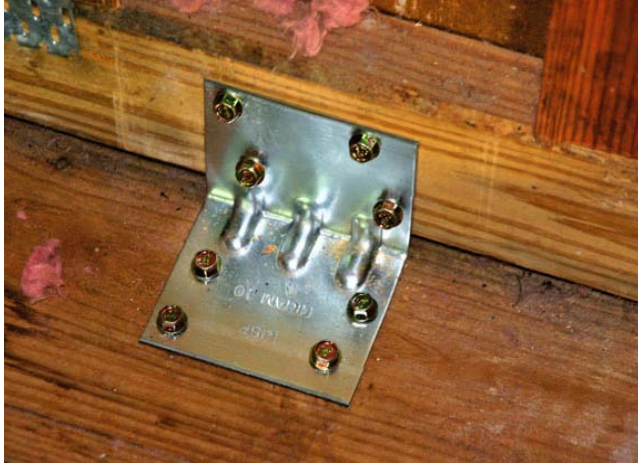


Figure10.2. HGAM right angle gusset bracket connected to 2x8 on top of masonry wall. Vertical fasteners can be attached just to the wood 2x8 using 1-1/2" wood or screws or optionally all the through the plate and anchored to the masonry wall using masonry screws.

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.