HURRICANE AND SEISMIC CLIP

A metal connector for securing a rafter, a top plate and a wall stud includes a generally central member in the form of a flat plate having an upper and lower portion; a pair of right angle bends on the upper portion of the central member form a pair of rafter webs. Each rafter web has an upper rafter tab and a plate tab portion that attaches to the upper side of the top plate. A pair of second generally right angle bends on the upper portion forming spaced rafter flanges for a rafter therebetween. Each upper plate tab includes a bend to define a plate tab. The lower portion of the central member includes extensions each having a bend that defines second plate tabs. A stud flange ties rafter, top plate and stud together.
HURRICANE AND SEISMIC CLIP
CROSS-REFERENCE TO RELATED APPLICATION

[0001] Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

REFERENCE TO A MICROFICHE APPENDIX


BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention
[0005] The present invention relates to connectors for wood frame building structures and particularly to steel hurricane and seismic clips for rafter and/or truss connection for uplift, shear and overturning loads.

[0006] 2. Relevant Art
[0007] Wood structures predominate in residential and light commercial construction. In the case of wood, steel, and concrete framing, the structure must be protected from upward, shear, and overturning loads developed by either wind or seismic activity. In the United States the amount of wind and seismic activity differs with geographical location and is enforced by building codes for these areas. In the case of upward loads the building is generally tied to the foundation using a variety of steel connectors that tie the bottom plate to the foundation, studs-to-plates, floors-to-walls (in the case of two or more floors), and roof-to-walls, or just simply, roofs to walls in the case of concrete or masonry. Typically, for roof-to-walls, connectors are attached to each truss or rafter that is spaced at some on center spacing (typically 12", 16", or 24" on center), to the wall top plate. Shear and overturning loads are resisted by a combination of additional connectors and wood blocking nailed between each truss or rafter to transfer forces from the roof diaphragm to the walls. The size and number of these steel connectors vary depending on the severity of the wind and/or seismic conditions in the locality of the building, and the geometry of the building.

[0008] In the United States these connectors and blocking are installed during the framing stages of construction. Connectors and blocking are generally installed by laborers hired by the framing contractor. Correct size, location, and number of fasteners (nails) are critical to the required load. Commonly, these laborers are inexperienced which results in improper or inadequate installation. In all structures, locations of connectors mandate their installation during the framing stages of construction which in turn increases labor costs. Also, existing structures without these connectors in place are at risk of destruction should a hurricane or earthquake occur.

[0009] There is a need for a structural truss or rafter connector that provides for uplift, shear, and overturning loads that is cost efficient, installable after the framing stages of the building is complete, and is independent from additional blocking as an integral part of the system.

[0010] The present clip provides a building structure with a wood framed roof, located in a wind and/or seismic zone, adequate resistance to uplift, shear, and overturning forces developed by the roof and transferring the same forces into the walls using a single connector at each truss or rafter, while at the same time providing a connector that can be installed after the structure has been framed. The present clip provides a less complicated structural connector for wind and seismic wood frame construction, simultaneously delivering a connector that is less susceptible to improper installation and at lower cost.

BRIEF SUMMARY OF THE INVENTION

[0011] In one aspect of the present invention there is provided a metal connector for securing a rafter and top plate of a building wall includes a generally flat central planar member having an upper and lower portion; a plurality of spaced openings in the lower portion of the central member for passage of fasteners therethrough to affix the central member to a top plate; a pair of spaced first generally right angle bends on the upper portion of the central member forming a pair of spaced elongate rafter webs; each rafter web having an upper and lower bend defining a upper rafter tab and an upper plate tab, each tab including at least one opening therethrough for passage of a fastener to affix respective tab to a respective rafter and a top side of a top plate; and a pair of spaced and parallel second generally right angle bends on the upper portion of the central member extending in a direction generally opposite to the direction of the rafter webs forming a pair of spaced rafter flanges, each rafter flange having a plurality of openings therethrough for fasteners to affix respective rafter flange to a rafter. Each upper plate tab of each rafter web includes a generally right angle bend extending substantially in the same plane as the central planar member for defining a downwardly disposed lower plate tab, each lower plate tab including at least one opening therethrough for a fastener to affix respective lower plate tab to a side of a top plate. The lower portion of central member includes a generally planar extension portion having a generally horizontally disposed right angle bend for defining a second lower plate tab, the second lower plate tab including at least one opening therethrough for a fastener to affix the second lower plate tab to a bottom side of a top plate.

[0012] Other aspects of the invention include the lower portion of the central member including a pair of spaced generally planar extension portions each having a generally horizontally disposed right angle bend for defining a pair of second lower plate tabs each including spaced openings for fasteners to affix each said second lower plate tab to a bottom side of a top plate. The extension portion includes a stud flange subtending therefrom, the stud flange including at least one opening for a fastener to affix the stud flange to a stud of a building wall. In addition, the extension portion includes a medially located stud flange between the second lower plate tabs having a plurality of spaced openings for fasteners for affixing the stud flange to a stud attached to a top plate of a building wall.

[0013] In another aspect of the present invention the central planar portion and the second lower plate tabs and the stud flange are substantially coplanar. The lower portion of the main member includes a pair of spaced generally planar plate portions, each plate portion having a generally horizontally disposed right angle bend for defining a pair of second lower plate tabs each including spaced openings for fasteners to affix each second lower plate tab to a top plate. The lower plate tabs and the second lower plate tabs are substantially parallel and spaced apart by a height of a top plate of a building wall. The first pair of right angle bends is respectively disposed along respective side portions of the central
planar member and being angularly disposed by imaginary acute angle at their intersection with a medially located vertically disposed axis of the central member. The at least one opening in each upper rafter tab and rafter flange is elongate in shape to accommodate the passage of a fastener therethrough at a selectable angle for affixing the tab to a rafter. The rafter flanges are oppositely disposed to be affixed to respective opposite sides of a rafter disposed in a space defined between the rafter flanges.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0014] The novel features believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

[0015] FIG. 1 is a plan view of the hurricane and seismic clip in accord with the present invention;
[0016] FIG. 2 is a perspective view of the clip of FIG. 1 after bending to provide the form for use; and
[0017] FIG. 3 is a perspective view of the clip of FIGS. 1 and 2 shown attached to a rafter, top plate and stud.

DETAILED DESCRIPTION OF THE INVENTION

[0018] With respect to the drawing, FIG. 1 illustrates the hurricane and seismic clip connector 10. The metal connector 10 is formed from of single metal plate cut, punched and bent, as shown in FIG. 2 to provide the desired features. The connector 10 has central planar portion 11 with upper portion 23 and lower portion 28. In accord with this invention there are two spaced rafter webs 12 bounded and defined by bends 13, 15, 15A and 22 that define a pair of respective rafter tabs 14 with spaced elongate openings 17; and upper plate tabs 18 with spaced elongate openings 19. The lower portions of a rafter webs 12 include plate tabs 20 respectively depending from tabs 18 and nail holes 21 therein. Adjacent to rafter webs 12 are two spaced portions 23A included in upper portion 23 which include bends 13 on one side and bends 27 on the other side. Rafter flanges 25 are also defined by bends 27 and have a plurality of elongate vertically aligned slotted openings 26 for attachment of the flanges 25 to a respective side of a rafter 38 (FIG. 3) located in the space 40 (FIG. 2) between flanges 25 which may be wide enough to accommodate a multi-layer rafter or truss that is being used as understood in the art.

[0019] The lower portion 28 of central planar portion 11 of connector 10 includes a pair of spaced extension members 30 and includes a plurality of spaced openings 29. Spaced bends 35 are bent along cutouts 43 to define spaced lower plate tabs 33 having a pair of spaced openings 34 therein. A medially located stud flange 36 extends downwardly a greater distance than unbent tabs 33 and includes a plurality of spaced openings 37 therethrough for affixing it to a stud 39 (FIG. 3).

[0020] FIG. 2 illustrates the formed connector 10 which is preferably formed by the manufacturer as shown and sold to home builders in the fully cut and bent condition shown in FIG. 2.

[0021] FIG. 3 illustrates the use of connector 10 being attached to a truss and/or rafter 38, stud 39 and a top plate 31 which is formed of upper and lower plate members 32. Openings 17, 19 and 26 are elongate or slotted to accommodate the use of fasteners such as nails at selectable angles, as usually well known to builders. Ribs 16 and 24 are formed in the metal plate of connector 10 to provide additional strength thereto.

[0022] With respect again to FIG. 1, bends 13 are each disposed at an acute angle 42 with respect to a medially-located vertically oriented axis 41 through central planar member 11. As shown in FIG. 2, the bends 27 are formed in a manner to be bent in one direction to dispose rafter flanges 25 directed toward the inside of a building with flanges 25 being parallel. Bends 13 are bent in a direction opposite to the angle of bends 27 and are directed outwardly of a building opposite to the direction of flanges 25.

[0023] When connector 10 is completely formed, depending plate tabs 20 are coplanar with central member 11 and stud flange 36.

[0024] In addition, extension portions 30 could be formed as a single member in the event stud flange 36 is not to be provided or used. In such event lower plate tabs 33 would also be a single member rather than being bifurcated.

[0025] Upper plate tabs 18 and second lower plate tabs 33 are substantially parallel and spaced apart by the height of a top plate 31 of the building wall.

[0026] Each connector 10 is sized to fit the specific size of the trusses, rafters, top walls and studs used in a specific application, it being understood that when the connector is used for larger width rafters or trusses, the entire width of clip 20 is made wider and the spacing between flanges 25 is wider to accommodate same between flanges 25.

[0027] When installed, the clip 10 provides greatly improved resistance to uplift, shear and overturning forces all by a single metal connector which ties together rafter or truss with the top plate and the stud particularly after framing of the building is complete. This is accomplished at each truss or rafter and properly installed by trained and skilled carpenters to make sure that the correct size, location, direction, and number of fasteners, usually nails, are provided to meet the necessary loads for uplift, shear and overturning forces. The rafter webs 12 and tabs 14, 18 and 20 greatly increase the resistance to sliding of the rafters along the top plate and are aided by the lower tab or tabs 33 as would be understood in the art.

[0028] While the invention has been described with respect to certain specific embodiments, it will be appreciated that many modifications and changes may be made by those skilled in the art without departing from the spirit of the invention. It is intended therefore, by the appended claims to cover all such modifications and changes as fall within the true spirit and scope of the invention.

What is claimed as new and what it is desired to secure by Letters Patent of the United States is:
1. A metal connector for securing a rafter and top plate of a building wall: comprising:
   a generally flat central planar member having an upper and lower portion;
   a plurality of spaced openings in said lower portion of said central member for passage of fasteners therethrough to affix said central member to a top plate;
   a pair of spaced first generally right angle bends on said upper portion of said central member forming a pair of spaced elongate rafter webs;
   each said rafter web having an upper and lower bend defining a upper rafter tab and an upper plate tab, each said tab
including at least one opening therethrough for passage of a fastener to affix respective said tab to a respective rafter and a top side of a top plate; and a pair of spaced and parallel second generally right angle bends on said upper portion of said central member extending in a direction generally opposite to the direction of said rafter webs forming a pair of spaced rafter flanges, each said rafter flange having a plurality of openings therethrough for fasteners to affix respective said rafter flange to a rafter.

2. The connector as defined in claim 1 wherein each said upper plate tab of each rafter web includes a generally right angle bend extending substantially in the same plane as said central planar member for defining a downwardly disposed lower plate tab, each said lower plate tab including at least one opening therethrough for a fastener to affix respective said lower plate tab to a side of a top plate.

3. The connector as defined in claim 1 wherein said lower portion of said central member includes a generally planar extension portion having a generally horizontally disposed right angle bend for defining a second lower plate tab, said second lower plate tab including at least one opening therethrough for a fastener to affix said second lower plate tab to a bottom side of a top plate.

4. The connector as defined in claim 1 wherein said lower portion of said central member includes a pair of spaced generally planar extension portions each having a generally horizontally disposed right angle bend for defining a pair of second lower plate tabs each including spaced openings for fasteners to affix each said second lower plate tab to a bottom side of a top plate.

5. The connector as defined in claim 3 wherein said extension portion includes a stud flange subventing therefrom, said stud flange including at least one opening for a fastener to affix said stud flange to a stud of a building wall.

6. The connector as defined in claim 4 wherein said extension portion includes a medially located stud flange between said second lower plate tabs having a plurality of spaced openings for fasteners for affixing said stud flange to a stud attached to a top plate of a building wall.

7. The connector as defined in claim 6 wherein said central planar portion and said second lower plate tabs and said stud flange are substantially coplanar.

8. The connector as defined in claim 2 wherein said lower portion of said main member includes a pair of spaced generally planar plate portions, each said plate portion having a generally horizontally disposed right angle bend for defining a pair of second lower plate tabs each including spaced openings for fasteners to affix each said second lower plate tab to a top plate.

9. The connector as defined in claim 8 wherein said lower plate tabs and said second lower plate tabs are substantially parallel and spaced apart by a height of a top plate of a building wall.

10. The connector as defined in claim 1 wherein said first pair of right angle bends is respectively disposed along respective side portions of said central planar member and being angularly disposed by imaginary acute angle at their intersection with a medially located centrally disposed axis of said central member.

11. The connector as defined in claim 1 wherein said at least one opening in each said rafter flange is elongate in shape to accommodate the passage of a fastener therethrough at a selectable angle for affixing each said rafter flange to a rafter.

12. The connector as defined in claim 1 wherein said at least one opening in each said rafter flange is elongate in shape to accommodate the passage of a fastener therethrough at a selectable angle for affixing each said rafter flange to a rafter.

13. The connector as defined in claim 1 wherein said rafter flanges are oppositely disposed to be affixed to respective opposite sides of a rafter disposed in a space defined between said rafter flanges.

14. A metal connector for securing a rafter having opposite sides, a top plate of a building wall having top and bottom sides and side surfaces and wall stud comprising: a generally central planar member in the form of a flat plate having opposite sides and an upper and lower portion; a plurality of spaced openings in said lower portion of said central member for the passage of fasteners therethrough to affix said central member to one side of a top plate; a pair of spaced generally right angle bends on said upper portion of said central member forming a pair of spaced elongate rafter webs each extending from said bend outwardly to respective opposite side of said central member; each said rafter web having an upper and lower bend defining an upper rafter tab and an upper plate tab portion; each said tab including two elongate openings therethrough for passage of a fastener at a selectable angle to affix said stud flange to a respective rafter and the top side of a top plate; and a pair of spaced and parallel second generally right angle bends on said upper portion of said central member extending in a direction generally opposite to the direction of said rafter webs forming a pair of oppositely disposed rafter flanges defining a space for a rafter therebetween, each said rafter flange having a plurality of vertically aligned elongate openings therethrough for fasteners to affix respective said rafter flange to one side of a rafter.

15. The connector as defined in claim 14 wherein each said upper plate tab portion of each first rafter web includes a right angle bend extending substantially in the same plane as said central member for defining a downwardly disposed lower plate tab coplanar with each said lower plate tab including an opening therethrough for a fastener to affix respective said lower plate tab to one side of the top plate.

16. The connector as defined in claim 14 wherein said lower portion of said central member includes a pair of spaced generally planar extension portions, each said extension portion having a generally horizontally disposed right angle bend for defining a pair of second lower plate tabs each including spaced openings for fasteners to affix each said second lower plate tab to a bottom side of a top plate.

17. The connector as defined in claim 16 further including a stud flange coplanar with and subventing from said lower portion of said central member and located medially between said second lower plate tabs of said central member, said stud flange including at least one opening for a fastener to affix said stud flange to a stud.

18. The connector as defined in claim 14 wherein said lower portion of said central member includes a pair of spaced generally planar lower extension portions and a medially located stud flange therebetween having a plurality of openings for fasteners for affixing said stud flange to a stud, each said lower extension portion having a generally horizontally
disposed right angle bend for defining a pair of second lower plate tabs each including a pair of spaced openings for fastener to affix each said second lower plate tab to the bottom side of a top plate.

19. The connectors as defined in claim 14 wherein said at least one opening in each said upper rafter plate tab is elongate in shape to accommodate the passage of a fastener there-through at a selectable angle for affixing said tab to a rafter.

20. The connector as defined in claim 14 wherein said first pair of right angle bends are respectively disposed along respective side portions of said central planar member and being angularly disposed by imaginary acute angle at their intersection with a medially located vertically disposed axis of said central member.

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