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BEAM-TO-COLUMN JOINT CONNECTION

Abstract

A prefabricated column assembly includes a hollow tubular column, a gusset plate and a connection plate. The hollow tubular column has a longitudinal axis. The gusset plate is attached to a first face of the column and extending in a plane generally parallel to the longitudinal axis of the column. A connection plate extends in a plane generally perpendicular to the gusset plate.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION [0001] This application claims priority to U.S. Provisional Application No. 63/554,803, filed Feb. 16, 2024, the entirety of which is hereby incorporated by reference.

FIELD

[0002] The present disclosure relates generally to a beam-to-column joint connection, and more particularly to a beam-to-column joint connection including a column assembly and gusset plate assembly.

BACKGROUND

[0003] Structures formed by basic, often steel, components such as columns, headers and joists that can be assembled relatively rapidly, while providing a solid and enduring structure. However, even this well-known construction method requires some care in making connections and there can be alignment issues that delay construction. In mezzanine structures used in factories and other commercial areas, it is also important that the components can be assembled very rapidly without loss of stability.

SUMMARY

[0004] In one aspect, a prefabricated column assembly comprises a hollow tubular column having a longitudinal axis and a gusset plate assembly. The gusset plate assembly comprises a first gusset plate, a first connection plate, a second gusset plate, and a second connection plate. The first gusset plate is attached to a first face of the column and extends in a plane generally parallel to the longitudinal axis of the column. The first connection plate is attached to the first gusset plate and extends in a plane generally perpendicular to the plane of the first gusset plate. The second gusset plate is attached to a second face of the column and extends in a plane generally parallel to the longitudinal axis of the column. The second connection plate is attached to the second gusset plate and extends in a plane generally perpendicular to the plane of the second gusset plate. The first and second connection plates provide a biaxial joint connection.

[0005] In another aspect, a prefabricated column assembly comprises a hollow tubular column having a longitudinal axis and a gusset plate assembly. The gusset plate assembly comprises a gusset plate and a connection plate. The gusset plate is attached to a face of the column and extends in a plane generally parallel to the longitudinal axis of the column. The connection plate is attached to the face of the column and extends in a plane generally perpendicular to the plane of the gusset plate. The gusset plate and connection plate provide a biaxial joint connection.

[0006] In another aspect, a joint connection in a mezzanine structure comprises a tubular column, a first stringer, a second stringer, and a gusset plate assembly. The tubular column has a longitudinal axis, a first lateral face, and a second lateral face. The gusset plate assembly comprises a first gusset plate subassembly and a second gusset plate subassembly. Each of the first and second gusset plate subassemblies comprises a first gusset plate and a second gusset plate interconnected with each other. The first gusset plate overlaps and is joined to the first lateral face of the tubular column. The second gusset plate overlaps and is joined to the second lateral face of the tubular column. The first gusset plate projects from the first lateral face of the tubular column. The first stringer is attached to the first gusset plate. The second stringer is attached to the second gusset plate. The first stringer and second stringer each extend away from the column in different directions.

[0007] In another aspect, a gusset plate for connecting a beam to a column comprises a metal plate and a pin. The metal plate has openings therein for receiving bolts. The pin projects outward from a major surface of the gusset plate and is positioned for catching the beam for supporting the beam by the metal plate.

[0008] Other objects and features will be in part apparent and in part pointed out hereinafter.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. **1** is a fragmentary top view of a building framework of the present disclosure;

[0010] FIG. **2** is a perspective of an interior biaxial joint connection structure of the building framework of FIG. **1**;

[0011] FIG. **3** is a top view of the joint connection structure of FIG. **2**;

[0012] FIG. **4** is a top view of a perimeter biaxial joint connection structure of the building framework of FIG. **1**;

[0013] FIG. **5** is a top view of a corner biaxial joint connection structure of the building framework of FIG. **1**;

[0014] FIG. **6** is a perspective of an interior biaxial joint connection structure of another embodiment;

[0015] FIG. **7** is a top view of the joint connection structure of FIG. **6**;

[0016] FIG. **8** is a perspective of an interior biaxial joint connection structure of another embodiment;

[0017] FIG. **9** is a top view of the joint connection structure of FIG. **8**;

[0018] FIG. **10** is a top view of a perimeter biaxial joint connection structure;

[0019] FIG. **11** is a top view of a corner biaxial joint connection structure;

[0020] FIG. **12** is a top view of another building framework of the present disclosure;

[0021] FIG. **13** is a perspective of a joint connection structure of another embodiment;

[0022] FIG. **14** is a side view of a joint connection structure of another embodiment; and

[0023] FIG. **15** is a perspective of a joint connection structure of another embodiment.

[0024] Corresponding reference characters indicated corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0025] Referring to FIGS. **1-3**, an interior, biaxial beam-to-column joint connection structure of a first embodiment is generally indicated at **11**. The joint connection structure may be used in the construction of a building framework **1** (see, FIG. **1**). In the illustrated embodiment, the joint connection structure joins a column assembly **13** including a column **15** to a plurality of full-length beam assemblies **17** (FIG. **2**) each including full-length beam channels **19** (broadly, stringers). A full-length beam channel is a beam channel that has a length sufficient to extend substantially the full-length between adjacent columns in a structure (see, FIG. **1**). In the illustrated embodiment, the joint connection structure **11** has a 4-sided/4-beam configuration whereby four full-length beam assemblies **17** are configured to be attached to the column assembly **13** providing a biaxial joint connection. In the illustrated embodiment, column **15** is an HSS tube section structure having a rectangular (broadly, “polygonal”) cross section defined by four column faces. In the illustrated embodiment, the beam channels **19** generally comprise U-shaped, cold formed steel channels. The beam channels **19** may be arranged in either a single or double configuration depending upon the location and load requirement of the joint connection. However, the column **15** and beam channels **19** may have any suitable configuration. The joint connection **11** is configured to withstand seismic loads and be incorporated into single and multi-story build frameworks.

[0026] Referring to FIGS. **2** and **3**, the column assembly **13** includes a gusset plate assembly **21** for attaching the column assembly to the beam assemblies **17**. The gusset plate assembly **21** comprises a plurality of gusset plates **23** connected to the column **15**. The gusset plates **23** function to distribute load applied to the beam assemblies **17** across the column flanges. In the illustrated embodiment, there are four (4) gusset plates each welded to a separate face of the column **15**. The gusset plates **23** extend within planes generally parallel to a longitudinal axis of the column **15**. Thus, each gusset plate **23** extends parallel to the face of the column to which it is attached. Each

gusset plate **23** is also contained within the lateral extension of the face of the column **15** to which it is attached. Thus, the gusset plates **23** do not extend laterally outward from the column **15**. In one embodiment, a width of each gusset plate **23** is at least 1 inch less that a width of the column flange to which the gusset plate is attached. In one embodiment, the width of each gusset plate is about 1.5 inches less than the width of the column flange to which the gusset plate is attached. Additionally, a thickness of each gusset plate **23** may be at least ½ inch. In one embodiment, the thickness of each gusset plate **23** is between about ½ inch and about 1 inch.

[0027] A connection plate **25** is attached to each gusset plate **23**. Each connection plate **25** is centered on and extends generally perpendicularly from the gusset plate **23** to which it is attached. Thus, a major surface of the connection plate **25** extends orthogonally to a major surface of the gusset plate **23**. The connection plates **25** define fastener holes for receiving fasteners for attaching the beam assemblies **17** to the column assembly **13**. The fastener holes are spaced apart along a bottom edge of the connection plates **25**. Thus, the column assembly **13** is bolted to the beam assemblies **17** by bolts **26** extending through aligned bolt holes in the connection plates **25** and the beam channels **19**. The bolt holes in the beam channels **19** may be disposed in a web of the channel adjacent a bottom flange of the channel. The bolts **26** attach a pair of beam channels **19** to opposite sides of a connection plate **25**. In one embodiment, the pair of beam channels **19** attached to a common connection plate **25** may be considered a beam assembly **17**. Alternatively, a single beam channel **19** attached to a connection plate **25** may be considered a beam assembly **17**. In the illustrated embodiment, the gusset plate assembly **21** is constructed and arranged so that four, co-planar beams assemblies **17** are connected to the column **15**.

[0028] The joint connection structure **11** outlined above is a biaxial beam-to-column type structure. The structure **11** provides for beam assembly connection along four sides of hollow tubular column **15**. Most preferably, each of the components of the joint connection structure **11**, as well as the beam channels **19** and column **15**, are made of structural steel. Some of the components of the joint connection structure **11** are united by welding and some by bolting. The welding may be initially performed at a fabrication shop. The bolting may be performed at the construction site, which is the preferred option in many regions of the world. However, it will be understood that the beam assembly **17** can be connected to the column assembly **13** in other suitable ways such as by welding. In one embodiment, the column assembly **13** may be considered a prefabricated column assembly such that the components of the column assembly are attached to each other at a manufacturing or fabrication shop prior to being delivered to the construction site.

[0029] Referring to FIG. **4**, a joint connection structure of another embodiment is generally indicated at **111**. The joint connection structure **111** is similar to the structure **11** shown in FIG. **2**. However, the joint connection structure **111** comprises a perimeter joint connection structure as shown in the building framework **1** in FIG. **1**.

[0030] Referring to FIG. **5**, a joint connection structure of another embodiment is generally indicated at **211**. The joint connection structure **211** is similar to the structure **11** shown in FIG. **2**. However, the joint connection structure **211** comprises a corner joint connection structure as shown in the building framework **1** in FIG. **1**.

[0031] Referring to FIGS. **6** and **7**, a joint connection structure of another embodiment is generally indicated a **311**. The joint connection structure **311** is similar to the structure **11** shown in FIG. **2**. As such, like elements have been given like reference numbers plus **300**. In the illustrated embodiment, the joint connection structure joins a column assembly **313** including a column **315** to a plurality of full-length beam assemblies **317** (FIG. **6**) each including full-length beam channels **319**. In the illustrated embodiment, column **315** is an HSS tube section structure having a rectangular (broadly, “polygonal”) cross section defined by four column faces. In the illustrated embodiment, the beam channels **319** comprise U-shaped channels. However, the column **315** and beam channels **319** may have any suitable configuration.

[0032] The column assembly **313** includes a gusset plate assembly **321** for attaching the column

assembly to the beam assemblies **317**. The gusset plate assembly **321** comprises a plurality of gusset plates **323** connected to the column **315**. In the illustrated embodiment, there are four (4) gusset plates. A first pair of gusset plates are welded to a first face of the column **315**, and a second part of gusset plates **323** are welded to a second face of the column opposite the first face. The gusset plates **323** extend laterally outward from the column **315** and within planes generally parallel to a longitudinal axis of the column **315**. Thus, each gusset plate **323** extends parallel to the face of the column **315** to which it is attached. The first gusset plate **323** of each pair extends laterally outward from the column **315** in a first direction, and the second gusset plate **323** in each pair extends laterally outward from the column in a second direction opposite the first direction. Thus, each first gusset plate **323** is configured for connection to one of the beam channels **319** of a beam assembly **317**, and each second gusset plate **323** is configured for connection to one of the beam channels **319** of another beam assembly **317**. Therefore, the gusset plates **323** are configured to attach a pair of co-axial beam assemblies **317** to the column assembly **313**.

[0033] A connection plate **325** is attached to the column **315** and extends outward from a pair of faces of the column between the gusset plates **323**. In the illustrated embodiment, the connection plate **325** extends through slots in the column faces and is welded directly to the column **315** at the slots. The connection plate **325** extends generally perpendicularly to the gusset plates **323**. Thus, a major surface of the connection plate **325** extends orthogonally to the major surfaces of the gusset plates **323**. The connection plate **325** defines fastener holes for receiving fasteners for attaching beam assemblies **317** to the column assembly **313**. The fastener holes are spaced apart along a bottom edge of the connection plate **325** at opposite end margins of the connection plate. Thus, the column assembly **313** is also bolted to a pair of co-axial beam assemblies **317** by bolts **326** extending through aligned bolt holes in the connection plate **325** and the beam channels **319**. The bolt holes in the beam channels **319** may be disposed in a web of the channel adjacent a bottom flange of the channel. The bolts **326** attach a pair of beam channels **319** to opposite sides of a connection plate **325**. In one embodiment, the pair of beam channels **319** extending from a common face of the column **315** may be considered a beam assembly **317**. In the illustrated embodiment of an interior joint connection structure, the gusset plate assembly **321** is constructed and arranged so that four, co-planar beams assemblies **317** are connected to the column **315**.

[0034] The joint connection structure **311** outlined above is a biaxial beam-to-column type structure. The structure **311** provides for beam assembly connection along four sides of hollow tubular column **15**. Most preferably, each of the components of the joint connection structure **311**, as well as the beam channels **319** and column **315**, are made of structural steel. Some of the components of the joint connection structure **311** are united by welding and some by bolting. The welding may be initially performed at a fabrication shop. The bolting may be performed at the construction site, which is the preferred option in many regions of the world. However, it will be understood that the beam assembly **317** can be connected to the column assembly **313** in other suitable ways such as by welding. In one embodiment, the column assembly **313** may be considered a prefabricated column assembly in which the components of the column assembly are attached to each other at manufacturing or fabrication shop prior to being delivered to the construction site.

[0035] Referring to FIGS. **8** and **9**, a joint connection structure of another embodiment is generally indicated a **411**. The joint connection structure **411** is similar to the structure **11** shown in FIG. **2**. As such, like elements have been given like reference numbers plus **400**. In the illustrated embodiment, the joint connection structure joins a column assembly **413** including a column **415** to a plurality of full-length beam assemblies **417** (FIG. **6**) each including full-length beam channels **419**. In the illustrated embodiment, column **415** is an HSS tube section structure having a rectangular (broadly, “polygonal”) cross section defined by four column faces. In the illustrated embodiment, the beam channels **419** comprise U-shaped, cold formed steel channels. However, the column **415** and beam channels **419** may have any suitable configuration.

[0036] The column assembly **413** includes a gusset plate assembly **421** for attaching the column assembly to the beam assemblies **417**. The gusset plate assembly **421** comprises a plurality (four) of gusset plate subassemblies **471** separately welded to column **415**. Each subassembly **471** hugs its two adjacent orthogonal faces of the column **415**, thereby enclosing the corner of the column, and is welded to the column. The gusset plate subassemblies each include a first gusset plate and a second gusset plate.

[0037] The gusset plates **423** extend laterally outward from the column **415** and within planes generally parallel to a longitudinal axis of the column **415**. Thus, each gusset plate **423** extends parallel to the face of the column **415** to which it is attached. The first gusset plate **423** of each pair extends laterally outward from the column **415** in a first direction, and the second gusset plate in each pair extends laterally outward from the column in a second direction orthogonal the first direction. Each gusset plate **423** is configured for connection to a beam channel **419** of a beam assembly **417**.

[0038] Each subassembly **471** comprises the first gusset plate **423** having an open slot located closer to one side of the first gusset plate, and the second gusset plate having an open slot located closer to one side of the second gusset plate. The gusset plates **423** are attached by mating the slots with each other and welding the gusset plates to the column **415** at vertical welds. The assembled gusset plate subassemblies **471** have an unsymmetrical, crossed configuration. The portions of the gusset plates **423** that define a smaller section are welded to the four corners of the column **415**, and the portions of the gusset plates that define a larger section extend laterally outward from the column and are bolted to the beam channels **419**.

[0039] Referring to FIG. **10**, a joint connection structure of another embodiment is generally indicated at **511**. The joint connection structure **511** is similar to the structure **411** shown in FIG. **8**. However, the joint connection structure **511** comprises a perimeter joint connection structure similar to the one shown in the building framework **100** in FIG. **12**.

[0040] Referring to FIG. **11**, a joint connection structure of another embodiment is generally indicated at **611**. The joint connection structure **611** is similar to the structure **411** shown in FIG. **8**. However, the joint connection structure **611** comprises a corner joint connection structure as shown in the building framework **100** in FIG. **12**.

[0041] FIG. **12** shows a building framework incorporating different types of joint connections. In particular, joint connection **11** is used for the interior joints, joint connection **511** is used for the perimeter joints, and joint connection **611** is used for the corner joints.

[0042] Referring to FIG. **13**, a joint connection structure of another embodiment is generally indicated at **711**. The joint connection structure **711** is a corner joint connection structure similar to the structures **211** and **611** shown in FIGS. **5** and **11**, respectively. However, the joint connection structure **711** comprises gusset plates **723** that include pins **730** attached to and extending laterally from the gusset plates. The pins **730** are receivable in notches **732** in the ends of the beam channels **719** to at least temporarily locate or seat the beam channels relative to or on the gusset plates **723**. The beam channels **719** can then be attached (e.g., bolted) to the gusset plates **723** to secure the beam channels to the gusset plates. In the illustrated embodiment, the notches **732** have open bottoms that allow the pins **730** to be received in the notches as the beam channels **719** are lowered into registration with the gusset plates **723**. The pins **730** properly position the beam channels **719** relative to the gusset plates **723** for being bolted to the gusset plates when the pins are received in the notches **732**. In one embodiment, the pins **730** extend from the major surfaces of the gusset plates **723** at an upward angle. The upward extension of the pins **730** may provide a more secure holding force for keeping the beam channel **719** in place. In another embodiment, the pins **730** extend from the major surfaces of the gusset plates **723** at an orthogonal angle. The pins **730** could extend from the gusset plates **723** at other angles without departing from the scope of the disclosure. Additionally, the pins **730** can be incorporated into other joint connection structures without departing from the scope of the disclosure. For instance, the pins **730** can be attached to

gusset plates in other corner joint connection structures or in the interior and perimeter joint connection structures disclosed herein.

[0043] Referring to FIG. **14**, a joint connection structure of another embodiment is generally indicated at **811**. The joint connection structure **811** is a corner joint connection structure similar to the structure **711** shown in FIG. **13**. The joint connection structure **811** comprises gusset plates **823** that include pins **830** attached to and extending laterally from the gusset plates. The pins **830** are receivable in openings **832** near the ends of the beam channels **819** to at least temporarily locate or seat the beam channels relative to or on the gusset plates **823**. The beam channels **819** can then be attached (e.g., bolted) to the gusset plates **823** to secure the beam channels to the gusset plates. In the illustrated embodiment, the openings **832** are elongate having their major dimension extending along a height of the beam channel **819** to facilitate insertion of the pins **830** into the openings after the beam channels have been lowered into registration with the gusset plates **823**. The pins **830** properly position the beam channels **819** relative to the gusset plates **823** for being bolted to the gusset plates when the pins are inserted into the openings **832**. In one embodiment, the pins **830** extend from the major surfaces of the gusset plates **823** at an upward angle. The upward extension of the pins **830** may provide a more secure holding force for keeping the beam channel **819** in place. In another embodiment, the pins **830** extend from the major surfaces of the gusset plates **823** at an orthogonal angle. The pins **830** could extend from the gusset plates **823** at other angles without departing from the scope of the disclosure. Additionally, the pins **830** can be incorporated into other joint connection structures without departing from the scope of the disclosure. For instance, the pins **830** can be attached to gusset plates in other corner joint connection structures or in the interior and perimeter joint connection structures disclosed herein.

[0044] Referring to FIG. **15**, a joint connection structure of another embodiment is generally indicated at **911**. The joint connection structure **911** is a corner joint connection structure similar to the structures **711** and **811** shown in FIGS. **13** and **14**, respectively. However, the joint connection structure **911** comprises gusset plates **923** that include a bottom seat plate **930** attached to and extending laterally from bottoms of the vertically extending plate members of the gusset plates. Ends of the beam channels **819** can rest on the seat plates **930** to at least temporarily locate or seat the beam channels relative to or on the gusset plates **923**. The beam channels **919** can then be attached (e.g., bolted) to the gusset plates **923** (or a connection plate attached to the gusset plate) to secure the beam channels to the gusset plates. In one embodiment, the seat plates **930** extend from the vertically extending plate members of the gusset plates **923** at an orthogonal angle providing a horizontal surface for supporting the beam channels **919**. However, the seat plates **930** could extend at other angles without departing from the scope of the disclosure. Additionally, the seat plates **930** can be incorporated into other joint connection structures without departing from the scope of the disclosure. For instance, the seat plates **930** can be incorporated into gusset plates in other corner joint connection structures or in the interior and perimeter joint connection structures disclosed herein.

[0045] It is believed that the present disclosure and many of its attendant advantages will be understood by the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the components without departing from the disclosed subject matter or without sacrificing all of its material advantages. The form described is merely explanatory, and it is the intention of the following claims to encompass and include such changes.

[0046] While the present disclosure has been described with reference to various embodiments, including preferred embodiments, it will be understood that these embodiments are illustrative and that the scope of the disclosure is not limited to them. Many variations, modifications, additions, and improvements are possible. More generally, embodiments in accordance with the present disclosure have been described in the context of particular embodiments. Functionality may be separated or combined in blocks differently in various embodiments of the disclosure or described with different terminology. These and other variations, modifications, additions, and improvements

may fall within the scope of the disclosure as defined in the claims that follow.
OTHER STATEMENTS OF THE DISCLOSURE
[0047] The following are statements or features of invention described in the present disclosure. Some or all of the following statements may not be currently presented as claims. Nevertheless, the statements are believed to be patentable and may subsequently be presented as claims. Associated apparatuses corresponding to the statements or methods below (and vice versa) are also believed to be patentable and may subsequently be presented as claims. It is understood that the following statements may refer to and be supported by one, more than one, or all the embodiments described above. [0048] A1. A joint connection in a mezzanine structure comprising: [0049] a tubular column having a longitudinal axis, a first lateral face and a second lateral face; [0050] a first stringer; [0051] a second stringer; [0052] a gusset plate assembly comprising a first gusset plate subassembly and a second gusset plates subassembly, each of the first and second gusset plate subassemblies comprising a first gusset plate and a second gusset plate interconnected with each other, the first gusset plate overlapping and being joined to the first lateral face of the tubular column and the second gusset plate overlapping and being joined to the second lateral face of the tubular column, the first gusset plate projecting from the first lateral face of the tubular column; [0053] the first stringer being attached to the first gusset plate and the second stringer being attached to the second gusset plate, the first stringer and second stringer each extending away from the column in different directions. [0054] A2. The joint connection of statement A1, in which the first stringer is bolted to an exterior face of the first gusset plate and the second stinger is bolted to an exterior face of the second gusset plate. [0055] B1. A gusset plate for connecting a beam to a column, the gusset plate comprising a metal plate having openings therein for receiving bolts and a pin projecting outward from a major surface of the gusset plate and positioned for catching the beam for supporting the beam by the metal plate. [0056] B2. The gusset plate of statement B1, wherein the pin extends from the gusset plate at a nonorthogonal angle with respect to the major surface of the gusset plate.

Claims

1. A prefabricated column assembly comprising: a hollow tubular column having a longitudinal axis; and a gusset plate assembly comprising a first gusset plate attached to a first face of the column and extending in a plane generally parallel to the longitudinal axis of the column, a first connection plate attached to the first gusset plate and extending in a plane generally perpendicular to the plane of the first gusset plate, a second gusset plate attached to a second face of the column and extending in a plane generally parallel to the longitudinal axis of the column, and a second connection plate attached to the second gusset plate and extending in a plane generally perpendicular to the plane of the second gusset plate, the first and second connection plates providing a biaxial joint connection.
2. The column assembly of claim 1, wherein the gusset plate assembly further comprises a third gusset plate attached to a third face of the column and extending in a plane generally parallel to the longitudinal axis of the column, and a third connection plate attached to the third gusset plate and extending in a plane generally perpendicular to the plane of the third gusset plate.
3. The column assembly of claim 2, wherein the gusset plate assembly further comprises a fourth gusset plate attached to a fourth face of the column and extending in a plane generally parallel to the longitudinal axis of the column, and a fourth connection plate attached to the fourth gusset plate and extending in a plane generally perpendicular to the plane of the fourth gusset plate.
4. The column assembly of claim 1, wherein the column comprises an HSS column.
5. The column assembly of claim 1, wherein the first and second gusset plates are welded to the column.
6. The column assembly of claim 5, wherein the first and second connection plates are welded to

and centered on the gusset plates.
7. The column assembly of claim 1, wherein the first and second gusset plates and the first and second connection plates each comprise planar plate members.
8. The column assembly of claim 1, in combination with a stringer bolted to one of the first and second connection plates.
9. The column assembly of claim 8, further comprising a second stringer bolted to said one of the first and second connection plates.
10. The column assembly of claim 9, wherein the first and second stringers are bolted to opposite sides of said one of the first and second connection plates.
11. A prefabricated column assembly comprising: a hollow tubular column having a longitudinal axis; and a gusset plate assembly comprising a gusset plate attached to a face of the column and extending in a plane generally parallel to the longitudinal axis of the column, and a connection plate attached to the face of the column and extending in a plane generally perpendicular to the plane of the gusset plate, the gusset plate and connection plate providing a biaxial joint connection.
12. The column assembly of claim 11, wherein the gusset plate comprises a first gusset plate, the gusset plate assembly further comprising a second gusset plate attached to the face of the column.
13. The column assembly of claim 12, wherein the first gusset plate extends laterally outward from the column in a first direction, and the second gusset plate extends laterally outward from the column in a second direction opposite the first direction.
14. The column assembly of claim 12, wherein the first and second gusset plates are welded to the face of the column.
15. The column assembly of claim 13, wherein the connection plate is welded to the face of the column.
16. The column assembly of claim 12, wherein the first and second gusset plates and the connection plate each comprise planar plate members.
17. The column assembly of claim 11, in combination with a stringer bolted to the connection plate.
18. The column assembly of claim 17, further comprising a second stringer bolted to the connection plate.
19. The column assembly of claim 18, wherein the first and second stringers are bolted to opposite sides of the connection plate.
20. The column assembly of claim 19, further comprising a third stringer bolted to one of the first and second gusset plates.