

BALCONY SYSTEM AND METHOD

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Application No. 62/767,355, entitled “Balcony System and Method,” and filed on November 14, 2018, which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] The construction industry is increasingly using modular construction techniques to improve efficiency. However, some aspects of construction, such as traditional balcony construction, may still present challenges to improving construction efficiency.

[0003] Workplace safety regulations, other rules, or industry practices may require all personnel in a building (or area of a building under construction) that has a balcony opening but no balcony guardrail installed to wear safety harnesses, which may increase labor costs and reduce time efficiencies. Further, installation of traditional balcony components may be time consuming and require skilled tradespeople and specialized equipment.

SUMMARY

[0004] Some implementations can include a balcony system, a false balcony system, and methods for making and installing both. Some implementations can include a balcony system having a balcony beam including a first end and a second end, wherein each of the first end and the second end are configured to attach to corresponding structural frame members of a building. The balcony system can also include a channel balcony frame, and a channel balcony frame attachment member attached to the balcony beam and having one or more apertures.

[0005] The balcony system can further include one or more reinforcement bars disposed in an interior space defined by the channel balcony frame, wherein the one or more reinforcement bars extend through the one or more apertures in the channel balcony frame attachment member, and wherein the reinforcement bars and the channel balcony frame attachment member are held in place within the interior space defined by the channel balcony frame by a floor formed within the interior space defined by the channel balcony frame, such that, after the floor is formed, the balcony beam, channel balcony frame and concrete floor form an integral unit.

[0006] The balcony system can also include one or more guardrail support brackets attached to the channel balcony frame via one or more fasteners that pass through the one or more guardrail support brackets and into the interior space defined by the channel balcony frame, wherein the one or more guardrail support brackets are secured in place by the floor formed within the interior space defined by the channel balcony frame. The balcony system can further include one or more stanchion guardrail supports each attached to a respective one of the one or more guardrail support brackets and secured in place by a corresponding closure plate.

[0007] In some implementations, the balcony system can also include a guardrail attached to the one or more stanchion guardrail supports, one or more horizontal guardrail members attached to the one or more stanchion guardrail supports, and one or more guardrail panels attached to the one or more horizontal guardrail members.

[0008] In some implementations, each of the first end and the second end can include a respective plate to couple the balcony beam to the corresponding structural frame members of the building. The channel balcony frame can have a rectangular shape.

[0009] In some implementations, the channel balcony frame can include one or more stanchion guard rail support apertures each configured to enable a respective stanchion guard

rail support to pass through a respective stanchion guard rail support aperture. The channel balcony frame can be formed from stainless steel and the balcony floor can be formed from concrete.

[0010] The balcony system can also include a light element coupled to the one or more stanchion guardrail supports. In some implementations, the one or more guardrail panels include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.

[0011] Some implementations can include a false balcony system having a balcony beam including a first end and a second end, wherein each of the first end and the second end are configured to attach to corresponding structural frame members of a building, and a balcony beam attachment member attached to the balcony beam such that the balcony beam attachment member and the balcony beam form an integral unit, wherein the balcony beam attachment member includes one or more apertures. The false balcony system can include one or more guardrail support brackets attached to the balcony beam attachment member via one or more fasteners that pass through the one or more guardrail support brackets and through a respective aperture in the balcony beam attachment member.

[0012] The false balcony system can also include one or more stanchion guardrail supports each attached to a respective one of the one or more guardrail support brackets and secured in place by a corresponding closure plate, and a guardrail attached to the one or more stanchion guardrail supports. The false balcony system can further include one or more horizontal guardrail members attached to the one or more stanchion guardrail supports, and one or more guardrail panels attached to the one or more horizontal guardrail members.

[0013] In some implementations, each of the first end and the second end can include a respective plate to couple the balcony beam to the corresponding structural frame members of the building. The false balcony system can also include a light element coupled to the one or

more stanchion guardrail supports. The guardrail panels can include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.

[0014] Some implementations can include a method including forming a balcony beam having a first end and a second end, and forming a channel balcony frame. The method can also include forming a balcony beam attachment member, and attaching the balcony beam attachment member to the balcony beam. The method can further include attaching guardrail support brackets to the channel balcony frame, and forming a balcony floor within a space defined by the channel balcony frame to form an integral balcony unit that includes the balcony beam, the channel balcony frame, and the balcony floor.

[0015] The method can also include providing the integral balcony unit and guardrail parts to a construction site of a building, wherein the guardrail parts include a guardrail and one or more stanchion guardrail supports, and attaching the integral balcony unit to a structural frame of the building. The method can further include attaching the guardrail parts to the integral balcony unit, and attaching one or more guardrail panels to the guardrail.

[0016] The method can also include attaching a respective plate to each of the first end and the second end of the balcony beam to couple the balcony beam to the structural frame of the building. Forming the channel balcony frame can include forming the channel balcony frame in a rectangular shape.

[0017] The channel balcony frame can include one or more stanchion guard rail support apertures each configured a respective stanchion guard rail support to pass through a respective stanchion guard rail support aperture. Forming the channel balcony frame can include forming the channel balcony frame from stainless steel. The guardrail panels can include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.

[0018] Some implementations can include a method comprising forming a balcony beam having a first end and a second end, and forming a balcony beam attachment member. The method can also include attaching the balcony beam attachment member to the balcony beam to form an integral balcony unit, and providing the integral balcony unit and guardrail parts to a construction site of a building, wherein the guardrail parts include a guardrail and one or more stanchion guardrail supports. The method can further include attaching the integral balcony unit to a structural frame of the building, and attaching the guardrail parts to the integral balcony unit. The method can also include attaching one or more guardrail panels to the guardrail.

[0019] The method can also include attaching a respective plate to each of the first end and the second end of the balcony beam to couple the balcony beam to the structural frame of the building. The guardrail panels can include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 is a diagram showing a perspective view of an example balcony system from a lower vantage point in accordance with some embodiments.

[0021] FIG. 2 is a diagram showing a side perspective view of an example balcony system in accordance with some embodiments.

[0022] FIG. 3 is a diagram showing a rear perspective view of an example balcony system in accordance with some embodiments.

[0023] FIG. 4 is a diagram showing a side sectional view of a guardrail connection in accordance with some embodiments.

[0024] FIG. 5 is a diagram showing a top plan view of a guardrail connection in accordance with some embodiments.

[0025] FIG. 6 is a diagram showing a front elevation view of a guardrail connection in accordance with some embodiments.

[0026] FIG. 7 is a diagram showing a false balcony system in accordance with some embodiments.

[0027] FIG. 8 is a diagram showing a balcony in accordance with some embodiments.

[0028] FIG. 9 is a diagram showing an example building with false balconies and balconies in accordance with some embodiments.

[0029] FIGS. 10A, 10B, and 10C show elevation, plan and framing views, respectively, of an example studio unit balcony with metal infill in accordance with some implementations.

[0030] FIGS. 11A, 11B, and 11C show elevation, plan and framing views, respectively, of an example studio unit balcony with metal infill in accordance with some implementations.

[0031] FIGS. 12A, 12B, and 12C show elevation, plan and framing views, respectively, of an example studio unit balcony with metal infill in accordance with some implementations.

[0032] FIGS. 13A, 13B, and 13C show elevation, plan and framing views, respectively, of an example one bedroom unit balcony with metal infill in accordance with some implementations.

[0033] FIGS. 13A, 13B, and 13C show elevation, plan and framing views, respectively, of an example one bedroom unit balcony with metal infill in accordance with some implementations.

[0034] FIGS. 14A, 14B, and 14C show elevation, plan and framing views, respectively, of an example one bedroom unit balcony with metal infill in accordance with some implementations.

[0035] FIGS. 15A, 15B, and 15C show elevation, plan and framing views, respectively, of an example one bedroom unit balcony with metal infill in accordance with some implementations.

[0036] FIGS. 16A, 16B, and 16C show elevation, plan and framing views, respectively, of an example one bedroom unit balcony with metal infill in accordance with some implementations.

[0037] FIGS. 17A, 17B, and 17C show elevation, plan and framing views, respectively, of an example two bedroom unit balcony with metal infill in accordance with some implementations.

[0038] FIGS. 18A, 18B, and 18C show elevation, plan and framing views, respectively, of an example two bedroom unit balcony with metal infill in accordance with some implementations.

[0039] FIG. 19 is a sectional view of an example balcony with metal infill in accordance with some implementations.

[0040] FIG. 20 is a sectional view of an example balcony with metal infill in accordance with some implementations.

[0041] FIG. 21 is a sectional view of an example balcony with metal infill in accordance with some implementations.

[0042] FIG. 22 shows sectional details of an example balcony with metal infill in accordance with some implementations.

[0043] FIG. 23 is a flowchart of an example method to make and install a balcony system in accordance with some embodiments.

[0044] FIG. 24 is a flowchart of an example method to make and install a false balcony system in accordance with some embodiments.

DETAILED DESCRIPTION

[0045] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented herein. The aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are implicitly contemplated herein.

[0046] This disclosure is drawn, inter alia, to methods, systems, products, devices, and/or apparatuses generally related to a balcony including a full balcony and a false balcony (also known as a balconette or French balcony). As used herein, “balcony” may refer to both a balcony and/or a false balcony as disclosed herein unless context dictates otherwise.

[0047] In some embodiments, a building may have one or more balconies. In some embodiments, when the building is being constructed, prefabricated balconies may be installed. The prefabricated balconies may provide a portion of an exterior surface of the building. In some embodiments, the prefabricated balconies may be coupled to one or more structural frame members of the building. In some embodiments, the balconies may be attached to the structural frame members to help align the structural frame members prior to exterior or interior wall panels being installed. In some embodiments, the balconies are coupled to a load-bearing structure of the building. For example, the load-bearing structure may be an external construction steel frame.

[0048] In some embodiments, one or more of the balconies may have lights or other utilities pre-installed. Utilities may include electrical, plumbing, heating and air conditioning,

telecommunications, and/or other utilities. Installing the lights or utilities during fabrication of the balconies prior to delivery to a building construction site may allow for faster assembly of the building and may reduce the number of skilled tradespeople required for installation of the balconies in the building in some embodiments.

[0049] In some embodiments, the balconies may include two types of balconies – full balconies and false balconies. In some embodiments, one or more of the balconies may be configured to provide at least a portion of an exterior surface of the building.

[0050] In some embodiments, the material composition of the balcony may include steel. In some embodiments, the material composition may include aluminum. In still other embodiments, the components of the balcony system may be made from a variety of building suitable materials ranging from metals and/or metal alloys, to wood and wood polymer composites (WPC), wood based products (lignin), other organic building materials (bamboo) to organic polymers (plastics), to hybrid materials, or earthen materials such as ceramics. In some embodiments, cement or other pourable or moldable building materials may also be used. In other embodiments, any combination of suitable building material may be combined by using one building material for some components of the balcony and other building materials for other components of the balcony. Selection of any material may be made from a reference of material options (such as those provided for in the International Building Code), or selected based on the knowledge of those of ordinary skill in the art when determining load bearing requirements for the structures to be built. Larger and/or taller structures may have greater physical strength requirements than smaller and/or shorter buildings. Adjustments in building materials to accommodate size of structure and/or load and environmental stresses can determine optimal economical choices of building materials used for all components in the balcony described herein. Availability of various building materials in different parts of the world may also affect selection of materials for building the system described herein.

Adoption of the International Building Code or similar code may also affect the selection of materials.

[0051] Any reference herein to “metal” includes any construction grade metals or metal alloys as may be suitable for fabrication and/or construction of the balcony and components described herein. Any reference to “wood” includes wood, wood laminated products, wood pressed products, wood polymer composites (WPCs), bamboo or bamboo related products, lignin products, and/or any plant derived product, whether chemically treated, refined, processed or simply harvested from a plant. Any reference herein to “concrete” includes any construction grade curable composite that includes cement, water, and a granular aggregate. Granular aggregates may include sand, gravel, polymers, ash and/or other minerals.

[0052] In general, in some implementations, a balcony system or false balcony system may be manufactured and installed in a method that includes manufacturing and assembling portions of the balcony or false balcony off-site from a construction site and delivering to the construction site a partially built balcony and kit of part to finish installation and assembly on-site at the construction site. For example, a steel fabricator may make a balcony beam and weld a channel member to the beam. The channel member can include a light gauge “c” section with holes punched at a given interval (e.g., 12 inches), where the holes are punched for rebar (reinforcing bar) to be inserted during the balcony floor manufacturing process. A balcony frame can be fabricated from rolled stainless steel.

[0053] The balcony beam and frame can be delivered to a concrete precast shop. At the precast shop, rebar (or reinforcing bar) is inserted into the holes in the channel welded to the balcony beam. The balcony beam and balcony frame can be placed into form that holds the beam and frame and permits the rebar to be inserted into the holes in the channel member. Also, guardrail support members can be installed and secure to the balcony frame. The form can then be poured with concrete (or other material suitable for casting). Once the concrete

cures, it secures the balcony beam to the balcony frame and creates an integral balcony assembly. Also, the guardrail support members are secured in place by the cured concrete.

[0054] Some implementations can include a guardrail having horizontal members to which the glazing for the balcony guardrail can be attached. By providing horizontal members for the glazing to attach to, the balcony system and false balcony system described herein permit the glazing pieces to be standardized and not limited to attaching to the guardrail stanchion supports (e.g., vertical posts). This provides an advantage of permitting standardized guardrail stanchion support spacing because the glazing is not tied directly to the stanchion supports.

[0055] Turning now to the drawings, FIGS. 1-3 are diagrams of an example balcony system 100 in accordance with some embodiments. The balcony system 100 is attached to two structural frame members (e.g., wide flange columns) 102 and 104.

[0056] The balcony system 100 includes two groups of components. A first group of components may be manufactured and assembled offsite (e.g., not on a building construction site where the balcony system 100 is to be installed). A second group of components (including guardrail components) may be installed on the balcony system 100 at the construction site.

[0057] The first group of components includes a balcony beam 112, a channel balcony frame 114, one or more reinforcing bars 116, a precast concrete balcony floor 118, a balcony beam attachment member 120, and one or more guardrail support brackets 122. In an example embodiment, the metal components (e.g., 112, 114, 116, 120, and 122) may be manufactured and assembled (or partially assembled) at a metal fabrication facility. The assembled or partially assembled metal components may then be sent to a concrete casting facility that pours and casts the concrete balcony floor 118. The concrete balcony floor 118, once cured,

secures the metal and concrete components together into an integral balcony unit that can be delivered to a construction site for use on a building.

[0058] Along with the integral balcony unit, the second group of components may be delivered to the construction site for use in final assembly of the balcony. The second group of components can include a guardrail 106, which may be a single piece or may be a multi-piece guardrail. The second group of components can also include one or more stanchion guardrail supports 108, one or more guardrail panels 110, and one or more sets of hardware including one or more closure plates 124 to attach the one or more stanchion guardrail supports 108 to corresponding guardrail support brackets 122.

[0059] At the construction site, the integral balcony unit can be installed on the building structure. For example, the balcony system 100 includes a balcony beam 112 having a first end and a second end. The first end of the balcony beam 112 is attached to a corresponding first structural frame member 102 and the second end of the balcony beam is attached to a corresponding second structural frame member 104. The attachment can be made via a plate at each of the first end and the second end of the balcony beam 112 that can be bolted or otherwise attached to the structural frame members 102 and 104.

[0060] Once the integral balcony unit is installed, the second group of balcony components can be installed for final assembly of the balcony system. Once the balcony guardrail 106 is in place, the risk of falling out of the balcony opening is substantially reduced. Thus, a need or requirement for use of safety harnesses within the room or area of the building having the balcony system may be removed and workers may proceed to work with greater safety and efficiency within the room or area by performing such tasks as interior wall construction, electrical connections, mechanical connections, and finishing without having to wear a safety harness.

[0061] As shown in FIG. 3, the second group of components (e.g., the guardrail components) can include horizontal members 302 that are attached to the stanchion guardrail supports 108. The guardrail panels 110 can be attached to the horizontal members 302.

[0062] The balcony beam 112 and the channel balcony frame 114 can be formed from stainless steel in one embodiment. The guardrail support brackets 122 can include an angle bracket that is attached to the channel balcony frame 114 via a bolt system (e.g., a 5 inch bolt) extending into an interior space defined by the channel balcony frame 114 and held in place by the concrete balcony floor 118.

[0063] FIGS. 4-6 are diagrams showing a side sectional view, a top plan view, and a front elevation view, respectively, of a guardrail connection in accordance with some embodiments. The connection includes bolts 402 and 404 (e.g., 5 inch bolts) that attach the guardrail support bracket 122 (which can be an angled guardrail support bracket) to the channel balcony frame 114 and that are secured in place by hardware (e.g., a nut, a washer, etc.) and the cured concrete balcony floor 118. The angled guardrail support bracket 122 is used to support and attach the stanchion guardrail support 108 to the channel balcony frame 114.

[0064] FIG. 7 is a diagram showing a false balcony system 700 in accordance with some embodiments. The false balcony system 700 includes a guardrail 702, one or more stanchion guardrail supports 704, one or more guardrail panels 706, a horizontal guardrail member 708, an optional light 710 (e.g., a continuous LED light strip), a “Z” break-shape balcony beam attachment member 712, one or more guardrail support brackets 714, and a balcony beam 716.

[0065] The “Z” break-shape balcony beam attachment member 712 is attached (e.g., welded or otherwise fastened or coupled) to the balcony beam 716. The guardrail support brackets 714 are attached to the “Z” break-shape balcony beam attachment member 712.

[0066] FIG. 8 is a diagram showing a balcony system 800 in accordance with some embodiments. The balcony system 800 includes a guardrail 802, one or more stanchion guardrail supports 804, one or more guardrail panels 806, a horizontal guardrail member 808, an optional light 810 (e.g., a continuous LED light strip), a channel balcony frame 812, one or more guardrail support brackets 814, one or more bolts 816 (attaching the guardrail support brackets 814 to the channel balcony frame 812), a cast concrete balcony floor 818, a balcony beam attachment member 820 (connected to the reinforcing members and cast into the concrete balcony floor), a balcony beam 822 (attached to the balcony beam attachment member 820), and one or more channel balcony frame attachment bolts 824 (securing the channel balcony frame 812 into the concrete balcony floor 818). A thermal break is provided between the cast concrete balcony floor 818 and the building.

[0067] FIG. 9 is a diagram showing an example building with false balconies 700 and balconies 800 in accordance with some embodiments. A building can include zero or more false balconies 700 and zero or more balconies 800.

[0068] FIGS. 10A, 10B, and 10C show elevation, plan and framing views, respectively, of an example studio unit balcony with metal infill in accordance with some implementations. In particular, FIG. 10A shows a structural column 1002 coupled to a balcony support member 1004 (e.g., a 6" x 10" tubular steel member), which supports the balcony and aligns and spaces the balcony and structural columns. The balcony includes a sloping steel bar top 1016 (e.g., 1/2" x 3-1/2") with factory-welded connections to vertical stanchions 1012 that fit into punch holes 1014 (e.g., holes punched 3' on center) in the balcony frame and are bolted to the balcony frame (e.g., 2204). The balcony further includes horizontal members 13 (e.g., 1-1/2"x1-1/2"x2-1/2" t-slot extrusion members factory welded to the vertical stanchions) that the guardrail panels 1020 are attached to. The guardrail panels of FIG. 10A or other figures herein can include one or more of tempered glass, 3Form, metal mesh, polycarbonate, and/or

photovoltaic panels. The balcony can also include a factory installed decking panel(s) 1026. The decking panel(s) 1026 can include any suitable decking material such as synthetic material, tile, wood, etc. Details of the section indicated by S1 in FIG. 10A are shown in FIG. 19.

[0069] As shown in FIG. 10B, the balcony frame can be coped and welded at the tubular steel support 1006. Also shown in FIG. 10B continuous Z-break shape members (e.g., 2"x2-1/8"x2"x2") having deck hold down clips and being factory-bolted to the balcony frame.

[0070] FIG. 10C shows metal infill including one or more of c-channel members 1008 (e.g., 4"x1.76" steel c channel) factory-welded to tubular steel member 1004, break-shape channel 2204, steel plates 1010 (e.g., 1/4" steel plates), and metal studs (e.g., 2-1/2" and 4") 1022 factory attached to the c-channel members 1008.

[0071] FIGS. 11A, 11B, and 11C; and 12A, 12B, and 12C show elevation, plan and framing views, respectively, of example studio unit balconies with metal infill with features similar to those shown in FIGS. 10A-10C. The example balconies shown in FIGS. 11A-C and 12A-C differ in terms of dimensions and/or number of components.

[0072] FIGS. 13A, 13B, and 13C; 14A, 14B, and 14C; and 15A, 15B, and 15C show elevation, plan and framing views, respectively, of example one bedroom unit balconies with metal infill with features similar to those shown in FIGS. 10A-10C. The example balconies shown in FIGS. 13A-C, 14A-C, and 15A-C differ from that shown in FIGS. 10A-C in terms of dimensions and/or number of components.

[0073] FIGS. 16A, 16B, and 16C show elevation, plan and framing views, respectively, of an example one bedroom unit balcony with metal infill with features similar to those shown in FIGS. 10A-10C. In addition to the feature shown in FIGS. 10A-C, FIGS. 16A and B also show decorative panels 1602 (e.g., PVC panels) attached to the balcony.

[0074] FIGS. 17A, 17B, and 17C show elevation, plan and framing views, respectively, of an example two bedroom unit balcony with metal infill with features similar to those shown in FIGS. 10A-10C. In addition to the feature shown in FIGS. 10A-C, FIGS. 17A and B also show decorative panels 1702 (e.g., PVC panels) attached to the balcony.

[0075] FIGS. 18A, 18B, and 18C show elevation, plan and framing views, respectively, of an example two bedroom unit balcony with metal infill with features similar to those shown in FIGS. 10A-10C. In addition to the feature shown in FIGS. 10A-C, FIGS. 18A and B also show decorative panels 1802 (e.g., PVC panels) attached to the balcony.

[0076] FIG. 19 is a sectional view (denoted S1 in earlier figures) of an example balcony with metal infill in accordance with some implementations. In particular, FIG. 19 shows a tubular steel balcony support member 1902 (e.g., a 6"x10" tubular steel member similar to 1004 in FIG. 10A), vertical stanchions 1904, horizontal member 1908 with angle welded to vertical stanchions and T-slot extruded member 1906 attached to the angle, guardrail panels 1910, optional continuous light strip 1912 (e.g., continuous LED light strip). The balcony also includes a deck including cement board 1914, waterproof membrane 1916, and decking 1920 (e.g., composite decking material) installed on top of the metal infilled balcony frame, with sheathing 1918 applied to an underside of the metal infilled balcony frame. FIG. 19 also shows relationship of the balcony to the corbel beam 1922, including a gap between the balcony and corbel beam 1922.

[0077] FIG. 20 is a sectional view of an example balcony with metal infill in accordance with some implementations. In particular, FIG. 20 shows a tubular steel balcony support member 2002 (e.g., a 6"x10" tubular steel member similar to 1004 in FIG. 10A), sloping steel member 2004 factory welded to vertical stanchions, horizontal member 2008 with angle welded to vertical stanchions and T-slot extruded member 2006 attached to the angle, guardrail panels 2010, optional continuous light strip 2012 (e.g., continuous LED light strip). The balcony

also includes a deck including cement board 2014, waterproof membrane 2016, and decking 2020 (e.g., composite decking material) installed on top of the metal infilled balcony frame, with sheathing 2018 applied to an underside of the metal infilled balcony frame. FIG. 20 also shows relationship of the balcony to the corbel beam 2022, including a gap between the balcony and corbel beam 2022. FIG. 20 further shows a decorative panel 2024 (e.g., a PVC panel) attached to the sloping member 2004.

[0078] FIG. 21 is a sectional view of an example false balcony with metal infill in accordance with some implementations. FIG. 21 shows a sloping steel bard top 2106 factory welded to vertical stanchions 2104. Guardrail panels 2108 are attached to the vertical stanchions 2104 attached to balcony frame member 2106 that is factory welded to the balcony support beam 2102.

[0079] FIG. 22 shows sectional details (D1-D4) of an example balcony with metal infill in accordance with some implementations. As shown in FIG. 22, a balcony frame 2204 is attached to a balcony beam 2202. The balcony includes metal infill members such as c-channel members 2206 factory welded to the balcony beam 2202 and balcony frame 2204.

[0080] The balcony includes a plurality of flat bar vertical stanchions 2214 that are bolted to guardrail support member 2208, which is factory-welded to the balcony frame 2204. The connection of the stanchions 2214 to the guardrail support member 2208 is reinforced by a closure plate 2210. Shim plates 2212 can be used in the stanchion 2214 to guardrail support member 2208 connection as needed.

[0081] As mentioned above, a metal infilled balcony can include metal studs 2216 attached (e.g., factory welded) to the c-channel members 2206.

[0082] The balcony deck shown in FIG. 22 includes a waterproof membrane 2218, composite decking sleeper 2226 (e.g., 1" x 3" class A fire rated), composite decking 2224 (e.g., 1" x 6" class A fire rated), steel plate 2220 (e.g., ¼" steel plate factory welded to c-channel members

2206), and steel plate 2228 (e.g., ¼" steel plate factory welded to balcony frame and c-channel members with water-tight welds). An interior of the balcony can include factory-installed fire insulation 2230, one or more layers of sheathing 2222 (e.g., two layers of Densglass sheathing), and fire rated rod and sealant 2232.

[0083] FIG. 23 is a flowchart of an example method to make and install a balcony system in accordance with some embodiments. The various operations of the methods described herein need not necessarily be performed in the exact order as shown. Moreover, some operations may be added, removed, modified, and/or combined together. The method may begin at 2302, where a balcony beam is formed. In some implementations, the balcony beam can be formed from tube steel and prefinished (e.g., finished at manufacture time and prior to installation in a building). In some implementations, the balcony beam can be a precast element that is formed and poured with the concrete deck as a single piece, which would eliminate a need for the tube steel balcony beam. The method continues to 2304.

[0084] At 2304, the channel balcony frame is formed. For example, the channel balcony frame can be formed from rolled stainless steel. The method continues to 2306.

[0085] At 2306, the channel balcony frame is attached to the balcony beam. For example, a balcony beam attachment member (e.g., 820) is attached to the balcony beam (e.g., by welding or other attachments) and one or more reinforcing bars or members can be connected to the balcony beam attachment member. The method continues to 2308.

[0086] At 2308, one or more guardrail support brackets are attached to the channel balcony frame. For example, bolts (e.g., 816) are used to attach the guardrail support brackets to the channel balcony frame, where the bolts extend into an interior space defined by the channel balcony frame. The method continues to 2310.

[0087] At 2310, the concrete balcony floor is cast within the interior space defined by the balcony channel frame. The concrete balcony floor, once cured, helps secure the channel

balcony frame, the guardrail support brackets, the reinforcing members, the balcony beam attachment member, and the balcony beam into an integral balcony unit (or balcony deck).

The method continues to 2312.

[0088] At 2312, the balcony deck and railing parts are provided to a construction site. The method continues to 2314.

[0089] At 2314, the balcony deck or integral balcony unit is attached to a building. For example, the balcony beam is attached at each end to a respective structural frame member (e.g., a wide flange metal column). Attaching the integral balcony unit can serve to attach the integral balcony unit to the structure and can also help align the structural members (e.g., wide flange columns). The method continues to 2316.

[0090] At 2316, the guardrail is attached to the integral balcony unit. For example, the stanchion guardrail supports can be attached to the guardrail support brackets. The guardrail can be attached to the stanchion guardrail supports. The horizontal guardrail members can be attached to the stanchion guardrail supports. The method continues to 2318.

[0091] At 2318, the guardrail panels can be attached to the horizontal guardrail members.

[0092] FIG. 24 is a flowchart of an example method for making and installing a false balcony system in accordance with some embodiments. The method begins at 2402, where a balcony beam is formed. In some implementations, the balcony beam can be formed from tube steel and prefinished (e.g., having a finished applied prior to being installed in a building). The method continues to 2404.

[0093] At 2404, a “Z” break-shape member (or balcony beam attachment member) is formed. For example, the “Z” break-shape member can be formed from rolled stainless steel. The method continues to 2406.

[0094] At 2406, the “Z” break-shape member is attached to the balcony frame. For example, a balcony beam attachment member (e.g., 712) is attached to the balcony beam (e.g., by

welding or other attachments) and one or more reinforcing bars or members can be connected to the balcony beam attachment member. The method continues to 2408.

[0095] At 2408, one or more guardrail support brackets are attached to the balcony beam attachment member. The method continues to 2410.

[0096] At 2410, the balcony beam and railing parts are provided to a construction site. The method continues to 2412.

[0097] At 2412, the balcony beam is attached to a building. For example, the balcony beam is attached at each end to a respective structural frame member (e.g., a wide flange metal column). Attaching the balcony beam can serve to attach the false balcony unit to the structure and can also help align the structural members (e.g., wide flange columns). The method continues to 2414.

[0098] At 2414, the guardrail is attached to the integral balcony unit. For example, the stanchion guardrail supports can be attached to the guardrail support brackets. The guardrail can be attached to the stanchion guardrail supports. The horizontal guardrail members can be attached to the stanchion guardrail supports. The method continues to 2416.

[0099] At 2416, the guardrail panels can be attached to the horizontal guardrail members.

[00100] The balcony may be attached to the frame of a building, for example to an external structural frame, via one or more plates bolted to a wide flange column. For example, the balcony may be attached to an exterior steel structure, which may provide the structural support and/or alignment for a building. Generally, any mechanism may be used to attach the balcony to the frame of the building, such as an external steel structure. Any type of fastening may generally be used. In some embodiments, the balcony may be coupled to a vertical or horizontal beam included in the frame of the building.

[00101] Concrete may be poured onto the floor and ceiling panel. Pouring the concrete may form a floor of the balcony. In some embodiments, the balcony may transmit lateral

loads to the lateral load system of the building. In this manner, the concrete may be poured at the completed height of the story of the building, after the floor and ceiling panels have been positioned at the desired story, thereby forming the floor of units in that story. In some embodiments, the balconies are installed after the concrete has cured on the floor and ceiling panels.

[00102] Embodiments of balcony and false balcony systems may provide a floor and ceiling system useable in mid-rise and high-rise residential projects, among others. The panels with or without the closure pieces and tracks installed may be configured to comply with one or more of the following building codes: fire, energy, handicap, life-safety, and acoustical (impact and ambient noise transfer). In some embodiments, the pre-assembled floor and ceiling panels with or without the closure pieces and tracks may be considered as a fully-integrated sub-assembly meeting fire, sound impact, energy, and life/safety codes. The floor and ceiling panels may be fully integrated with electrical, fire protection, energy insulation, and sound isolation capabilities in some embodiments. The floor and ceiling panels may be designed to achieve a fire rating set by the applicable building code, such as a two-hour fire rating.

[00103] The balconies described herein may be fabricated off-site in a factory or shop and transported to the construction site (building site) for attachment to a structural frame, such as a structural exoskeleton, of a building. A balcony system or false balcony system, or components thereof, may be fabricated in various sizes, such as 8 feet to 10 feet in width up to 22 feet in width. At the building site, the balcony may be attached to structural frame members, floor and ceiling panels, end walls, demising walls, utility panels, building utilities, or any combination thereof. The structural frame members may provide support for the balcony, which may include a concrete slab poured off-site in a casting facility or on-site. In some embodiments, the balcony transfers loads to the structural frame members. In some

embodiments, the balcony transfers loads directly to a steel structure of the building, and the balcony does not translate loads from the floor and ceiling panel to the structure. In some embodiments, the balcony may be non-load bearing (e.g., in the case of a false balcony).

[00104] The examples provided herein are for explanatory purposes only and should not be considered to limit the scope of the disclosure. Each example embodiment may be practical for a particular environment such as urban mixed-use developments, low-rise residential units, and/or remote communities. Materials and dimensions for individual elements may be selected to comply with one or more of the following building codes: fire, energy, handicap, life-safety, and acoustical (impact and ambient noise transfer) without departing from the scope of the principles of the disclosure. The elements and/or system may also be configured to comply with social and/or religious codes as desired. For example, materials, systems, methods, and/or apparatuses may be configured to comply with the International Building Code as it has been adopted in a jurisdiction.

[00105] The present disclosure is not to be limited in terms of the particular embodiments described in this application, which are intended as illustrations of various aspects. Many modifications and embodiments can be made without departing from its spirit and scope. Functionally equivalent methods and apparatuses within the scope of the disclosure, in addition to those enumerated herein, are possible from the foregoing descriptions. Such modifications and embodiments are intended to fall within the scope of the appended claims. The present disclosure is to be limited only by the terms of the appended claims, along with the full scope of equivalents to which such claims are entitled. This disclosure is not limited to particular methods, which can, of course, vary. The terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting.

[00106] With respect to the use of substantially any plural and/or singular terms herein, the terms can be translated from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

[00107] In general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as “open” terms (e.g., the term “including” should be interpreted as “including but not limited to,” the term “having” should be interpreted as “having at least,” the term “includes” should be interpreted as “includes but is not limited to,” etc.).

[00108] If a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases “at least one” and “one or more” to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles “a” or “an” limits any particular claim containing such introduced claim recitation to embodiments containing only one such recitation, even when the same claim includes the introductory phrases “one or more” or “at least one” and indefinite articles such as “a” or “an” (e.g., “a” and/or “an” should be interpreted to mean “at least one” or “one or more”); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly recited, such recitation should be interpreted to mean at least the recited number (e.g., the bare recitation of “two recitations,” without other modifiers, means at least two recitations, or two or more recitations).

[00109] Furthermore, in those instances where a convention analogous to “at least one of A, B, and C, etc.” is used, in general such a construction is intended in the sense one

having skill in the art would understand the convention (e.g., “a system having at least one of A, B, and C” would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to “at least one of A, B, or C, etc.” is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., “a system having at least one of A, B, or C” would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). Virtually any disjunctive word and/or phrase presenting two or more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase “A or B” will be understood to include the possibilities of “A” or “B” or “A and B.”

[00110] In addition, where features or aspects of the disclosure are described in terms of Markush groups, the disclosure is also thereby described in terms of any individual member or subgroup of members of the Markush group.

[00111] For any and all purposes, such as in terms of providing a written description, all ranges disclosed herein also encompass any and all possible subranges and combinations of subranges thereof. Any listed range can be easily recognized as sufficiently describing and enabling the same range being broken down into at least equal halves, thirds, quarters, fifths, tenths, etc. As a non-limiting example, each range discussed herein can be readily broken down into a lower third, middle third and upper third, etc. Language such as “up to,” “at least,” “greater than,” “less than,” and the like include the number recited and refer to ranges which can be subsequently broken down into subranges as discussed above. A range includes each individual member. Thus, for example, a group having 1-3 items refers to groups having

1, 2, or 3 items. Similarly, a group having 1-5 items refers to groups having 1, 2, 3, 4, or 5 items, and so forth.

[00112] The herein described subject matter sometimes illustrates different components contained within, or connected with, different other components. Such depicted architectures are merely embodiments, and in fact many other architectures can be implemented which achieve the same functionality. In a conceptual sense, any arrangement of components to achieve the same functionality is effectively “associated” such that the desired functionality is achieved. Hence, any two components herein combined to achieve a particular functionality can be seen as “associated with” each other such that the desired functionality is achieved, irrespective of architectures or intermedial components. Likewise, any two components so associated can also be viewed as being “operably connected”, or “operably coupled”, to each other to achieve the desired functionality, and any two components capable of being so associated can also be viewed as being “operably couplable”, to each other to achieve the desired functionality. Specific embodiments of operably couplable include but are not limited to physically mateable and/or physically interacting components.

[00113] While various aspects and embodiments have been disclosed herein, other aspects and embodiments are possible. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting.

CLAIMS

What is claimed is:

1. A balcony system, comprising:

a balcony beam including a first end and a second end, wherein each of the first end and the second end are configured to attach to corresponding structural frame members of a building;

a channel balcony frame;

a channel balcony frame attachment member attached to the balcony beam and having one or more apertures;

one or more reinforcement bars disposed in an interior space defined by the channel balcony frame, wherein the one or more reinforcement bars extend through the one or more apertures in the channel balcony frame attachment member, and wherein the reinforcement bars and the channel balcony frame attachment member are held in place within the interior space defined by the channel balcony frame by a floor formed within the interior space defined by the channel balcony frame, such that, after the floor is formed, the balcony beam, channel balcony frame and concrete floor form an integral unit;

one or more guardrail support brackets attached to the channel balcony frame via one or more fasteners that pass through the one or more guardrail support brackets and into the interior space defined by the channel balcony frame, wherein the one or more guardrail support brackets are secured in place by the floor formed within the interior space defined by the channel balcony frame;

one or more stanchion guardrail supports each attached to a respective one of the one or more guardrail support brackets and secured in place by a corresponding closure plate;

a guardrail attached to the one or more stanchion guardrail supports;

one or more horizontal guardrail members attached to the one or more stanchion

guardrail supports; and

one or more guardrail panels attached to the one or more horizontal guardrail members.

2. The balcony system of claim 1, wherein each of the first end and the second end include a respective plate to couple the balcony beam to the corresponding structural frame members of the building.

3. The balcony system of claim 1, wherein the channel balcony frame has a rectangular shape.

4. The balcony system of claim 1, wherein the channel balcony frame includes one or more stanchion guard rail support apertures each configured to enable a respective stanchion guard rail support to pass through a respective stanchion guard rail support aperture.

5. The balcony system of claim 1, wherein the channel balcony frame is formed from stainless steel and the balcony floor is formed from concrete.

6. The balcony system of claim 1, further comprising a light element coupled to the one or more stanchion guardrail supports.

7. The balcony system of claim 1, wherein the one or more guardrail panels include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.

8. A false balcony system, comprising:

a balcony beam including a first end and a second end, wherein each of the first end and the second end are configured to attach to corresponding structural frame members of a building;

a balcony beam attachment member attached to the balcony beam such that the balcony beam attachment member and the balcony beam form an integral unit, wherein the balcony beam attachment member includes one or more apertures;

one or more guardrail support brackets attached to the balcony beam attachment member via one or more fasteners that pass through the one or more guardrail support brackets and through a respective aperture in the balcony beam attachment member;

one or more stanchion guardrail supports each attached to a respective one of the one or more guardrail support brackets and secured in place by a corresponding closure plate;

a guardrail attached to the one or more stanchion guardrail supports;

one or more horizontal guardrail members attached to the one or more stanchion guardrail supports; and

one or more guardrail panels attached to the one or more horizontal guardrail members.

9. The false balcony system of claim 8, wherein each of the first end and the second end include a respective plate to couple the balcony beam to the corresponding structural frame members of the building.

10. The false balcony system of claim 8, further comprising a light element coupled to the one or more stanchion guardrail supports.

11. The false balcony system of claim 8, wherein the guardrail panels include one or more of

tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.

12. A method comprising:

forming a balcony beam having a first end and a second end;

forming a channel balcony frame;

forming a balcony beam attachment member;

attaching the balcony beam attachment member to the balcony beam;

attaching guardrail support brackets to the channel balcony frame;

forming a balcony floor within a space defined by the channel balcony frame to form an integral balcony unit that includes the balcony beam, the channel balcony frame, and the balcony floor;

providing the integral balcony unit and guardrail parts to a construction site of a building, wherein the guardrail parts include a guardrail and one or more stanchion guardrail supports;

attaching the integral balcony unit to a structural frame of the building;

attaching the guardrail parts to the integral balcony unit; and

attaching one or more guardrail panels to the guardrail.

13. The method of claim 12, further comprising attaching a respective plate to each of the first end and the second end of the balcony beam to couple the balcony beam to the structural frame of the building.

14. The method of claim 12, wherein forming the channel balcony frame comprises forming the channel balcony frame in a rectangular shape.

15. The method of claim 12, wherein the channel balcony frame includes one or more stanchion guard rail support apertures each configured a respective stanchion guard rail support to pass through a respective stanchion guard rail support aperture.
16. The method of claim 12, wherein forming the channel balcony frame comprises forming the channel balcony frame from stainless steel.
17. The method of claim 12, wherein the guardrail panels include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.
18. A method comprising:
- forming a balcony beam having a first end and a second end;
 - forming a balcony beam attachment member;
 - attaching the balcony beam attachment member to the balcony beam to form an integral balcony unit;
 - providing the integral balcony unit and guardrail parts to a construction site of a building, wherein the guardrail parts include a guardrail and one or more stanchion guardrail supports;
 - attaching the integral balcony unit to a structural frame of the building;
 - attaching the guardrail parts to the integral balcony unit; and
 - attaching one or more guardrail panels to the guardrail.
19. The method of claim 18, further comprising attaching a respective plate to each of the first end and the second end of the balcony beam to couple the balcony beam to the structural frame of the building.

20. The method of claim 18, wherein the guardrail panels include one or more of tempered glass, metal mesh, polycarbonate, photovoltaic panels, or resin panels.