A building system includes a plurality of panels. Each of the panels includes a plurality of studs configured to serve as structural members and a polymeric block including a structural layer defined by the width of the studs and an offset layer. The offset layer extends in an interior direction from the structural layer. Upper and lower lengthwise notches may be included in the offset layer of the polymeric block. Non-structural elements are installed in the upper and lower lengthwise notches for use in mounting interior elements (e.g., wall cladding) to the interior side of the panels.
FIG. 19
FIG. 25
FIG. 26
FIG. 32

Attachment Plate
14" x 5" LVL Beam
3 5/8" Steel Channel
18 Gauge
3 5/8" Steel Stud
18 Gauge
1 5/8" x 2 1/4"
Steel Stud
20 STR Gauge
Non Structural
1 1/2" x 2 5/8"
Adjustable Angle Bracket

FIG. 33

Panel Dividing
Attachment Plate
3 5/8" x 1 3/8"
Steel Stud
20 Gauge
3 5/8" Steel Channel
18 Gauge
1 5/8" x 1 1/4"
Steel Stud
20 DVV Gauge
Non Structural
1 1/2" x 2 5/8"
Adjustable Angle Bracket
14" x 5" LVL Beam
TRACK AND PANEL BUILDING SYSTEM

PRIORITY CLAIM

[0001] This application claims priority to U.S. Provisional Application Ser. No. 62/666,430 entitled “TRACK AND PANEL BUILDING SYSTEM” filed Dec. 11, 2015, which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] Field

[0003] The present invention relates generally to systems and methods of constructing buildings. More particularly, the present disclosure relates to systems and methods of using modular building panels with framed insulating blocks.

[0004] Description of the Related Art

[0005] For many years, a common manner of constructing residential structures involved constructing a wood frame. One of the problems with a wood framed house is that such a house may be relatively expensive to heat in the winter and hard to cool in the summer. As the cost of energy has continued to rise, this has been a continuing concern for the homeowners and, hence, a concern for home builders.

[0006] Foam may be used for insulation purposes in residential buildings. Sometimes expanded foam is sprayed inside the walls or under the roofs of residential buildings to provide additional insulation. In recent years, insulating concrete forms (referred to as “ICF”) has been used in residential structures. Many different types of methods have evolved for building ICF residential buildings.

[0007] A problem with some foam systems is that much labor is required in the shaping, cutting or modifying the foam blocks for the particular structure. A second problem is that after cutting, shaping or modifying the foam structure, the foam structure loses much of its insulating value. Third, the insulating foam may not have good structural integrity, so concrete must be used to give the strength necessary for the structure.

[0008] Some insulating modular panels have been used for building. In some cases, the panels must be held in place by braces or other temporary structural members during the construction process. Supplying and implementing such temporary bracing systems adds labor and cost to the construction process.

[0009] Custom passages, notches or other features may be added to a foam panel when it is to be installed, for example, to run electrical cables or plumbing. In many cases, making such features may require cutting into structural members associated with the panel. For example, to make passage for a conduit in an insulating panel, it may be necessary to cut a hole or notch in a metal rail supporting the panel. Such cutting adds time and complexity to the planning and construction of the building.

[0010] Some existing insulating modular panels that are suitable for installation in conformance with existing building codes fall short on providing adequate thermal insulation. Thermal insulating performance of a panel can be improved by increasing the thickness of the panel. In many cases, however, if a panel is too thick, it may result in the panel not being suitable for installation consistent with a particular building code; or, in some cases, any building code.

[0011] Another challenge with building with insulating modular panels is that the layout and design of the walls and other structural elements often varies from one building to another. Often, panels must be custom produced or fabricated to address the particular design (e.g., the length of a wall, the location of a corner). Having to produce or modify panels or related elements increases labor costs of construction.

SUMMARY

[0012] Embodiments of building panels, and methods and systems for making and using building panels, are described herein. In an embodiment, a building system includes a plurality of panels. Each of the panels includes a plurality of studs configured to serve as structural members and a polymeric block including a structural layer defined by the width of the studs and an offset layer. The offset layer extends in an interior direction from the structural layer. Upper and lower lengthwise notches may be included in the offset layer of the polymeric block. Non-structural elements may be installed in the upper and lower lengthwise notches for use in mounting interior elements (e.g., wall cladding) to the interior side of the panels.

[0013] At one end of the panel, the lateral edge of the structural layer may extend beyond the lateral edge of the offset layer. At the other end, the lateral edge of the offset layer may extend beyond the lateral edge of the structural layer. One or more tracks couple with the studs of the panels such that the panels form a wall of a building. Adjacent panels may couple with one another at their lateral ends in a lap joint.

[0014] In some embodiments, the building system includes one or more corner pieces that couple with adjacent panels to form a corner in a wall of the building. Different corner pieces are provided for different types of corners (for example, exterior corner versus interior corner).

[0015] In one embodiment, a method of building includes installing one or more lower tracks on a foundation; installing one or more corner pieces on at least one of the lower tracks; installing two or more panels on one or more of the tracks to form two or more walls, wherein at least one of the panels comprises an interior offset layer; coupling at least two of the panels with the at least one corner piece, wherein one of the wall panels installed in a different direction from the corner piece than at least one other of the wall panels; and installing one or more upper track pieces on the wall panels.

[0016] In one embodiment, a roof system for a building includes two or more beams, one or more sets of opposing tracks mounted on at least two adjacent parallel beams to face one another across the span between the beams, and one or more panels that slide on the tracks. The beams are in a parallel spaced relationship with one another. The panels include insulation for the building.

[0017] In one embodiment, a method of constructing a roof a building includes providing two or more beams in a parallel spaced relationship to one another, providing one or more sets of opposing tracks on at least one pair of beams; and sliding a plurality of the panels on the opposing tracks to form an insulating layer of the roof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 illustrates one embodiment of one embodiment of a building panel.
FIG. 2 illustrates an exploded view of one embodiment of a building panel.

FIG. 3 illustrates an interior view of a building panel.

FIG. 4 illustrates one embodiment of a connection between building panels.

FIG. 5 illustrates one embodiment of a portion of a building including an interior offset layer and corner pieces.

FIG. 6a is a top view of a panel including an interior offset layer according to one embodiment. FIG. 6b is a side view of the panel.

FIG. 7 shows a side view of a panel with an upper non-structural member in an upper lengthwise notch and a lower non-structural member in a lower lengthwise notch.

FIG. 7A is a front view of the upper portion of the panel shown in FIG. 7.

FIGS. 8A, 8B, and 8C are interior, side, and top views of a panel.

FIG. 9 illustrates a section of building having alternate interior and exterior corners.

FIG. 10 is a top view of one embodiment of a panel having ends with staggered interior and exterior layers.

FIG. 11 is a top view illustrating one embodiment of an exterior corner piece.

FIG. 12 is a top view illustrating one embodiment of an interior corner piece.

FIGS. 13A and 13B shown embodiment of an exterior corner pieces having upper and lower notches.

FIG. 14 illustrates one embodiment of an interior corner piece including junction-facing studs.

FIGS. 15A and 15B illustrate front and cross sectional top views of a portion of a track and panel system including a window.

FIG. 16 illustrates a top view of a portion of a track and panel system including a doorway, and window, and an exterior corner.

FIGS. 17A and 17B illustrate front and cross sectional top views of a track and panel system including a doorway.

FIG. 18 illustrates front, side, and top views of a door header panel.

FIG. 19 illustrates front, side, and top views of a window sill panel.

FIG. 20 illustrates front, side, and top views of a window header panel.

FIG. 21 illustrates a cross sectional view of a window header and sill installation in a panel system according to one embodiment.

FIG. 22 illustrates a cross sectional view of a window jamb installation in a panel system according to one embodiment.

FIG. 23 illustrates a cross sectional view of a door header panel installation in a panel system according to one embodiment.

FIG. 24 illustrates a cross sectional view of a door jamb installation in a panel system according to one embodiment.

FIG. 25 illustrates one embodiment of a window head and sill including panel notches.

FIG. 26 illustrates an alternate system for a corner of a building.

FIGS. 27 and 28 illustrates one embodiment of a track and tack system for a building.

FIG. 29 illustrates a portion of a panel installed using a track and tack system in one embodiment.

FIG. 30 illustrates a side view of a roof system using insulated panels, installed on a beam-mounded track system.

FIG. 31 is schematic section view of the roof system shown in FIG. 30.

FIG. 32 is a detail view of a beam providing tracks for roof panels on both sides of the beam.

FIG. 33 illustrates installation of a panel in a track on a beam.

FIG. 34 is an exterior (top) view illustrating an insulating panel installed in a roof system between two parallel beams.

FIG. 35 is an interior (bottom) view illustrating an insulating panel installed in a roof system between two parallel beams.

FIG. 36 illustrates an alternate embodiment of a track and panel roof system.

While the invention is described herein by way of example for several embodiments and illustrative drawings, those skilled in the art will recognize that the invention is not limited to the embodiments or drawings described. It should be understood, that the drawings and detailed description were not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims. The headings used herein are for organizational purposes only and are not meant to be used to limit the scope of the description or the claims. As used throughout this application, the word “may” is used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense (i.e., meaning must). Similarly, the words “include”, “including”, and “includes” mean including, but not limited to.

DETAILED DESCRIPTION OF EMBODIMENTS

As used herein, an element is “structural” if it is intended to bear loads of a building (e.g., the weight of walls or a roof).

As used herein, an element is “non-structural” if it is not intended to bear loads of a building. For example, elements, such as channels or rails, that are designed to support or hold wall cladding, plumbing, electrical lines, or fixtures are non-structural.

As used herein, “stud” or “framing stud”, means a primarily vertical member that can bear a downward load.

As used herein, “frame member” means a member that can be coupled with one or more other members to form a frame.

As used herein, a “polymeric material” means a material that is made at least primarily of one or more polymers. As used herein, a “polymer” means a naturally occurring or synthetic compound consisting of large molecules made up of a linked series of repeated simple monomers. Examples of polymers include polyolefins (such as polyethylene and polypropylene), polyurethanes, polynyl chloride, polystyrenes, poly ethylene vinyl alcohol, polyvinyl alcohol, polycaprolactone, polylactic acid and foamed starch. A polymeric material may be expanded foam, such as expanded polystyrene. In some embodiments, a polymeric material is fire retardant.
As used herein, “polymeric block” means a block that is at least primarily made of a polymeric material.

As used herein, a “lap joint” means a joint in which at least a portion of the elements overlap one another. As used herein, a “partial lap joint” means a joint in which only a portion of at least one of the members overlaps the other member. In a partial lap joint, the thickness of the overlapping members may be unequal. One example of a partial lap joint is a half lap joint. As used herein, a “half lap joint” means a joint in which the joining members are notched or stepped such that portions of the members to overlap one another.

As used herein, a “layer” refers to a layer or portion of the thickness of a panel or other member. In a typical installation of a panel, the layers would be in a vertical relationship, for example, an interior layer alongside of an exterior layer. A panel may have layers that serve different functions, for example, one layer of a panel may be structural and insulating, while another layer of a panel is insulating but non-structural.

As used herein, to be “embedded” in or to another element or elements means at least partially contained within, or at least partially surrounded by, the element or elements. As one example, a framing stud is embedded in a polymeric block if the framing stud is inserted, pressed, or dropped into a pre-cut slot or channel in the block. As another example, a framing stud may be embedded by expanding a loose foam material around the framing stud. In certain embodiments, there may be clearance between the surfaces (for example, a gap between the surfaces of a framing stud and the adjacent surfaces of a polymeric block).

As used herein, a “c-shaped” cross section refers to a cross section that is generally in the form of a C. As used herein, a “u-shaped” cross section refers to a cross section that is generally in the form of a U. A c-shaped member or a u-shaped member may include variations such as bumps, bulges, ridges, corrugations, lips, rounded corners, sharp corners, tapers.

Fig. 1 illustrates one embodiment of a building panel. Building panels may be used, for example, as elements of a wall, floor, ceiling, or roof of a building. Building panel 100 includes block 102 and frame 104. Frame 104 includes main studs 106, top cross rail 108, and bottom cross rail 110. Block 102 includes main body 112 and offset 114. Building panel 100 is installed on slab 116. Building panel 100 may be coupled to adjacent building panel 101. Main studs 106 may extend in a vertical direction through block 102.

Offset 114 may extend from the framed portion of block 102 toward the interior portion of a building relative to frame 104. In Fig. 1, the thickness of the offset is shown as dimension 115. In one embodiment, frame members are about 3 and 5/8 inches up to about 7 and 5/8 inches in thickness, and the thickness of offset 114 is about 4 and 5/8 inches up to about 8 and 5/8 inches.

Interior surface studs 120 are mounted on the interior surface of offset 114. In the embodiment illustrated in Fig. 1, interior surface studs 120 are installed such that both interior surface studs 120 and main studs 106 run vertically and are parallel to each other. With respect to the cross section of the studs, however, interior surface studs 120 may be installed in a different orientation than main studs 106. In this case, interior surface studs 120 are installed such that the cross section of interior surface studs 120 is perpendicular to the cross section of main studs 106. In certain embodiments, different studs may run in different directions that one another. For example, one or more of studs in the frame of a building panel may be embedded in the building panel at a slant and others of studs in the frame of the building panel may run vertically. As another example, the surface-mounted studs for a building panel may be installed at a slant, and the studs in the frame of the building panel may run vertically.

In the embodiment shown in Fig. 1, the surface-mounted studs are at an orientation that is perpendicular to that of the main studs. A building panel may, nevertheless, in various embodiments include studs that are installed in other relative orientations to one another. For example, a stud in a building panel may be installed in an orientation that is 45 degrees relative to another stud in the building panel.

Block 102 may be made of a polymeric material. In some embodiments, block 102 is made of expanded polystyrene foam. Block 102 may be of an insulating material. In some embodiments, the density of a block is between about 1.0 and about 2.0 pounds per cubic foot. Some embodiments of a block include polymeric material having a density of 1 pound per cubic foot, 1.5 pounds per cubic foot, or 2.0 pounds per cubic foot.

In some embodiments, a block of a building panel includes passageways or openings. For example, as shown in Fig. 1, block 102 includes cylindrical passages 118 and passages 112. Cylindrical passages 118 and passages 112 may be used for running conduit, electrical wires, plumbing, or other elements. A block for a building panel may also include openings for doors or windows. In some embodiments, a block includes notches, channels, or other features for receiving, connecting, or meshing with other building elements. In some embodiments, passageways are provided at spaced intervals along the length of a panel. For example, a vertical race may be provided in the offset portion of building panel 100 at 8 inch intervals along the length of the panel.

Frame members such as main studs 106, top cross rail 108, bottom cross rail 110, may be made of a metal, such as steel or aluminum. In one embodiment, main studs 106, top cross rail 108, bottom cross rail 110 are made of steel. In other embodiments, frame members are made of galvanized steel.

Main studs 106, top cross rail 108, and bottom cross rail 110 may combine to form frame 104. Top cross rail 108 may couple with main studs 106 at the top of block 102. Bottom cross rail 108 may couple with main studs 106 at the bottom of block 102. In one embodiment, top cross rail 108 and bottom cross rail 110 are coupled to the main studs by threaded fasteners, such as bolts or machine screws. In certain embodiments, the cross rails for the panel may be connected to the main studs by way of rivets 117.

A building panel may be of any suitable dimensions. A building panel may be, for example, between 8 feet and 18 feet tall. In one embodiment, a building panel is about 9 feet tall. In another embodiment, a building panel is about 50 inches tall. Two or more panels may be stacked on one another. As shown in Fig. 1, the bottom portion of a building panel may have a notch corresponding to a step on the slab on which the panel is to be installed.

In some embodiments, different building panels may be produced with different offset thicknesses. In some
embodiments, different building panels may have different densities from one another. In certain embodiments, an offset portion of a panel (for example, offset from a frame), has a different density than other portions of the panel.

In the embodiment illustrated in FIG. 1, the offset portion of block 110 is offset in an interior direction. A panel block may, nevertheless, in various embodiments include an offset in other directions. For example, a panel block may include an offset in an exterior direction.

In some embodiments, passages in a block for a panel are provided in a portion of the panel that is offset from frame members of the panel. For example, passages may be provided in offset 114 of building panel 100. In some cases, pipes, wiring, conduits or other elements may be routed in the passages without drilling or cutting in frame members for a panel.

FIG. 2 illustrates an exploded view of the building panel shown in FIG. 1. Main studs 106 may reside in main slots 123. Main studs 106 may be at least partially embedded in block 102. In some embodiments, main studs 106 are in place when block 102 is molded into a solid block. For example, main studs 106 may be held in position in loose polymeric material, such as beads or pellets, from which block 102 is made (for example, by way of a fixture).

Interior surface studs 120 may be installed in interior surface slots 126 in the offset portion of block 102. In some embodiments, each of studs 120 is inserted from the top (for example, through the top surface of offset 114). In some embodiments, cross members of frame, such as top cross rail 108, bottom cross rail 110, or both, may be positioned in a block when the block is molded. In certain embodiments, all of the frame members of a panel are in place during molding of a block.

FIG. 3 illustrates an interior view of a building panel. Interior surface studs 120 are installed on interior surface 130 of block 102 in slots 126 in the interior offset portion of block 102. In some embodiments, interior surface studs are press-fit into interior surface slots 126. Interior surface studs 120 may be used for attaching additional building elements or decorative elements to building panel 100.

Interior surface studs 120 may run the full height of the offset portion. In some embodiments, two or more sections may be present in a particular slot. In this manner, relatively short lengths of studs (for example, scrap generated during construction of the building) can be used for the surface-mounted studs.

Block 102 includes junction box cavity 124. Junction box cavity 124 may be adjacent to a pair of slots 126 for interior surface studs 120. A junction box may be positioned in junction box cavity 124 and attached to interior surface studs 120.

FIG. 4 illustrates one embodiment of a connection between building panels. Building panels 100a and 100b are connected with panel connector 140. Panel connector 140 bridges the top of frames 104 of building panels 100a and 100b. Panel connector 140 may connect building panels 100a and 100b at junction 144.

Pins 142 may pass through holes in panel connector 140 and engage in corresponding holes or sockets in frames 104, blocks 102, or both. In some embodiments, pins 142 temporarily hold building panels 100a and 100b together until a more permanent connection is established between the panels. For example, pins 142 may temporarily hold building panels 100a and 100b in place until building panels 100a and 100b are coupled to one another by way of an adhesive, or by way of threaded fasteners securing panel connector 140 to building panels 100a and 100b. Pins 142 may be made of any suitable material. In one embodiment, pins 142 are made of a polymer.

In some embodiments, passages may be provided between internal passages in a panel and the surfaces of the panel. For example, in FIG. 4, passage 145 may be drilled to create access between passage 118 and the exterior face of panel 100a. In some embodiments, surface studs and studs of a frame (for example, main studs 106) are generally aligned with one another along the length of a panel, such that any obstruction of passages (such as passage 145) is minimized.

Track and Panel System with Notched Interior Offset Layer, Lap Joints and Corner Pieces

In various embodiments, a building system includes insulated panels that can be coupled to form walls. FIG. 5 illustrates one embodiment of a portion of a building. Building 200 includes panels 202, corner piece 204, upper track 206, and lower track 208. Building 200 may also include window 210 and doorway 212.

Each of panels 202 includes block 214, studs 216, and interior studs 218. Interior studs may be hat channels installed in slots in the interior face of panels 202.

Corner piece 204 may be used to couple the panels 202 that meet at the corner. Corner piece 204 may have a uniform cross section and extend the height of panels 202. Corner piece 202 may include a polymeric block construction with one or more structural and non-structural studs held in the polymeric block.

In one embodiment, the polymeric blocks of the panels and corner piece are constructed from 1 to 2 lb, 5/8" polystyrene panels in varying widths. The track and panel system may include structural and non-structural steel.

Panels as described herein may couple with another by way of a lap joint, one after another. In certain embodiments, adjoining panels at a corner of a building may be joined via a lap joint.

The panels may be pre-cut to allow for cold form structural steel studs to be in-bededded on the exterior side of the panel and cold form non-structural steel studs or hat channels to be in-bededded on the interior of the panel.

The panel may also be cut with notches on top and bottom so that when placed in structural steel track, the panel can be attached in accordance with the 2012 International Residential Building Code on the bottom and a structural steel track can be attached on the top in accordance with the 2012 International Residential Building Code Section 603.

Some or all of the panels may include interior offset layers. The interior offset layers may include lengthwise notches at top and/or bottom. The notches may accommodate non-structural members, such as channels. Interior elements such as wall cladding may be secured to the wall by way of the non-structural members. In one embodiment, non-structural channels run in top and bottom notches over the length of a panel. An interior offset layer may provide increased thermal insulation and accommodate fixtures, electrical lines, plumbing, ductwork, and other components and systems of the building.

Panels as described herein may specifically designed to allow for the above mentioned connecting
methodology as well as the utilization of a non-structural angle component, which would be attached at the bottom to the foundation and on the interior side of the panel to the non-structural stud or hat channel and at the top to the structural track and on the interior of the panel to the non-structural stud or hat channel. These non-structural components may serve as a way to secure interior wall coverings as well as interior hangings.

[0094] In various embodiments, the panel may be cut with the structural components and non-structural components to be off-set such that access to all required Building Code connections can be made in accordance to code.

[0095] In some embodiments, a system includes corner pieces that connect to wall panels at corner locations. The corner pieces may be the same height as the wall panels. Each corner piece may be either an exterior corner or an interior corner. During construction, the builder may select the appropriate corner piece (for example, whether the exterior side of the corner piece is an inside corner or an outside corner) depending on location. Having corner pieces of multiple configurations may reduce the need for field-cutting of panels to build the corner portion of a building.

Panels with Interior Offset Layer

[0096] FIG. 6a is a top view of a panel including an interior offset layer according to one embodiment. FIG. 6b is a side view of the panel. Panel 230 includes polymeric block 232, structural studs 234, and surface hat channel members 236. Polymeric block 232 includes upper lengthwise notch 238, lower lengthwise notch 240, vertical chase 242, and horizontal chases 244. The width of structural studs 234 within block 232 defines a structural layer of polymeric block 232. The portion of polymeric block 232 that is not within the width of structural studs 234 may be considered an offset layer. In this case, the offset layer is on the interior to the structural layer. In one embodiment, each of structural studs 234 is about 3 and 5/8 inches in width, 18 gauge steel.

[0097] Upper lengthwise notch 238 and lower lengthwise notch 240 may each accommodate a non-structural member. FIG. 7 shows a side view of panel 230 with upper non-structural member 246 in upper lengthwise notch 238 and lower non-structural member 248 in lower lengthwise notch 240. Either or both of front wall 250 of upper non-structural member 246 and front wall 252 of lower non-structural member 248 may lap over the interior face of panel 230. Upper non-structural member 246 and lower non-structural member 248 may be attached to upper track 257 and lower track 259 and to surface hat channel members 236 where front walls 250 and 252 contact the interior face of panel 230. Attachment may be by glue, clips, screws, or other suitable fasteners. Upper non-structural member 246 and lower non-structural member 248 may be used as attach points for items to be installed on the interior of panel 230, such as wall claddings. FIG. 7A is a front view of the upper portion of the panel shown in FIG. 7.

[0098] Although in the embodiment shown in FIG. 7, non-structural interior elements are surface hat channel members 236, interior non-structural elements may in various embodiments have other forms and sizes. Examples of interior surface elements may hat channel, steel studs. Interior elements may vary in size and form depending on code and load requirements.

[0099] Non-structural members 246 and 248 may be, in one embodiment, steel channels 1 and 7/8 inches wide. Non-structural members 246 and 248 may be used for mounting of interior wall elements. For example, upper non-structural member 246 and lower non-structural member 248 may be used as attach points for wall claddings.

[0100] FIGS. 8A, 8B, and 8C are interior, side and top views of a panel. Panel 222 may be of similar form and construction to that described above relative to FIGS. 1 through 7A, including a polymeric block with framing studs and interior non-structural members. Panel 222 includes upper notch 223 and lower notch 224. In the embodiment shown in FIGS. 8A, 8B, and 8C, notched end 225 includes a notch running from top to bottom and flat end 226. The flat end of the panel may be suitable for use where door jams or other framing of openings in a wall are located. The notched end may couple with an adjacent panel in a lap joint, such as shown at the corner pieces in FIGS. 9-12.

[0101] For illustrative purposes, the interior surface elements shown in FIGS. 8A, 8B, and 8C are illustrated as hat channels. In one embodiment, the hat channels used as interior elements may be 1 1/2 inches by 2 1/2 inches, 25 gauge. As with the embodiment described above relative to FIG. 7, however, interior non-structural elements may nevertheless in various embodiments have other forms and sizes. Examples of interior surface elements may be 7/8 inch by 2 1/8 inch hat channel, (eighteen gauge or 25 gauge), 7/8 by 2 1/8 hat channel, or 1% steel stud.

Corner Pieces

[0102] In some embodiments, a track and panel system includes different corner pieces depending on the type of corner. FIG. 9 illustrates a section of building having alternate interior and exterior corners. Building 257 includes wall 258 and interior floor 259. Wall 259 includes panels 260, exterior corner piece 262, and interior corner piece 264. Exterior corner piece 262 is used for exterior (outside-pointing) corners of the building. Interior corner piece 264 is used for interior (inside-pointing) corners of the building. Thus, in exterior corner piece 262, the adjacent exterior surfaces span a 270 degree angle with respect to one another, and the adjacent interior surfaces span 90 degrees with respect to one another. In interior corner piece 264, the adjacent interior surfaces span a 270 degree angle with respect to one another, and the adjacent exterior surfaces span 90 degrees with respect to one another.

[0103] Although the corner pieces in FIG. 9 are shown as right angles, corner pieces may, in certain embodiments, have angles other than right angles. For example, a corner piece may have a 45 degree inside corner, a 45 degree outside corner, 60 degree inside corner, 60 degree outside corner, or any angle as may be needed for the layout of a particular building.

[0104] FIG. 10 is a top view of one embodiment of a panel having ends with staggered interior and exterior layers. Panel 230 may have a two-layer construction (structural layer-offset layer) similar to that of building panel 100 described above relative to FIG. 1. Thus, in this embodiment, panel 230 includes structural layer 270, offset layer 272, and ends 274A and 274B. At end 274A, offset layer 272 extends beyond the end face of structural layer 270, to form a stepped end. Conversely, at end 274B, structural layer 272 extends beyond the end face of offset layer 272, also forming a stepped end. The step dimensions of ends 274A and 274B match one another such that any number of panels 230 can be place consecutively with the end 274A of one panel 230 aligns and overlaps end 274B of the next panel 230.
In some embodiments, a wall is formed by placing panels 230 consecutively with their ends in a lap joint. Adjoining panels can be glued to another at the joints.

**FIG. 11** is a top view illustrating one embodiment of an exterior corner piece. Exterior corner piece 262 may be used to join adjacent panels 230 at a corner of a building.

**FIG. 12** is a top view illustrating one embodiment of an interior corner piece. Interior corner piece 264 may be used to join adjacent panels 230 at a corner of a building. Each of panels 230 may couple to interior corner piece 264 in a lap joint, such as shown in FIG. 10. Joints may be glued together, held by fasteners, or by a combination of glue and fasteners.

In one embodiment, steel studs of the corner pieces are 3% steel channel, 18 gauge. Hat channels and corner channels in the corner pieces can be 22 gauge.

**FIG. 13A** and **FIG. 13B** shown embodiment of an exterior corner pieces having upper and lower notches. Exterior corner piece 320 includes block 322, exterior layer studs 324, and interior layer stud 326. Upper notch 328 and lower notch 329 are provided at the top and bottom of the piece. Electrical traces 327 are included in the interior layer of the corner piece. In some embodiments, both exterior corner pieces and interior corner pieces include upper and lower notches and electrical traces.

In some embodiments, studs are provided at each surface of a corner piece that is used to join the corner piece to panels. FIG. 14 illustrates one embodiment of an interior corner piece including junction-facing studs. Corner piece 330 includes exterior layer studs 308, interior layer studs 332, and corner stud 334. Exterior layer studs 308 and interior layer studs 332 may face complementary surfaces of panels to form lap joints at an interior corner of a building.

**Panel Types**

In various embodiments, building panels include, for example, wall panels, door panels, and window panels. Any or all of wall panels, door panels, and window panels may include a polymeric block with a frame. Any or all of the wall panels, door panels, and window panels may include block offsets from the frame of the panel. In some embodiments, one or more of the building panels for a building are cut to size and shape. Cutting of the panels may be performed on-site (for example, during construction of the building) or off-site.

**FIGS. 15A and 15B** illustrate front and cross sectional top views of a portion of a track and panel system including a window. Track and panel system 340 includes panels 342, window sill panel 344, and window jamb panel 346. Each of panels 342 includes a polymeric block with structural studs 350, hat channels 352, and chases 354. Upper track 356 and lower track are provided at the top and bottom of the panel elements.

**FIG. 16** is a top view illustrating a portion of a track and panel system including a doorway, and window, and an exterior corner. Track and panel system 360 includes panels 342, corner piece 362, doorway 364, and window 366. Panels 342 may be as described above relative to FIGS. 15A and 15B.

**FIGS. 17A and 17B** illustrate front and cross sectional top views of a portion of a track and panel system including a doorway. Track and panel system 380 includes doorway 382, door sill panel 384. Each of panels 342 includes a polymeric block with structural studs 350, hat channels 352, and chases 354. Upper track 356 and lower track are provided at the top and bottom of the panel elements.

**FIG. 18** is front, side, and top views illustrating a door header panel. Door header panel includes polymeric block 402 including a structural layer and an offset layer, structural studs 404, rails 406, hat channels 408, and chases 410.

**FIG. 19** is front, side, and top views illustrating a window sill panel. Window sill panel 420 includes polymeric block 422 including a structural layer and an offset layer, structural studs 424, rails 426, hat channels 428, and chases 430.

**FIG. 20** is front, side, and top views illustrating a window header panel. Window header panel 440 includes polymeric block 442 including a structural layer and an offset layer, rails 444, and hat channels 444.

In the embodiments shown in FIGS. 18 through 20, each of the panels includes both an upper and lower notch running the length of the panel. In certain embodiments, however, notches may be provided at only the upper location or the lower location, or at neither the upper or lower location. In certain embodiments, panels may include one or more notches the span only a portion of the length of the panel. Although in various embodiments, described and shown herein, notches are shown a square, notches may, in various embodiments, be other shapes, such as rectangular, arcuate, or triangular.

**FIG. 21** illustrates a cross sectional view of a window header and sill installation in a panel system according to one embodiment. Header panel 460 includes panel block 462 and steel studs 464. Header panel 460 includes a...
structural layer and an offset layer, similar to that described above relative to FIGS. 1-8C. On the exterior side, siding 466 is coupled to panel block 462 and is supported on L-clip 468. On the interior side, gyepboard 470 is attached by way of vertical hat channel 472 and hat channel clip 473. F-clip 474 supports lower clip 475. Window 476 is secured to the panel by way of nail fin 477 and molding clip 478. In one embodiment, window 476 is a high efficiency window, Fibrecote 300 series.

[0126] FIG. 22 illustrates a cross sectional view of a window jamb installation in a panel system according to one embodiment. In window jamb 500, the window, exterior siding 466, and gyepboard 470 are installed in a manner similar to that described above relative to FIG. 18. Rain screen blocking 502 spaces siding 470 from the panel. The window jamb installation includes stud 467, which, in one embodiment, is a 1 and 5/8 steel stud. Stud 467 may provide structural rigidity to the installation.

[0127] FIG. 23 illustrates a cross sectional view of a door header panel installation in a panel system according to one embodiment. In door header panel 520, door jamb 521 is installed on stud 522. Exterior siding 466 is supported on angle 524. Flashing 525 is provided below angle 524. Angle 520 may be provided for mounting of gyepboard 470 or other interior elements. Rain screen blocking 502 spaces siding 470 from the panel.

[0128] FIG. 24 illustrates a cross sectional view of a door jamb installation in a panel system according to one embodiment. In door jamb installation 540 includes door jamb 542. Door jamb 542 is installed on stud 544. Exterior siding 466 and gyepboard 470 are mounted in a manner similar to that described above relative to FIG. 18. Rain screen blocking 502 spaces siding 470 from the panel. The door jamb installation includes stud 467, which, in one embodiment, is a 1 and 5/8 steel stud.

[0129] In some embodiments, panels adjoining a window, door, or other aperture in a building include notches in the interior surface of the panel. FIG. 25 illustrates one embodiment of a window head and sill including panel notches. Window header and sill include notches 552. Angles 554 are mounted at upper one of the notches. Hat channel 554 is provided in the notch above the window. Angles 556 may be attached on the pass below hat channel 554. Hat channel 554 may be coupled to angles 556 and 557. Gyepboard 558 may be mounted to hat channel 554, angle 557, angle 556, or a combination thereof.

[0130] FIG. 26 illustrates an alternate system for a corner of a building. Track and panel system 560 includes panel 562 and panel 564. Panel 562 and panel 564 each include a structural layer and an offset layer. Panel 562 and panel 564 meet at corner 566. Panel 562 includes notch 568. Panel 562 and panel 564 may be coupled in an overlapping joint at corner 566 using glue, fasteners, or a combination of both.

Construction of a Building

[0131] In various embodiments, a building is constructed using a track and panel system on a structural base. The track and tack system for mounting panels to form the walls of the building. FIGS. 27 and 28 illustrates one embodiment of a track and tack system for a building. System 580 includes channels 582 mounted on structural base 584 at the intended locations of the walls of the building. Each of channels 582 serves as a track for receiving one or more panels. In one embodiment, channel 582 is 3/8 inches wide, 18 gauge steel.

Anchor bolts 587 may be placed at a suitable spacing along the length of each channel 582.

[0132] Non-structural angle brackets 586 may be provided on the interior side of channels 582. The location of non-structural angle brackets 586 may be selected to correspond with the locations of interior studs or hat channels on the interior sides of the panels. The bottom leg of each bracket may extend under the lower notches of a panel. Each of brackets 586 may be aligned with, and coupled to, a stud, hat channel, or other vertical member on the interior face of one of the panels. In certain embodiments, brackets 586 are adjustable (e.g., for height or horizontal position). Brackets 586 may serve as non-structural members for mounting interior elements, such as cladding. In one embodiment, each of bracket 586 is a 1½ inch by 2½ inch angle bracket.

[0133] FIG. 29 illustrates a portion of a panel installed using a track and tack system in one embodiment. Building 590 includes channel 582 and bracket 586 mounted on structural base 584. Panel 592 is installed in channel 582. Top channel 594 is installed on the top of panel 592 (top channel 594 may extend across multiple panels coupled to another in a row). Hat channel 596 is provided on the interior of panel 592. Bracket 597 may connect hat channel 596 to top channel 594. Bracket 598 may connect hat channel 596. As in other embodiments previously described, other non-structural members, such as studs, can be included on the interior side of a panel.

[0134] In one embodiment of an install of a track and panel system is as follows:

[0135] The bottom track and the non-structural tacks go down around the entire exterior of the structure. Then Corner #1 is put in place and fastened to the bottom track and the non-structural tacks. Then the panels go together and are fastened to the track and tacks as they are set in place. The top track is placed on top in unto 12 sections with 2 overlap and fastened as it is placed into position. Then the tack angle non-structural fasteners are secured to the track and then to the non-structural components. The track running 90 degrees from the one just described may be notched to accommodate the first track.

[0136] Top track may be attached in sections as described above and be a continual installation as the wall is going up. Successive panels may be slid together and glued on both sides of the connecting cut outs. The panels may be independently attached to the top and base track. The corner pieces and the panels are glued together. Both top and bottom tracks may extend the length of the wall, including over the corner pieces.

[0137] Use of the corner pieces may allow for a more uniform panel design for a standard panel. Without the corner pieces, the construction team may, for example, be forced to make many different panels to make corners. Exterior and interior corner pieces may eliminate or reduce the need for making customer-specific and/or building-specific panels.

Roof System with Track and Panel Insulation Layer

[0138] In some embodiments, a roof system utilizes a track that is connected to a structural member. Panels may be slid into the track perpendicular to the structural member. The panels may be notched so that they are interlocking (similar to the wall system described above relative to FIGS. 7-12. Panels used in the roof system may utilize varying structural and non-structural steel components (depending on, for example, the roof design and load requirements.)
In some embodiments, a track and panel system is used to construct an insulated roof of a building. In certain embodiments, a series of insulated panels is installed on a pair of opposing track mounted on parallel beams. FIG. 30 illustrates a side view of a roof system using insulated panels, installed on a beam-mounted track system. FIG. 31 is schematic section view of the roof system shown in FIG. 30.

In some embodiments, the panels used in a track and panel system are the same as those used to form the walls of a building. For example, the panels described in FIGS. 1 through 8C above may be employed in a roof system. Thus, various panels used in a roof system include a structural layer includes a set of embedded structural studs and an offset layer that does not include a structural studs (though it may include non-structural members such as surface studs or hat channel for mounting interior elements such as gyprock panel for ceilings).

Referring again to FIGS. 30 and 31, building 600 includes roof system 602. Roof system 602 includes beams 604, panels 606, roof 608, and channels 610. In one embodiment, beams 604 are 14 inch by 5 inch LVL beams. Beams 604 may be in parallel spaced relationship to one another. Channels 610 are attached to the sides of beams 604 near the top such that the openings of the channels face each other across the span between adjacent beams. In one embodiment, channels 610 are 3/8 inch steel channels, 18 gauge.

Non-structural angle brackets 614 are attached to beams 604 below channels 606. Non-structural angle brackets 614 are attached to channels 610 of the bottom side of panels 606, such interior surface studs 616.

Panels 606 may include a polymeric block having multiple layers and embedded metal members, such as described above relative to FIGS. 1-8C. Panels 606 include structural layer 617 and offset layer 619. Structural layer 617 includes structural studs 620. Offset layer 619 includes interior surface studs 616.

To construct roof system 602, panels 606 may be successively installed into channel 606 on opposing channels between a pair of adjacent beams at the higher end of the roof system, then slid down along the channel. (For illustrative purposes, the right-most of panels 606 is shown as not fully slid into place.) As each panel reaches its position, a lap joint is formed between the panel and the panel immediately preceding it in the installation. In some embodiments, an adhesive is used at the joint between the panels. Once each panel is in place, structural studs 620 of the panel may be fastened to the opposing channels 610 to secure the panel in place. Roof 608 may be installed after all of panels 606 have been installed and secured.

In some embodiments, a roof slopes downwardly in both directions from an apex. In this case, panels may be installed at the apex and slid down toward the walls until the channels are filled up to the apex on each side of the building.

Roof system may have any suitable slope. In one embodiment, roof has a slope of 1 inch per foot. In another embodiment, a roof has a slope of ½ inch per foot.

For illustrative purposes, the beams in FIG. 31 are shown at 8 foot spacing. The spacing between beams may, however, vary from embodiment to embodiment, depending factors such structural requirements for the building and the layout of the building. A building may include any number of track and panel sections, in any arrangement.

FIG. 32 is a detail view of a beam providing tracks for roof panels on both sides of the beam. Channels 610 may be mounted on beams 604. The channels may be secured using conventional fasteners. Structural studs 620 in insulating panels 606 are fastened to panel. Attachment plate 621 is secured on top of beam 614. Attachment plates may be provided at each of one or more beams to secure roof 608 to the beams.

Non-structural angle brackets 614 are fastened to beams and interior surface studs 616. Ceiling 623 may be installed on non-structural angle brackets 614, interior surface studs 616, or a combination of both.

FIG. 33 illustrates installation of a panel in a track on a beam. Fasteners 625 are provided to couple structural studs 620 of panel 606 to channel 610. Fasteners 627 are provided to couple interior surface studs 616 to non-structural angle brackets 614. Fasteners 627 are provided to couple non-structural angle brackets 614 to beam 604.

FIG. 34 is an exterior (top) view illustrating an insulating panel installed in a roof system between two parallel beams. Panel 606 includes structural studs 620 (near side) and interior surface studs 616 (far side).

FIG. 35 is an interior (bottom) view illustrating an insulating panel installed in a roof system between two parallel beams. Panel 606 includes interior surface studs 616 (near side) and structural studs 620 (far side).

In the embodiment shown in FIGS. 30 through 35, the wider layer of the panel is installed “face-up” on the tracks, such that the wider layer of the panels are on top in the installed condition. In particular, the roof system described in FIGS. 30 through 35 was shown installed the layer including structural studs (e.g., 3/8 wide) in the channel. Panels may nevertheless, in other embodiments, be installed include ridges, grooves, or studs that allow it be installed in any suitable channel.

FIG. 36 illustrates an alternate embodiment of a track and panel roof system. Roof system 640 is generally similar to roof system 602 described above relative to FIGS. 30-35, except that the roof layer of the insulating beam is narrower. In this case, the insulating panel may include a 1½ inch by 1½ steel structural stud, and slide into a 1½ inch steel channel. A narrow track such as shown in FIG. 36 may be suitable for relatively shorter spans between beams (for example, a four-foot span).

In the embodiments shown in FIGS. 30 through 36, the track and panel system includes a stud on an extended rim of the panel that engages in a groove (in this case, the inside of the channel) mounted on the beams, which serves a track for the rim. In some embodiments, however, the groove/rim arrangement of the system may be reversed. For example, each of the beams may be outfitted with one or more rails that serve as tracks and engage in corresponding grooves on the panels.

Various types of finishing elements or materials, such as drywall, may be attached to, or placed in front of, the interior surfaces of the building panels. In one embodiment, the non-structural channel runs vertically 16” OC. The non-structural channels may be used to attach interior wall coverings such as drywall, as well as any of various decorative items.

Various types of siding or other exterior elements may be attached to, or placed in front of, the exterior surfaces of building panels.
In some embodiments, a building is assembled by placing two or more building panels on a surface to form a row. Building panels may be connected by any of the various approaches described above. In some embodiments, each panel is free standing when placed on the slab or other supporting element or structure. As such, in some embodiments, a building is constructed without bracing elements to hold the building panels in place during construction.

In some embodiments, one or more building panels are installed on a footing. The footing may account for geometric variances or features of a slab or foundation. For example, a footing may compensate for curvature or a slope in a slab on which the building panel is to be mounted.

In some embodiments, electrical lines or plumbing lines are pre-installed in building panels. In some embodiments, windows, doors, or other apertures may be created in a building panel prior to delivery to a building site. Creating openings or apertures may reduce the time to a construct the building.

In an embodiment, a building panel includes a polymeric block, a frame coupled to the polymeric block, and a base member coupled to the polymeric block, the frame, or both. The base member couples with a slab.

In an embodiment, a method of constructing a building includes placing two or more building panels including polymeric blocks on a slab. The base of the building panels may be fastened to the slab.

In an embodiment, a building includes a slab and two or more building panels. Each of the building panels may include a polymeric block and a base. The bases of the building panels are fastened to the slab.

A base for a building panel may be made of any suitable material. In some embodiments, a base is a strip or angle of sheet metal. In certain embodiments, a base of a panel may be a strip of wood (for example, a 2 by 4).

In an embodiment, a building panel includes a solid polymeric block having an aperture, and a frame coupled to the aperture. Reinforcing elements are coupled to the frame along at least one side of the aperture. The reinforcing elements may inhibit deformation of the frame in the aperture.

In an embodiment, a method of making a building panel includes providing a frame for an aperture. At least one side of the frame is reinforced with reinforcing elements. Loose polymeric material is provided adjacent to the frame. A solid polymeric block is formed from the loose polymeric material such that the frame the frame defines an aperture in the solid block. The reinforcing elements may inhibit deformation of the frame in the aperture.

In some embodiments, a panel includes slots for carrying conduit, cables, plumbing, or other elements. The horizontal slots may intersect vertical slots in the panel. In some embodiments, slots for running conduits, plumbing, wires, or other elements have a dovetail cross section.

In some embodiments, vertical studs on opposing sides of a panel are offset from one another. In one embodiment, vertical studs on opposing sides of a panel are staggered with respect to one another.

In certain embodiments, air cavities are provided in a panel. Air cavities may be sized and shaped to provide thermal isolation, acoustic isolation, or both, between the interior and the exterior of the panel.

In some embodiments, one or both sides of a panel includes cross bracing. The ends of each of the cross bracing members by couple to junctions at the 4 corners of the panel. The crossing members may be attached to one or more additional vertical studs (for example, at the intersection of the cross members with one another. In certain embodiments, a building panel is a shear panel.

In certain embodiments, a panel includes 2½ inch studs. In one embodiment, a panel is about 5½ inches. Examples of other thicknesses for a panel include about 2½ inches, or 3½ inches.

In some embodiments described above, the cross section of a stud or other structural member is in the form of a hat section. A stud or other structural member of a panel may nevertheless have any other suitable cross section. For example, a stud may have a c-shaped cross-section, a u-shaped cross-section, an arcuate cross section, a corrugated cross section, or vee-shaped cross section.

In certain embodiments, multiple building panels are produced from a solid block made in one molding process. Each of the building panels may be produced by slicing the building panel from a solid larger solid block. In some embodiments, the frames include studs and cross rails. Fixture elements may maintain frames in the desired spacing from one another during a molding process. Loose polymeric material, such as polymeric beads or pellets, may be introduced into the mold around and within frames. In some embodiments, the loose polymeric material includes pre-formed polystyrene beads. The polymeric material may be heated to fuse the media. The block may be allowed to cool to form stock block. At this point, the frame elements are fixed in place in the stock block. The fixture elements may be removed.

After stock block is formed, it may be removed from the mold and positioned at a cutting station. The cutting station may include a hot wire cutting system with one or more hot wires. The hot wire system may be used to slice stock blocks at planes to create multiple block segments. Each of the segments may form a building panel. Each building panel may include one of frames and a block. The hot wire system may be used to perform additional shaping and cutting, such as adding notches, cavities, passages, or windows to the panel.

In one embodiment, a building panel includes a frame section 3 and 5/8 inches thick, with an offset in one direction of 3 and 5/8 inches and an offset in the other direction of 5 and 3/8 inches. In one embodiment, a building panel includes a frame section 3 and 5/8 inches thick, with an offset in one direction of 4 and 5/8 inches and no offset (offset of zero) in the other direction. In one embodiment, a building panel includes a frame section 3 and 5/8 inches thick, with an offset in one direction of 8 and 3/8 inches and no offset (offset of zero) in the other direction.

In an embodiment, a block for producing building panels includes a solid polymeric block and two or more building panels coupled to the solid polymeric block. The solid polymeric block may be sliced into portions (for example, segmented) to produce two or more building panels. Each of the building panels so produced may include one of the building panel frames. In some embodiments, the frames are included in the block in an array such that the block can be sliced in two or more different directions to slice off rows or columns of building panels from the block.

In some embodiments, panels are aligned to promote flow of the polymeric material during formation of the solid block. In one embodiment, a cradle is used to align
elements during formation. Holes may be provide in steel to improve flow, for example, to allow the polymeric material to reach spaces in or around doors and windows.

[0178] Steam may be used to heat the loose polymeric material. In one embodiment, the oven is heated to a temperature of about 212 degrees F. to about 220 degrees F. In one embodiment, the oven is heated to a temperature of about 200 degrees F. to about 250 degrees F. In certain embodiments, the polymeric material is heat molded. For example, the polymeric material is molded to expand against metal elements, such as frame elements. In certain embodiments, a vacuum is pulled such that the polymeric material is vacuum packed.

[0179] In some embodiments, a polymer material is selected to reduce moisture retention. In one embodiment, a block is formed from a closed cell polystyrene. The block may be allowed to cure. In one process, the block is allowed to cure for about 3 days.

[0180] In various embodiments, buildings, panels, or other components and features thereof, and methods of producing or constructing buildings and their components, are as described in U.S. patent application Ser. No. 13/926,426 entitled “MODULAR BUILDING PANEL WITH FRAME” filed Jun. 25, 2013 (the “426 application”), which is incorporated by reference as if fully set forth herein. Moreover, aspects and components of the inventions described in this application may be combined with aspects and components of the ‘426 application.

[0181] In certain embodiments, a solar power generation system is installed on a track and panel system built residence.

[0182] In some of FIGS. 1 through 28, dimensions, spacing, and standard components are indicated. The dimensions, spacing, and components may nevertheless differ from those shown on the drawings and will vary from embodiment to embodiment, depending on the structural requirements, layout, and various other factors.

[0183] Further modifications and alternative embodiments of various aspects of the invention may be apparent to those skilled in the art in view of this description. Accordingly, this description is to be construed as illustrative only and is for the purpose of teaching those skilled in the art the general manner of carrying out the invention. It is to be understood that the forms of the invention shown and described herein are to be taken as embodiments. Elements and materials may be substituted for those illustrated and described herein, parts and processes may be reversed, and certain features of the invention may be utilized independently, all as would be apparent to one skilled in the art after having the benefit of this description of the invention. Methods may be implemented manually, in software, in hardware, or a combination thereof. The order of any method may be changed, and various elements may be added, reordered, combined, omitted, modified, etc. Changes may be made in the elements described herein without departing from the spirit and scope of the invention as described in the following claims.

1. A building system, comprising:
   a plurality of panels, each of at least two of the panels comprising:
     a plurality of studs configured to serve as structural members;
   a polymeric block comprising:
     a structural layer defined by the width of the studs, wherein the structural layer comprises opposing lateral edges;
     an offset layer, wherein the offset layer extends in an interior direction from the structural layer, wherein the offset layer comprises opposing lateral edges, wherein the at least one panel further comprises:
       a first end;
       a second end opposite the first end,
       wherein, at one of the first end and the second end, the lateral edge of the structural layer extends beyond the lateral edge of the offset layer, and,
       wherein, at the other of the first end and the second end, the lateral edge of the offset layer extends beyond the lateral edge of the structural layer, one or more tracks configured to couple with at least some of the studs of the plurality of panels such that the panels form one or more walls of a building, wherein adjacent ones of the panels are configured to couple with one another at their lateral ends in a lap joint.

2. The building system of claim 1, further comprising one or more corner pieces, wherein at least one of the corner pieces is configured to couple two panels with one another to form a corner of the building.

3. The building system of claim 2, further comprising one or more corner pieces, wherein at least one of the corner pieces is configured to couple two panels with one another to form a corner of the building, wherein the corner pieces is joint to at least one of the panels by a half-lap joint.

4. The building system of claim 2, wherein at least one of the corner pieces is configured to create exterior right angle corner at the junction between two panels, wherein at least one other of the corner pieces is configured to create an interior right angle corner at the junction between two panels.

5. The building system of claim 1, wherein the offset layer of the polymeric block of at least one of the panels comprises a lower lengthwise notch.

6. The building system of claim 1, wherein the offset layer of the polymeric block of at least one of the panels comprises a lower lengthwise notch.

7. The building system of claim 1, further comprising one non-structural tack member coupled to at least one of the non-structural members.

8. The building system of claim 7, wherein at least one of the one or more non-structural tack members is installed in an upper step in the polymeric block of at least one of the panels.

9. The building system of claim 7, wherein at least one of the one or more non-structural tack members is installed in a lower step in the polymeric block of at least one of the panels.

10. The building system of claim 7, wherein at least one of the panels further comprises an interior wall element coupled to at least one of the non-structural tack members.

11. The building system of claim 10, wherein the interior element comprises interior wall cladding.

12. The building system of claim 1, wherein at least one of the panels comprises one or more non-structural interior studs or hat channels in the offset layer of the polymeric block.
13. The building system of claim 1, wherein at least one of the panels further comprises one or more chases in the offset layer of the polymeric block.

14. The building system of claim 1, wherein the structural layers of the panels are configured to couple with roof structural elements in accordance with at least one building code.

15. The building system of claim 1, wherein at least one of the panels is a window header panel.

16. The building system of claim 1, wherein at least one of the panels is a window sill panel.

17. The building system of claim 1, wherein at least one of the panels is a door header panel.

18. A building system, comprising:
   a plurality of panels, each of at least two of the panels comprising:
   a plurality of studs configured to serve as structural members;
   a polymeric block comprising:
   a structural layer defined by the width of the studs,
   wherein the structural layer comprises opposing lateral edges;
   an offset layer, wherein the offset layer extends in an interior direction from the structural layer,
   wherein the offset layer comprises opposing lateral edges,
   wherein the at least one panel further comprises:
   a first end;
   a second end opposite the first end; and
   one or more tracks configured to couple with at least some of the studs of the plurality of panels such that the panels form one or more walls of a building,
   wherein at least one of the panels comprises one or more upper or lower lengthwise notches in the offset layer of the polymeric block.

19. A building system, comprising:
   a plurality of panels, each of at least two of the panels comprising:
   a plurality of studs configured to serve as structural members;
   a polymeric block comprising:
   a structural layer defined by the width of the studs,
   wherein the structural layer comprises opposing lateral edges;
   an offset layer, wherein the offset layer extends in an interior direction from the structural layer,
   wherein the offset layer comprises opposing lateral edges,
   wherein the at least one panel further comprises:
   a first end;
   a second end opposite the first end;
   one or more corner pieces configured to couple with adjacent panels to form a corner in a wall of a building;
   and
   one or more tracks configured to couple with at least some of the studs of the plurality of panels such that the panels form one or more walls of a building.

20. A method of building, comprising:
   installing one or more lower tracks on a foundation;
   installing one or more corner pieces on at least one of the lower tracks;
   installing two or more panels on one or more of the tracks to form two or more walls, wherein at least one of the panels comprises an interior offset layer;
   coupling at least two of the panels with the at least one corner piece, wherein one of the wall panels installed in a different direction from the corner piece than at least one other of the wall panels; and
   installing one or more upper track pieces on the wall panels.

21. The method of claim 20, wherein at least one of the corners is an interior corner of the building.

22. The method of claim 20, wherein at least one of the corners is an exterior corner of the building.

23. The method of claim 20, wherein at least one of the panels is coupled to at least one other panel by way of a lap joint.

24. The method of claim 20, wherein at least one of the corner panels is coupled to at least one of the corner pieces by way of a lap joint.

25. The method of claim 20, further comprising installing one or more non-structural members in an interior notch of at least one of the panels.

26. A panel, comprising:
   a plurality of studs configured to serve as structural members;
   a polymeric block comprising:
   a structural layer defined by the width of the studs,
   wherein the structural layer comprises opposing lateral edges;
   an offset layer, wherein the offset layer extends in an interior direction from the structural layer,
   wherein the offset layer comprises opposing lateral edges,
   wherein at least one of the panels comprises one or more upper or lower lengthwise notches in the offset layer of the polymeric block.

27. A panel, comprising:
   a plurality of studs configured to serve as structural members;
   a polymeric block comprising:
   a structural layer defined by the width of the studs,
   wherein the structural layer comprises opposing lateral edges;
   an offset layer, wherein the offset layer extends in an interior direction from the structural layer,
   wherein the offset layer comprises opposing lateral edges,
   wherein the at least one panel further comprises:
   a first end;
   a second end opposite the first end;
   wherein, at one of the first end and the second end, the lateral edge of the structural layer extends beyond the lateral edge of the offset layer, and,
   wherein, at the other of the first end and the second end, the lateral edge of the offset layer extends beyond the lateral edge of the structural layer.

28. A corner piece for connecting adjacent building panels at a corner of a building, comprising:
   a polymeric block comprises two or more faces;
   one or more structural members coupled to the polymeric block,
   wherein the corner piece is configured to couple with a first panel in a first direction and a second panel in a second direction.

29. The corner piece of claim 28, wherein the corner piece is configured to couple with at least one panel in a lap joint.

30-58. (canceled)