ULTRA-LITE BUILDING SYSTEM

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An ultra-lite building system comprising a building constructed with base plates, wall panels composed of plastic core columns and foam surrounding the core columns, a plastic header assembly, plastic and foam joists and plastic or metal studs extending between said foam wall panels.
ULTRA-LITE BUILDING SYSTEM

RELATED PATENTS AND APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 66,490,527 entitled “Ultra-Lite Building System” filed on Jul. 29, 2003. The Provisional Application is of common inventorship with the subject application and the disclosure of that Provisional Application is incorporated by reference as though set forth at length.


BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention

[0004] Conventional building construction is a time consuming, resource heavy, and labor intensive process. The materials used in conventional building are quite heavy, costly, and not fire and heat resistant. Since the beginning of the industrial revolution, people have been trying unsuccessfully to minimize on-site labor costs with prefabricated components, such as prefabricated panels. Other than the use of drywall and plywood, today’s house is still being built stick by stick just as it was long ago, and requires the labor of many different trades, such as frame building, roofing, siding, etc.

[0005] A fault in many of previously known prefabricated building components was an inability to have internal access, which is ordinarily required for the placement of utility lines and overly finished building components tend to be inaccessible. If the pipes and wires are pre-installed within components, splices between components can reduce line efficiency, increase labor, and defeat the purpose of prefabrication. Hence, the ideal building system would utilize components that are lightweight, very strong, easily arranged, with constant and convenient internal access, and made of an approved heat and fire-resistant material, with cost-savings both in expedient manufacture and systematic on-site assembly.

[0006] 2. Description of Related Art

[0007] Polymer foam materials, e.g., sheets or blocks of low density expanded polystyrene, polyurethane and the like, have been widely used in the construction industry for purposes of building insulation. Plastic foam in the form of panels or foamed-in-place polyurethane has been used, for example, to provide an insulating wall or roof sheathing material, as perimeter insulation for floor slabs, as an insulative core layer sandwiched between structural components such as plywood, wall board or metal, as disclosed in U.S. Pat. No. 3,583,123, or as insulative layers surrounding poured concrete, as for example disclosed in U.S. Pat. No. 5,664,382.

[0008] It has also been proposed in the prior art to utilize plastic foam materials in combination with other structural components to prepare structural building panels or blocks which are said to be capable of structural rigidity especially from lateral loads or other stresses applied to them. Examples of such structural components may be found in U.S. Pat. No. 5,638,651 which discloses an interlocking insulated panel having an expanded polystyrene core sandwiched and glued between oriented strand board (OSB) and further containing a pair or metal channels glued to opposite sides of the core and partially embedded in the core. The metal channels are said to impart structural strength to the panel. U.S. Pat. No. 4,903,446 discloses a prestressed plastic foam structural member prepared by forming a grid-work of rope-like or wire tendons maintained in a tension condition within a mold, and encapsulating the grid-work with expandable plastic foam to form a lightweight structural member.

[0009] Also, U.S. Pat. No. 4,351,870 discloses a building panel material comprising a centrally disposed convoluted sheet stiffening layer of high strength material, such as metal or plastic, laminated on each side with an adhered sheet of expanded plastic material such that the expanded plastic sheet contacts the convoluted crests and troughs of the centrally disposed sheet. The panel may also contain coatings on the outer foamed plastic surfaces thereof which are of a decorative or weather-proofing nature, as well as combustion-inhibiting layers positioned on one or both sides of one or both expanded plastic sheet layers.

[0010] Further, U.S. Pat. No. 5,448,862 discloses a prefabricated formed plastic staircase where vertical slots are provided for the insertion of reinforcing steel rods meant for embedment in concrete beams below the surface to provide stiffening for the overall structure but no assistance to the function loading on the tread surfaces.

[0011] U.S. Pat. No. 5,256,222 discloses a lightweight wallboard including expanded siliceous inorganic particles bonded together by an inorganic binder. A wall board of this design may, as an example, have advantageous use in the subject housing system.

[0012] Other related structures are disclosed in U.S. Pat. Nos. 4,159,681; 4,241,555; 4,558,550; 4,611,450; and 4,774,794.

[0013] In applications such as described above, the expanded plastic material serves two primary roles:

[0014] a) an insulation layer which imparts both insulative value and moisture barrier properties to the structure, and/or

[0015] b) a matrix imparting three-dimensional shape to the structure and providing a platform for mounting or assembling structural components and/or fire retardant or finishing layers.

[0016] In these applications are the main structural components intended for the primary purpose of supporting or bracing axial loads directly applied to an encapsulated rigid structure, nor is the expanded plastic material by itself intended to, or capable of, supporting high compressive or axial loads applied thereto, or even capable of contributing significantly to the strength of the main structural components which are designed into such systems as the load and stress-bearing components. In the prior art, the general intent of the foam is to provide diaphragm rigidity to a planar configuration from lateral forces, with no active purpose in
the support of directly applied longitudinal axial loading in compression. And while such diaphragm rigidity may have been accomplished, the end product results are limited to purposes of rigid building enclosure rather than as the main building structural supporting elements.

[0017] For example, consider a steel wire mounted vertically between the plates of a press. The wire will initially resist a certain amount of compressive axial force applied. As more pressure is applied, the wire will strain and begin to buckle and eventually bend or break at the point of compressive tensile failure. Now consider the wire inserted longitudinally at the axis of a cylinder of STYROFOAM™ plastic about the size of a wooden thread spool such that the wire tips are exposed at the base and top of the cylinder. As the main support for the structure, the axially disposed wire will be subjected to the same forces as described for the unsupported wire, but will to some degree be laterally supported by the STYROFOAM™ matrix. Since the styrene foam can support only about 20-25 lbs per square inch compressive force after 10% deformation, the wire remains the main structural component. The tendency of the wire to buckle is, however, somewhat restrained by forces generated as the wire bows and compresses the surrounding foam in the direction of bowing, but there is no support for the wire on the side opposite the direction of bowing and the wire will eventually rupture the compressed foam and fail as described above. This is essentially the same phenomena involved with the prior art structures described above where structural layers are laminated to or encapsulated within foam layers and the resulting structure subjected to stress.

[0018] Now consider, that same steel wire coated with an adhesive and inserted longitudinally at the axis of the STYROFOAM™ cylinder such that the wire tips are exposed at the base and top of the cylinder and the shaft is circumferentially bonded to the foam. As the main support for the structure, the axially disposed wire will be subjected to the same forces as described for the unbounded wire, but the tendency of the wire to buckle is now restrained by foam matrix compressive resistance on the bowing side, and tensile forces on the opposite side between wire and foam because of the adhesive. Also, the circumferentially bonded adhesive on the wire itself will resist elongation and contraction of the wire’s surface to provide additional stiffening and stability, further resisting the wire’s tendency to buckle under compressive axial load.

OBJECTS OF THE INVENTION

[0019] It is therefore, a general object of the invention to provide an ultra-light building system operable to utilize the foam matrix itself, in combination with an adhesive to a fully encapsulated rigid sheet or membrane, for the prime purpose of laterally bracing said membrane to support high compressive axial load with minimum material expenditure. By volume, in the present invention the system is greater than 50% air, by which is created a structural matrix that laterally braces an axial-loaded membrane to produce ultimate strength. Therein, structural performance is maximized with minimum material.

[0020] It is further object of the present invention to provide a high strength but extremely light weight axial load-bearing structural foam core panels where the strength to weight ration can exceed 1000 to 1.

[0021] Another object of the present invention is to provide structural load-bearing wall panels wherein the encapsulated rigid sheet or membrane structure is in the form of longitudinally corrugated sheets with hollow tubular sections which are continuous across the entire dimension of the panels and establish a functionally homogeneous composite structure.

[0022] Yet another object of the present invention is to provide pairs of said corrugated sheets which, when reversed and mated together, form hollow tubular sections with perforated surfaces for the aspiration of process gases, the additional structural resistance against buckling, and the eventual installation of utilities related to panel erection in building construction.

[0023] Another object of the present invention is to provide this same wall panel configuration in the horizontal or oblique application to resist laterally applied loads.

[0024] Still another object of the present invention is to provide filler floor joists or beams which may be joined to vertical wall sections to create a stable structure.

[0025] Another object of the present invention is to provide floor beams comprising rigid hollow tubular sections encapsulated in a rectangular volume of foam.

[0026] Yet another object of the present invention is to provide studs and joists that enhance the structural integrity of the structure in case of fire.

[0027] It is another general object of the invention to provide an ultra-light building system that is suitable to construct a house of reinforced foam components that is both light weight and extremely rugged and suitable for modular construction.

[0028] It is another general object of the invention to provide an ultra-light building system which consists of a combination of wall panels, mounting plates, headers, joists and studs that are collectively light weight yet structurally rugged and suitable for long term building construction.

SUMMARY OF THE INVENTION

[0029] In the present invention, a stronger, cheaper, and much lighter composite material is used for building structures. The ultra light composite building materials are resilient to certain forces of nature, such as earthquakes yet are concurrently capable of supporting weight at a ratio of 1000 to 1. The system is comprised of five basic components: plates, wall panels, headers, joists, and studs. These building components are capable of housing all of the necessary internal wiring, plumbing, and ducts required in a conventional building structure. The material from which the components are made is naturally insulating, moisture resistant, non-toxic and environmentally sound, eliminating the use and need of lumber in building structures. However, the components of the present invention are fully compatible with conventional building materials, tools, and building related skills.

[0030] The building components of the present invention can be pieced together in a tools-free interlocking framework, which integrates many building functions into a single step. The present invention drastically reduces the rough building time to about one week, which takes about five weeks with conventional materials, tools, and skills. Further,
the present invention is cost-efficient and less resource intensive, because it consolidates the major building processes, such as building the frame, insulation, vapor barrier, sheathing, drywall, plumbing, mechanical, electrical, siding, and roofing.

DRAWINGS

[0031] Other objects and advantages of the present invention will become apparent from the following detailed description of preferred embodiments thereof taken in conjunction with the accompanying drawings, wherein:

[0032] FIG. 1 is an axonometric view (partially broken away to disclose internal detail) of a building structure using the ultra-lite building system in accordance with the subject invention;

[0033] FIG. 2 is an axonometric view of a base plate to support building side wall panels of the ultra-lite building system and a corresponding head plate;

[0034] FIG. 3 is an axonometric view of one of the building wall panel components of the ultra-lite building system and an associated stud and locking column;

[0035] FIG. 4 is a view of a junction header for connecting components of the ultra-lite building system;

[0036] FIGS. 5A-B is an axonometric view of a floor beam and floor panel component of the ultra-lite building system;

[0037] FIG. 5C is an axonometric view of a floor joist component of the ultra-lite building;

[0038] FIG. 6 is a view of a building stud in accordance with the ultra-lite building system;

[0039] FIG. 7 is a view of a three-piece duct manifold building component for the ultra-lite building system;

[0040] FIG. 8A is a view of a building jamb stud component accessory;

[0041] FIG. 8B is a ninety degree corner building component accessory;

[0042] FIGS. 8C-D are one-hundred-thirty-five degree corner building component and a junction component accessory; and

[0043] FIG. 9 is a detailed view of an alternative component of a wall panel disclosed in FIG. 3 of the ultra-lite building system.

DETAILED DESCRIPTION

[0044] Turning now to the drawings wherein like references refer to like parts, FIG. 1 discloses an axonometric view (partially broken away to disclose internal detail) of a building structure 10 fabricated in accordance with the ultra-lite building system.

[0045] In a preferred embodiment the building structure 10 is constructed upon conventional foundation of concrete pad 12. First a perimeter course of base plates 14 are positioned about the perimeter of the concrete pad. These base plates can be bolted to the concrete pad in a conventional manner. Each of the base plates 14 includes a plurality of upstanding stub columns 16 which are preferably circular in cross section but may be manufactured with other geometrical configurations such as elliptical, square, triangular, etc. as desired.

[0046] Mounted above the base plates are a plurality of wall panels 18. These wall panels 18 are generally composed from plastic columns 20 which are interconnected by spacer plates 22 as will be discussed in greater detail below. The columns 20 and spacer plates 22 are engulfed with plastic foam material which forms a generally solid rectangular panel configuration which is extremely light but is concomitantly structurally rugged and fully functional as a conventional wall, load bearing assembly.

[0047] The columns 20 of the wall panels 18 are configured in cross-section to be compatible with the stub columns 16 of the base plates and the wall panels 18 are assembled into wall surfaces by being positioned over the base plates 14 and slid into vertical alignment with the stub columns 16.

[0048] In a preferred embodiment the wall panels 18 are vertically secured by metal studs 24 (note FIGS. 2 and 6). The metal studs further add a degree of structural integrity to the overall building construction to prevent collapse in the event of a fire.

[0049] A plurality of header plates 26, having column stubs 28 that extend above and below the plates serve to engage an upper opening in the wall panel columns 20. With the base plate 14 bolted to the concrete pad 12, the wall panels secured with metal studs 24 and application of header plates 26 it will be appreciated that an extremely light but solid construction has already been assembled.

[0050] Next junction modules 28 are mounted on top of the header plates 26. The junction modules 28 comprise a plastic shell construction that is in the form of a solid rectangular configuration with side walls and edge surfaces (note FIGS. 7A and 7B). A circular aperture 30 is fashioned through the side surfaces of each of the junction modules and operably receives a cylindrical pipe saddle 32.

[0051] A plurality of joist beams 34 extend between opposing junction modules and include generally parallel side wall surfaces and an arcuate upper surface. The joist beams are dimensioned to fit over the pipe saddles 32 and form a floor support surface between opposing walls of the building structure. As will be discussed below, each of the joists 34 is composed of a plastic shell and a foam coating that provides an extremely strong but light component.

[0052] As also shown in FIG. 1 the building structure 10 can be facely fabricated with a second story. This is accomplished with the use of another course of header plates 40 that are structurally identical to header plates 26 and serve to support another course of wall panels 42 with vertical metal studs as discussed above.

[0053] The building structure or house 10 can be finished with attic sections of header plates 44 and wall sections 46 as shown in FIG. 1.

[0054] Finally, a roof 48 can be constructed over the wall structure by assembling additional wall sections 50 together with crown or ridge beams 52 and gutter plates 54. Of course the building structure 10 can be enhanced with conventional trim accoutrements such as siding 56 or brick facing 58 and the roof can be covered with conventional shingles 60, etc.
FIG. 2 discloses a detailed view of the base plate 14 and a corresponding header plate 26. The base plate is a relative heavy construction plastic base 62 mounted on a flashing plate 64. In this the base plate 62 is preferably about 4.8 inches wide and 0.6 inches thick. Holes 66 are cut through the center of each stub column 16 to permit engagement with a bolt embedded within the concrete pad 12 (note again FIG. 1). The height of the stub columns can vary in length, however, a presently preferred dimension is about 3 inches.

FIG. 2 also shows a corresponding header plate 26. This header includes a rugged base member 68 and a plurality of double column members 70 which extend above and below the plane of the base 68 approximately 3 inches for a conventional design.

Turning now to FIG. 3 there will be seen a wall panel 18 in accordance with the invention. In this, the panel is formed from a plurality of plastic columns 76 which extend in a parallel array throughout the length of the panel 18. Each of the columns is interconnected in series by spacer plates 78 which are also constructed from a plastic material. The columns and connecting plates can be extruded as one piece of fashioned out of molded corrugated sheets which are fashioned in halves and then the halves are abutted together to make up the columns 76 and connecting plates 78. A foam core 80 surrounds the columns and plates and is fashioned into a generally sold rectangular block of construction material. Of course with the plastic and foam construction in reality the panel is more than 50% air but is still very rugged and structurally sound as detailed is in detail in previous related U.S. Pat. No. 6,412,243 entitled “Ultra-Lite Modular Composite Building System.” The disclosure of this prior patent is hereby incorporated by reference as though set forth at length.

In a preferred embodiment the panel 18 is dimensioned in width so that half a column is exposed at each edge 82 and 84 which extends through the height of the panel 18. These channels enable the panel to be assembled with compatible channels 86 on eight side of a sheet metal stud 88. In addition, the side wall construction includes tying columns 90 which are constructed from extruded plastic and serve to fit between the studs 88 and the panel edge channels to tie the two together into a structural unit.

FIG. 4 discloses a junction box assembly 28 and a pipe bearing saddle 32. In addition FIG. 4 includes a spacer block 92 and an aperture cap 94. The junction module is fabricated from a heavy plastic material of 0.6 inches in thickness and is a solid rectangular shell which has four edge surfaces 96 with three equally spaced apertures 98 and a transverse large diameter opening 100 of about 9.6 inches or so that extends through the side surfaces of the junction block 28. The opening 100 includes course screw threads 102 which are operable to selectively receive a cap 94 or a bearing pipe saddle 32. In this the cap 94 has exterior course screw threads 104 and the saddle pipe 32 also has screw threads 106 that are operable for engagement with the threads of the opening 100 in the junction 28.

FIG. 5A discloses a floor panel section 108 that is composed of a plastic shell 110 and a foam core 112. The single section 108 is operable to be formed into a rectangular beam by placing two panel sections 108 together as shown at 114. The single floor panel is operable to traverse across joists as shown in FIG. 1. Alternatively the floor panels can be formed back to back into a spacer beam as shown at 114. As apparent with the other structural elements of the subject invention the flooring and spacer beam construction if both light weight and very rugged.

FIG. 5B discloses a joist shell 116 that is fabricated from extruded plastic or sheet metal and includes opposing generally parallel sides 118 and 120 and an arcuate connection crown 122. Rectangular channels or windows 124 are fashioned through the joist 116 to lighten the weight and to provide access through the joist for pipes, conduits and ducts. The joist may be formed with a form coating or a crown assembly 126 to provide structural rigidity and support of floor panels 108 as discussed above.

FIG. 6 discloses a stud element 88. The stud is preferably made from sheet metal and includes opposing and outwardly looking arcuate, and longitudinally extending half channel 86 as discussed in connection with FIG. 3 above. The metal studs 88 serve to provide structural rigidity in the event of a fire and prevent collapse of the building structure. Horizontal channels 120 are also fashioned through the studs and operable receive horizontal dowels that operably engage with horizontal apertures in corresponding channels in wall panel members.

FIG. 7 discloses structural details of alternative uses of junction blocks 28 that include pipe segments 130 and ducts 132 that can be directed throughout the building structure without cutting extra holes or otherwise compromising the structural integrity of the system.

FIGS. 8A-D disclose various structural details of various connecting units. FIG. 8A discloses a jam stud composed of a plastic shell 132 and a foam core 134. FIG. 8B comprises a 90 degree corner section 136 composed from a plastic skeleton of columns 140 and spacers 142 and a surrounding foam 144. FIG. 8C shows a similar plastic 146 and foam 148 core forming a 135 degree corner section and FIG. 8D discloses a wall intersection 150 with a plastic skeleton 152 and a foam core 154.

Finally FIG. 9 discloses an alternative embodiment of the wall panel of FIG. 3 where an metallic insert plate 156 is embedded within the spacer panel 78 extending between adjacent plastic columns 76. This insert plate provides enhances structural rigidity and includes triangular punched out segments 158 to securely interact with the surrounding plastic spacer panel 78.

The foam layer 80 is preferably composed of expanded polymeric beads. However, in alternative embodiments other types of foam or expanded foam layers could be provided. The foam layer 80 is formed on opposing sides of the structural members 76 and 78 as a composite lamination with an adhesive. This process is disclosed in detail in prior U.S. Pat. No. 6,205,728 which is hereby incorporated by reference in its entirety. The composite formation formed by the structural members 76 and 78 and the foam layer 80 form a lightweight panel section in which the structural members are laterally stiffened by the foam layer and, thus, can withstand an increased axial load without laterally bending or buckling outward.

In one embodiment a cover layer 160, note FIG. 2, is comprised of a heat and fire retardant substrate, with a moisture retardant drywall compatible paper attached
directly to the outer surface of the substrate, and the substrate itself attached directly to the outer side of the foam layer 80 opposite from the structural members 76 and 78. In an alternate embodiment the cover layer 160 could be a fabric wall paper covering or a separate panel or board attached to the lamination. One product that would be suitable for this purpose is the panel disclosed in U.S. Pat. No. 5,256,222 as noted above. For the drywall paper and heat and fire retardant substrate embodiment, the combined laminate could be attached to the foam layer 80 as the foam layer is being expanded on the structural members 76 and 78 or shortly thereafter. Thus, process gases from expansion of the foam layer 80 can escape through the holes 37 and out the perforated hollow tubular sections 76. The panel sections could alternatively or additionally provide a layer of an intumescent material as or on the cover layer 160. Alternatively, the layer of intumescent material could also be provided immediately beneath the surface paper membrane of the laminate 160. However, an intumescent material need not be provided.

[0068] The tubular columns 80 can be used as passage-ways to position electrical wires or other types of utilities therethrough. Additionally, the tubular sections 806 can have flexible water supply pipes extending therethrough, or be used as a substitute for air conditioning ductwork.

SUMMARY OF MAJOR ADVANTAGES OF THE INVENTION

[0069] After reading and understanding the foregoing description of the invention, in conjunction with the illustrative drawings, it will be appreciated that several advantages of the subject system are obtained.

[0070] The subject invention provides a new way to build housing. The lightweight construction is faster to assemble, stronger, cheaper and better than conventional wood stick construction buildings.

[0071] The subject invention provides earthquake resistance, and a strength to weight ratio of approximately 1000 to 1 in a composite material hat is greater than 50% air.

[0072] The steel or sheet metal studs makes the structure rugged and resistant to collapse in the event of fire.

[0073] The wall panels, joists, header blocks, junction blocks, all have channels that are usable for pipes, ducts and wiring without cutting special channels and altering the structural integrity of the overall construction.

[0074] In describing the invention, reference has been made to a preferred embodiment and illustrative advantages of the invention. Those of skill in the art, however, and familiar with the instant disclosure of the subject invention may recognize additions, deletions, modifications, substitutions and other changes which will fall within the purview of the subject invention set forth in the following claims.

What is claimed is:

1. An ultra-lite building construction comprising:
   a plurality of base plates operable to be secured to a building foundation, each of said base plates having a plurality of upright generally cylindrical columns;
   a plurality of wall panels, each of said wall panels having a core composed of an plurality of generally parallel, hollow, cylindrical, longitudinally extending, columns interconnected by spanning plates and said core being covered with a foam material and an outer skin of a moisture resistant coating, wherein said core columns operably receive, correspondingly dimensioned, said plurality of upright, generally cylindrical, columns of said base plates;
   upright studs extending between next adjacent wall panels of said plurality of wall panels and serving to connect with said wall panels and thereby vertically steady said wall panels;
   a plurality of header plates having a plurality of generally cylindrical columns extending above and below said header plates, wherein a portion of said cylinders extending below said header plates operably extending into the top of said cylindrical columns of said wall panels;
   a plurality of junction modules comprising a generally solid rectangular shape in exterior configuration but hollow interiorly to form a shell and having at least one opening extending into each edge surface thereof and said edge openings being operable to engage with an upwardly extending column of said plurality of header plates and a transverse central opening extending thought the center of said generally rectangular shell;
   a plurality of joist beams extending in a generally parallel array between opposing header modules operably connected to said header plates; and
   a roof positioned above said joist beams to form a building structure.

2. An ultra-lite building construction as defined in claim 1, wherein:
   said cylindrical columns of said base plate are generally circular in cross-section.

3. An ultra-lite building construction as defined in claim 1, wherein:
   said core and spanning plates are composed of a plastic material.

4. An ultra-lite building construction as defined in claim 1, wherein:
   said core is composed of a sheet metal material.

5. An ultra-lite building construction as defined in claim 1, wherein:
   said interconnecting spanning plates have a plurality of embedded rectangular reinforcement metal plates.

6. An ultra-lite building construction as defined in claim 1, wherein:
   said embedded rectangular reinforcement metal plates have generally triangular punched through projections for engaging said plastic spanning material.

7. An ultra-lite building construction as defined in claim 1, wherein:
   said outer skin of moisture resistant coating comprises a moisture resistant paper coating.
9. An ultra-lite building construction as defined in claim 1, wherein:

- said upright studs are composed of sheet metal and have arcuate edges;
- said wall panels having correspond arcuate edges; and
- a column inserted between mutually facing arcuate edges of a stud and a wall section for connecting said stud to an edge of said wall panel.

10. An ultra-lite building construction as defined in claim 1 and further comprising:

- a member extending through the center of each of said header modules for connecting said header module to a corresponding arcuate surface of a joist beam.

11. An ultra-lite building construction as defined in claim 1 and further comprising:

- a dome composed of a foam material and being positioned upon an upper surface along the length of each of said joists to provide a flat surface to receive flooring material.

12. An ultra-lite building construction as defined in claim 1 wherein:

- said joist is composed from plastic sheet material and being coated with a foam material for structural rigidity.

13. An ultra-lite building construction as defined in claim 1 and further comprising:

- said roof being composed from a plurality of said wall panels connected together at junction locations.

14. An ultra-lite building construction as defined in claim 13 and further comprising:

- a second course of wall panels positioned upon an upper edge of said initial plurality of wall panels and being connected to said junction modules by a header plate with a plurality of generally cylindrical columns extending above and below said header plates and said roof being mounted above said second course of wall panels.