A shelter construction kit includes at least six composite panels which are identical prior to the positioning of access openings. Each of the six composite panels has a first side edge having an integrally formed male coupling and a second side edge having an integrally formed female coupling. Each of the first side edge and the second side edge extend outwardly at 45 degrees from the first flat face to the second flat face. When the first side edge of one panel is coupled to the second side edge of another panel in a first orientation the coupled panels are on a common plane. When the first side edge of one panel is inverted and coupled to the second side edge of another panel in a second orientation the coupled panels form a 90 degree corner. Roof/wall interface brackets are provided to secure the roof panels in place. Assembly instructions are provided describing how to couple the panels.
SHELTER CONSTRUCTION KIT

FIELD OF THE INVENTION

[0001] The present invention relates to a shelter construction kit and, in particular, a shelter suitable for, but not limited to, telecommunications equipment, military, disaster services, and animal husbandry.

BACKGROUND OF THE INVENTION

[0002] Installations such as for temporary Military housing generally consist of canvas or other soft material, primarily due to their ease of transportation and set up. These temporary shelters or tents are neither workable for long periods of term nor suitable for permanent installations. Long-term use requires the establishment of more permanent facilities along with the ensuring transportation, material and labour commitment of traditional building design and materials.

[0003] Installations for disaster services agencies consist primarily of canvas or other non-insulated soft-sided shelters. These are generally deployed due to the speed of response time needed to establish a large number of quick weatherproof shelters for disaster victims and disaster workers alike. There is a need for alternative structures.

[0004] Wireless telecommunications networks require a plurality of selectively placed telecommunications stations capable of receiving and transmitting signals. Each telecommunications station has a shelter that, in view of its size and purpose, could be described as a shelter. The shelter is used to protect the necessary telecommunications equipment from damage from weather, animals, and vandals.

[0005] The shelters presently in use are primarily metal structures. As wireless telecommunications networks have expanded within cities, problems have been encountered with the metal structures that has caused the industry to look for alternative shelters. The most strategic place to position a telecommunications station in a city, is on top of a high rise building. In order to place an assembled metal structure on top of such a high rise building, a crane or a helicopter must be used. This is extremely costly. Taking the metal structures up the elevator of the high rise building in a disassembled state appears to be a more cost effective alternative; however, the use of shelter construction kits has also proven to be unworkable. The size and weight of the components have made them difficult to transport in elevators and impossible to transport in some elevators. When components have been used which fit in the elevator, an inordinate amount of time and effort has been required for assembly. Due to space constraints, which vary from building to building, shelters which have been used successfully on some buildings may not necessarily fit in the space available on other buildings.

SUMMARY OF THE INVENTION

[0006] What is required is a shelter construction kit which is better suited for the requirements of the telecommunications and other industries.

[0007] According to the present invention there is provided a shelter construction kit which includes at least six composite panels which are identical prior to the positioning of access openings. This includes at least one panel for a first end wall, at least one panel for a second end wall, at least one panel for a first side wall, at least one panel for a second side wall, and at least two panels for a roof. Each of the at least six composite panels having a first flat face, a second flat face in parallel spaced relation to the first flat face, a first side edge having at least one integrally formed male coupling and a second side edge having at least one integrally formed female coupling adapted to mate with the at least one integrally formed male coupling. Each of the first side edge and the second side edge extend outwardly at either 22.5 degrees or 45 degrees from the first flat face to the second flat face. Roof/wall interface brackets are provided which are adapted to secure the panels used for the roof to the panels used for the side walls and end walls. Assembly instructions are provided describing how to couple the panels to form a shelter structure.

[0008] With an angle of 45 degrees, when the first side edge of one panel is coupled to the second side edge of another panel in a first orientation with the angles offset, the coupled panels are on a common plane. When the first side edge of one panel is inverted and coupled to the second side edge of another panel in a second orientation with the angles cumulative, the coupled panels form from a 90 degree corner.

[0009] With an angle of 22.5 degrees, when the panels are joined together end to end with the angles offsetting, the coupled panels form a straight corrugated wall structure and four panels joined together with the angles cumulative, the coupled panels form a 90 degree corner.

[0010] The shelter construction kit, as described above, better meets the needs of the telecommunications and other industries. The composite panels are light weight. The fact that all of the panels are identical (except for access openings) and have integrally formed male and female couplings simplifies assembly. The shape and size of the shelter can be configured, as required, to suit the space requirements of the installation. An additional benefit is obtained due to the fact that the composite panels do not provide radio frequency interference as do metal shelters.

[0011] Although beneficial results may be obtained through the use of the shelter construction kit, as described above, additional benefit is obtained due to the fact that the shelters can be assembled quickly and easily and can be disassembled, transported easily to another location and reassembled with ease.

[0012] Although beneficial results may be obtained through the use of the shelter construction kit, as described above, it is preferred that the panels be devoid of any access openings and that the assembly instructions provide for access openings to be cut at the time of assembly. This avoids having a kit sent out in which an access opening is in an incorrect location. An advantage of the use of composite panels, that openings may be readily cut at a selected position without compromising the integrity of the panel.

[0013] Although beneficial results may be obtained through the use of the shelter construction kit, as described above, the roof would have either a 22.5 or 45 degree slope depending upon the angle formed when panels are joined. Even more beneficial results may, therefore, be obtained when a roof ridge beam is provided to alter the coupling angle of panels used for the roof and thereby reduce roof pitch. This is not important for small shelters, becomes increasingly important as the size of the shelter is increased.
Although beneficial results may be obtained through the use of the shelter construction kit, as described above, it is important that the connection of the panels provide an effective weather seal. Each panel has a first end edge and a second end edge. It is preferred that the male coupling extends the length of the first side edge from the first end edge to the second end edge, and that the female coupling extends the length of the second side edge from the first end edge to the second end edge. This ensures that when the male coupling and the female coupling are engaged a seal is formed along the entire length of the panel.

Although there are various types of male to female engagements which may be used, it is preferred that the male coupling is a dovetail tongue and the female coupling is a mating dovetail groove. This type of engagement is better able to resist penetration by water, as it entails several changes of direction.

Although beneficial results may be obtained through the use of the shelter construction kit, as described above, in order to facilitate caulking to preclude water penetration it is preferred that a first sealing shoulder be provided on the first side edge adjacent to the male coupling and a second sealing shoulder be provided on the second side edge adjacent to the female coupling. The first sealing shoulder is perpendicular to the first flat face and the second sealing shoulder is perpendicular to the second flat face. The first sealing shoulder and the second sealing shoulder engage when the male coupling and the female coupling mate.

**BRIEF DESCRIPTION OF THE DRAWINGS**

These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings, the drawings are for the purpose of illustration only and are not intended to in any way limit the scope of the invention to the particular embodiment or embodiments shown, wherein:

**FIG. 1** is an exploded perspective view of a shelter formed from a shelter construction kit in accordance with the teachings of the present invention.

**FIG. 2** is a top plan view of a panel of the shelter construction kit illustrated in FIG. 1.

**FIG. 3** is a top plan view of the panel illustrated in FIG. 2.

**FIG. 4** is a perspective view of one panel coupled to another on the same plane.

**FIG. 5** is a top plan view of one panel coupled to another panel in perpendicular relationship.

**FIG. 6** is a perspective view of panels assembled form a rectangular enclosure.

**FIG. 7** is a detailed top plan view of coupling used to couple panels.

**FIG. 8** is a section view of the roof interface ratchet.

**FIG. 9** is a section view of the roof ridge beam.

**FIG. 10** is a perspective view of the shelter structure assembled from the kit illustrated in FIG. 1.

**FIG. 11** is a top plan view of an alternative embodiment of shelter structure assembled from the kit illustrated in FIG. 1, in which that angle is 22.5 degrees.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

The preferred embodiment, a shelter construction kit generally identified by reference numeral 10, will now be described with reference to FIGS. 1 through 10.

**FIG. 2** refers to FIG. 1, each of six panels 12 has a first flat face 24, a second flat face 26 in parallel spaced relation to first flat face 24, a first side edge 28 that has an integrally formed male coupling 30 and second side edge 32 that has an integrally formed female coupling 34 that is adapted to mate with integrally formed male coupling 30. In the illustrated embodiment, male coupling 30 is a dove tail tongue and female coupling 34 is a mating dovetail groove, however it will be appreciated that other types of coupling configurations can also be used.

**FIG. 3** refers to FIG. 1, each panel 12 also has a first end edge 36 and a second end edge 38. Male coupling 30 extends the length of first side edge 28 from first end edge 36 to second end edge 38. Female coupling 34 extends the length of second side edge 32 from first end edge 36 to second end edge 38. Referring to FIG. 4, each of first side edge 28 and second side edge 32 extend outwardly at 45 degrees from first flat face 24 to second flat face 26. When first side edge 28 of one panel 12 is coupled to second side edge 32 of another panel 12 in a first orientation with the angles offset by, coupled panels 12 are on a common plane. Referring to FIG. 5, alternatively when first side edge 28 of one panel 12 is inverted and coupled to second side edge 32 of another panel 12 in a second orientation with angles cumulative, coupled panels 12 form a 90 degree corner. Referring to FIG. 6, in this manner panel 12 can be couple together to form a rectangular enclosure generally reference by numeral 41 which is formed of first sidewall 18, second sidewall 20, first end wall 14 and second end wall 16.

**FIG. 7** shows referring to FIG. 1, a first sealing shoulder 42 is provided on first side edge 28 adjacent to male coupling 30. First sealing shoulder 42 is perpendicular to first flat face 24. A second sealing shoulder 44 is provided on second side edge 32 adjacent to female coupling 34. Second sealing shoulder 44 is perpendicular to second flat face 26. First sealing shoulder 42 and second sealing shoulder 44 engage when male coupling 30 and female coupling mate 34.

**FIG. 8** refers to FIG. 4, roof/wall interface brackets 46 are provided. Referring to FIG. 1, roof/wall interface bracket 46 are adapted to secure panels 12 and are used for roof 22 to panels 12 used for first sidewall 18, second sidewall 20, first end wall 14 and second end wall 16. Referring to FIG. 8, roof/wall interface brackets 46 have a saddle 47 adapted to rest upon the sidewalls and an upstanding member 49 adapted to engage the roof.
Referring to FIG. 9, a roof ridge beam 48 is provided. Referring to FIG. 1, roof ridge beam 48 sits at the apex of the roof and is used to alter coupling angle of panels 12 that form roof 22 and thereby reduce roof pitch. Referring to FIG. 9, roof ridge beam 48 has two opposed angular grooves 51 which receive the panels 12 which form roof 22.

Assembly instructions 50 are provided which describe how to couple panels 12 to form shelter structure 52. Assembly instructions 50 also provide for access openings 54 to be cut at the time of assembly of shelter structure 52.

Operation:

Referring to FIG. 1, shelter construction kit 10, as described above, can be assembled to form a shelter structure 52 illustrated in FIG. 10. Referring to FIG. 10, assembly instructions 50 which are provided with kit 10 describe how to couple panels 12 together to form shelter structure 52. Preferably, assembly instructions 50 also describe how to cut access openings 54 in shelter structure 52 as panels 12 of shelter construction kit 10 do not need to provide for any access openings 54 prior to assembly. Referring to FIG. 6, to form shelter structure 52 illustrated in FIG. 10, one of panels 12 is coupled to another of panels 12 by engaging male coupling 30 on one panel 12 with female coupling mate 34 on another panel 12. By assembling panels 12 in this manner on a common plane 40 illustrated in FIG. 4, each of first sidewall 18 and second wall 20 are formed. Referring to FIG. 5, to make a corner, first side edge 28 of one panel 12 is inverted and coupled to second side edge 32 of another panel 12 in a second orientation with angles cumulative, such that first end wall 14 and second end wall 16 are perpendicular to first side wall 18 and second side wall 20 to form a rectangular enclosure 41 illustrated in FIG. 6. It will be appreciated that if other dimensions are required, first sidewall 18 and second sidewall 20 can be comprised of more than just one panel 12, and first end wall 14 and second end wall 16 can include more than just one panel 12 each.

Referring to FIG. 7, first sealing shoulder 42 and second sealing shoulder 44 engage when male coupling 30 and female coupling 34 are mated to join one panel 12 to another panel 12. Caulking compound is placed between first sealing shoulder 42 and second sealing shoulder 44. When first sealing shoulder 42 and second sealing shoulder 44 are engaged with caulking between, they serve to seal out environmental elements such as water and dust penetration, so that such elements cannot interfere with telecommunications equipment. The use of a male coupling 30 extending the length of the panel in the form of a dove tail tongue and a female coupling 34 extending the length of the panel in the form of a mating dove tail groove is better able to resist penetration by water, as it entails several changes of direction.

Referring to FIG. 1, two panels 12 are secured together by roof ridge beam 48 to form roof 22. Roof ridge beam 48 is used to alter coupling angle of panels 12 that are used for roof 22 and thereby reduce roof pitch. Roof/wall interface bracket 46 is used to secure two of panels 12 used for roof 22 to panels 12 used for first sidewall 18, second sidewall 20, first end wall 14 and second end wall 16. Access openings 54 can be cut to allow for access to rectangular enclosure 41 illustrated in FIG. 6.

Referring to FIG. 1, shelter construction kit 10, better meets the needs of the telecommunications industry, although it will be well suited to other industries as well. Composite panels 12 are light weight, and of a size and dimension that ensures that each panel 12 will fit into a standard size elevator. The fact that all of panels 12 are identical (except for access openings) and have integrally formed male couplings 30 and female couplings 34 simplifies assembly. Referring to FIG. 10, the shape and size of shelter structure 52 can be configured, as required, to suit the space requirements of the installation. An additional benefit is obtained due to the fact that composite panels 12 do not provide radio frequency interference as do metal shelters. Further advantages will hereafter be described.

Supplied in a kit for field installation. This allows for a complete structure to be prepackaged and shipped to a location that a structure is required. The kit can be mechanically transported as a complete package or manually transported in pieces and assembled.

Installed at the required location. This also allows for a faster installation and quicker utilization.

Light weight for shipping. This allows for transportation by light truck and trailer, aircraft or small boat or ship. There are no special permits for over size handling required. This reduces the cost of complexity of transportation needs and allows for a faster deployment to a required site.

Variable floor grid loading capacity. This allows for flexibility of design and end user adaptation of the structure. This allows for easier reconfiguration and reuse, which increases the length of potential use of a structure and decreases costs and loss of use due to redesign.

Self-locking ridge beam for setting and sealing roof panels.

Ridge beam has integral hanger for ceiling grid for cable trays.

Does not create radio frequency interference. Fiberglass components are RF transparent and do not absorb radio frequency waves.

Flexible designs using interlocking panels. This allows for an infinite number of configurations in various sizes horizontally and vertically that allows for single and split-level floor plan design. The panels allow for the design of structures around existing natural and man made configurations and allow for horizontal and vertical design adaptability. The design of the panels allow for horizontal penetrations to be located anywhere along the exterior of the wall design. The panels also allow for vertical penetrations through floors and roofs without compromising the structural integrity of the panels.

Modular components enable the shelter to be restructured. Restructuring or reconfiguration is accomplished by the addition or removal of panels.

Easily assembled and reassembled. The design of the component wall panel allow for the panels to be assembled into a structure, by any
individual with reasonable physical abilities and modest training. There are no special trades or engineering skills required to assemble and structure composed of the modular panels.

[0054] Portable in kit form. This enables the transportation of the kit to and from any site, either in complete or partial kits. The kit can be easily transported via light truck and trailer, lifted in a complete form by light duty crane or light duty helicopter, or airlifted to remote regions and dropped by parachute.

[0055] The kit can be easily disassembled at site and moved by individual pieces to the required location. This allows for non-mechanical transportation of individual pieces for assembly on site. The design of the kit allows for the structure to be disassembled and removed from a site with no mechanical assistance.

[0056] Alternative Embodiments

[0057] Referring to FIG. 11, there is illustrated how a shelter can be constructed using panels 12 with angles of 22.5 degrees. It is to be noted that the straight sections of wall are “corrugated” and that it takes a combination of five panels to form a 90 degree corner.

[0058] In this patent document, the word “comprising” is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded. A reference to an element by the indefinite article “a” does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there be one and only one of the elements.

[0059] It will be apparent to one skilled in the art that modifications may be made to the illustrated embodiment without departing from the spirit and scope of the invention as hereinafter defined in the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A shelter construction kit, comprising:
   - at least six composite panels which are identical prior to the positioning of access openings, including at least one panel for a first end wall, at least one panel for a second end wall, at least one panels for a first side wall, at least two panels for a roof;
   - each of the at least six panels having a first flat face, a second flat face in parallel spaced relation to the first flat face, a first side edge having at least one integrally formed male coupling adapted to mate with the at least one integrally formed male coupling, and each of the first side edge and the second side edge extending outwardly at one of 22.5 degrees or 45 degrees from the first flat face to the second flat face;
   - roof/wall interface brackets adapted to secure the panels used for the roof to the panels used for the side walls and end walls; and
   - assembly instructions describing how to couple the panels to form a shelter.

2. A shelter construction kit as defined in claim 1, wherein the first side edge and the second side edge extend outwardly at 45 degrees, such that when the first side edge of one panel is coupled to the second side edge of another panel in a first orientation the coupled panels are on a common plane and when the first side edge of one panel is inverted and coupled to the second side edge of another panel in a second orientation the coupled panels form a 90 degree corner.

3. A shelter construction kit as defined in claim 1, wherein the first side edge and the second side edge extend outwardly at 22.5 degrees, such that the panels joined together end to end with the angles offsetting form a straight corrugated wall structure and four panels joined together with the angles cumulative form a 90 degree corner.

4. The shelter construction kit as defined in claim 1, wherein the assembly instructions provide for access openings to be cut at the time of assembly.

5. The shelter construction kit as defined in claim 1, wherein a roof ridge beam is provided to alter the coupling angle of panels used for the roof and thereby reduce roof pitch.

6. The shelter construction kit as defined in claim 1, wherein each panel has a first end edge and a second end edge, the male coupling extends the length of the first side edge from the first end edge to the second end edge, and the female coupling extends the length of the second side edge from the first end edge to the second end edge.

7. The shelter construction kit as defined in claim 6, wherein the male coupling is a dove tail tongue and the female coupling is a mating dove tail groove.

8. The shelter construction kit as defined in claim 1, wherein a first sealing shoulder is provided on the first side edge adjacent to the male coupling, the first sealing shoulder being perpendicular to the first flat face, and a second sealing shoulder is provided on the second side edge adjacent to the female coupling, the second sealing shoulder being perpendicular to the second flat face, the first sealing shoulder and the second sealing shoulder engaging when the male coupling and the female coupling mate.

9. A shelter construction kit, comprising:
   - at least six composite panels which are identical prior to the positioning of access openings, including at least one panel for a first end wall, at least one panel for a second end wall, at least one panels for a first side wall, at least two panels for a roof;
   - each of the at least six panels having a first flat face, a second flat face in parallel spaced relation to the first flat face, a first side edge having at least one integrally formed male coupling, and each of the first side edge and the second side edge extending outwardly at one of 22.5 degrees or 45 degrees from the first flat face to the second flat face;
   - roof/wall interface brackets adapted to secure the panels used for the roof to the panels used for the side walls and end walls; and
   - assembly instructions describing how to couple the panels to form a shelter.
first sealing shoulder on the first side edge adjacent to the male coupling, the first sealing shoulder being perpendicular to the first flat face, and a second sealing shoulder on the second side edge adjacent to the female coupling, the second sealing shoulder being perpendicular to the second flat face, the first sealing shoulder and the second sealing shoulder engaging when the male coupling and the female coupling mate;

roof/wall interface brackets adapted to secure the panels used for the roof to the panels used for the side walls and end walls;

a roof ridge beam to alter the coupling angle of panels used for the roof and thereby reduce roof pitch; and

assembly instructions describing how to couple the panels to form a shelter structure.

10. The shelter construction kit as defined in claim 9, wherein the assembly instructions provide for access openings to be cut at the time of assembly.

11. The shelter construction kit as defined in claim 9, wherein the male coupling is a dove tail tongue and the female coupling is a mating dove tail groove.