

A SHELTER AND A METHOD OF FORMING THE SAME.

[001]. Field

[002]. The present invention is generally directed to erectable shelter, and in particular, to improved erectable shelter constructions and methods for assembly thereof.

[003]. Background

[004]. A shelter can range from a fabric tent to a transitional building that may last months or years. Generally such shelters are light weight to allow disassembly and transportation of the shelter for ease of relocation. To facilitate portability comfort is often sacrificed such that there is not much room inside such shelters and it is often not possible to stand in or comfortably lie down in such shelters. Light weight material such as nylon are often used. Nylon expands when it gets wet leading to sagging of nylon on such fabric tents. Light weight fasteners such as zippers often break. The watertight protective covering often causes a build-up of condensation within the shelter that often results in things in the shelter getting wet.

[005]. Camping can cause damage to the local ecology. Often shelters take up a large piece of land and block movement of water and animals over that plot. Further, the base of the shelter causes compaction and wear of the natural surface where the shelter is located. This can result in physical damage to vegetation, diminishing the total vegetation cover, can change species composition and reduce species richness. In many parks this has been overcome by setting aside specific space for campsites to minimize the area that will be damaged. Other amenities such as toilets and showers can be provided near campsites providing some level of comfort. In some less developed countries there are no such campsite spaces set aside. Camping at such sites is likely to cause damage to the local ecology. Further, without any toilet facilities human waste may contaminate water systems of the local ecology.

[006]. There is a need for alternative shelter to ameliorate at least one of the problems mentioned above

[007]. Summary

[008]. It is an object of the present invention to provide an improved shelter.

[009]. Accordingly, an aspect of the invention provides a shelter comprising: a floor; an upper frame extending upwardly from the floor; the upper frame covered with a protective layer; wherein the floor comprises a deck frame and floor panels located on the deck frame.

[0010]. Another aspect of the invention provides a method of constructing a shelter comprising: forming a floor comprising floor panels located on a deck frame; elevating an upper frame over the floor to converge near an apex; and covering the upper frame with a protective layer.

[0011]. Other aspects of the invention will become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

[0012]. Brief description of the drawings

[0013]. The present invention will now be described, by way of illustrative example only, with reference to the accompanying drawings, of which:

[0014]. **Figure 1:** A side view of the shelter is constructed starting with, (a) a deck frame positioned on a plurality of vertically adjustable support legs, (b) an upper frame extending upwardly from the deck frame, (b) a floor panel located on the deck frame, and (c) the upper frame covered with a protective layer.

[0015]. **Figure 2:** A side view of the construction of the deck frame on the vertically adjustable legs.

[0016]. **Figure 3:** A side view of the deck frame on the vertically adjustable legs.

[0017]. **Figure 4:** Components of the deck frame including a central vertically adjustable leg and interconnecting beams.

[0018]. **Figure 5:** A side view of the floor support frame built onto the deck frame.

[0019]. **Figure 6:** A plan view of the floor.

[0020]. **Figure 7:** A side view of the erection of the upper frame.

[0021]. **Figure 8:** A plan view of: **A** the deck frame; **B** the upper frame and nose panel frame erected over the deck frame; and **C** the outer frame placed over the deck frame the upper frame and nose panel frame.

[0022]. **Figure 9:** A side view of the construction of the nose frame onto the upper frame.

[0023]. **Figure 10:** A side view of the construction of the nose frame onto the upper frame.

[0024]. **Figure 11:** A side view of the construction of the nose frame onto the upper frame.

[0025]. **Figure 12:** A side view of the outer frame placed over the shelter prior to attaching the outer protective layer over the outer frame.

[0026]. **Figure 13:** A plan view of the shelter with three protective layers.

[0027]. **Figure 14:** A cross section view of the ventilation air movement.

[0028]. **Figure 15:** A side view of the shelter with three protective layers.

[0029]. Detailed description

[0030]. An aspect of the invention provides a shelter comprising: a floor; an upper frame extending upwardly from the floor; the upper frame covered with a protective layer; wherein the floor comprises a deck frame and floor panels located on the deck frame.

[0031]. The construction of the structure may allow the shelter to be strong, light weight, maximize natural ventilation, provide protection from the elements, minimize the effect on the natural ecology where it is erected and may be easily erected without compromising comfort.

[0032]. The upper frame 10 is preferably made from strong light weight material such as aluminium, carbon fibre, bamboo or any other suitable material such as softwood timber, or combinations of aluminium and steel.

[0033]. In various embodiments the floor comprises a deck frame and floor panels located on the deck frame. Specific non-limiting embodiments are depicted in the drawings whereby referring to figure 1a and 1c, a deck frame 4 is constructed and floor panels are located on the deck frame 4 to form the floor 16. This allows people to comfortably stand in the shelter.

[0034]. Referring to Figures 1c, 5 and 6 a substantial part of the infrastructural floor may be constructed from tough durable materials such as aluminium, steel or carbon fibre. Aluminium is known for its strength, mobility and durability. It is thus ideal for use in transportable shelter. The shelter is durable and movable for reuse and repositioning. It is possible to combine local resources with indigenous methods and highly advanced engineering to design and construct the frames of the skeleton structure. Local materials such as timber, bamboo or other materials could be used. The described embodiment uses aluminium and steel.

[0035]. In various embodiments the floor panels comprise built-in furniture components. This makes it very easy to erect a shelter with a high level of comfort and a wide range of features quickly.

[0036]. Referring to Figure 6 floor panels or cassettes are laid over a floor support frame 26 to form the floor 16. The panels may have built-in furniture components like a sunken lounge 52, sunken space for a toilet 60 with a large sink, sunken space for a shower 64. Both the shower area 64 and the toilet area 60 may have steps leading into them and in various embodiments have LED lighting 58 on the steps. Other sunken areas may include a wet storage area 66. Other built-in furniture components may include raised areas such as a bed platform 56 this will allow further storage areas to be included under the raised areas extending any storage space already provided in the floor 16 between the deck frame 4 and the floor panels. The additional storage area may be accessible by lift up covers 54 over the storage compartments. Where a stove 62 is included it should be located in the central area near under the apex especially in embodiments where a chimney is included as an aperture near the apex 12 to make use of the natural ventilation to remove any smoke from the shelter 1. Other fixtures such as lamps 44, air conditioning vents 46, foot switches 48, sockets 50, LED lighting 58 and

slide out tables 68 may be included in the floor panels to add to the comfort of any one staying in the shelter 1. In various embodiments the built in components of either the sunken or raised areas of each individual panel may have a similar shape to another built in components of either a sunken or raised areas permitting matching panels to be stacked. This makes the modular floor panels easy to pack and the light weight nature of these panels makes them easy to transport but still allows the comfort of having a floor while camping.

[0037]. In various embodiments a first shelter is interconnected with a second shelter (not shown) whereby one side of the floor of the first shelter is connected to one side of a floor of the second shelter and a special floor panel is laid over the interconnection to form an interconnected floor between the first and second shelter. This makes the interconnected shelters appear to have the same floor and permits extension of the shelter into a larger shelter using the modular floor panels. Again the panels for a larger two room shelter are light weight and easily packed and transported. It also makes it easier for inhabitants to move from the first shelter into the second shelter across the even floor.

[0038]. In various embodiments the floor panels are elevated above the deck frame allowing space between the deck frame and the floor panels within the floor. The space allows insulation, facilitates ventilation and provides storage space.

[0039]. In various embodiments the floor further comprises a floor support frame erected on the deck frame between the deck frame and the floor panel. In various embodiments a floor support frame 26 is erected on the deck frame 4. In various embodiments the floor support frame 26 comprises a series of U shaped struts some ending with floor support plates 28. Essentially any frame structure that elevates the floor panels above the deck frame 4 would be suitable. This allows features such as ducting for water or air conditioning to be laid between the deck frame 4 and the floor panels within the floor 16. The space created may also be used for storage or to place equipment that is preferably not seen or that requires access for maintenance or removal such as a toilet waste tank 32. The space also enhances natural ventilation and insulation. In various embodiments the floor support frame may be made of aluminium or any other strong lightweight material. In various embodiments a water tank is located on the floor support frame between the deck frame and the floor panel. Referring to figure 5 the following components are placed in the space provided by the floor support frame 26. Ducting for air conditioning 30, a toilet waste tank 32, a water tank 34, a consumer unit 36, a battery pack charger 38, a water heater and pump 40 and air conditioning units 42.

[0040]. A light weight structural space frame supports floor panels such as triangular floor cassettes which may hold the entire necessary infrastructure. The integrated infrastructure such as electrical battery, boiler, pump system, water storage, waste water management, are

compact. The infrastructural floor also holds the necessary ducting for the natural ventilation air-intake.

[0041]. In various embodiments the floor is positioned on a plurality of vertically adjustable support legs. As used herein a plurality of vertically adjustable support legs refers to enough support legs to hold the weight of the shelter and any inhabitants. At least two legs would be needed and preferably three legs or more preferably four legs. The number of legs collectively must be able to provide enough support for the shelter but cover the minimum amount of space on the surface on which it is placed to minimize damage to the natural ecology.

[0042]. In various embodiments each vertically adjustable support leg comprises a foot at an end of the leg, the foot placable on a surface.

[0043]. Referring to figure 1a, each vertically adjustable support leg 2 comprises a foot 6 at an end of the leg 2, the foot placable on a surface. The foot 6 is designed to be placed on any surface including a natural surface. The foot 6 may be any shape, round, square or odd shaped provided that all the feet collectively are able to provide enough surface area to support the shelter but cover the minimum amount of space on the surface to minimize damage to the natural ecology. In various embodiments the foot may be formed of a flexible material that is able to flex over the contours of the surface on which it is placed.

[0044]. In various embodiments each of the vertically adjustable legs comprise an upper portion and a lower portion wherein the upper portion is telescoping in relation to the lower portion wherein each of the vertically adjustable legs are expandable or contractible to a variety of heights.

[0045]. In various embodiments the vertically adjustable legs comprise an upper portion and a lower telescoping portion wherein the upper and lower telescoping portions are expandable or contractible to a variety of heights. The vertically adjustable legs with telescoping upper and lower portions allow expansion or contraction of each leg and have a means of stopping the movement of the upper and lower portions when the desired height of the shelter is attained. Any means known in the art such as screw threads, by means of a pinhole system, spring buttons that engage with one of a series of holes punched in the upper or lower portion opposite to the spring button or any other known adjustable engaging means would be suitable provided the legs are able to be adjusted vertically to allow a distance that is suitable to allow for natural rainfall infiltration. In various embodiments, the space may be of at least 500 mm under the shelter, preferably at least 700 mm of space is under the shelter.

[0046]. In the first instance this to ensure a support-system that can adapt to different situations such as rock-faced undergrounds or forest-floors or uneven sand-dunes near a coastline. With this foundation-system, the shelter stands elevated from the landscape. This allows for a greater protection against animals and protection from heavy rainfall whilst

accommodating natural ventilation. At the same time this ensures a minimal footprint and low interruption of the existing landscape with water infiltration and soil conditions maintained in similar to natural conditions. The shelter 1 is supported by multiple legs 2 which can be individually manipulated to allow for the levelling of the shelter 1. The advantages of the legs allow the shelter to be placed and oriented in a vast variety of locations. Thus optimum conditions can be sought for prevailing ventilation, sun or rain conditions. As the shelter 1 stands elevated from the landscape in various embodiments a staircase 18 may be provided to allow people to comfortably enter the shelter 1.

[0047]. In various embodiments the floor is adjustable using the legs such that the deck frame 4 is preferably evenly level. This is to allow a person to comfortably stand on a floor 16 without the person falling or toppling. Referring to figure 1b and 1c a floor 16 is constructed by positioning floor panels on the deck frame 4.

[0048]. An upper frame 10 extends upwardly from the deck frame 4. The upper frame 10 may have a series of sections that are each attached pivotally to the deck frame 4 at a series of pivot points 14 and then each of the sections are lifted into place such that the upper frame converges centrally near an apex to connect with each of the other sections to form the upper frame 10. Each section is formed of two poles that at a first end each pole connects 14 to the deck frame 4 the poles are distanced from the next pole in such a way as to connect to each end of a beam 5 that forms one of a plurality of sides that forms the deck frame 4. At the end away from where each pole connects to the deck frame the poles are in contact forming a triangular shape between the two poles and the beam 5 that forms one of a plurality of sides that forms the deck frame 4. The poles of the upper frame 10 allow more space in the shelter 1 allowing people to stand up comfortably. The length of the poles can be adjusted to cater to taller people but generally each pole is at least 2m long and preferably at least 3m long. In this arrangement you have the pivoting frame from the base which is the important because then everything is erected in a set formation resulting in a shelter of a defined shape so that the shelter can interlock with another shelter.

[0049]. Referring to figures 2-4 in various embodiments the deck frame 4 is erected on the adjustable legs 2 a central vertically adjustable leg 3 is placed on the surface at a location where the shelter 1 is to be erected. A beam 5 which is shaped to interconnect with a top of the central vertically adjustable leg 3 is positioned to interconnect with the top in such a way that the beam and the leg form an angle that is substantially at a right angle however any angle that will form a level deck frame that is able to support a floor that will allow a person to comfortably stand would be suitable. The first beam 5 is secured to the top of the central leg 3 with a fixing bracket 24. The end of the first beam 5 away from the top of the central leg 3 is temporarily propped up. A second beam 5 almost the same as the first beam is positioned to

interconnect with the top of the central leg 3 directly adjacent the first beam 5 but the end of the second beam 5 away from the top of the central leg 3 is at a distance away from the first beam 5. The second beam 5 is secured to the top of the central leg 3 with a fixing bracket 24. The end of the second beam 5 away from the top of the central leg 3 and away from the first beam is temporarily propped up (see Figure 2A). A third beam designed to interconnect with the first and second beams is then placed between the first and second beam forming a triangle in the same plane. The third beam 5 is secured to the first beam at one end with a fixing bracket 24 and the second beam at the other end with a fixing bracket 24. A second leg 2 is placed partway along the third beam (see Figure 2B) and the height is adjusted such that the first, second and third beams are substantially level in the same plane. This process is repeated with other beams 5 around the central leg 3 resulting in a shape made up of a series of triangles that forms the deck frame 4 all in the same plane. Resulting shapes may include hexagons or octagons or other similar shapes. These set shapes allow it to be possible for a shelter to abut and interlock with another shelter in a modular way. A least one side of this shape extends with 2 additional beams whereby the ends away from the side are placed close to each other to almost form another triangle but a short beam is placed between the ends away from the side. This forms a nose. Another leg 2 is placed partway along the short beam (see Figure 3) and the height is adjusted such that the beams forming the deck frame 4 are level in the same plane.

[0050]. Referring to figure 1d the upper frame 10 is covered with a protective layer 20. In various embodiments the protective layer comprises an inner protective layer 20 and a middle protective layer 96. In various embodiments the protective layer comprises three protective layers an inner protective layer, a middle protective layer and an outer protective layer. The protective layer may provide any one of a variety of protection such as protection from insects, sun shading, acoustic insulation, provision of privacy, rain, sleet, snow, wind, and thermal insulation when required.

[0051]. In various embodiments a first shelter is interconnected with a second shelter (not shown) whereby one side of the floor of the first shelter is connected to one side of a floor of the second shelter and the protective layer of both the first and second shelters are stretched towards each other to form a shelter over the passage between the two interconnected first and second shelter.

[0052]. In various embodiments the shelter 1 comprises three frames. Referring to figures 7 to 12 a first frame is the deck frame 4 of the floor which in various embodiments is positioned on a plurality of vertically adjustable support legs 2.

[0053]. A second frame is the upper frame 10 that has a series of poles pivotally connected 14 to each corner of the deck frame 4 formed at the end of each beam 5 away from the central

leg 3. In various embodiments the pivotal connection 14 is a pin joint connection 72. In various embodiments two adjacent poles are connected at the end distant from where they are pivotally connected to the deck frame 4, in various embodiments these two poles may be further connected part way between the two ends via a brace. The two connected poles can then be raised and bolted to a top ring to form one side of the upper frame 10. Each pole may be formed of two or more lengths that connect together to extend the length of the pole. Any suitable connection 70 may be used preferably a connection 70 that allows quick and strong attachment to allow quick connection and quick release. At the nose of the deck frame 4 a pair of struts 11 may be attached to the deck frame 4 at one end and connectable to the upper frame 10 at the other end of the struts 11. In various embodiments the connection of the struts 11 may be attached to the deck frame 4 at one end and connected to either a pole or a brace between two poles of the upper frame 10 at the other end of the struts 11. In various embodiments the connection between the struts 11 and the upper frame 10 is a pin joint connection 72 however any suitable attachment means may be used.

[0054]. In various embodiments the shelter further comprises an outer frame which extends at one point below the floor and closely follows the contours of the upper frame.

[0055]. In various embodiments (not shown) where a shelter has one side of the floor adjacent to one side of a floor of a second shelter to form interconnected floors the outer frame extends across and closely follows the contours from the upper frame of the first shelter to the upper frame of the second shelter and extends at either side of the interconnected floors below the interconnected floors forming an interconnected outer frame. In various embodiments the interconnected outer frame is at a height that allows people to move from the first shelter to the second shelter comfortably being sheltered and not having to crawl. The interconnected outer frame may be at least 100cm above the floor to allow comfortable passage.

[0056]. In various embodiments the upper frame further comprises a nose frame which extends at one point below the floor and closely follows the contours of the upper frame. The upper frame 10 may have bolted to it a nose frame 78. The nose frame 78 when erected extends below the deck frame 4 of the floor 16 and closely follows the contours of the struts 11 and upper frame 10 where the struts are connected. This may be achieved by a series of interconnected pieces that are straight 86, 84 bent as elbow shapes 82, 88, 90 or bent as S shaped pieces 80. Any other nose frame may be suitable provided when erected it closely wraps the struts 11 and upper frame 10 where the struts are connected and extends below the deck frame 4 of the floor 16. In various embodiments the straight sections 84 or 86 and/or the bent or curved sections 80, 82, 88 or 90 may be formed of steel, aluminium, alloys or carbon fibre. In various embodiments two middle steel S-pieces 80 are attached to the deck frame 4 (see figure 9). On both sides of the nose frame 78 a middle side straight aluminium

piece is connected to a rear end of the S-piece 80. A rear side steel elbow 82 is connected to the middle side straight aluminium piece. A brace 84 is connected between the rear elbow 82 and the deck frame 4 (see figure 10). The middle front steel elbow 90 is connected using half joints 92. In various embodiments an outer protective layer is stretched over the nose frame.

[0057]. In various embodiments an outer protective layer is stretched over the nose frame.

[0058]. The third frame is the outer or exterior frame 76. Referring to figure 8C or Figure 12 the outer frame 76 may be prepared separately on the floor and then clipped onto the upper frame 10 to hold the outer protective layer 94. Similar to the nose frame 78 the outer frame 76 may be shaped by a series of interconnected pieces that are straight and bent or curved shapes and may be formed of steel, aluminium, alloys or carbon fibre. The outer frame 76 preferably closely follows the contours of the upper frame 10 at the location where it connects to the upper frame 10 and extends below the deck frame 4 of the floor in an erected state. This wrapping effect of the outer frame and the nose frame with the stretched and pre-tensioned fabric envelope is designed to withstand wind loads of up to 70mph gusts of wind, along with the specified ground anchorage of the primary steel legs bolted to any substructure. Substructure being natural material or in the absence of, organic timber or other bio-degradable material piles driven in-situ. In the event of impending typhoon conditions with sufficient metrological warning, the superstructure i.e. Fabric envelope, external sunshades, metal structures and all loose interior furniture above the deck level, would be dismantled, packed away and a tarpaulin-type fabric cover put in place. The cover is then to be lashed down by ground anchors (as similar to traditional tents with outrigging tie downs) to prevent a 'lifting-up' event of the still in-situ deck; the primary concern for excessive wind conditions.

[0059]. In various embodiments an outer protective layer is stretched over the outer frame.

[0060]. In various embodiments the protective layer comprises three protective layers an inner protective layer, a middle protective layer and an outer protective layer. Referring to figure 13, the shelter 1 is designed with a triple tensile principle. The first inner protective layer 20 comprises 3 interior tents housing various domestic programs allowing for a variety of internal configurations by movement of the 3 separate pieces of fabric. The second middle protective layer 96 is the middle tensile allowing for rainwater protection and deflection with 3 main openings. The outer protective layer 94 comprises 3 heat shields reflecting solar heat and allowing for natural ventilation between heat shield 94 and middle layer 96 preventing the shelter 1 from gaining too much heat due to solar radiation. The inner protective layer 20 and/or the middle protective layer 96 may be stretched up towards the aperture near the apex 12 using cables.

[0061]. As mentioned in the above a triple membrane structure; the protective layer or membranes that may be able to provide a variety of shelter such as protection from insects, sun shading, acoustic insulation, provision of privacy and thermal insulation when required.

[0062]. Any one of the layers may be formed from material with attributes as follows;

[0063]. 1. By producing acoustically-transparent fabric the interior will benefit from lower levels of background noise and a more pleasant experience for inhabitants of the shelter.

[0064]. 2. Fabric membranes can carry quilting to their rear face to offer thermal insulation in colder climates at night.

[0065]. 3. Open-cell fabrics will allow natural (or controlled) airflow to permeate whilst providing protection against insects.

[0066]. In various embodiments the middle layer fabric may be made from FIREX polyester with welded PVC coated Polyester rainwater deflectors over the openings.

[0067]. In various embodiments the outer layer fabric may be 3 exterior heatshields made from PVC/polyester wings.

[0068]. In various embodiments the protective layer defines an aperture near an apex of the upper frame. The upper frame 10 and protective layer 20 defining an aperture 12 near the apex of the upper frame facilitates air movement out of the shelter permitting ventilation in the shelter. Ventilation keeps the inside of the shelter cool and makes it comfortable in a tropical environment. Ventilation also reduces condensation occurring inside the shelter.

[0069]. If we take a generally tropical climate into account, referring to figure 14, the shelter 1 ensures occupants will stay cool by allowing various modes of natural ventilation. Natural ventilation is the process of supplying and removing air through an indoor space without using mechanical systems. It refers to the flow of external air to an indoor space as a result of pressure differences. The structure of the shelter 1 allows wind driven ventilation. Ventilation is ensured by using wind pressure; the aero dynamic form of the gentle slope provided by the nose frame 78 further enhanced by the outer protective layer 94 stretched over the nose frame and up to the apex of the upper frame 10 forces the predominant wind upwards over its pitched roof and over its wind scoop at the very tip of the roof. This will in turn create a suction effect pulling hot air through the central interior space upwards and out of the aperture near the apex 12. Cooler air intake is established through the openings. Further, as the nose frame 78 and outer frames 76 are designed to extend below the deck frame 4 of the floor, a conduit for the cooler air under the shelter is created for the air to enter the shelter 1. The location of the shelter may also be optimised by facing the opening in the main wind direction but also through the controlled opening and closing of the exterior membrane. The following guidelines are important to ensure the operation of natural ventilation;

- Building location and orientation; our shelter can be placed at a vast variety of places as the vertically adjustable legs 2 allow the shelter floor to be level and the shelter to be placed in any orientation; thus optimum conditions can be sought out to allow for optimal ventilation.
- Building form and dimensions; the shape of the external protective layer 94 being gently sloped towards the aperture near the apex 12 allow for natural ventilation by constantly pulling the internal air out of the aperture 12 and maintaining air flow through the structure.
- Indoor partitions and layout; the inner protective layer 20 and middle protective layer 96 may be specifically designed to enhance natural ventilation.
- Opening typologies, operation, and location can also be used to enhance ventilation;

[0070]. Additionally, in this design the exterior membrane 94 may play a role in the provision of controlled openings and air flow. Referring to Figure 15, the outer frame 76 of the external protective layer 94 at its lowest point in use extends below the floor 16 and the deck frame 4. This has the effect of drawing air from below the deck frame 4 of the floor. This effect may be enhanced with the use of a skirt fitting 22. Further the gaps between the external layer 94 and the middle layer 96 and the internal layer 20 provide conduits for the passage of air drawn towards the aperture near the apex 12.

[0071]. The ventilation may be further enhanced with the use of a portable battery operated reverse cycle air conditioning/heating unit. A Dometic HB 2500 TM from Dometic is used in the embodiment depicted in figures 5 and 6.

[0072]. The shelter may require a daily amount of electricity to provide light and warm water. In various embodiments portable solar panels are used to supply power to the shelter. FTL Solar panels are light weight, flexible, easily deployed, portable, movable and can be hooked up to a variety of batteries for energy storage. The off grid panels are extremely durable and designed to withstand heavy rain and strong winds.

[0073]. In various embodiments the shelter addresses the meditative qualities of rainfall and water harvesting principles are incorporated in the design of the typical large roof surfaces. Large roof surfaces also accommodate overhangs to facilitate covered open indoor spaces to allow people to enjoy rainfall in comfort. To make sure not too much water is refrained from entering the soil on site; the vertically adjustable legs allow each shelter to stand at least about 500mm, preferably about 700mm from the natural surface to allow for natural rainfall infiltration.

[0074]. In various embodiments the shelter allows for up to 550 gallons (about 2 Kilolitres) of water to be captured and stored in each floor. This equals 11 days water use with 50 gallon

(about 200 litres) a day or a tank total of about 2,100 litres. This is achieved via middle protective layer 96 having a surface potential for water contact via rainfall or condensation. The slope or gradient of the middle protective layer 96, along with gravity, naturally lets water fall downwards towards custom bespoke C-channels on the edges of the fabric structure such as along the windows or at the lower edges (not shown). The channels act like troughs channelling the water, through or into weep holes whereby simple plumbing direct the water to the tank/reservoir. These C-channels are semi-flexible and either fused or welded to the fabric or attached via a fused sleeve which the semi-flexible batons are inserted. In various embodiments the tank/reservoir is sized according to a regions climatic rainfall. In various embodiments the tank/reservoir is located centrally under the floor of the structure. The use of the water follows regular plumbing discharge. A similar system may be used for water used in the sink or shower to be directed to a tank for grey water recycling and can be used for flushing the toilet or to be filtered for other use. The two plumbing systems may provide on demand water through a series of pumps and filters for end-user usage. This facilitates limit the amount of water needed without reducing comfort.

[0075]. Additionally, with the instillation of dry or low flow toilet systems along with low flow faucet and shower heads further water saving can be achieved without compromising comfort.

[0076]. In various embodiments a passive dry toilet system is used to minimize the use of water and energy. No toxic chemicals are used. Dry toilets are available as low flow or waterless, electric or non-electric. The container will be located and accessed from underneath the shelter. Waste will be emptied and taken away.

[0077]. A sanitation system that does not require any water to function. Not only does it save on water use, but it is entirely isolated from the surrounding environment and cannot contaminate underground water resources. The system utilises a natural biological process to break down human waste into a dehydrated odourless compost-like material.

[0078]. Another aspect of the invention provides method of constructing a shelter comprising: forming a floor comprising floor panels located on a deck frame; elevating an upper frame over the floor to converge near an apex; and covering the upper frame with a protective layer.

[0079]. In various embodiments the method further comprises forming built-in furniture components in the floor panels.

[0080]. In various embodiments the method further comprises placing fixtures in a space located between the deck frame and the floor panels within the floor.

[0081]. In various embodiments the method, further comprises erecting a floor support frame between the deck frame and the floor panel.

[0082]. In various embodiments the method further comprises placing a water tank on the floor support frame.

[0083]. In various embodiments the method further comprises positioning the floor on a plurality of vertically adjustable support legs.

[0084]. In various embodiments the method further comprises adjusting the support legs vertically.

[0085]. In various embodiments the method further comprises placing a second protective layer over the upper frame.

[0086]. In various embodiments the method further comprises providing a nose frame which extends at one point below the floor and closely follows the contours of the upper frame.

[0087]. In various embodiments the method further comprises providing an outer frame which extends at one point below the floor and closely follows the contours of the upper frame.

[0088]. In various embodiments the method further comprises stretching an outer protective layer over the nose frame.

[0089]. In various embodiments the method further comprises stretching an outer protective layer over the outer frame.

[0090]. In various embodiments the upper frame and protective layer define an aperture near an apex of the upper frame.

[0091]. In various embodiments the method further comprises connecting a first side of the floor of the shelter to a side of a floor of the second shelter.

[0092]. In various embodiments the shelter has a clear componentry system relating to both its functioning and its construction process. The main components as shown in the drawings are as follows;

1. The structure of the deck frame 4 sitting on elevated legs 2 will be constructed first
2. This to hold a cassette floor structure 16 with openings to receive built in furniture
3. The lounge 52, bed 56, shower 64 and toilet 60 do fit in the provided openings
4. The vertical structure of the upper frame 10 is raised from the elevated deck frame 4
5. The stove 62 may hang from the upper frame 10 braced by the nose panel frame 78 which may be bolted to the upper frame 10 over the toilet 60 area.
6. The interior protective layer 20 may be attached to the inside of the upper frame 10
7. The middle layer 96 is attached over the inner protective layer 20 to provide for rainwater protection
8. An additional skeleton or outer frame 76 is mounted on the shelter 1 to hold the outer protective layer 94 in the form of 3 heat shields in place

9. Finally the chimney hood will cap the aperture near the apex 12 of the shelter

[0093]. Throughout this document, unless otherwise indicated to the contrary, the terms “comprising”, “consisting of”, “having” and the like, are to be construed as non-exhaustive, or in other words, as meaning “including, but not limited to”.

[0094]. Furthermore, throughout the specification, unless the context requires otherwise, the word “include” or variations such as “includes” or “including” will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0095]. As used in the specification, the singular form “a”, “an” and “the” include plural references unless the context clearly dictates otherwise.

[0096]. Unless defined otherwise, all technical and scientific terms used herein have the same meaning as is commonly understood by a skilled person to which the subject matter herein belongs.

[0097]. It should be further appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may be combined to form yet further embodiments falling within the intended scope of the invention.

Claims

1. A shelter comprising: a floor; an upper frame extending upwardly from the floor; the upper frame covered with a protective layer; the floor comprises a deck frame and floor panels located on the deck frame, the floor is positioned on a plurality of vertically adjustable support legs, wherein the upper frame further comprises a nose frame which extends at one point below the deck frame of the floor and closely follows the contours of the upper frame having an outer protective layer stretched over the nose frame and an outer frame which extends at one point below the deck frame of the floor and closely follows the contours of the upper frame having an outer protective layer stretched over the outer frame.
2. The shelter according to claim 1, wherein the floor panels comprise built-in furniture components.
3. The shelter according to claim 1 or 2, wherein the floor panels are elevated above the deck frame allowing space between the deck frame and the floor panels.
4. The shelter according to any one of the preceding claims, wherein each vertically adjustable support leg comprises a foot at an end of the leg, the foot placable on a surface.
5. The shelter according to claim 4, wherein the foot is formed of a flexible material.
6. The shelter according to any one of the preceding claims, wherein each of the vertically adjustable legs comprise an upper portion and a lower portion wherein the upper portion is telescoping in relation to the lower portion wherein each of the vertically adjustable legs are expandable or contractible to a variety of heights.
7. The shelter according to any one of the preceding claims, wherein the protective layer comprises an inner protective layer and a middle protective layer.
8. The shelter according to any one of claims 1 to 7, further comprising a floor support frame erected on the deck frame between the deck frame and the floor panel.
9. The shelter according to claim 8, further comprising a water tank located on the floor support frame between the deck frame and the floor panels.

10. The shelter according to claim 9, further comprising C channels on an edge of a middle layer of the protective layer to channel water to the water tank.
11. The shelter according to any one of the preceding claims, wherein the outer protective layer comprises a heat shield.
12. The shelter according to any one of the preceding claims, further comprising a skirt fitting below the floor.
13. The shelter according to any one of claims 1 to 12, wherein the protective layer defines an aperture near an apex of the upper frame.
14. The shelter according to any one of the preceding claims, further comprising a second shelter whereby one side of the floor of the first shelter is connected to one side of a floor of the second shelter.
15. A method of constructing a shelter comprising; forming a floor comprising floor panels located on a deck frame; positioning the floor on a plurality of vertically adjustable support legs; elevating an upper frame over the floor to converge near an apex; covering the upper frame with a protective layer providing a nose frame which extends at one point below the deck frame of the floor and closely follows the contours of the upper frame; stretching an outer protective layer over the nose frame; providing an outer frame which extends at one point below the deck frame of the floor and closely follows the contours of the upper frame; and stretching an outer protective layer over the outer frame.
16. The method according to claim 15, further comprising forming built-in furniture components in the floor panels.
17. The method according to claim 15 or 16, further comprising placing fixtures in a space located between the deck frame and the floor panels.
18. The method according to any one of claims 15 to 17, further comprising erecting a floor support frame between the deck frame and the floor panel.
19. The method according to claim 18, further comprising placing a water tank on the floor support frame.

20. The method according to claim 19, further comprising channeling water via a second protective layer to the water tank.
21. The method according to any one of claims 15 to 20, further comprising adjusting the support legs vertically.
22. The method according to any one of claims 15 to 21, further comprising placing a second protective layer over the upper frame.
23. The method according to any one of claims 15 to 22, wherein the upper frame and protective layer define an aperture near an apex of the upper frame.
24. The method according to any one of claims 15 to 23, further comprising connecting a first side of the floor of the shelter to a side of a floor of the second shelter.