

Cellular Flooring Units

The invention relates to cellular flooring units
5 facilitating the under floor distribution of service
lines.

It is well known in the art to utilize a corrugated
metal sheet having alternating valleys and crests
connected by inclined webbing in conjunction with an
10 attached lower metal plate to create a plurality of
spaced, parallel conduits or cells. The cells are used
to receive service lines (e.g. power, electronics,
communication and the like). It is also well known
that separation of these services is highly desirable,
15 both for safety reasons and so that each can be
separately maintained without risk of interference
with the others. In addition to providing a separate
conduit for each service, it is also highly desirable
to provide access to all the services at one location.
20 Further, providing an overlying trench having
transversely oriented passageways which are connected
with the conduits in a manner so that certain
conduit-passageway channels are isolated from other
such channels is also desirable for reasons listed
25 below.

Finally, it is highly desirable to surround channels containing high voltage lines or other potentially heat generating service lines with as much concrete as possible to increase the fire resistant qualities of an entire structure. This goal has not been addressed or achieved by any known prior art devices.

The invention provides a cellular flooring unit comprising:

- 10 (a) a corrugated sheet having one or more valleys and one or more crests in alternation with the valleys, each adjacent valley and crest being connected by an inclined webbing;
- 15 (b) means for longitudinally dividing the valley or at least one of the valleys into a plurality of parallel conduits each having an open top surface; and
- (c) cover means positioned on the sheet over the or each divided valley to create a plurality of closed cells.

20 The cells are formed exclusively out of the valleys rather than the crests. The corrugated sheet requires no attached lower base sheet of metal, thereby reducing the amount of material required for a given job. They may be compactly nested to facilitate
25 shipping and handling. No access openings are required

as will be understood from the description below. Preferably, the corrugated sheets have a substantially symmetrical pattern of valleys and crests. The corrugated sheets can easily be positioned over an entire floor area with only preliminary information of where service lines will be required.

The cells are preferably formed by supporting a "U" shaped dividing member in the centre of any valley to provide three open parallel conduits. Providing a cover means will produce three separate enclosed conduits or cells in any single valley. If more than three cells are required a "W" shaped dividing member or several adjacent "U" shaped members can be utilized and if only two cells are required an "I" shaped member can be provided.

Preferably an overlying trench is also provided. This may comprise a plurality of vertical wall members having a base sheet attached thereto to form a plurality of passageways oriented transversely with respect to the conduits in the corrugated sheet. The base sheet preferably has a gap therein positioned over the divided valley or valleys in the sheet to allow unrestricted access between the conduits and passageways. Suitably there is also provided isolating means to isolate at least one communicating passageway and conduit from the others. A cover is also desirably

provided for the trench.

Concrete can flow beneath the trench into the undivided valleys in the corrugated sheet thereby providing a structure of greater strength and one which offers greater resistance to fires.

The trench may be manufactured in standard modular lengths which can be easily assembled and attached to the top of the corrugated sheets at the job site. The isolating means may lock the dividing member of the corrugated sheet to the trench.

The isolating means may be in the form of a cross-shaped plate member. The longitudinally extending portions of the plate provide a cover for the U-shaped dividing member in the gap area of the trench base and transversely extending portions provide a base in the gap area for a central trench passageway. An opening is provided in the centre of the cross-shaped member to allow access between the isolated centre conduit defined by the U-shaped members and the centre trench passageway.

In construction, the corrugated sheets are placed on the floor's supporting beams. Identical sheets in modular lengths are desirably used so that any individual sheet may be placed at any location without

regard to a floor plan. The sheets are positioned end to end to provide a plurality of spaced-apart, continuous, parallel valleys across the floor. As the floor is closed in, it may be necessary to cut some of the sheets to the proper length. Next, it is determined which valleys will be utilized as service raceways. Dividing members are then placed end to end in the chosen valleys in order to create a plurality of open, parallel conduits in each of the chosen valleys. Dividing members can be designed to provide two or more conduits in any single valley and are preferably provided in modular lengths corresponding to the lengths of the corrugated sheets. A cross-shaped isolating member is then desirably attached to the dividing member in the area where an overlying trench will be required. Then modular lengths of the trench are positioned and attached together so that the trench gap is aligned over the isolating member. The isolating member engages the interior wall members of the trench, thereby aiding in aligning it in its proper position and in securing it in place. If possible, all the service lines are placed into their respective conduits and passageways before they are covered and a layer of concrete is poured over the sheet in order to eliminate feeding of the service lines through closed cells. Access housings, also having isolated means, may then be placed in desired locations and covers

placed over the exposed portions of the divided valleys of the corrugated sheet thereby enclosing the service lines in their cells and passageways. A cover is only provided for those valleys being utilized as cells.

5 Since no base sheets are provided on the corrugated sheets, trapping pockets of air in unused cells is prevented. By leaving the underside of the sheets exposed, heat can be swiftly radiated away from the sheets to the adjacent free flowing air, making the
10 system less likely to fail in the event of a fire than a conventional cellular flooring unit. Access to the cells may be provided by utilizing either spaced-apart covers or covers having openings therein. No holes or openings are required in the corrugated sheet.

15 If service lines are not placed in the cells before they are enclosed, a string or wire is preferably placed in each conduit before it is covered to facilitate feeding the lines at a later time. The end of a service line is tied to the string or wire at one access opening and
20 pulled through the enclosed cell from a second opening.

In another embodiment, a corrugated metal sheet having generally alternating crests and valleys or equal width on one edge of the sheet, with the opposite edge of the sheet rolled to have a plurality of narrower crests
25 therein, may be provided. A cover plate over the

valleys between these narrower crests and on each side thereof will create a plurality of closed parallel cells. The cells are preferably provided along an edge of the sheet to allow for easier matching of sheets should
5 cutting of the sheets be required.

The invention is illustrated by the drawings, of which:
Figure 1 is an isometric view in exploded form showing a corrugated metal sheet, "U" shaped dividing member and cover means;
10 Figure 2 is a cross-sectional view of the structure shown in Figure 1 as assembled showing three separately enclosed cells formed from a single valley;
Figure 3 is a cross-sectional view of another embodiment showing four separately enclosed cells
15 formed by a "W" shaped dividing member;
Figure 4 is a cross-sectional view of yet another embodiment showing two separately enclosed cells formed by an "I" shaped dividing member;
Figure 5 is an isometric view of a sheet having a
20 wide valley to provide cells with larger cross-sectional areas;
Figure 6 is a cross-sectional view showing a sheet having a plurality of narrow crests at one edge thereof and a cover means to utilize the valleys between and
25 adjacent to said narrow crests as enclosed raceway cells;

Figure 7 is an isometric view of a sheet having a single valley and spaced-apart covers;

Figure 8 is an isometric view of portions of two interconnected corrugated sheets and associated "U" shaped dividing member;

Figure 9 is an isometric view of an overlying trench unit;

Figure 10 is an isometric view in exploded form of a mounting tray and associated electrical receptacles, and cover plate;

Figure 11 is an isometric view of a service access housing unit;

Figure 12 is an isometric view of a cross-shaped isolating member; and

Figure 13 is an isometric view partly in section of an entire cellular flooring system showing the interconnection of components shown in Figures 8 to 12 and a partly broken away covering means therefor.

Referring specifically to Figures 1 and 2, a corrugated metal sheet 10 is provided. The sheet 10 has a symmetrical pattern of spaced-apart crests 12 and valleys 14 with inclined webbing 16 connecting adjacent valleys and crests. Shallow valleys or stiffening ribs 18 are rolled into each crest 12 to provide greater stiffness in the sheet 10. A plurality of embossments 17 on the inclined webbing 16 provides greater mechanical retention with a layer of concrete (not shown) which is poured over the corrugated sheet 10. In the centre of each valley 14 is provided a small ridge 20 to cooperate with a corresponding ridge 22 located on the base portion 28 of a dividing member 26.

The dividing member 26 is a "U" shaped channel member having a base portion 28 and two substantially vertical wall portions 30. The dividing member 26 can be made from any suitable material such as a metal or a plastics material. The dividing member 26 can be secured to the valley 14 by any suitable means, such as self-taping screws or by locking it into an access housing (see below), and serves to provide three open parallel conduits in any chosen valley. The height of the vertical wall portions 30 is preferably slightly greater than the depth of the valley 14.

In use, the corrugated sheets 10 are positioned and connected together to form a sub-flooring supported by supporting beams. Once it is determined where service lines will be required, a dividing member 26 is placed into the appropriate valley 14 or valleys. Once the dividing member 26 is in place, the valley will contain three parallel conduits 1, 2 and 3 having open top surfaces. At this point, it is preferred to place all of the service lines carefully into their selected conduits. This process is far more efficient than feeding and pulling the lines through enclosed cells as is the current practice. If the lines are not placed prior to enclosing the cells, strings may be placed to facilitate the feeding process when the service lines are required. An access housing (see below) may then be placed over each access location. As mentioned above, the access housing may be used to secure the dividing member and covers to the sheet.

20 A cover 32 fabricated from any suitable material is provided to enclose the service lines or strings in their respective cells 1, 2 and 3. For the embodiment of Figures 1 and 2, the cover has two elevated offsets 34 to receive the wall portions 30 of the dividing member 26 when assembled. The offsets 34 also serve to increase the stiffness of the cover. The edges 33 of the cover

32 are supported by edges 15 of the crest 12 located on each side of the valley 14 chosen as a service raceway. Access to the cells can be provided in any of a number of ways. One way is to provide cover sheets 32 having generally semi-circular cut outs 36 on their front and rear edges so that circular and oval access openings to cells 1, 2 and 3 will be formed when two cover sheets are placed end to end as shown in Figure 1. Alternatively, cover sheets may be provided having access openings therein as shown in Figure 5 or openings may be provided between cover sheets as shown in Figure 7. No holes or openings are required in the sheet 10. Finally, a layer of concrete is poured over the assembled sheets 10 and the covered cells to complete the floor.

Referring specifically to Figure 3, a substantially "W" shaped dividing member 40 is provided to cooperate with the valley 14 of the corrugated sheet 10. The sheet 10 can be identical to the corrugated sheets 10 shown in Figures 1 and 2. The ridge 20 receives a corresponding ridge 44 formed in the central portion of the "W" shaped dividing member 40 as shown. Once the dividing member 40 is in place, four open, parallel conduits 45, 46, 47 and 48 are formed. After service lines are placed, a cover 50 is provided to enclose the service lines in their respective cells. For the embodiment of Figure 3, the cover 50 has edges 53 supported on the edges 15 of

the crests 12 and three elevated offsets 52 to receive the wall portions of the dividing member 40 as shown. Access openings can be provided in the cover 50 in the manner described above or spaced-apart covers may be used.

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In Figure 4, an "I" shaped dividing member 58 is provided to create two parallel enclosed cells 62 and 64 from the valley 14 of the corrugated sheet 10. The corrugated sheet 10 is identical to the sheets 10 shown in the previous figures. In this embodiment, a base portion 59 of the dividing member 58 is formed to receive the ridge 20 of the valley 14. A cover 60 having edges 71 supported on the edges 15 of the crests 12 and having an elevated offset 70 to receive the dividing member 58 is provided. Access openings may be provided as described above.

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Figure 5 shows a sheet 100 rolled to have a plurality of spaced-apart parallel crests 102 and at least one valley 104 having a width greater than that of the crests.

Inclined webbing 106 connects adjacent crests and valleys, and is provided with embossments 107 to increase the mechanical retention of the sheet with a layer of concrete (not shown) which is poured over it. Shallow valleys or stiffening ribs 108 are preferably provided in the crests 102 to increase the stiffness of the

metal sheet 100. A pair of spaced-apart ridges 105 are preferably provided in the valley 104 to aid in aligning and securing a dividing member to the valley.

5 In Figure 5 a "U" shaped dividing member 110 is shown, but any of the above described dividing members can be adapted for use with the sheet 100. The base portion 115 and wall portions 114 of the dividing member 110 are formed to fit securely between the ridges 105 as shown. A ridge 112 is provided in the base portion 115
10 of the dividing member 110 to provide adequate space for the member to be placed over a portion of the corrugated sheet 100 which has been welded or bolted to a lower supporting beam. By providing a dividing member in a relatively wide valley, cells having a larger
15 cross-sectional area can be created for applications in which such added space is required.

A cover 120 is also provided. It has edges 121 supported on the edges 104 of the crests 102. Shallow valleys or stiffening ribs 122 are provided in the cover
20 to add stiffness and to contact and seal the dividing member 110, as shown, to create three enclosed parallel cells 126, 127 and 128. Access openings 125 are provided in the cover 120 above each cell.

In Figure 6, a sheet 80 has generally alternating crests

82 and valleys 84 of equal width on one edge of the sheet with the other edge of the sheet 80 having a plurality of narrower crests 86 therein. The valleys which form cells 90, 91 and 92 adjacent to narrower crests 86 provide open parallel conduits in a reduced spaced to receive a desired number of service lines. After the lines are placed, a cover 88 is secured over the valleys to create a plurality of enclosed parallel cellular raceways. Three such cells 90, 91 and 92 are shown in Figure 6. The cover 88 is provided with a plurality of small crests or stiffening ribs 94 to increase its stiffness and to receive the crests 86 of the corrugated sheet 80. Each end 89 of the cover 88 is formed to receive the edge 96 of the adjacent crest 82. Small valleys or stiffening ribs 98 are also provided in the crests 82 to increase the stiffness of the corrugated sheet 80 and embossments 87 are also provided in the webbing 83 to provide greater mechanical retention with a layer of concrete. In this embodiment of the invention, the cells are provided on one edge of the corrugated sheet 80 to eliminate inadvertent cutting of the wrong side of the sheet 80 should cutting of the front sheet be required to fill in floor space requiring less than the full width of a sheet.

Figure 7 shows a sheet 150 having a single valley 154 provided with a pair of spaced apart ridges 155 to aid

in aligning and securing a dividing member to the sheet. Embossments 157 are provided on the webbing 156 to increase the mechanical retention of the sheet 150 with a layer of concrete which is poured over it. Shallow valleys or stiffening ribs 158 are provided in the sheet to increase the stiffness of the metal.

A "U" shaped dividing member 160 separates the valley 154 into three open parallel conduits. The base portion 165 and wall portions 164 of the dividing member 160 are formed to fit securely between the ridges 155 as shown. A ridge 162 is provided in the base portion of the dividing member 160, and serves the same purpose as the ridge 112 described above.

Two cover sheets 170 are shown each having elevated offsets 174 to receive the wall portions 164 of the dividing member 160. As a result, three enclosed cells 180, 181 and 182 are formed. Shallow valleys or stiffening ribs 171 are provided in the cover sheets 170 to increase their stiffness. The outside edges 172 of the cover sheets 170 are bent upwardly to allow for easy installation and removal. Access to the enclosed cells is permitted through an uncovered portion of the sheet 150 between the spaced-apart covers 170. An access housing (see below) is attached directly over this uncovered portion prior to the pouring of concrete

over the sheet and covers.

Referring specifically to Figure 8, a corrugated sheet 200 is shown, together with a part of a second corrugated sheet 200. Each sheet has a substantially symmetrical pattern of spaced-apart crests 202 and valleys 204. 5 Inclined webbing 206 connects adjacent valleys and crests. Shallow valleys or stiffening ribs 208 are provided in each crest 202 to increase stiffness of the sheets 200. Embossments 207 are provided on the 10 webbing 206 for the reason stated above and a ridge 210 is provided in the centre of each valley 204 to cooperate with a corresponding ridge 212 located in the base portion of a "U" shaped dividing member 218. An elevated offset 201 at one edge of the first sheet 200 15 is sized to receive a smaller offset 203 formed on the opposite end of the second sheet 200 thereby providing a means to interlock a plurality of sheets 200 together over the entire flooring area within a structure.

The dividing member 218 is a "U" shaped channel member 20 having a base portion 220 and wall portions 222. The wall portions 222 have wings 224 extending outwardly therefrom. As will be described in greater detail below, the extending wings 224 are used to secure other components of the cellular flooring system together 25 and to provide a central conduit 226, preferably used for

electrical power lines, which has no exposed sharp metal edges which might cut into the power lines.

Three conduits 226, 227 and 228 are formed in a single valley 204 when the dividing member 218 is positioned therein.

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Figure 9 shows a single trench unit 230 which rests transversely across the crests 202 of the sheets 200.

Two or more trench units 230 having a modular length may be coupled together in an end to end relationship

10 as shown in Figure 13, or a single trench unit may be designed to have the required length. The trench unit 230 comprises two outer vertical wall members 232 and 234 and two inner vertical wall members 236 and 238.

It is also contemplated that two or more wall members

15 could be substituted by modified dividing members similar to those described above. The wall members 232, 234, 236 and 238 are each height adjustable and are provided in a parallel spaced-apart relationship so as to provide three parallel passageways 240, 242 and
20 243, each passageway having an open top. The bottom of passageways 240, 242 and 243 is closed by a base sheet 246. As shown in the drawing, a gap 248 is provided in the base sheet 246 at one end of the trench unit 230 to provide unrestricted vertical access between
25 the conduits 226, 227 and 228 (shown in Figure 8) and the passageways 240, 242 and 243. The trench unit 230

is positioned on the crests 202 of the sheet 200 so that its vertical wall members 232, 234, 236 and 238 extend transversely with respect to the conduits 226, 227 and 228 and so that the gap 248 is positioned directly above the said conduits. If more than three passageways are required in the trench unit 230, additional interior wall members may be employed. A trench cover 250 (shown in Figure 13) is removably attached over the entire length of the trench thereby fully enclosing the passageways 240, 242 and 243. The final height of the trench can be adjusted by manipulating the wall members to accommodate any desired flooring thickness. Adjustments are made so that the cover 250 is level with a layer of concrete which is provided over the corrugated sheets 200.

Figure 10 is an isometric view in exploded form of a mounting tray and associated electrical receptacle and cover plate referred to as mounting unit 255. The mounting tray 260 generally has the shape of an inverted "U" shaped channel having a top portion 270 and generally downwardly extending side portions 280. Lower extending edges 282 of the side portions 280 are folded inwardly and upwardly through 180° of arc and are spaced at a distance to receive and engage the extending wings 224 of the dividing member 218 (Figure 8). An inwardly extending tab 284 is provided at each end of the side portions 280 approximately half way down from the top

270. The tabs 284 are used to support the weight of the tray 260 onto the extending wings 224 described above. It can be seen that the tray 260 can easily be snapped onto the dividing member 218 at any point along its length where outlet receptacles might be required. The folded edges 282 prevent upward movement and the tabs 284 prevent downward movement. The tray 260 can be moved longitudinally on the dividing member 218 by sliding it on the wings 224 thereby permitting easy alignment of the tray to a final position. The tray 260, in addition to providing a mounting bracket, also serves as an isolating means separating the power lines from other services. As will later be described, the tray 260 is covered by an access housing which permits access to all of the conduits. An access opening 290 is provided in the top portion 270 of the tray 260 to receive electrical outlets and the like. The central portions of the sides 280 of the tray extend upwardly above the top 270 and then outwardly to provide surfaces 286 which are used for mounting standard receptacle components 294 as shown. Edges 292 of the top surface 270 adjacent to the opening 290 are formed upwardly so that no sharp metal edges extend into the conduit 226 (Figure 8). In fact, the entire cellular flooring system is designed so that no sharp edges can contact or damage the service lines placed into conduits or passageways. A stand cover plate 295 may be provided to enclose the space surrounding

the receptacles 294.

In Figure 11 an access housing unit 300 is shown. The housing has a body portion 302 formed from sheet metal and a height adjustable top plate 310 for covering an opening provided in the housing. The body portion 302 is designed to span across conduits 226, 227 and 228 as shown in Figure 13 and is secured at ends 304 and 306 thereof to a crest 202 adjacent to the said conduits. As mentioned, the body portion has an opening in its top surface to provide access to the underlying service lines which are placed in the conduits 226, 227 and 228 and top plate 310 is height adjustable so that it can be levelled with a layer of concrete which is poured over the corrugated sheets 200.

Figure 12 is an isometric view of a cross-shaped isolating plate 320. The plate 320 has longitudinally extending portions 330 and transversely extending portions 340 extending outwardly from a central access opening 350. Portions 330 each have downwardly extending edges 332, a portion of which is folded inwardly and upwardly to provide a snap on engaging means to secure the portions 330 to the outwardly extending wings 224 of the dividing member 218 in the same manner as the edges 282 of the mounting tray 260 described above with reference to Figure 10. The portions 330 provide a

cover for the conduit 226 in the portion of the trench
230 where the gap 248 is provided in the trench base
sheet 246. The transversely extending portions 340 of
the plate 320 provide a base for the portion of trench
5 passageway 240 which crosses over the gap 248 in the
base sheet 246. The plate 320 therefore isolates the
conduit 226 and the passageway 240 from all other
conduits and passageways. The access opening 350
provides vertical access only between the conduit 226
10 and the passage 240. Upwardly extending edges 352 of the
plate 320 are provided adjacent to the access opening
350. The edges 352 are folded over to provide a snap-on
engaging means for attaching them to inwardly extending
portions 237 and 239 provided at the base of the interior
15 wall members 236 and 238 shown in Figure 9. The plate 320
thus serves to isolate the conduit 226 and the passageway
240 and to lock the trench 230 to the dividing member 218.
Further, the plate 320 eliminates any possibility of
misalignment of the dividing member 218 relative to the
20 trench passageway 240.

It is contemplated that various other isolating members
could be designed in accordance with the invention. In
one such variation, a substantially square plate, having
three approximately spaced access openings arranged
25 diagonally therein, could effectively isolate each of
three connected conduit-passage pairs from the others.

In this case, the two outermost openings could be formed by cutting away two diagonally opposed corner portions of the plate.

Referring now to Figure 13, a completely assembled
5 cellular flooring system is illustrated. A plurality of corrugated sheets 200 are attached together as described with reference to Figure 8. A "U" shaped dividing member 218 placed into the valley 204 provides three parallel conduits 226, 227 and 228; each conduit having an open
10 top surface. A plate 320 is placed over the conduit 226 in the centre of the location where the overlying trench 230 will be provided. A trench unit 230 having a base sheet 246 and an open top surface is placed over the plate 320 so that the transversely extending portions
15 340 of the plate 320 span the gap 248 in the base sheet 246 and so that portions 237 and 239 of the interior trench walls 236 and 238 extend across and engage portions 352 of the plate 320. It is to be understood that the trench and dividing member are locked together by the plate by
20 a simple snap-on process and that all of the above components are provided in standard modular lengths and therefore, are easily assembled at the job site.

A single trench comprising one or more trench units 230 preferably extends from one end of a structure to
25 another and serves as the main feeder for all service

lines. If more than one trench unit is used two or more trench units 230 can be easily coupled together in an end to end relationship with clips 350 as shown. A gap 248 need only be provided in the trench base sheets which cross over divided or separated valleys; otherwise, the trench base 246 extends the full length of the trench wall members. Outer trench walls are attached to the crests 202 of the corrugated sheets 200 by sheet metal screws or any other suitable means.

10 Once the valleys are separated and the trench is in place, all of the service lines are placed into their respective passageways and conduits to avoid the feeding process described above. Receptacle mounting units 255 containing any desired outlet hardware are then snapped onto the dividing member 218 at all desired locations over the mounting units 255 onto crests 202 as shown. All remaining exposed conduits are covered by the covers 360. The covers 360 have two sets of spaced-apart depressions 362 therein formed to receive the wings 224 of the dividing member 218 to aid in properly aligning the covers 360 over the conduits and to help cover the sharp metal edges of the wings. The ends 364 of the covers 360 are slightly elevated so that they may overlap the base portion of the access housing 300 and outer trench walls 232 and 234, again covering sharp metal edges. Top covers 250 are also provided on trench 230.

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The cellular flooring system of the invention is preferably made up from standard sized corrugated sheets which may be fabricated in quantity, compactly nestled, shipped in bundles, installed as received from the factory and placed at any location without regard to a floor plan. Of course, cutting of the sheets may be required to fill in the exact dimensions as the floor is closed. Standard sized dividing members, isolating plates, trench members, access housings and covers are preferably used in conjunction with the sheets. Since no special fabrication is required, each of the above components can be efficiently mass produced at a reduced cost. Further cost savings are made by placing service lines into the open conduits before they are covered, thereby eliminating the need for fishing the lines through enclosed cells. Eliminating the fishing process reduces the risk of damaging the lines and reduces the wiring time.

In the cellular flooring system of the invention, a relatively small number of standard components can be easily assembled in the field. Each component can be fabricated from sheet metal rather than more expensive castings. By using only valleys for service raceways, the need for a base sheet attached beneath the corrugated sheet is eliminated. This reduces trapped air spaces and reduces the likelihood and severity of fires. A

plurality of services may be accessed at a single location while keeping desired service lines isolated from others. The trench has a base sheet except for where the trench crosses over the service conduits to allow concrete to flow under the trench into the valleys not being utilized by raceways. Providing concrete around the conduits and passageways provides greater fire protection than flooring systems which utilize bottomless trenches because those systems place service lines directly on the crests where there is nothing to prevent rapid conduction of heat throughout the corrugated sheet.

CLAIMS:

1. A cellular flooring unit comprising:
 - (a) a corrugated sheet having one or more valleys and one or more crests in alternation with the valleys, each adjacent valley and crest being
5 connected by an inclined webbing;
 - (b) means for longitudinally dividing the valley or at least one of the valleys into a plurality of parallel conduits each having an open top
10 surface; and
 - (c) cover means positioned on the sheet over the or each divided valley to create a plurality of closed cells.
2. A cellular flooring unit according to claim 1
15 wherein each crest has at least one stiffening rib formed therein to increase the stiffness of the corrugated sheet.
3. A cellular flooring unit according to claim 1 or claim 2 wherein the inclined webbing has a plurality of
20 embossments formed therein to increase the mechanical retention of the flooring unit to a concrete slab poured thereon.
4. A cellular flooring unit according to any preceding claim wherein the dividing means is a "U" shaped



dividing channel member.

- 5 5. A cellular flooring unit according to claim 4 wherein the or each valley has a ridge longitudinally disposed therein for cooperation with a corresponding ridge in the base of the "U" shaped dividing member to align and aid in securing the dividing member to the valley.
- 10 6. A cellular flooring unit according to any of claims 1 to 3 wherein the dividing means is a "W" shaped dividing channel member.
- 15 7. A cellular flooring unit according to claim 6 wherein the or each valley has a ridge longitudinally disposed therein for cooperation with the "W" shaped dividing member to align and aid in securing the dividing member to the valley.
8. A cellular flooring unit according to any of claims 1 to 3 wherein the dividing means is an "I" shaped dividing member.
- 20 9. A cellular flooring unit according to claim 8 wherein the or each valley has a ridge longitudinally disposed therein and the "I" shaped dividing member has a base portion shaped to receive the ridge to align and



aid in securing the dividing member to the valley.

10.A cellular flooring unit according to any of claims 1 to 3 wherein the valley or at least one of the valleys has a width greater than the width of any of the crests.

5 11. A cellular flooring unit according to claim 10 wherein the or each wide valley has a pair of spaced apart parallel ridges longitudinally disposed therein to align and aid in securing the dividing means to the sheet.

10 12. A cellular flooring unit according to any preceding claim wherein the cover means has openings therein to provide access to the closed cells.

15 13. A cellular flooring unit according to any preceding claim wherein the cover means is provided at least in part by a plurality of cover sheets positioned so that an uncovered portion of the corrugated sheet remains to provide access to the closed cells.

20 14. A cellular flooring unit according to any of claims 1 to 12 wherein the cover means is provided at least in part by a plurality of cover sheets each having at least one substantially semi-circular cut out in at least one end thereof positioned so that substantially circular access openings are created when the cover



sheets are placed end to end.

15. A cellular flooring unit according to any preceding claim wherein the cover means has elevated offsets therein
5 to receive the dividing means.

16. A cellular flooring unit according to any preceding claim wherein the cover means is provided at least in part by a trench supported on the crests of the corrugated
10 sheet, the trench comprising:

- i) a plurality of vertically disposed spaced-apart wall members defining a plurality of parallel passageways, each passageway being transversely oriented with respect to the conduits;
- 15 ii) a base provided underneath the passageways to close the bottoms of the passageways,
- iii) an opening in the wall members and the base to provide access between the conduits and the passageways; and
- 20 iv) trench cover means provided over the wall members to close the tops of the passageways;

the cellular flooring unit further comprising isolating means positioned in the opening selectively to isolate at least one conduit and passageway from the remaining
25 conduits and passageways, the isolating means being removable independently of the base of the trench.

17. A cellular flooring unit according to claim 16 wherein:

- 30 (a) the dividing means provides one central and two adjacent parallel conduits in one valley of the corrugated sheet;
- (b) the trench has four spaced-apart wall members presenting one central and two adjacent parallel
35 passageways; and



(c) the isolating means is a cross-shaped plate member positioned between the conduits and the passageways in the opening in the trench base, the cross member having longitudinally extending portions which cover and isolate the central conduit and transversely extending portions which provide a base member for and isolate the central passageway, the cross member having an opening in its centre to provide access between the isolated centre conduit and the centre passageway.

18. A cellular flooring unit according to claim 16 or claim 17 wherein the trench base is a plate secured to the bottom of the wall members.

19. A cellular flooring unit according to any of claims 16 to 18 wherein the trench wall members have height adjusting means.

20. A cellular flooring unit according to any of claims 16 to 19 wherein the isolating means has engaging means thereon for snapping it into locking engagement with both the trench and the dividing means thereby to lock the trench into position over the dividing means.

21. A cellular flooring unit according to claims 4 and 20 wherein the 'U' shaped dividing channel member has outwardly extending wing portions to aid in engaging it to the isolating means.

22. A cellular flooring unit according to any preceding claim wherein the cover means is provided at least in part by an access housing spanning a dividing valley and overlying the conduits, the cellular flooring unit further comprising a mounting tray enclosed by the access housing



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for receiving electrical receptacles and the like.

23. A cellular flooring unit according to claim 22 wherein the tray has engaging means for snapping it into
5 locking engagement with the dividing means at any point along the length of the dividing means.

24. A cellular flooring unit according to claims 4 and 23 wherein the 'U' shaped dividing channel member has
10 outwardly extending wing portions to aid in engaging it to the mounting tray.

25. A cellular flooring unit according to any preceding claim wherein the corrugated sheet has one or more valleys
15 and one or more crests, each adjacent valley and crest being of equal width and being connected by an inclined webbing, and further has at one edge a plurality of narrower crests to provide a desired number of valleys in a reduced space; the flooring unit further comprising a
20 cover means positioned on the sheet over the valleys formed by the narrower crests to create a plurality of closed parallel cells which can be accessed through openings in the cover means.

25 26. A method for placing underfloor service lines, the method comprising:

- 30 (a) placing on the support beams of a floor corrugated sheets having one or more valleys and one or more crests in alternation with the valleys, each adjacent valley and crest being connected by an inclined webbing;
- (b) choosing which valleys to use as service raceways;
- 35 (c) dividing each chosen valley into a plurality of parallel open conduits;



- (d) placing service lines or string means into the conduits;
- (e) providing access housings;
- (f) placing cover means over the chosen valleys; and
- 5 (g) pouring a layer of concrete over the sheets and covers; and, if string means are placed into the conduits,
- (h) attaching service lines to the string means through one access housing; and
- 10 (i) pulling the string means and attached service lines from a second access housing to position the service lines within the conduits.

27. A method for placing underfloor service lines, the
15 method comprising:

- (a) placing on the support beams of a floor corrugated sheets having one or more valleys and one or more crests in alternation with the valleys, each adjacent valley and crest being connected by an
20 inclined webbing;
- (b) choosing which valleys to use as service raceways;
- (c) dividing each chosen valley into a plurality of open parallel conduits;
- 25 (d) placing isolating means, which are independent of the undermentioned trench, over the divided valley;
- (e) placing a trench having a plurality of parallel passageways therein transversely over said conduits
30 in a manner so that the conduits may access the passageways and said isolating means isolates at least one conduit and passageway from the remaining conduits and passageways; and
- (f) placing service lines into the conduits and
35 passageways.



28. A method according to claim 27 further comprising:

- (a) placing access housings over the conduits at desired locations;
- (b) providing cover means for the conduits;
- 5 (c) providing cover means for the trench; and
- (d) pouring a layer of concrete over the sheets and conduit cover means to a level which is substantially the same height as the trench cover.

10 29. A cellular flooring unit substantially as described herein with reference to the drawings.



conduits and passageways; and

(f) placing service lines into the conduits and passageways.

29. A method according to claim 28 further comprising:

(a) placing access housings over the conduits at desired locations;

(b) providing cover means for the conduits;

(c) providing cover means for the trench; and

(d) pouring a layer of concrete over the sheets

and conduit cover means to a level which is substantially the same height as the trench cover.

30. A cellular flooring unit substantially as described herein with reference to the drawings.

