



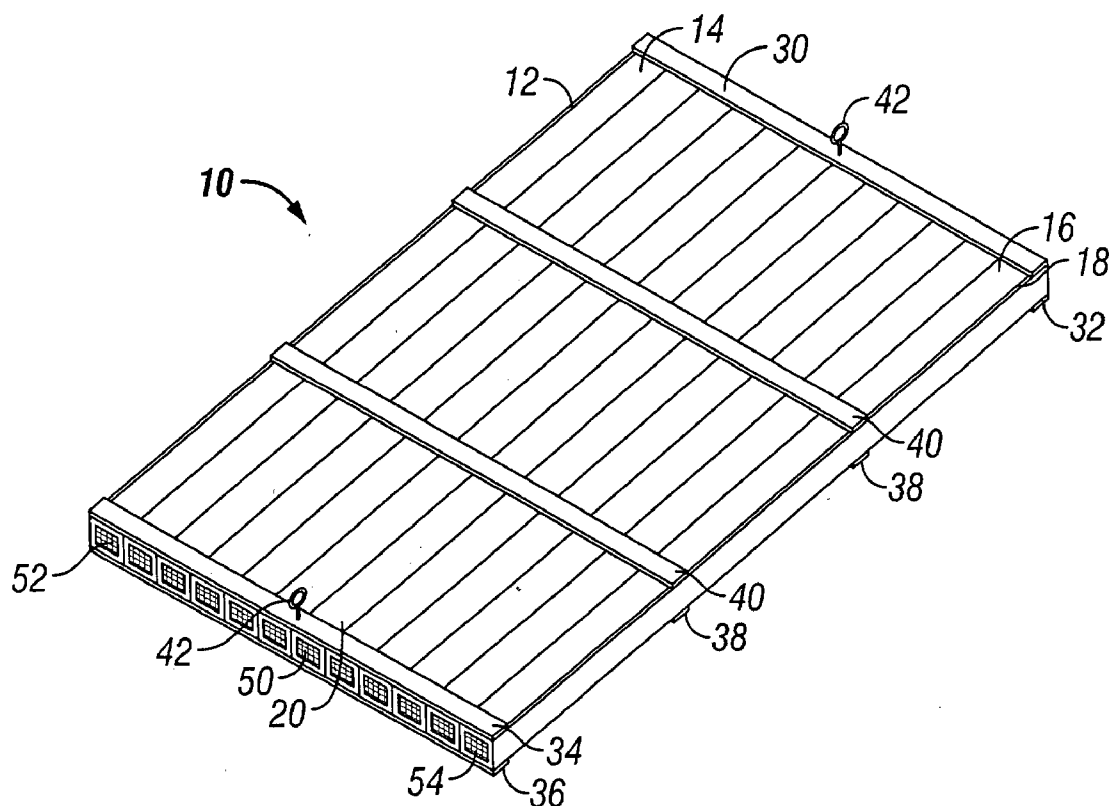
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(19) **United States**(12) **Patent Application Publication**(10) **Pub. No.: US 2004/0141809 A1****Wagstaff**(43) **Pub. Date: Jul. 22, 2004**(54) **CONSTRUCTION MAT****Publication Classification**(76) Inventor: **Jimmy J. Wagstaff**, Pearland, TX (US)(51) **Int. Cl.⁷ E01C 5/16**(52) **U.S. Cl. 404/35**

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AKIN, GUMP, STRAUSS, HAUER & FELD**711 LOUISIANA STREET****SUITE 1900 SOUTH****HOUSTON, TX 77002 (US)**(57) **ABSTRACT**

A construction mat is disclosed that includes plurality of beam members secured together to form a durable platform. Metal tubing can be used for the beam members with the cavity of the tubing being filled by a filler material such as polystyrene, polyurethane foam, or other materials having comparable characteristics.

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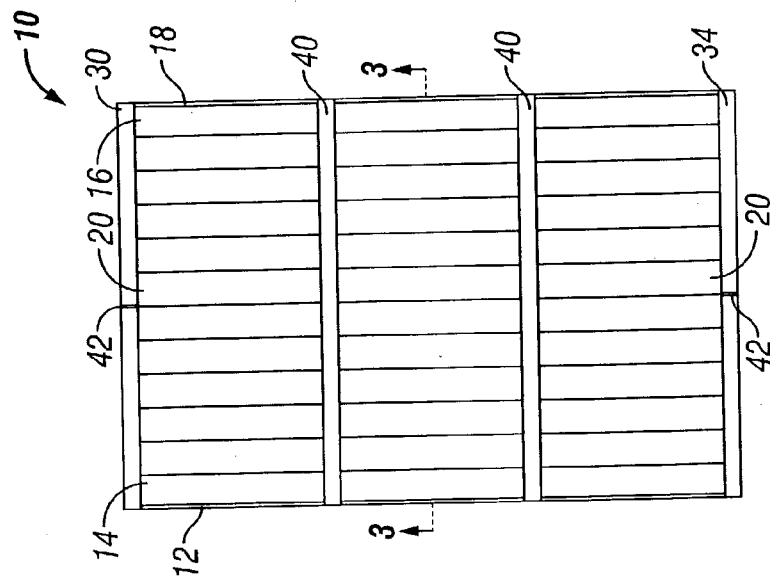


FIG. 2

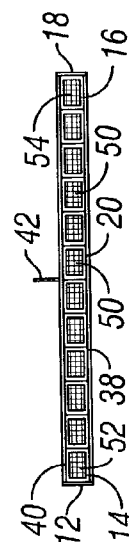


FIG. 3

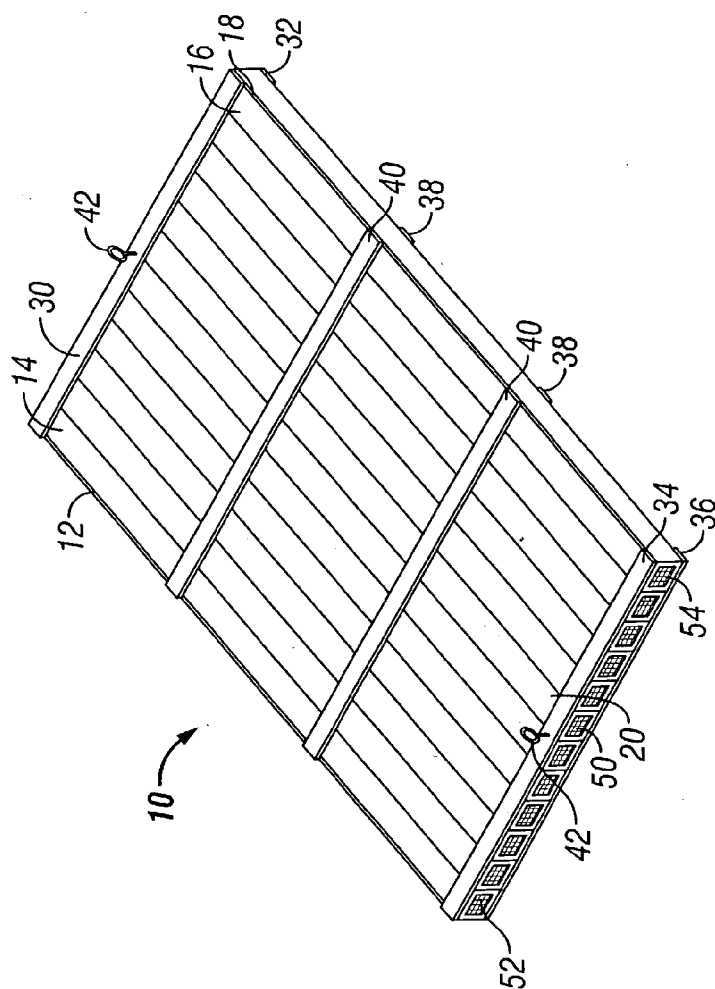


FIG. 1

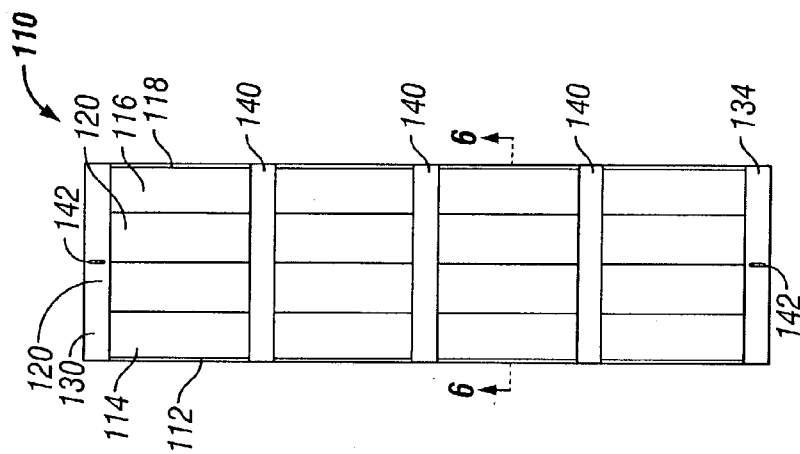


FIG. 5

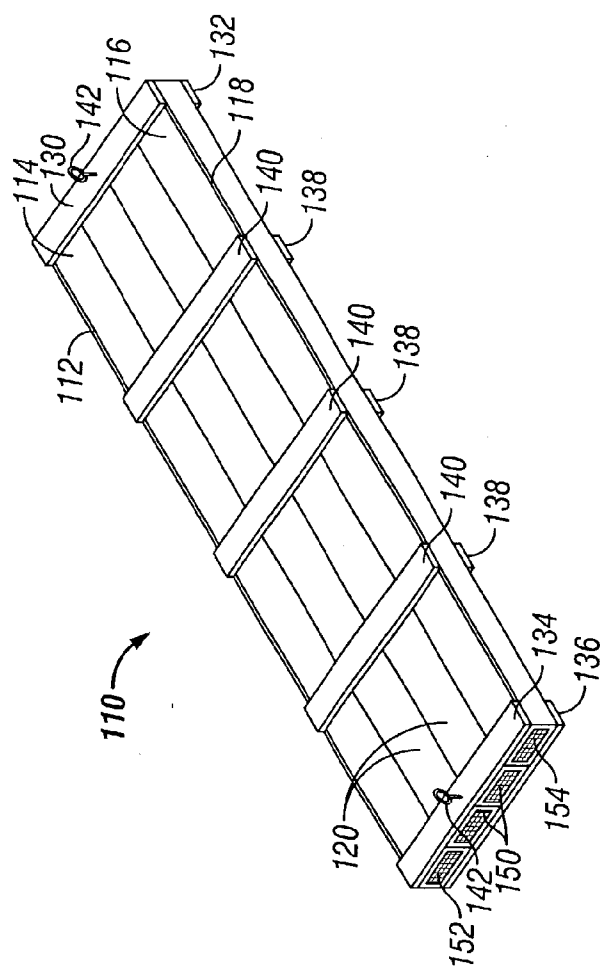


FIG. 4

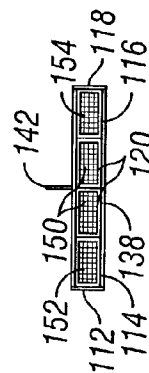


FIG. 6

CONSTRUCTION MAT**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] Not applicable.

STATEMENTS REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO A MICROFICHE APPENDIX

[0003] Not applicable.

BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The invention relates to construction mats. More particularly, the invention relates to construction mats such as those used to provide a temporary road surface for supporting construction and/or other traffic, and mats for supporting heavy equipment for construction or maintenance.

[0006] 2. Description of the Related Art

[0007] For a host of activities such as construction, maintenance, drilling, etc., trucks and heavy equipment need to be transported to and used at the desired site. Often, because of poor ground conditions, for example if the ground is too wet, such trucks and alike cannot traverse the wet ground because they will become stuck. Additionally, these trucks and heavy equipment can also do significant damage to the natural environment surrounding a particular site. In the past, temporary roads have been constructed in such sites using gravel, shell, or the like. In addition to it being expensive and time consuming, these temporary roads and platforms are also damaging to the natural environment.

[0008] Construction mats have been used as platforms for supporting heavy equipment during construction or maintenance, and also to provide a solid road surface for construction equipment, trucks, and other vehicles needing to access unpaved construction or maintenance sites. The mats eliminate the need for the construction of gravel roads and platforms. Generally, construction mats are formed in discrete units which can be assembled into a platform or temporary road at the site where they are needed. Upon completion of a project, the mats can be lifted up and transported out of the area, preferably to be reused elsewhere. Conventional construction mat designs are disclosed in U.S. Pat. No. 4,875,800 to Hicks, U.S. Pat. No. 5,087,149 to Waller, and U.S. Pat. No. 5,201,601 to Stanley et al. These patents are hereby incorporated by reference in their entirety for all purposes.

[0009] The most common material used to build construction mats has been hardwood. Wood is generally easy to work with and in the past has been readily available. One problem with wooden construction mats is durability. Over time, wooden construction mats are subject to deterioration due to the weather and other environmental conditions. This is particularly true where the construction mats are placed in muddy or boggy areas. The mixture of water, mud, and other contaminants can invade into the seams or gaps between the boards of construction mats, causing the wooden mats to rot

from within. As a result, conventional mats must often be repaired or replaced. Deterioration of wooden construction mats can be mitigated by specially treating the wood; however, this adds considerable cost to the fabrication of these mats and could also create environmental problems. Additionally, wooden construction mats are easily broken, cracked, or gauged by the equipment using them.

[0010] In recent years, construction mats have come into greater use. This is true in part due to environmental regulations requiring the use of mats for all wetland area construction and/or maintenance projects. While construction mat usage has become more prevalent, it has become increasingly difficult to obtain high quality wooden construction mats. Wooden construction mats are preferably made from durable hardwoods, which are no longer readily available. Therefore, wooden construction mats used today are often even less durable and deteriorate more rapidly.

[0011] Construction mats are often somewhat large in dimension, so heavy lifting and moving equipment is generally necessary to transfer and arrange the mats at the site where they are to be used. Since the mats are temporary and must be transported to the site, transportation issues such as weight of the mats are important factors in construction mat design. It would be undesirable to replace conventional wooden mats with mats that were heavier.

[0012] Attempts have been made to use materials other than wood to build construction mats; however, these other materials introduce additional problems such as cost, weight, availability, and safety concerns. One example of construction mat built from materials other than wood is found in U.S. Pat. No. 6,007,271 issued to Cole et al. This patent is hereby incorporated by reference in its entirety for all purposes. Cole shows mats constructed of aluminum or steel in square or rectangular shapes having a series of intersecting beam members forming a rigid frame structure and a top plate having an upper surface. The top plate and frame structure of the Cole mat also defined an opening in the mat to receive an equipment bucket for lifting bucket. A significant problem with the Cole mats is that when the mats are placed in a wet or boggy environment, the hollow beam members can fill with water, mud or other contaminants. This problem is exacerbated by the movement of heavy equipment over the mats that effectively pumps the mud and water into the beams. When it is time to lift or move the mats the additional weight of water and mud can make moving or transporting difficult. It can also be difficult to clean the water and mud out from within the beam members. These problems cannot be eliminated simply by using solid beams because that would add too much weight. Additionally, construction of the Cole mats to include an opening in the platform surface can be a safety hazard for those working on or around the mats.

[0013] It would be desirable therefore to have a construction mat which is durable and easily transportable. Preferably, the construction mat would be lightweight, weighing no more than comparable wooden mats, yet not have the deterioration problem of wooden mats. It would also be desirable that the construction mats be made in such a way that the mats would not readily pick up and hold water or mud from the surrounding environment.

BRIEF SUMMARY OF THE INVENTION

[0014] The present invention includes durable construction mats and a method for making durable construction mats. The construction mats in the present invention have plurality of beam members that are secured together to form a rigid platform. Preferably, at least the internal beam members have a cavity that can be filled with a durable and water resistant filler material. Preferably, the filler material is a polystyrene foam, however, other foams, polymers, or filler materials having comparable properties can also be used.

[0015] In a preferred embodiment, the beam members are made of metals such as steel or aluminum and are secured together with metal straps. Reinforcing bars can be added to the outside edges to strengthen the outside edges of the mats for vehicle entry and exit. Preferably, the mats have a lifting element attached to or within the mat.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0016] Six figures have been selected to illustrate examples of the present invention. It is believed that those skilled in the art when considering these figures along with the ensuing description will be sufficiently advised to practice the invention in various forms beyond those specifically disclosed in these figures.

[0017] FIG. 1 is a perspective view of one embodiment of a road mat (also known as a truck mat) made according to the present invention.

[0018] FIG. 2 is a plan view of the road mat of FIG. 1.

[0019] FIG. 3 is a cross sectional view of the mat of FIG. 1.

[0020] FIG. 4 is a perspective view of an example of a equipment platform mat (also known as a dragline mat) made according to the present invention.

[0021] FIG. 5 is a plan view of the equipment platform mat of FIG. 4.

[0022] FIG. 6 is a cross sectional view of the mat of FIG. 4.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Referring to FIGS. 1-3, a specific preferred embodiment of the construction mat of the present invention is shown. In particular, these figures show a preferred embodiment of a road mat 10 made in accord with the present invention.

[0024] Mat 10 includes a plurality of beam members. A first beam member 14 forms one outside edge of mat 10 and a second member 16 forms a second outside edge of mat 10. Mat 10 has at least one internal beam member 20, preferably placed between and generally parallel with first and second beam members 14 and 16. Preferably, mat 10 contains a plurality (at least two) internal beam members 20. In a most preferred embodiment beam members are directly adjacent to one another making a solid platform. Alternatively, plates or covers could be used to fill gaps.

[0025] Preferably, beam members 14, 16, and 20 are made of metal such as steel or aluminum. Beam members could also be made from different materials including but not limited to other metals or synthetic materials. In a preferred embodiment, beam members 14, 16, and 20 are made from tubing. In a more preferred embodiment, beam members are made from rectangular tubing; however, tubing having other shapes or configurations including but not limited to square, circular, etc. can also be used. Most preferably, beam members are made from rectangular tubing having a nominal thickness of at least about $\frac{3}{16}$ ", more preferably about $\frac{3}{8}$ ", with an overall dimension of about four inches by six inches to about eight inches by twelve inches.

[0026] Beam members are preferably held together by connecting straps. Preferably, there is an upper connecting strap 30 attached to the upper surface of the beam members on one end and an upper connecting strap 34 on the other end of the beam members. There can be a number of internal upper connecting straps 40 as might be needed to stabilize the construction mat 10 depending upon the mat dimensions, weight, etc. Similarly, a lower connecting strap 32 is preferably attached to the lower surfaces of beam members on one end and lower connecting strap 36 is attached to the lower surface of beam members on the opposite end. Internal lower connecting members 38 can likewise be added as needed.

[0027] Connecting members are preferably welded to the beam members. However, other forms of attachment including riveting, bolting, etc. such as may be known to those skilled in the art can also be used. In a preferred embodiment, connecting members are welded to first and second beam members 14 and 16, and more preferably welded to all of the beam members. Connecting members are preferably made of metal having nominal $\frac{1}{4}$ " thickness and 4 inches in width or larger. Most preferably, connection members made from the same material as the beam members themselves.

[0028] Lifting elements 42 are preferably attached to mat 10 at connecting straps 30 and 34. Preferably, lifting elements 42 comprise a chain lifting eye; however, other alternative lifting or hoisting components such as straps, lugs, D rings, etc. may also be used.

[0029] In a preferred embodiment of mat 10, internal beam members 20 include a cavity. This cavity is filled with a filler material 50 which is durable and weather resistant. The purpose of the filler material is to prevent mud and water from entering the cavity during the mats use. The combination of tubing and filler material gives mat 10 the structural support needed, without the additional weight of a solid beam member, and prevents accumulation of mud and water inside. In one preferred embodiment, the cavity inside the internal beam members 20 is filled with a polymer material, such as polystyrene (also known by the trade name Styrofoam®). Alternatively, internal beam members 20 can be filled with polyurethane foam, or other foams, polymers or filler materials that have comparable durability and water resistance. Most preferably, the filler material is a two part high density foam material.

[0030] In a preferred embodiment, mat 10 includes reinforcing bars 12 and 18 which are attached to outside edges of the first and second beam members 14 and 16, respectively. Reinforcing bars 12 and 18 can be welded to beam members 14 and 16, or attached by other means including

bolting, riveting, etc. The reinforcing bars **12** and **18** provide an additional measure of strength at the point where a vehicle or equipment would come onto the mat. Preferably, reinforcing bars **12** and **18** have a nominal thickness of about $\frac{3}{8}$ " to about $\frac{3}{4}$ " and are about four inches in width.

[0031] Construction mats used as road mats can be manufactured in a number of different dimensions. Preferably, road mat **10** is nominally 8 feet wide. In the most preferred embodiment, this dimension is reached by using twelve 8 inch by 4 inch rectangular tubing beam members. Similarly, road mat **10** can have an overall width as is needed for a particular construction activity given the construction site needs and transportation limitations. Preferably, road mat **10** is approximately 12 to 16 feet long.

[0032] Referring to FIGS. 4-6, another specific preferred embodiment of the construction mat of the present invention is shown. In particular, these figures show a preferred embodiment of an equipment platform mat **110** made in accord with the present invention.

[0033] In general, the equipment platform mats are made in a similar manner to the road construction mats previously described and shown in FIGS. 1-3.

[0034] In a preferred embodiment, equipment platform mat **110** includes a first beam member **114** forming an outside edge of mat **110** and a second beam member **116** forming a second outside edge of mat **110**. Mat **110** has at least one internal beam member **120**, preferably placed between and generally parallel with first and second beam members **114** and **116**. Preferably, mat **110** contains at least two internal beam members **120**. In a most preferred embodiment, beam members are directly adjacent to one another making a solid platform. Alternatively, plates or covers could be used to fill in gaps.

[0035] Preferably, beam members **114**, **116**, and **120** are of a similar design and construction as the beam members used in mat **10**. Most preferably, beam members are made from rectangular tubing having a nominal thickness of about $\frac{3}{8}$ " with an overall dimension of about six inches by twelve inches.

[0036] Beam members are preferably held together by connecting straps. Preferably, there is an upper connecting strap **130** attached to the upper surface of the beam members on one end and an upper connecting strap **134** on the other end of the beam members. There can be a number of internal upper connecting straps **140** as needed. Similarly, a lower connecting strap **132** is attached to the lower surface of beam members on one end and a lower connecting strap **136** is preferably attached to the lower surface of beam members on the opposite end. Internal lower connecting straps **138** can likewise be added as needed. Design and construction of connecting straps for mat **110** is similar to the connecting members described above for mat **10**. Most preferably, connecting straps of mat **110** have a nominal thickness of $\frac{1}{2}$ " and are six inches wide.

[0037] Lifting elements **142** are preferably attached to mat **110** at connecting straps **130** and **134**. Preferably, lifting elements **142** comprise a chain lifting eye, however, other alternative lifting or hoisting components such as straps, lugs, D rings, etc., may also be used.

[0038] In a preferred embodiment of mat **110**, internal beam members **120** include a cavity. This cavity is filled

with filler material **150** which is durable and weather resistant. The preferred design and characteristics of the filler material **150** is the same as the filler material **50** discussed above in regards to FIGS. 1-3.

[0039] In a preferred embodiment, mat **110** includes reinforcing bars **112** and **118** which are attached to outside edges of the first and second beam members **114** and **116**, respectively. Reinforcing bars **12** and **18** can be welded to beam members **114** and **116**, or attached by other means including bolting, riveting, etc. The reinforcing bars **112** and **116** provide an additional measure of strength at the point where a vehicle or equipment would come on to the mat. Preferably, reinforcing bars **112** and **118** have a nominal thickness of $\frac{1}{2}$ " and are 6 inches in width.

[0040] Construction mats used as equipment platform mats can be manufactured in a number of different dimensions. Preferably, equipment platform mat **110** is nominally four feet wide. In a most preferred embodiment, this dimension is reached by using 4 six inch by twelve inch rectangular tubing beam members. Similarly, equipment platform mat **110** can have an overall width as is needed for particular construction activity given the construction site needs and transportation limitations. Preferably, construction mat **110** is approximately fourteen to twenty eight feet long.

[0041] A number of road mats **10** may be used to prepare a roadway by arranging the mats on the ground adjacent to one another. Similarly, a number of equipment platform mats can be used together to provide a platform of adequate dimension. Alternatively, a combination of road mats **110** and equipment platform mats **110** can be used to provide the access and support as needed for a particular site.

[0042] In the most preferred method of building the construction mats described herein, the mats are preferably manufactured following sequence. Initially, the beam members are cut into the appropriate portions. The appropriately sized beam members are then placed side by side. Upper connecting straps are laid over the top of the beam members and reinforcing bars positioned at the appropriate ends. The upper connecting and reinforcing bars are welded into the proper positions. The partially completed mat is then turned over and lower connecting straps placed and then welded into the proper positions. Finally, the filler material is injected into the cavity of the beam member. As will be understood by one of skill in the art, described is the most preferred method of building the construction mats; however, the sequence and techniques described could be altered or varied depending upon the facilities available to the builder, the size and type of mat being constructed, the materials being used to construct the mat, etc.

[0043] In the most preferred embodiments, all exterior surfaces of road mat **10** are coated to add durability to the life of mat **10**. Preferably, a primer, paint, polymer coating or other coatings such known in the art can also be used. Alternatively, a spray on synthetic or plastic material (such as are used for truck bed liners or the like) can also be used.

[0044] The foregoing disclosure and description of the invention are illustrative and explanatory thereof, but to the extent foreseeable, the spirit and scope of the invention are defined by the appended claims.

We claim:

1. A construction mat comprising:
 beam members comprising a first beam member forming a first outside edge of the construction mat, a second beam member forming a second outside edge of the construction mat, said second beam member being generally parallel to said first beam member, and at least one internal beam member, said internal beam member having an internal cavity and being placed between and generally parallel to said first and second beam members;
 at least one connecting strap attached to said first and second beam members to fix the relative position between said first and second beam members; and
 filler material substantially filling the internal cavity of said internal beam member.
2. The construction mat of claim 1, comprising a plurality of internal beam members, wherein said filler material substantially fills the internal cavity of each internal beam member.
3. The construction mat of claim 1, wherein said beam members comprise metal beam members.
4. The construction mat of claim 1, wherein said first and second beam members comprise beam members having an internal cavity.
5. The construction mat of claim 1, wherein said internal beam members comprise tubing.
6. The construction mat of claim 1, wherein said filler material comprises a foam material.
7. The construction mat of claim 1, wherein said filler material comprises a polymer.
8. The construction mat of claim 1, wherein said filler material comprises polystyrene.
9. The construction mat of claim 1, wherein said filler material comprises polyurethane foam.
10. The construction mat of claim 1, wherein said connection strap is attached to said internal beam members.
11. The construction mat of claim 1, wherein said connecting strap comprises an upper connecting strap attached to an upper surface of said first and second beam members.

12. The construction mat of claim 1, wherein said connection strap comprises a lower connecting strap attached to a lower surface of said first and second beam members.

13. The construction mat of claim 1, comprising an upper connecting strap attached to the upper surface of said first and second beam members and a lower connecting strap attached to the lower surface of said beam members.

14. The construction mat of claim 13, comprising a plurality of upper connecting straps and a plurality of lower connecting straps.

15. The construction mat of claim 1, further comprising a reinforcing bar affixed to an outside surface of said first beam member.

16. The construction mat of claim 1, wherein said beam members are substantially adjacent to each other.

17. A construction mat comprising:

beam members comprising a first beam member forming a first outside edge of the construction mat, a second beam member forming a second outside edge of the construction mat, said second beam member being generally parallel to said first beam member, and a plurality of internal beam members, said internal beam members being placed between and generally parallel to said first and second beam members, said internal beam members having internal cavities;

upper connecting straps attached to an upper surface of said first and second beam members;

lower connecting straps attached to a lower surface of said first and second beam members to fix the relative position between said first and second beam members; and

foamed filler material substantially filling the internal cavities of said internal beam members.

19. The construction mat of claim 17, wherein said filler material comprises a polymer.

20. The construction mat of claim 17, wherein said filler material comprises polystyrene.

21. The construction mat of claim 17, wherein said filler material comprises polyurethane foam.

* * * * *