ABSTRACT

A modular wall system includes a plurality of wall panels, each with a core, a front skin, a rear skin, and at least one edging piece along at least one edge. The edging piece has first and second edgewise extensions extending first and second lengths, respectively, and defining an intermediate groove, wherein the first extension is adjacent the front skin, and wherein the first length is greater than the second length. A floor track has a base flange and a substantially vertical panel-receiving channel. At least one vertically oriented H-spline is provided for resting on the floor track and being positioned between two adjacent wall panels. The H-spline has a front flange and a rear flange joined by a web, wherein the front flange has a transverse width adapted to be received in the intermediate grooves of edging pieces of the adjacent wall panels while permitting substantially flush abutment of the front skins of the adjacent wall panels. The lesser length of the second edgewise extensions of the edging pieces provides a gap for receiving the web. The rear flange extends over a portion of the rear skins of the adjacent wall panels. A top channel is disposed along a top of the modular wall system and receives a plurality of the wall panels. A first side channel is disposed along a side of the modular wall system and receives at least one of the wall panels.
REUSABLE AND RECYCLABLE MODULAR WALL SYSTEM FOR A CONSTRUCTION BARRIER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to provisional application 61/074,565, filed Jun. 20, 2008, entitled “Modular Temporary Construction Safety/Privacy Wall” which is incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

[0002] Not Applicable.

BACKGROUND OF THE INVENTION

[0003] The present invention relates in general to construction barriers, and, more specifically, to a modular wall system for temporary installations.

[0004] Temporary walls or partitions are often used at construction sites such as renovation or remodeling projects in malls, hotels, office buildings, and other public or private venues. The walls provide a safety and security barrier while the renovation or remodeling project is in progress. The walls also block dust and noise from entering public spaces in front of the walls.

[0005] Even though the need for a construction barrier is temporary, typical practice is to build walls using conventional metal stud and drywall structures. Such walls are expensive, time consuming, and are labor intensive to install and remove. In order to provide a finished look and to provide an acceptable surface for applying graphics (e.g., a “Coming Soon” message), the time and expense of finishing the drywall (i.e., taping, mudding, sanding, and painting) is necessary. The typical barrier walls generate large amounts of solid waste when torn down. An average wall 70 feet long and 12 feet high generates about one ton of debris that ends up in a landfill. Thus, there is a need for a temporary safety/privacy wall system that can be installed and removed quickly, with less labor, and lower cost while reducing solid waste.

SUMMARY OF THE INVENTION

[0006] A preferred embodiment of a modular wall of the invention employs a wall panel which may be comprised of a core bonded with a perimeter edge piece and a plastic skin of about 0.060 thickness or may be a single piece construction with the core, edge piece, and skin integrally formed. The core may have a honeycomb shape or a corrugated shape, for example. The wall panels may be comprised of a polymer such as polypropylene or acrylonitrile butadiene styrene (ABS). Top and bottom tracks of extruded aluminum receive the wall panels and allow for only 0.060 play after a panel is installed. A joiner spline between adjacent panels is comprised of an extruded H-channel that provides about 3° support on the back side of the panels and about 2.0° internal support via a groove in each edge piece. Panels at side and/or top ends of the wall are attached to the main section of the wall by a continuous hinge, thereby allowing them to be turned at an angle to the main section. The bottom track may be secured to the floor or ground or may rest in place. The bottom track may be provided with a non-slip rubber tape to protect the floor surface. Panels are stood up and slid into the bottom track with the H-splines being placed between adjacent panels. The top track is slid on and fastened to the panels approximately every 8’ with a through pin and cotter pin. The modular wall structure is tied back to existing structure of the site about every 4’ at the top or bottom of the wall with aluminum angle braces. The front plastic skins of the panels are in a flush abutment to provide a smooth surface that can be decorated with desired graphics. At the time of removal, the parts of the modular wall are easily disassembled and most of the parts can be reused to construct another barrier at a different construction site. The materials for any parts that were modified too much to be reused can be easily recycled.

[0007] More specifically, the modular wall system for temporary erection at a construction site comprises a plurality of wall panels. Each wall panel has a core, a front skin, a rear skin, and at least one edging piece along at least one edge, wherein the edging piece has first and second edgewise extensions extending first and second lengths, respectively, and defining an intermediate groove, wherein the first extension is adjacent the front skin, and wherein the first length is greater than the second length. A floor track has a base flange and a substantially vertical panel-receiving channel. At least one vertically oriented H-spline is provided for resting on the floor track and being positioned between two adjacent wall panels. The H-spline has a front flange and a rear flange joined by a web, wherein the front flange has a transverse width adapted to be received in the intermediate grooves of edging pieces of the adjacent wall panels while permitting substantially flush abutment of the front skins of the adjacent wall panels. The lesser length of the second edgewise extensions of the edging pieces provides a gap for receiving the web. The rear flange extends over a portion of the rear skins of the adjacent wall panels. A top channel is disposed along a top of the modular wall system and receives a plurality of the wall panels. A first side channel is disposed along a side of the modular wall system and receives at least one of the wall panels.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a perspective view of a front side of a modular wall of the present invention.

[0009] FIG. 2 is a perspective view of a rear side of the wall in FIG. 1.

[0010] FIG. 3 is an end view of a floor track of the present invention.

[0011] FIG. 4 is a top view of the floor track.

[0012] FIG. 5 is a front view of a wall panel.

[0013] FIG. 6 is a cross-sectional, perspective view of the wall panel along lines 6-6 of FIG. 5.

[0014] FIG. 7 is a cross-sectional view through an edge piece of the present invention.

[0015] FIG. 8 is an end view of an H-spline of the present invention.

[0016] FIGS. 9 and 10 are cross-sectional views showing the joining of adjacent wall panels with an H-spline.

[0017] FIG. 11 is a perspective view of a C-channel used as a top channel or side channel of the present invention.

[0018] FIG. 12 is an end view showing hinged C-channels receiving corresponding wall panels.

[0019] FIG. 13 is an exploded view showing a typical assembly of a modular wall of the present invention.

[0020] FIG. 14 is a rear view showing multiple stacks of wall panels using the present invention.
FIG. 15 is a front plan view showing a door section of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. 1, a modular wall system 10 can be erected as a temporary barrier at a construction site 11 having a floor or ground 12. Modular wall 10 includes a main wall section including a plurality of wall panels 13-17 that are arranged to provide a smooth planar face that can be decorated with graphics, for example. Panels 13-17 are set in a floor track 18 that rests on and may be attached or sitting freely on floor 12. A top channel 19 is disposed along the tops of wall panels 13-17, and a pair of side channels 21 and 22 are disposed over the lateral sides of panels 13 and 17, respectively, of the main wall section. As described in greater detail below, floor track 18 includes a base flange and a substantially vertical panel-receiving channel while top channel 19 is substantially C-shaped to receive the wall panels. A plurality of locking pins 22-26 interlock wall panels 13-17 with floor track 18 and top-channel 19, respectively. Each pin passes through aligned holes in the respective floor track 18 or top channel 19 and the respective wall panel 13-17. Preferably, the locking pins may be alternated between the top and bottom of the wall panels for adjacent panels, as shown, so that each panel is locked to either the top channel or the floor track. Thus, locking pin 22 interlocks the bottom of wall panel 13 to floor track 18. Locking pin 23 interlocks wall panel 14 with top channel 19. A greater or lesser number of pins may be employed depending upon the specific width of wall panels 13-17, or for other considerations.

The main wall section typically is placed out in front of the area being reconstructed (i.e., in a spot not being modified). Therefore, floor track 18 may include a resilient layer at the bottom thereof, such as a rubber tape, to protect floor 12 as is described in greater detail below. Furthermore, the wall will typically turn at the sides or top in order to tie back to existing structure. Thus, a side wall section includes a wall panel 27 received in a side channel 28 and a floor track extension 29. Side channel 28 is preferably connected via a continuous hinge with side channel 20. A top channel 30 and side channel 31 are also disposed around wall panel 27, which is locked in place by additional locking pins 32 and 33, for example. Side channel 31 may be attached to an existing wall of the construction site (e.g., by nails or screws) to support the entire wall and to complete the barrier on the respective side. On the opposite end of wall 10, a wall panel 34 provides a similar end closure to the existing construction site and is retained in a side channel 35, top channel 36, and side channel 37, while being locked in place by a locking pin 38. A top of the wall may be formed in a similar fashion by providing top wall panels on channels hinged with the top channels of the other wall portions and attached to the existing construction site in a similar manner. If used, the side wall section(s) and top wall section(s) can also be interconnected with specially-cut pieces of wall panels (e.g., a triangular gable piece) mounted in appropriately cut side channels in order to close any resulting openings in the barrier.

The rear side of wall 10 is shown in FIG. 2. Visible from the rear side of wall 10 are H-splines 40-44 which are placed between adjacent wall panels. Each spline 40-44 may be preferably mounted to surrounding structures to support modular wall 10. In particular, a plurality of angle braces may attach the H-splines to a floor or ceiling in the construction site using double sided tape or other bonding materials. Additional angle braces may also attach the side channels or top channel to a relatively permanent structure of the construction site, if desired. As shown in FIG. 2, angle braces 46-48 and 49 are each attached to a respective H-spline 40-42 and 44 and to floor 12. The angle braces may extend a sufficient distance away from wall 10 to allow them to be attached away from a finished portion of floor 12 and to provide adequate lateral support for wall 10. Angle braces may also be used to anchor to overhead structure. Thus, an angle brace 50 connected to H-spline 43 is tied back to a ceiling structure 51 within the construction site.

On the side section of wall 10, FIG. 2 shows an extension floor track 45 receiving the side wall panel 34. FIGS. 3 and 4 shows a floor track 18 in greater detail. A base flange 55 supports a pair of side walls 56 and 57 to create a substantially vertical panel-receiving channel 58 into which a wall panel 59 may be inserted, as shown in phantom. Base flange 55 has a resilient layer 60 along the bottom side thereof in order to protect the floor surface on which it is mounted. Layer 60 may be comprised of a rubber tape, for example. Base flange 55 may contain holes (not shown) for receiving floor fasteners when it is desired to anchor floor track 18 to the floor or ground. Walls 56 and 57 include aligned holes 61 and 62 to receive the locking pins. Sets of such aligned holes may be provided at regular intervals to receive locking pins for every other wall panel. In a preferred embodiment, track 18 is comprised of extruded aluminum which may be cut to various standard lengths and finished by drilling the aligned holes for the locking pins.

FIG. 5 shows a wall panel 65 comprising a sandwich structure with a corrugated core, front and rear skins, and edging pieces around the periphery. As shown in FIG. 6, the corrugated core 66 has a front skin 67 and a rear skin 68 which bond to corresponding flat surfaces of the corrugations. An alternative embodiment, a honeycomb core can be employed wherein an approximately one inch thick core has a closed cellular structure. A first edge piece 69 and a second edge piece 70 are also bonded to front and rear skins 67 and 68, as shown. The width of panel 65 is adapted to fit within the various channels of the floor track, top channels, and side channels with a clearance of about 0.060 inches. Preferably, panel 65 may be about 1.125 inches thick and may be provided in standard 4 foot by 8 foot sizes. It may also be desirable to provide a width up to 5 feet and lengths up to 20 feet. All the components of the sandwich panel may preferably be comprised of 100% polypropylene thermoplastic or 100% ABS thermoplastic. All four edge pieces on a particular wall panel preferably comprise the grooved shape shown in FIG. 6 so that every edge can optionally be received in either an H-spline or any of the top or side channels. Pre-drilled holes (not shown) may be provided through one or more of the edge pieces for receiving locking pins described below. Although a glued, composite structure is shown for panel 65, it may also be desirable to form the panels from a single piece of extruded or molded polymer providing the same overall shape.

FIG. 7 shows an edge piece 69 formed (e.g., either extruded or molded) of a thermoplastic having a main body 71 with a first edgewise extension 72 and a second edgewise extension 73 defining an intermediate groove 74. First edgewise extension 72 is adjacent to the front skin of the sandwich panel and has a length greater than the length of second
edgewise extension 73. The difference in length is to provide a gap for receiving the H-spline as described in detail below.

[0029] FIG. 8 shows an end view of an H-spline 40 including a front flange 75 and a rear flange 76 joined by a web 77. Each beam of front flange 75 has a transverse width D₁ adapted to be received in the intermediate grooves of the edging pieces of adjacent wall panels. Likewise, the thickness D₂ of front flange 75 is adapted to fit within the intermediate grooves while leaving a small amount of play for easy insertion. Web 77 has a length L₁, adapted to receive the second extension on each adjacent wall panel. The H-spline is likewise preferably formed from extruded aluminum and is provided in various standard lengths matched to (e.g., slightly shorter than) the standard heights of the wall panels.

[0030] FIGS. 9 and 10 illustrate the installation of panels 16 and 17 onto H-spline 40. As they are joined, front flange 75 enters grooves 74. Web 77 occupies a gap formed between second edgewise extensions 73 that results from their length being shorter than the lengths of front edgewise extensions 72. First edgewise extensions 72 together with the front skins come into abutment to provide a smooth, almost undetectable seam.

[0031] FIG. 11 shows a C-channel 78 that can be employed for both a top channel and a side channel depending on the particular needs of an individual installation. It may contain pairs of aligned holes (not shown) for receiving locking pins and other features to facilitate attachment to fixed structures (i.e., relatively permanent structures) at the construction site. The C-channel may preferably be comprised of extruded aluminum about ¼ inch thick.

[0032] Side or top wall sections may be added to a wall system using a pair of hinged C-channels as shown in FIG. 12. Thus, a first C-channel 80 is joined to a second C-channel 81 by a substantially continuous hinge 82 using a conventional hinge structure and method of attachment (e.g., spot welding) known to those skilled in the art. A wall panel 83 is inserted into C-channel 80 and a wall panel 84 is inserted into C-channel 81. A locking pin 85 passes through aligned holes in C-channel 80 and the edge piece of wall panel 83. Pin 85 has a radial hole 86 disposed on one side of C-channel 80 and a head 87 on the other side of C-channel 80. A cotter pin or padlock (not shown) may be installed into radial hole 86 to keep pin 85 in place and to prevent unauthorized persons from dismantling the modular wall.

[0033] FIG. 13 illustrates an exploded view of a modular wall system of the present invention. After laying a floor track and floor track extensions of appropriate length and location, a wall panel 90 is inserted into a panel-receiving channel of the floor track. An H-spline 91 is inserted onto an edging piece of panel 90 and rests on the floor track. An adjacent wall panel (not shown) is inserted on the opposite side of H-spline 91 and additional wall panels and H-splines are set up according to the desired size of a wall. A top channel 92 is inserted over the wall panels and into abutment with the H-splines. A plurality of locking pins (not shown) may be inserted through the respective floor track, top channel, and wall panels, and locked in place. It should be noted that the lengths of the H-splines are less than the lengths of the wall panels since the H-splines extend only between the upper edge of the floor tracks and the lower edge of the top channel. While wall panels and H-splines are being added to the wall, angle bracings may be periodically attached in order to brace the H-splines to relatively permanent structures at the site. Side channels 93 are also added as appropriate. The top channel and side channels are also preferably braced to relatively permanent structures via respective angle braces or additional wall sections. To add a side wall section, a hinged C-channel and wall panels may be added as represented by assembly 94. Likewise, a top wall section or canopy can be added via an assembly 95 with a hinged C-channel that creates a canopy channel to receive a corresponding top wall panel.

[0034] A higher wall can be achieved by stacking wall panels between vertical H-splines running continuously (i.e., when using wall panels of a lesser height than the full height of a wall). Thus, a wall 100 shown in FIG. 14 has a floor track 101 and a top track 102 separated by a plurality of vertical H-splines 103-106. A plurality of tall panels 107 are interspersed with a plurality of short wall panels 108 with intervening horizontal H-splines 109. By staggering the horizontal seams of the wall panels, improved wall stability is obtained.

[0035] A door may be created within the modular wall as shown in FIG. 15. A floor track 110 extends to a door frame 111 and contains a wall panel 112. Another floor track 113 extends from the opposite side of door frame 111 and contains a wall panel 114. A top channel 115 extends over wall panels 112 and 114. Door frame 111 includes outwardly extending side C-channels 116 and 117 and a top outwardly extending C-channel 118. A door assembly 120 is prehung within frame 111 and may have a latch assembly 121. A sill 122 extends between the side C-channels of frame 111. The outwardly extending side C-channels 116 and 117 are attached to wall panels 112 and 114 and floor tracks 110 and 113, respectively, by a plurality of locking pins 123 passing through respective aligned holes. A lintel wall panel 124 may be inserted between the outwardly extending top C-channel 118, top channel 115, and additional short H-splines (not shown) to fill any space present above the prehung door assembly.

What is claimed is:

1. A modular wall system for temporary erection at a construction site, comprising:
   a plurality of wall panels each having a core, a front skin, a rear skin, and at least one edging piece along at least one edge, wherein the edging piece has first and second edgewise extensions extending first and second lengths, respectively, and defining an intermediate groove, wherein the first extension is adjacent the front skin, and wherein the first length is greater than the second length;
   a floor track having a base flange and a substantially vertical panel-receiving channel;

   at least one vertically oriented H-spline resting on the floor track and positioned between two adjacent wall panels, the H-spline having a front flange and a rear flange joined by a web, wherein the front flange has a transverse width adapted to be received in the intermediate grooves of edging pieces of the adjacent wall panels while permitting substantially flush abutment of the front skins of the adjacent wall panels, wherein the lesser length of the second edgewise extensions of the edging pieces provides a gap for receiving the web, and wherein the rear flange extends over a portion of the rear skins of the adjacent wall panels;

2. The modular wall system of claim 1 further comprising:
   a hinge disposed along a substantial length of the top channel;
a canopy channel attached to the top end channel via the hinge; and
a top wall panel mounted within the canopy channel and adapted to be mounted to relatively permanent structure at the site.

3. The modular wall system of claim 1 further comprising:
a hinge disposed along a substantial length of the first side channel;
a second side channel attached to the first side channel via the hinge;
a extension floor track having a base flange and a substantially vertical panel-receiving channel, the extension floor track extending non-parallel from the floor track; and
a side wall panel mounted within the second side channel and the vertical panel-receiving channel of the extension floor track.

4. The modular wall system of claim 1 further comprising:
a plurality of angle braces, each attached to a respective rear flange of a respective H-spline and to a relatively permanent structure at the site.

5. The modular wall system of claim 4 wherein the relatively permanent structure is comprised of a floor or ground underlying the modular wall.

6. The modular wall system of claim 4 wherein the relatively permanent structure is comprised of an upper structure of a building on the site.

7. The modular wall system of claim 4 further comprising:
a locking pin mounted through aligned holes in the vertical panel-receiving channel and one of the plurality of wall panels.

8. The modular wall system of claim 1 further comprising:
a locking pin mounted through aligned holes in the top channel and one of the plurality of wall panels.

9. The modular wall system of claim 1 further comprising:
a plurality of locking pins including at least a first locking pin mounted through aligned holes in the vertical panel-receiving channel and one of the plurality of wall panels and a second locking pin mounted through aligned holes in the top channel and a different one of the plurality of wall panels.

10. The modular wall system of claim 1 including a pre-hung door section for installation between a pair of wall panels in the modular wall system, the door section comprising:
a frame having outwardly extending C-channels at its sides and top and a sill at its bottom;
a door panel hung within the frame; and
a plurality of locking pins mounted through respective aligned holes in the C-channels and respective wall panels on each lateral side of the door section.

11. The modular wall system of claim 10 further comprising:
a lintel wall panel inserted into the C-channel at the top of the frame; and
a pair of H-splines mounted to the lateral sides of the lintel wall panel.

12. The modular wall system of claim 1 wherein the core, front skin, rear skin, and edging piece of each wall panel are comprised of recyclable plastic.

13. The modular wall system of claim 12 wherein the core is corrugated.

14. The modular wall system of claim 1 wherein the floor track, H-spline, top channel, and side channel are comprised of extruded aluminum.

15. The modular wall system of claim 1 wherein the floor track further comprises a resilient layer applied to the base flange.

16. A method of installing a modular wall system for temporary erection at a construction site, the method comprising the steps of:
laying a floor track, wherein the floor track has a base flange and a substantially vertical panel-receiving channel;
inserting a first wall panel into the panel-receiving channel, wherein the first wall panel has a core, a front skin, a rear skin, and at least a first edging piece along at least one edge, wherein the first edging piece has first and second edgewise extensions extending first and second lengths, respectively, and defining a first intermediate groove, wherein the first extension is adjacent the front skin, and wherein the first length is greater than the second length; inserting an H-spline onto the first edging piece and resting on the floor track, wherein the H-spline has a front flange and a rear flange joined by a web, wherein the front flange has a transverse width adapted to be received in the first intermediate groove of the first edging piece of the first wall panel, wherein the lesser length of the second edgewise extensions of the first edging piece provides a gap for receiving the web, and wherein the rear flange extends over a portion of the rear skin of the first wall panel;
inserting a second wall panel into the panel-receiving channel, wherein the second wall panel has a core, a front skin, a rear skin, and at least a second edging piece along at least one edge, wherein the second edging piece has first and second edgewise extensions extending first and second lengths, respectively, and defining a second intermediate groove, wherein the first extension is adjacent the front skin, and wherein the first length is greater than the second length, wherein the front flange of the H-spline further receives the second intermediate groove of the second edging piece of the second wall panel, wherein the lesser length of the second edgewise extensions of the second edging piece provides a gap for receiving the web, wherein the rear flange extends over a portion of the rear skin of the second wall panel, and wherein there is substantially flush abutment of the front skins of the first and second wall panels;
inserting a top channel over the first and second wall panels; and
inserting a first side channel disposed along a side of one of the wall panels.

17. The method of claim 16 further comprising the step of:
bracing the H-spline to a relatively permanent structure on the site.

18. The method of claim 16 further comprising the step of:
bracing at least one of the top channel or first side channel to a relatively permanent structure on the site.

19. The method of claim 18 wherein the braced top channel or side channel is hinged to a C-channel, and wherein the bracing step is comprised of:
inserting a third wall panel into the C-channel; and
attaching the third wall panel to a relatively permanent structure on the site.
20. A modular wall system for temporary erection at a construction site, comprising:

- a plurality of wall panels each having a core, a front skin, a rear skin, and at least one edging piece along at least one edge, wherein the edging piece has first and second edgewise extensions extending first and second lengths, respectively, and defining an intermediate groove, wherein the first extension is adjacent the front skin, and wherein the first length is greater than the second length;
- a floor track having a base flange and a substantially vertical panel-receiving channel;
- at least one vertically oriented H-spline resting on the floor track and positioned between two adjacent wall panels, the H-spline having a front flange and a rear flange joined by a web, wherein the front flange has a transverse width adapted to be received in the intermediate grooves of edging pieces of the adjacent wall panels while permitting substantially flush abutment of the front skins of the adjacent wall panels, wherein the lesser length of the second edgewise extensions of the edging pieces provides a gap for receiving the web, and wherein the rear flange extends over a portion of the rear skins of the adjacent wall panels; and
- a brace for bracing the H-spline to a relatively permanent structure on the site.

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