PREFABRICATED COMPOUND MASONRY UNITS

Inventors: Dave Muirhead, Milford, MI (US); Jim Gendron, Westland, MI (US)

Assignee: CONSTRUCTIVE, L.L.C., Ferndale, MI (US)

Filed: Nov. 30, 2011

Continuation of application No. 13/274,502, filed on Oct. 17, 2011.

Provisional application No. 61/439,863, filed on Feb. 5, 2011, provisional application No. 61/393,599, filed on Oct. 15, 2010.

Publication Classification
Int. Cl.
E04B 2/48 (2006.01)
E04B 2/00 (2006.01)

U.S. Cl. 52/585.1; 52/745.19

ABSTRACT

Disclosed herein are embodiments of prefabricated compound masonry units and methods of producing the same. One embodiment of a prefabricated compound masonry unit comprises at least one course comprising a plurality of blocks mortared to form a layer, the at least one course having a top surface and a bottom surface each having a first side and a second side. Longitudinal tension reinforcement is provided along at least a portion of a length of the at least one course and held with bonding material.
PREFABRICATED COMPOUND MASONRY UNITS

CROSS REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] The present invention relates in general to reinforced prefabricated compound masonry units and in particular to compound units reinforced with fiber reinforced polymer.

BACKGROUND

[0003] Structures, including residential, commercial and industrial buildings, are made from masonry using individual units laid in and bound together by mortar. The common materials of masonry construction are clay masonry such as brick and terra cotta; stone, such as marble, granite, travertine, and limestone; concrete block, including without limitation conventional concrete masonry units and autoclaved aerated concrete; glass block; stucco; and tile. Masonry is generally a highly durable form of construction. However, the materials used, the quality of the mortar and workmanship, and the pattern in which the units are assembled can significantly affect the durability of the overall masonry construction.

[0004] Concrete masonry is a commonly used building material composed of individual units of basic composition is concrete. The units can be hollow or solid. Concrete is strong in compression and weak in tension. For cast-in-place concrete, adding embedded reinforcement provides tensile capacity. The reinforcement can include steel reinforcing bars, steel fibers, glass fibers, or plastic fiber. Reinforcement is not used in individual concrete masonry units, but masonry elements constructed of hollow units can be reinforced similar to cast-in-place concrete.

[0005] Masonry grout is similar to concrete and is poured into the hollow concrete masonry units at the building site. Care needs to be taken to properly cure the grout and achieve the required strength. Concrete, concrete masonry units, mortar, and masonry grout all contain Portland cement. Cement-based materials require a moist, controlled environment to gain strength and harden fully. The cement paste hardens over time, initially setting and becoming rigid and gaining in strength in the days and weeks following. Hydration and hardening during the first three days can be critical. Fast drying and shrinkage due to factors such as evaporation may lead to increased tensile stresses at a time when the material has not yet gained significant strength, resulting in greater shrinkage cracking. During the curing period, it is preferable to maintain conditions with a controlled temperature and humid atmosphere. Properly curing concrete leads to increased strength and lower permeability, and avoids cracking from the surface drying out prematurely. Care must also be taken to avoid freezing or overheating. Improper curing can cause scaling, reduced strength, poor abrasion resistance and cracking.

[0006] To ensure proper curing of cement-based products, it would be desired to cure them in a controlled setting rather than at the building site. This is one reason why the use of concrete masonry units (blocks) is desirable. The concrete masonry units can be partially or fully cured off site at a manufacturing facility.

[0007] The individual masonry units are transported to the building site where they are installed. To build a structure over about five feet in height, scaffolding is usually necessary to support the masons while they work. Weather can affect the progress of the masonry when laid on site as well. Individual concrete masonry units have no reinforcement. The masonry reinforcement and grout are added as and after the units are set.

SUMMARY

[0008] Disclosed herein are embodiments of prefabricated compound masonry units and methods of producing the same. One embodiment of a prefabricated compound masonry unit comprises at least one course comprising a plurality of blocks mortared to form a layer, the at least one course having a top surface and a bottom surface each having a first side and a second side. Longitudinal tension reinforcement is provided along at least a portion of a length of the at least one course and held with bonding material.

[0009] The course of the prefabricated compound masonry unit has a joint between adjacent blocks with the longitudinal tension reinforcement spanning each joint of both the first side and the second side of one or both of the bottom surface and top surface of the at least one course. The longitudinal tension reinforcement can be fiber reinforced polymer in dowel or biscuit form. The course can have a bed extending along a length of the course with the longitudinal tension reinforcement extending along at least a portion of the length and retained in the bed with the bonding material. The course can have a bed extending along a length of the course a joint between adjacent blocks, with the longitudinal tension reinforcement spanning each joint at least one location in the bed.

[0010] Also disclosed herein are methods of making a prefabricated compound masonry unit prior to transporting the unit to a building site. One such method comprises forming a first course from a plurality of blocks by joining adjacent blocks with mortar, running longitudinal tension reinforcement along at least a portion of a length of the first course and retaining the longitudinal tension reinforcement to the first course with a bonding material. The method can further comprise forming a channel along the first course, wherein the longitudinal tension reinforcement is run within the channel. The channel can be formed by cutting into each block or along the course or molding the channel into each block when the block is molded. The first course has a joint between adjacent blocks and the longitudinal tension reinforcement can be run only to span each joint. The first course can have a bed extending along the length and the longitudinal tension reinforcement can be run within the bed. A second course can be formed from a plurality of blocks by joining adjacent blocks with mortar. The second course can be formed with the bonding material enclosing the longitudinal tension reinforcement between the first course and second course. Any number of
courses can be formed to make any size unit. The preformed compound masonry unit can then be transported to the building site.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The description herein makes reference to the accompanying drawings wherein like reference numerals refer to like parts throughout the several views, and wherein:

[0012] FIG. 1 is a perspective view of an embodiment of a prefabricated compound masonry;

[0013] FIG. 2 is a cross sectional view of FIG. 1 along line 2-2;

[0014] FIG. 3 is an enlarged perspective view of a portion of FIG. 1;

[0015] FIG. 4 is an enlarged perspective view of an uncompleted prefabricated compound masonry unit having a corner;

[0016] FIG. 5 is a perspective view of an embodiment of a prefabricated compound masonry unit having post-tensioned rods;

[0017] FIG. 6 is a side view of another embodiment of a prefabricated compound masonry unit;

[0018] FIG. 7 is a side view of a prefabricated compound masonry unit being hoisted into the air for placement on a means of transportation;

[0019] FIG. 8 is a side view of another embodiment of a compound masonry unit as disclosed herein;

[0020] FIG. 9 is a cross sectional view of FIG. 8 along line 9-9;

[0021] FIG. 10 is a plan view of FIG. 8;

[0022] FIG. 11 is a side view of another embodiment of a compound masonry unit as disclosed herein;

[0023] FIG. 12 is a cross sectional view of FIG. 11 along line 12-12;

[0024] FIG. 13 is a cross sectional view of an alternative embodiment of FIG. 12; and

[0025] FIG. 14 is a cross sectional view of another embodiment of a compound masonry unit as disclosed herein with a reusable carrier.

DETAILED DESCRIPTION

[0026] The concept of prefabricated compound masonry units reinforced with fiber reinforced polymer (hereinafter “frp”) includes individual concrete masonry units constructed as elements (walls, beams, lintels or other masonry elements) and reinforced with frp that can be transported to the building site for incorporation into a building structure. The frp provides tensile strength to the units during transportation and handling and during installation of subsequent masonry.

[0027] Prefabricated compound masonry units are disclosed herein along with carriers for transporting the prefabricated compound masonry units. As used herein, a “block” is a single concrete masonry unit. As used herein, “compound” refers to the use of two or more individual blocks. A block can be clay masonry such as brick and terra cotta; stone, such as marble, granite, travertine, and limestone; concrete block, including without limitation conventional concrete masonry units and autoclaved aerated concrete; glass block; stucco; and tile. Compound masonry units can comprise a plurality of these blocks with one or more layers each of frp, epoxy or high strength mortar. Post tensioning tendons or rods incorporated into the compound masonry unit can provide added strength during handling or in the finished assembly.

[0028] The prefabricated compound masonry units are manufactured in a controlled factory setting using accepted code and practices in such a manner as to be easily transported and easily integrated into field building applications. This procedure would use craftsmen currently trained in the discipline of masonry and schooled in the new art of incorporating frp reinforcement for strategic advantages of strength. Process monitoring of the build would produce design compliance, assuring strict code conformance to achieve product quality regardless of the weather and the natural environment. The integration of one or more frp layers allows for sufficient rigidity and soundness for transportation and handling.

[0029] The prefabricated compound masonry units have many advantages over using individual units at the build site or pouring concrete at the build site. The prefabricated compound masonry units are adaptable for add-ons for last minute owner requirements. The prefabricated compound masonry units are built using the existing contingent of building trades. Use of the prefabricated compound masonry units can eliminate work stoppage due to weather conditions and lessen transportation damage and site damage of the individual units and other components. The use of prefabricated compound masonry units can also lessen occurrences of theft of product from unguarded building sites as the compound masonry units are too large to be easily transported without the proper assist and truck. The prefabricated compound masonry units limit moisture-related shrinkage issues and can be produced with consistent quality. The use of the prefabricated compound masonry units can provide “ease of building” on tight or busy sites and also provide safe, dust free construction solutions. These advantages are provided as examples and are not meant to be limiting. Those skilled in the art will recognize these advantages and more associated with the prefabricated compound masonry units and their use.

[0030] The prefabricated compound masonry units can be made to any overall shape and size desired or required by those skilled in the art so long as the units can be transported. Examples of applications for which the use of the prefabricated compound masonry units is contemplated include but are not limited to the following: columns, decorative walls, corners, floors, roofs, footings “meat” or insulated, headers for doors and windows, lintels, beams, posts, key walls, knee walls, ledges, retaining walls, wall sections, wall sections with returns and walkways.

[0031] The prefabricated compound masonry units can be built on a build base 10 as seen in FIG. 1. The build base 10 is shown raised off the ground for the comfort of the builder. However, the build base 10 does not need to be raised off the ground. The build base 10 is leveled so that the resulting prefabricated compound masonry unit 100 built on the base 10 is level. The building materials can be laid directly on the build base 10 or a base cover can be used to cover the build base 10 to prevent build up of building materials such as epoxy and mortar on the build base 10.

[0032] One embodiment of a prefabricated compound masonry unit is illustrated in FIGS. 1 and 2 and comprises at least one course 12 comprising a plurality of blocks 40 mortared to form a layer; the at least one course 12 having a top surface 14 and a bottom surface 16 each having a first side 18 and a second side 19. Longitudinal tension reinforcement 20 is provided along at least a portion of a length L of the at least one course 12 and held with bonding material 30.

[0033] Longitudinal tension reinforcement 20 can be laid out on the build base 10 or base cover in an amount and
configuration that is determined by the desired prefabricated compound masonry unit. Frp is used as the longitudinal tension reinforcement 20. As used herein as non-limiting examples, frp includes carbon fibers, aramid fibers, or glass fibers which are set in bonding material, which is epoxy or high strength mortar or an equivalent material. These frps can be used as the longitudinal tension reinforcement 20 because they have limited stretch, thereby providing the longitudinal reinforcement required when the prefabricated compound masonry unit 100 is lifted. Bonding material is used interchangeably with epoxy and high strength mortar and refers to the material that adheres the frp to the masonry blocks. The amount and configuration will change depending on one or more of the dimensions, weight and application of the resulting prefabricated compound masonry unit 100.

[0034] As seen in FIGS. 1 and 2, the longitudinal tension reinforcement 20 can be located in channels 25 that can be cut into or molded into the individual blocks 40 or courses 12 of such blocks 40. The channels 25 are configured to receive the frp 20. Bonding material 30 is applied to the frp 20 and blocks 40 are placed on top of the epoxy 30 and frp 20 so that the epoxy 30 and frp 20 are received in the channels 25. Each of the first side 18 and second side 19 of at least one of the top surface 14 and bottom surface 16 of at least one course 12 and held with bonding material 30. The longitudinal tension reinforcement 20 can extend along substantially an entire length L of the at least one course 12. The prefabricated compound masonry unit 100 can have a plurality of courses 12 having a lowermost course and an uppermost course with the first side 18 and the second side 19 of at least one of the top surface 14 and bottom surface 16 of each of the lowermost course and the uppermost course having the channel 25 formed therein, with the longitudinal tension reinforcement 20 retained within each channel 25 with the bonding material 30.

[0038] Post-tensioning rods or bars can optionally be incorporated into the prefabricated compound masonry unit 100 as required. The need for post-tensioning rods, as well as the number of post-tensioning, will be determined by one or a combination of the dimensions, weight and application of the resulting prefabricated compound masonry unit 100, as non-limiting examples. As shown in FIG. 5, the post-tensioning can be inserted vertically into existing openings in the blocks 40 to span one or more of the courses in the prefabricated compound masonry unit 100. The post-tensioning rods are threaded at their ends. They are held in place (put in tension) by running them through a hole in steel plates 60 at the bottom and the top of the wall, then putting nuts 65 on the rods 70 and tightening them to apply a compressive load to the wall. Basically, the rods 70 act like a large clamp, which resists loads that might otherwise tend to flex the wall and thereby crack the mortar joints. Once the wall is set in place, the nuts can be removed, and the post-tensioning may be incorporated as a portion of the vertical reinforcement required in the masonry walls. If required, the post-tensioning can be grouted in place. Post-tensioning rods or bars can also be used horizontally in the prefabricated compound unit as tension reinforcement by itself or in combination with frp.

[0039] The epoxy 30 can be installed in the channels 25 before laying the frp 20 in the channel 25 and/or after laying the frp 20 in the channel. It is also contemplated that mortar or cement be used instead of epoxy 30 to adhere the frp 20 to the channel 25. The epoxy 30 is cured as required.

[0040] Other embodiments of the longitudinal tension reinforcement 20 are also contemplated. For example, the frp 20 can be moved into the cavity in the middle of the blocks. There the block could be cut to create a trench, or the tooling for the block molds could be amended to create a trough in which to lay the frp 20 and contain the epoxy 30 until it sets up and binds the frp in place.

[0041] Another alternative is to place the frp 20 directly in the wet mortar bed used to bind the blocks 40 together, as illustrated in FIG. 6, eliminating the need for the channel 25 and also eliminating the need for the epoxy. To avoid slippage or sliding when the mortar is dry, the frp 20 can be coated in silica sand or other abrasive before laying it in the wet mortar bed. For example, the prefabricated compound masonry unit 100 can have two courses having a lower course 112 and an upper course 114 with the longitudinal tension reinforcement 20 placed in the bonding material 30 along both the first side 18 and the second side 19 of the top surface 116 of the lower course 112 with a bottom surface 118 of the upper course 114 placed directly on the bonding material 30 and aligned with the lower course 112.

[0042] Another embodiment uses tensioned steel as the longitudinal tension reinforcement is the bottom course and frp in the top most course of the prefabricated compound masonry unit. Middle courses can incorporate with the ten-
sioned steel or the FRP as longitudinal tension reinforcement as desired or required by the application.

[0043] As shown in the figures, the longitudinal tension reinforcement 20 is in the form of a wire or rod. The longitudinal tension reinforcement can be post-tensioned or not. However, other embodiments of the longitudinal tension reinforcement 20 are contemplated. For example, the longitudinal tension reinforcement 20 can be mesh, plate or shaped FRP. The shapes can include, as non-limiting examples, dowels, biscuits and other joinery known to those skilled in the art. The dowels or biscuits can be placed along joints of adjacent blocks 40 in the channels 25 if provided, in existing openings in the individual units or in apertures cut into the individual units specifically to receive the shaped FRP.

[0044] The use of the longitudinal tension reinforcement as a lightweight tension member prevents cracking of the mortar joints during shipment of the prefabricated compound masonry units 100. As shown in FIG. 7, when the prefabricated compound masonry unit 100 is hoisted to and from a truck or other means of transportation, the longitudinal reinforcement provided by the disclosed embodiments prevents the unit 100 from cracking.

[0045] FIG. 8 is a side view of another embodiment of a compound masonry unit 200. As shown in FIG. 8, a single course of blocks 202 can be used to make the compound unit 200. The individual units are joined together with mortare 204 to make the course. FIG. 10 is a plan view of a portion of the course.

[0046] FIG. 9 is a cross-sectional view of FIG. 8 along line 9-9. As shown in FIG. 9, a thin layer 206 of mortar is spread in the bed 208 of the unit 200. The thin layer 206 can be approximately 0.25 inch to 1 inch. This thickness is not meant to be limiting and is provided as example only. Other thicknesses can be used as desired or required. However, increased thickness will increase the weight of the compound unit. It is also contemplated that epoxy can be used in place of the mortar mix to form the thin layer 206. FRP 210 is laid on the thin layer 206 of mortar. The FRP 210 can be in strands, and one or more strands can be used. The FRP can also be in plates or rods, and one or more plates or rod can be used. Over the FRP is placed another layer 212 of mortar mix to enclose the FRP. The layer 212 can be of the same thickness or a different thickness than the thin layer 206.

[0047] The layers 206, 212 of mortar mix and FRP 210 can run the length of the compound masonry unit 200. It is also contemplated that at least the FRP 210 only be placed in the bed 208 across the joints of individual units 202. Alternatively, the FRP 210 can be laid in multiple sections in any suitable lengths that provide the requisite strength to the compound masonry unit 200.

[0048] FRP 210 can also be added to the compound unit 200 to bridge the joints between individual units 202 at the top of the course, as shown in FIG. 9. FIG. 10 is a plan view of a portion of the course that includes the joint between two units 202. The joint is defined by the mortar 204. As shown in FIG. 9, the FRP 210 bridges the joint 204 between the individual units 202. A length of FRP 210 is set in slots in the units 202 and set in place with epoxy. The course can be put together with the FRP 210 in the bridge joints, with the FRP 210 in the bed 208 being laid after the course is made. The FRP can be installed in strips at each joint or continuous through all joints. Bridging the joints with FRP 210 can be used alone or in conjunction with using the FRP 210 in the bed 208.

[0049] Another embodiment of the compound unit 200′ is shown in FIGS. 11 and 12. In this embodiment, the compound unit 200′ is shown with two courses 201 of blocks. Although the compound unit 200′ is shown having two courses, it is contemplated that the compound unit 200′ can be made of more than two courses. The bottom course is made of a plurality of units 202 while the second course is made of a plurality of units 204′. In this embodiment, FRP 210 is added to the compound unit 200′ to bridge the joints between individual units 202′ at the top of the bottom course, as well as to bridge the joints between individual units 204′ at the top of the second course. The FRP 210′ bridges the joints between the individual units 202′ and 204′. A length of FRP 210′ is set in slots in the units 202′, 204′ and set in place with epoxy.

[0050] The embodiment of FIG. 12 is shown without any additional reinforcement added to the bed 208′. Alternatively, the layers described with regard to FIG. 9 can be incorporated into the compound unit 200′. A thin layer 206 of concrete mix can be spread in the bed 208′ of the compound unit 200′. The thin layer 206′ can be approximately 0.25 inch to 1 inch. This thickness is not meant to be limiting but rather enabling. Other thicknesses can be used as desired or required. However, increased thickness will increase the weight of the compound unit. It is also contemplated that mortar or epoxy can be used to form the thin layer 206′. FRP 210′ is laid on the thin layer 206′ of mortar mix. The FRP 210′ can be in strands, and one or more strands can be used. The FRP can also be in plates or rods, and one or more plates or rod can be used. Over the FRP is poured another layer 212′ of mortar mix to enclose the FRP. The layer 212′ can be of the same thickness or a different thickness than the thin layer 206′.

[0051] The layers 206′, 212′ of mortar mix and FRP 210′ can run the length of the unit 200′. It is also contemplated that at least the FRP 210′ only be placed in the bed 208′ across the joints of individual units 202′. Alternatively, the FRP 210′ can be laid in multiple sections in any suitable lengths that provide the requisite strength to the compound unit.

[0052] FIG. 13 is an alternative embodiment to FIG. 12. The alternative embodiment is the same in every respect as the embodiment in FIG. 10 and thus the description will not be repeated. As shown in FIG. 13, the FRP 210′ in the bottom course 202′″ is inserted in a different position than that in FIG. 11. Rather than bridging the joints of the units 202′ at the top of the course, the FRP′″ bridges the joints between the units 202′ in two places along the bed 208′″ of the compound unit 200′″. A length of FRP 210″ is set in slots in the units 202′″ and set in place with epoxy. Only two pieces of FRP 210″ are illustrated. However, this is not meant to be limiting. One or more pieces of FRP 210″ can be used to bridge the joints as desired or required. The position of the FRP 210″ along the bed is also provided by means of example and is not meant to be limiting. The positions can be adjusted as desired or required. The depth of the FRP 210″ in the units 202′″ is also illustrative and not meant to be limiting.

[0053] FIG. 14 is a cross-sectional view of an alternative embodiment of a compound masonry unit 200″ that incorporates the FRP 210″ in the joint between individual units 202″ to bridge the joint as shown in FIG. 12, and incorporates into the same course the FRP 210′bridging the joints between the units 202″ in two places along the bed 208″ of the compound unit 200″, as shown in FIG. 13.

[0054] Also illustrated in FIG. 14 is an embodiment of a reusable carrier 220 for the prefabricated compound masonry units 200. The reusable carrier 220 allows for transportation
of prefabricated compound masonry units manufactured as disclosed herein, enabling transportation of the units to the build sites. The reusable carrier 220 comprises a support member 222 having two support legs 224 extending from the support member 222 to form an inverted “U” shape. The support member 222 and support legs 224 can be made of lumber.

As shown in FIG. 14, a prefabricated compound masonry unit 200" is set on the support member 222 of the reusable carrier 220. The prefabricated compound masonry unit 200" would be banded to the carrier 220 in a plurality of positions along their lengths. The slings of a crane would then be placed around the combined unit and the unit moved to the transporter for transportation to the building site. At the building site, the combined unit would be removed in the same way from the transporter. The reusable carrier 220 can be used for a portion of the shoring support as well as shipping. Once the prefabricated compound masonry unit is incorporated into the final structure, reinforced, grouted and then cured, the carrier shoring is removed. The reusable carrier 220 would be brought back to the manufacturing site for reuse. Use of the reusable carrier 220 is not limited to the compound masonry units disclosed herein. The reusable carrier 220 can be used to shore and transport other masonry units known in the art.

In the embodiments disclosed herein, the compound masonry units can be compressed or post tensioned horizontally prior to applying the frp. When concrete masonry units are used other than brick, the compression reduces possible issues from mortar and unit shrinkage. The frp can be applied after compression to ensure that the proper reinforcement is provided.

In the embodiments described herein, a coating comprising poly urea can be applied to the compound masonry units prior to transporting to the build site. The poly urea provides corrosion protection and abrasion resistance and fills joints. As used herein, “poly urea” means a polymer coating that uses many different formulations of poly urea with different physical property ranges. A poly urea coating can also be used to water proof the compound masonry units as desired or required.

While the invention has been described in connection with certain embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under the law.

What is claimed is:

1. A prefabricated compound masonry unit comprising:
   at least one course comprising a plurality of blocks mortared to form a layer, the at least one course having a top surface and a bottom surface each having a first side and a second side; and
   longitudinal tension reinforcement provided along at least a portion of a length of the at least one course and held with bonding material.

2. The prefabricated compound masonry unit of claim 1, wherein the longitudinal tension reinforcement extends along at least a portion of both the first side and the second side of one or both of the bottom surface and top surface of the at least one course and held with bonding material.

3. The prefabricated compound masonry unit of claim 1, wherein the at least one course is two courses having a lower course and an upper course with the longitudinal tension reinforcement placed in the bonding material along both the first side and the second side of the top surface of the lower course with a bottom surface of the upper course placed directly on the bonding material and aligned with the lower course.

4. The prefabricated compound masonry unit of claim 1, wherein the longitudinal tension reinforcement extends along substantially an entire length of the at least one course.

5. The prefabricated compound masonry unit of claim 1, wherein each of the first side and second side of at least one of the top surface and bottom surface has a channel formed therein, with the longitudinal tension reinforcement retained within each channel with the bonding material.

6. The prefabricated compound masonry unit of claim 5, wherein the longitudinal tension reinforcement is fiber reinforced polymer.

7. The prefabricated compound masonry unit of claim 6, wherein the bonding material is one of epoxy and high strength mortar.

8. The prefabricated compound masonry unit of claim 5, wherein the at least one course is a plurality of courses having a lowermost course and an uppermost course with the first side and the second side of at least one of the top surface and bottom surface of each of the lowermost course and the uppermost course having the channel formed therein, with the longitudinal tension reinforcement retained within each channel with the bonding material.

9. The prefabricated compound masonry unit of claim 1, wherein the at least one course has a corner and the longitudinal tension reinforcement extends across the corner on one or both of the top surface and the bottom surface of the at least one course.

10. The prefabricated compound masonry unit of claim 1, wherein the at least one course is a plurality of courses having a lowermost course and an uppermost course and further comprising:
   at least one post-tensioning rod having a rod extending between a top surface of the uppermost course and a bottom surface of the lowermost course and attached to a plate at each end.

11. The prefabricated compound masonry unit of claim 1, wherein the at least one course has a joint between adjacent blocks with the longitudinal tension reinforcement provided along at least a portion of a length spanning each joint of both the first side and the second side of one or both of the bottom surface and top surface of the at least one course.

12. The prefabricated compound masonry unit of claim 11, wherein the longitudinal tension reinforcement is fiber reinforced polymer in dowel or biscuit form.

13. The prefabricated compound masonry unit of claim 1, wherein the at least one course has a bed extending along a length of the course, the bed positioned between external walls of at least one course, with the longitudinal tension reinforcement extending along at least a portion of the length of the bed and retained in the bed with the bonding material.

14. The prefabricated compound masonry unit of claim 11, wherein the at least one course has a bed extending along a length of the course, the bed positioned between external walls of the at least one course, with the longitudinal tension reinforcement extending along at least a portion of the length and retained in the bed with the bonding material.
15. The prefabricated compound masonry unit of claim 1, wherein the at least one course has a bed extending along a length of the course, the bed positioned between external walls of the at least one course, and a joint between adjacent blocks, with the longitudinal tension reinforcement spanning each joint at at least one location along a surface of the bed.

16. A method of making a prefabricated compound masonry unit prior to transporting the unit to a building site comprising:

forming a first course from a plurality of blocks by joining adjacent blocks with mortar;
running longitudinal tension reinforcement along at least a portion of a length of the first course;
retaining the longitudinal tension reinforcement to the first course with a bonding material.

17. The method of claim 16, further comprising:
forming a channel along the first course, wherein the longitudinal tension reinforcement is run within the channel.

18. The method of claim 17, wherein the channel is formed by one of cutting or molding with the block.

19. The method of claim 16, further comprising:
moving the prefabricated compound masonry unit to the building site.

20. The method of claim 16, wherein the first course has a joint between adjacent blocks and the longitudinal tension reinforcement is run only to span each joint.

21. The method of claim 16, wherein the first course has a bed extending along the length, the bed positioned between external walls of the first course, wherein the longitudinal tension reinforcement is run within the bed.

22. The method of claim 16 further comprising:
forming a second course from a plurality of blocks by joining adjacent blocks with mortar, wherein the second course is formed with the bonding material enclosing the longitudinal tension reinforcement between the first course and second course.

* * * * *